COURSE GUIDE

HED 417
EPIDEMIOLOGY AND PUBLIC HEALTH

Course Team Dr. Emmanuel Hniyaa Da'am (Course Developer/ Course Writer)- University of Jos

NATIONAL OPEN UNIVERSITY OF NIGERIA

National Open University of Nigeria
Headquarters
University Village
91, Cadastral Zone
Nnamdi Azikiwe Expressway
Jabi, Abuja

Lagos Office
14/16 Ahmadu Bello Way
Victoria Island, Lagos

e-mail: centralinfo@nou.edu.ng
URL: www.nou.edu.ng

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INTRODUCTION

Epidemiology is an old scientific discipline that dates back to the middle of the nineteenth century. It is a discipline that aims at identifying the determinants of diseases and health in populations. It uses a population approach like demography, perhaps the scientific discipline that most closely resembles epidemiology. Epidemiology is defined by the object of research, to identity determinants that change the occurrence of health phenomena in human populations.

Epidemiology is the study of the distribution and determinants of health-related states or events in specified populations, and the application of this study to the control of health problems. Epidemiology is a scientific discipline with sound methods of scientific inquiry at its foundation. Epidemiology is data-driven and relies on a systematic and unbiased approach to the collection, analysis, and interpretation of data. Basic epidemiologic methods tend to rely on careful observation and use of valid comparison groups to assess whether what was observed, such as the number of cases of disease in a particular area during a particular time period or the frequency of an exposure among persons with disease, differs from what might be expected. Epidemiology is not just a research activity but an integral component of public health, providing the foundation for directing practical and appropriate public health action based on this science and causal reasoning (CDC, 2012)

Public health is the science and art of preventing disease, prolonging life and improving quality of life through organized efforts and informed choices of society, organizations (public and private), communities and individuals. Public health is the science of protecting and improving the health of people and their communities by promoting healthy lifestyles, researching disease and injury prevention, and detecting, preventing and responding to infectious diseases. Public health focuses on improving and protecting community health and well-being, with an emphasis on prevention among large groups of people. www.publichealth.org. accessed 13/03/2021

At the end of this course the student is expected to show full understanding of epidemiology and public health in relation to the prevention of diseases, prolonging of life and improving quality of life of the community..

COURSE COMPETENCIES

This course aims at providing you with relevant information on Epidemiology and Public Health for the prevention of diseases, prolonging of life and improving quality of life.

COURSE OBJECTIVES

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

- define the word “epidemiology”
- explain the various types of epidemiological studies
- describe the basic measurement in epidemiology
- explain the epidemiology of communicable
- explain the epidemiology of non-communicable diseases
- discuss the epidemiology of chronic diseases
- define public health and state the purpose of public health surveillance
- identify health problems for surveillance
- collect data for surveillance
- analyse and interpret data
- disseminate data.

WORKING THROUGH THIS COURSE

The overall aim of this course is to help you appreciate the relevant of epidemiology and public health in the understanding of causation and the determinant factors responsible for the disease outbreak. You need to read this learning material seriously with good understanding as well as to be able to answer self-assessment exercise in each of the unit. It also provide you with relevant references and links that can enhance your understanding of these units in the modules.

STUDY UNITS

This course is made up of 41 Study Units in three Modules. They are:

Module 1 Introduction to Epidemiology

Unit 1 Introduction to Epidemiology
Unit 2 Types of Epidemiology Studies
Unit 3 Causality and Causal Inference
Unit 4 Ethical Consideration in Conducting Epidemiological Studies

PRESENTATION SCHEDULE

Your course materials have important dates for early and timely completion and submission of your TMAS and also attending tutorials. You should remember that you will also submit all your assignment by the time and date stipulated and guide against failing behind in your assignment

ASSESSMENT

There are three components of Assignment in this Course: Self-Assessment Exercise and Assignment at the end of each Study Unit, the Tutor Marked Assignment (TMAs); and a Written Examination. In doing the assignments, you are expected to use the information gathered during your study of the course.

HOW TO GET THE BEST FROM THIS COURSE

This course material provides you with the opportunity to read and learn at your own pace; time and location. To get the best from this course you need to work with the material in the following logical order:

1. Read each Unit step by step as arranged
2. Note the key points in each Unit as you read the material.
3. Refer to the link and text provided for you.
4. Attempt the Assessment Exercise given to you at each step after reading.
5. Obey all the rules and guiding instructions given to you.

FACILITATION

Online facilitation would be made available to provide you with the opportunity to interact with your Tutor and your Colleagues across the World.

MAIN COURSE

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Module 3 Introduction to Public Health …….

MODULE 1

UNIT 1 INTRODUCTION TO EPIDEMIOLOGY

CONTENT

1.0 INTRODUCTION

This Course HED 417 Epidemiology and Public Health is for Physical and Health Education Teachers in Training. Epidemiology is the study of health and disease among populations. It is a basic science and foundation of public health and it really answers the questions for us, what causes disease? what are the signs and symptoms of disease? how do diseases spread? how can we prevent disease? And how can we control disease? This unit therefore hopes to unfold the concept of epidemiology, scope of epidemiology, purpose of epidemiology and uses of epidemiology.

2.0 OBJECTIVES

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

- define epidemiology
- explain History of Epidemiology
- state the scope of epidemiology
- mention the purpose of epidemiology
- explain the objectives of epidemiology
- describe the uses of epidemiology
- explain epidemiological triad
- explain the chain of infection.

3.0 MAIN CONTENT

3.1 Definition of Epidemiology

Epidemiology is the study of the distribution and determinants of health-related states in specified populations, and the application of this study to control health problems. Epidemiology originates from Hippocrates' observation more than 2000 years ago that environmental factors influence the occurrence of disease. However, it was not until the nineteenth century that the distribution of disease in specific human population groups was measured to any large extent. This work marked not only the formal beginnings of epidemiology but also some of its most spectacular achievements. The finding by John Snow that the risk of cholera in London was related to the drinking of water supplied by a particular company provides a well-known example. Snow's epidemiological studies were one aspect of a wide-ranging series of investigations that examined related physical, chemical, biological, sociological and political processes. Comparing rates of disease in subgroups of the human population became common practice in the late nineteenth and early twentieth century's. This approach was useful way of linking environmental conditions or agents to specific diseases. In the second half of the twentieth century, these methods were applied to chronic non-communicable diseases such as heart disease and cancer, especially in middle and high-income countries (R Bonita et al, 2006). Epidemiology in its modern form is a relatively new discipline and uses quantitative methods to study diseases in human populations, to inform prevention and control efforts. For example, Richard Doll and Andrew Hill studied the relationship between tobacco use and lung cancer, beginning in the 1950s. Their work was preceded by experimental studies on the carcinogenicity of tobacco tars and by clinical observations linking tobacco use and other possible factors to lung

cancer. By using long term cohort studies, they were able to establish the association between smoking and lung cancer

Epidemiology is an old scientific discipline that dates back to the middle of the nineteenth century. It is a discipline that aims at identifying the determinants of diseases and health in populations. It uses a population approach like demography, perhaps the scientific discipline that most closely resembles epidemiology. Epidemiology is defined by the object of research, to identity determinants that change the occurrence of health phenomena in human populations. Epidemiology is a population science that underpins health improvement and health care, and is concerned with the pattern, frequency, trends, and causes of disease or is the study of the distribution and determinants of health-related states or events in specified populations, and the application of this study to control of health problems.

Epidemiology is defined as "the study of the distribution and determinants of health related states or events in specified populations, and application of this study to control of health problems. *Study* includes observation, surveillance, hypothesis-testing, analytic research methods, and experiments. *Distribution* refers to analysis according to time, place, and classes of persons affected. *Determinants* are the physical, biologic, social, cultural, and behavioural factors influencing health. *Health-related states or events* include diseases and injuries, causes of death, behaviour such as use of tobacco, reactions to preventive or therapeutic regiments, and provision and use of health services. *Specified populations* are those with identifiable characteristics, such as precisely known numbers. (Last, 2001).

Epidemiologic methods were first used to study diseases like cholera and measles. Now all diseases or health events are studied by means of epidemiologic methods and these methods are constantly changing to meet these new needs. Even the term "epidemic" is used to describe an unexpected increase in the frequency of any disease such as myocardial infarction, obesity, or asthma. Today the discipline is used to study genetic, behavioural, and environmental causes of infectious and non-infectious diseases. The discipline is used to evaluate the effect of treatments or screening and it is the key discipline in the movement that may have been oversold with the title "evidence-based medicine. Public health epidemiology uses the "healthy" population to study the transition from being healthy to being diseased or ill (Jørn et al, 2010).

Public health is defined as the science and art of preventing diseases, prolonging life, promoting health and efficiencies through organised community effort. It is concerned with the health of the whole

population and the prevention of disease from which it suffers. It is also one of the efforts organized by society to protect, promote, and restore the peoples' health. It is the combination of sciences, skills and beliefs that is directed to the maintenance and improvement of the health of all the people through collective social actions. Public health involves both direct and indirect approaches. Direct measures in public health include immunization of children, modern birth control, hypertension, and diabetes case findings. Indirect methods used in public health protect the individual by community-wide means, such as raising standards of environmental safety, assurance of a safe water supply, sewage disposal and improved nutrition. In public health practice, both direct and indirect approaches are relevant.

3.2 Explain History of Epidemiology

- Epidemiology originated from Hippocrates' observation more than 2000 years ago that environmental factors influence the occurrence of disease.
- However, it was not until the nineteenth century that the distribution of disease in specific human population groups was measured to any large extent.
- This work marked not only the formal beginnings of epidemiology but also some of its most spectacular achievements.
- The finding by John Snow that the risk of cholera in London was related to the drinking of water supplied by a particular company provides a well-known example. Snow's epidemiological studies were one aspect of a wide-ranging series of investigations that examined related physical, chemical, biological, sociological and political processes.
- Comparing rates of diseases in subgroups of the human population became common practice in the late nineteenth and early twentieth century's.
- This approach was initially applied to the control of communicable diseases and proved to be a useful way of linking environmental conditions or agents to specific diseases.
- In the second half of the twentieth century, these methods were applied to chronic non-communicable diseases such as heart disease and cancer, especially in middle and high-income countries.
- Epidemiology in its modern form is a relatively new discipline and uses quantitative methods to study diseases in human populations to inform prevention and control efforts.
- Modern epidemiology accommodates multiple exposures contributing to increased risk for one disease (many-to-one) and

situations where one risk factor contributes to multiple diseases (one-to-many).

3.3 Scope and Purpose of Epidemiology

Scope of epidemiology is the spectrum of scientific, ethical, and practical principles and guidelines that are relevant to the design, conduct, analysis, and interpretation/reporting of research on health-related issues in epidemiologic populations and to provide a basis for developing disease control and preventive measures for groups at risk.

- Aging epidemiology: Examines the public health impact of aging societies, and the multi-factorial changes associated with aging that make health issues for older persons important and unique.
- Applied public health epidemiology: Areas of focus include population health status assessment; infectious and chronic disease surveillance and control; maternal and child health epidemiology; and environmental health epidemiology.
- Cancer Epidemiology: Cancer epidemiology is the study of the distribution and determinants of the likelihood of cancer development. Cancer epidemiology can be used to identify events that increase or decrease cancer incidence in specific populations.
- Cardiovascular and diabetes epidemiology: It is the study of the distribution and determinants of the likelihood of cardiovascular disease and diabetes development.
- Clinical trials and methods: The activities of the epidemiologic methods group contribute to all areas of emphasis, specializing in design and conduct of studies including adaptive trials, survey sampling, and statistical methods.
- Environmental epidemiology: Environmental epidemiology is a branch of epidemiology concerned with determining how environmental exposures impact human health. This field seeks to understand how various external risk factors may predispose to or protect against disease, illness, injury, developmental abnormalities, or death.
- Global health epidemiology: Global health epidemiology addresses the causes and consequences of morbidity and mortality that cross-regional or national boundaries, with emphasis on research in resource-poor countries and application of research findings to the implementation of programs to promote health in those areas.
- Infectious disease epidemiology: The study of the incidence and spread of infectious diseases in populations over time. Host, pathogen and environmental factors are monitored to determine

the dynamics of infection, the ultimate goal of which is to devise intervention strategies.

- Injury prevention epidemiology: Emphasis on the application of epidemiologic methods in population and clinical settings to understand key risk and prognostic factors for primary and secondary prevention of injury.
- Forensic epidemiology: The discipline of forensic epidemiology, a branch of forensic medicine, provides a systematic approach to the assessment of general and specific individual causation, with the results suitable for presentation in a court of law.
- Molecular and genetic epidemiology: Molecular epidemiology is a branch of epidemiology and medical science that focuses on the contribution of potential genetic and environmental risk factors, identified at the molecular level, to the etiology, distribution, and prevention of disease within families and across populations. Genetic epidemiology aims to identify the unknown genes that influence risk of malignancies.
- Population neuroscience: Focuses on the application of epidemiology methods and cutting-edge neuroimaging methodologies in population and clinical studies to enhance etiological research and evaluation of specific therapies in the disorders of the central nervous system.
- Occupational epidemiology: Occupational epidemiology is a sub discipline of epidemiology that focuses on investigations of workers and the workplace.
- Obesity and nutritional epidemiology: The study of nutrition and other behavioural factors and their relation with population health. At the same time, it aims to better understand the dynamics of obesity and other metabolic disorders, studying their determinants and consequences.
- Prevention, lifestyle, and physical activity epidemiology
- Psychiatric epidemiology: The psychiatric epidemiology area of emphasis focuses on the acquisition of epidemiological, biostatistical, and psychiatric concepts and methods, and on their application to research in the field of psychiatric disorders.
- Reproductive, perinatal, and pediatric epidemiology: This area focuses on the determinants of health and disease in reproduction and childhood development.
- Women's health epidemiology: Women's health epidemiologists conduct research to improve the physical and mental health, safety and well-being of the maternal and child health and the purpose of epidemiology is to promote, protect, and preserve good health of the population (Vlajinac, 2008).

3.4 Explain the Objectives of Epidemiology

- To identify the etiology, or cause, of a disease and its relevant risk factors (i.e., factors that increase a person's risk for developing a disease).
- To study the natural history and prognosis of the disease.
- To determine the extent of disease found in the community.
- To develop a rational basis for prevention programs based on identified etiologic or causal factors
- To intervene to reduce morbidity and mortality from the disease
- To work on to reduce or eliminate exposure to those factors
- To develop appropriate vaccines and treatments, which can prevent the transmission of the disease to others.
- To help plan health services and facilities for effective health care delivery
- To define the baseline natural history of a disease in quantitative terms so that as we develop new modes of intervention, either through treatments or through new ways of preventing complications
- To help compare the results of using new modalities with the baseline data to determine whether new approaches have truly been effective.
- To evaluate both existing and newly developed preventive and therapeutic measures and modes of health care delivery
- To help provide the foundation for developing public policy relating to environmental problems, genetic issues, and other social and behavioural considerations regarding disease prevention and health promotion.

3.5 Uses of Epidemiology

1. We use epidemiology to identify risk factors for disease, as well as identify the cause or etiology.
2. We use epidemiology to determine the extent of disease in a population.
3. We use it to study the natural history and prognosis of a disease or illness.
4. We use epidemiology to evaluate existing or new preventive and therapeutic measures.
5. We use epidemiology to provide a foundation for developing public policy and regulatory decisions.
6. We use epidemiology to search for the cause of a disease
7. We use epidemiology to determine, describe, and report on the natural course of disease, disability, injury, and death

8. We use it to aid in the planning and development of health services and programs
9. We use it to provide administrative and planning data for evaluation of health services
10. We use it to study the cause (or etiology) of disease(s), or conditions, disorders, disabilities.
11. We use it to determine the primary agent responsible or ascertain causative factors
12. We use it to determine the characteristics of the agent or causative factors
13. We use it to determine the mode of transmission of disease
14. We use it to identify and determine geographic patterns
15. We use it to evaluate a new therapy or a new health measure
16. We use it to determine whether services are available, accessible, effective and efficient.

3.6 Explain Epidemiological Triad

The Epidemiologic Triangle sometimes referred to as the **Epidemiologic Triad,** is a tool that scientists use for addressing the three components that contribute to the spread of disease: an external agent, a susceptible host and an environment that brings the agent and host together. This demanded a broader concept of disease causation that synthesised the basic factors of agent, host, and environment focus on different classes of factors, especially with regard to infectious diseases.

- The interaction and interdependence of agent, host, environment, and time are used in the investigation of diseases and epidemics.
- The agent is the cause of disease;
- The host is an organism, usually a human or an animal, that harbors the disease
- The environments are those surroundings and conditions external to the human or animal that cause or allow disease transmission; and
- time accounts for incubation periods, the life expectancy of the host or the pathogen, and duration of the course of illness or condition

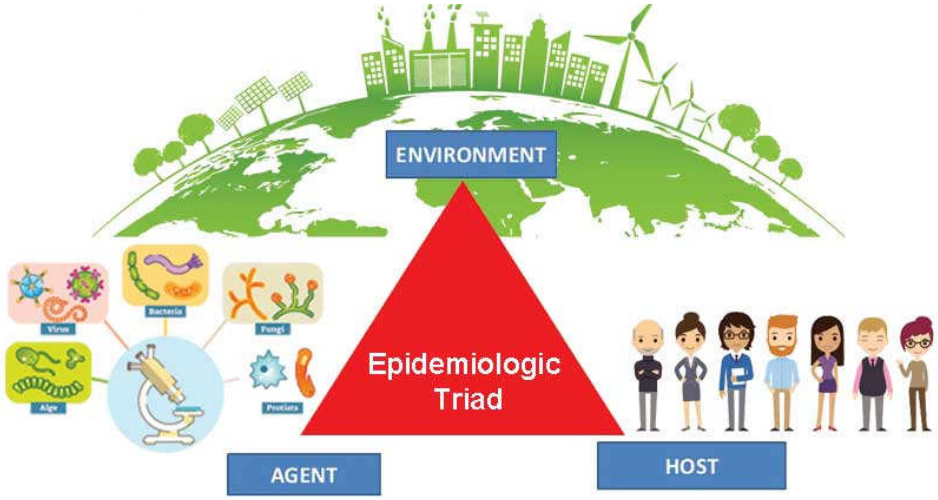

Figure 1: Epidemiologic Triad

The Agent

- Agents of infectious diseases include bacteria, viruses, parasites, fungi, and molds.
- With regard to non-infectious disease, disability, injury, or death, agents can include chemicals from dietary foods, tobacco smoke, solvents, radiation or heat, nutritional deficiencies, or other substances, such as poison.
- One or several agents may contribute to illness.
- Generally, the agent must be present for the disease to occur; however, the presence of that agent alone is not always sufficient to cause disease.
- A variety of factors influence whether exposure to an organism will result in disease, including the organism's pathogenicity (ability to cause disease) and dose.

The Host

- A host offers subsistence and lodging for a pathogen and may or may not develop the disease.
- The level of immunity, genetic makeup, level of exposure, state of health, and overall fitness of the host can determine the effect a disease organism will have on it.
- Opportunities for exposure are often influenced by behaviours such as sexual practices, hygiene, and other personal choices as well as by age and sex.

The Environment

- The ability of the pathogen to accept the new environment can also be a determining factor because some pathogens thrive only under limited ideal conditions.
- For example, many infectious disease agents can exist only in a limited temperature range.

- Environmental factors can include the biological aspects as well as social, cultural, and physical aspects of the environment.
- The surroundings in which a pathogen lives and the effect the surroundings have on it are a part of the environment.
- The environment can be within a host or external to it in the community.

The Time

- Time includes the severity of illness in relation to how long a person is infected or until the condition causes death or passes the threshold of danger towards recovery.
- Delays in time from infection to when symptoms develop, duration of illness, and threshold of an epidemic in a population are time elements with which the epidemiologist is concerned (Sagar,2019)

A traditional model of infectious disease causation, known as the Epidemiologic Triad is depicted in Figure 1. The triad consists of an external **agent;** a **host** and an **environment** in which host and agent are brought together, causing the disease to occur in the host. A **vector**, an organism which transmits infection by conveying the pathogen from one host to another without causing disease itself, is part of the infectious process or the vector is frequently related to all components making it a hub node in the transmission network, and hence a good target for infection control approaches. This represents the interaction between an agent, host or persons and environment or place within a specific time dimension.

The epidemiological triad can be applied to non-infectious diseases where the agent could be ‘unhealthy behaviours, unsafe practices, or unintended exposures to hazardous substances’. Within the epidemiological triad the agent is known as a ‘necessary’ factor. It has to be present for morbidity to occur or lead to disease. For the disease to occur it needs the combination of what have been called ‘sufficient’ factors. These would include a host, which might be an individual or group of individuals who are susceptible to the agent. Susceptibility might be on the basis of age, sex, ethnic group or occupation. Environmental factors can also be sufficient factors that combine with the agent.

In the traditional epidemiologic triad model, transmission occurs when the agent leaves its **reservoir** or **host** through a **portal of exit**, is conveyed by a **mode of transmission** to enter through an appropriate **portal of entry** to infect a **susceptible host**. Transmission may be **direct** (direct contact host-to-host, droplet spread from one host to

another) or **indirect** (the transfer of an infectious agent from a reservoir to a susceptible host by suspended air particles, inanimate objects (vehicles or fomites), or animate intermediaries (vectors).

How to Break the Epidemiologic Triangle?

To prevent the spread of disease, at least one side of the Epidemiologic Triangle must be broken. The mission of an epidemiologist is to break at least one of the sides of the Triangle, disrupting the connection between the environment, the host, and the agent, and stopping the continuation of disease by:

- Preparing food safely because food can carry germs to the consumers
- Washing hands often with potable water or follow proper hand hygiene at all times
- Cleaning and disinfecting commonly used surfaces or clean and disinfect lobbies, exam rooms, bathrooms and other common areas often
- Wear appropriate personal protective equipment (PPE) while treating patients
- Coughing and sneezing into a tissue or your sleeve
- Not share personal items
- Getting vaccinated with vaccine
- Avoiding touching wild animals
- Kill germs by disinfecting high-touch areas regularly.
- Staying at home when sick.

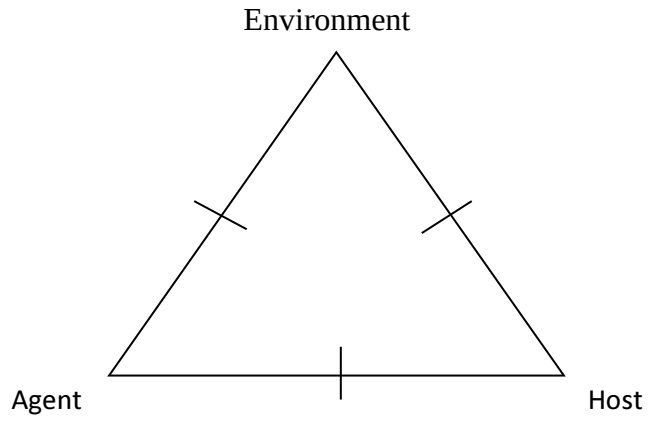

Figure 2: Breaking the Epidemiologic Triangle of Disease

3.7 Chain of Infection

Chain of infection is a process that begins when an infectious agent (e.g., bacteria. Virus, parasite, or fungus) leaves its reservoir or host (humans, animals, plants, or the general environment) through a portal of exit (body orifices, bodily fluids, tissue, excreta, secretions), and is

conveyed by some mode of transmission (direct, indirect, airborne), then enters through an appropriate portal of entry to infect a susceptible host (compromised individuals. Susceptibility factors include age, pre-existing disease, lifestyle factors, stress, medication, etc.).

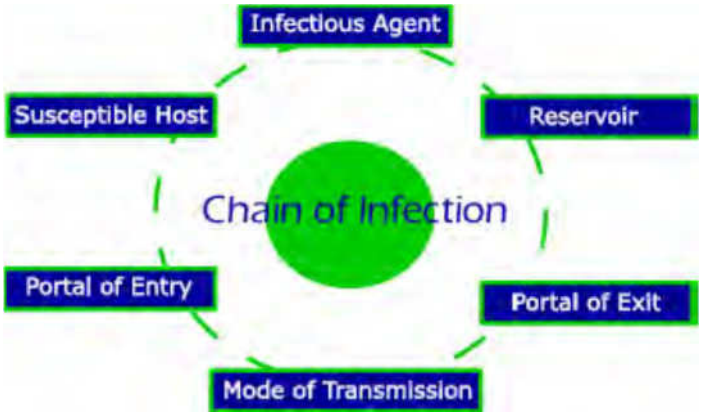

Figure 3: Chain of Infection

4.0 CONCLUSION

Having successfully read and completed this unit it is assume that you have fully understood the introduction to epidemiology and public health.

5.0 SUMMARY

In this unit, you have learnt the concept of epidemiology, the history of epidemiology, scope of epidemiology; purpose of epidemiology, the objectives of epidemiology, the uses of epidemiology, the epidemiologic triad and chain of infection.

6.0 TUTOR-MARKED ASSIGNMENT

1. Define Epidemiology and explain its role as the foundation for Public Health.
2. Outline the objectives of Epidemiology.
3. Describe the Epidemiologic Triangle of Disease under Agent, Environment and Host.
4. With the aid of a Diagram, Explain the Chain of Infection.

7.0 REFERENCES AND FURTHER READING

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UNIT 2 TYPES OF EPIDEMIOLOGY STUDIES

CONTENT

1.0 INTRODUCTION

Epidemiology is the study of how often diseases occur in different groups of people and why. Epidemiological information is used to plan and evaluate strategies to prevent illnesses and as a guide to the management of patients in whom diseases have already developed. Epidemiological studies measure the risk of illness or death in an exposed population compared to that risk in an identical, unexposed population. For example, a population with the same age sex, race and social status as the exposed population. This unit aims at exposing you to different methods of epidemiological studies.

2.0 OBJECTIVES

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

- describe cross-sectional studies
- explain case-control studies
- define cohort studies
- explain Longitudinal Studies
- describe analytic studies
- discuss intervention studies.

3.0 MAIN CONTENT

3.1 Types of Epidemiological Studies

The basic epidemiological study designs are cross-sectional studies, case-control studies, cohort studies and intervention studies.

Cross-sectional studies provide a snapshot of a population by determining both exposures and outcomes at one-time point. Cross-sectional studies measure the prevalence of conditions or characteristics of people in a population at a point in time or over a short period. They are essentially descriptive studies; their results can often suggest causative or risk factors associated with particular illness or behaviour. They may be used to ascertain the prevalence of a health-related behaviour, such as the wearing of seat belts or participation in exercise. In cross-sectional studies, it is not always necessary to investigate the whole population but a sample is usually sufficient, provided that the individuals in the sample are representative of the total group under consideration. Cross-sectional studies are useful in planning public health interventions (Breslow, 2005, and Wolfgang and Iris, 2014)

Case-control studies identify the study groups based on the outcome, and the researchers retrospectively collect the exposure of interest. These focus on determining disease causation. The ‘case’ is a person who has a particular symptom or medical condition. Thus, the focus is on a group of cases which is then compared with a ‘control group’ consisting of persons not having the symptom or the medical condition. Investigations are then carried out into the previous exposure of the two groups to particular factors that are suspected of causing the symptom or condition. If the two groups differ regarding their exposure to such factors, a causal link between the symptom/condition and the factor is inferred or deduce (Breslow, 2005, and Wolfgang and Iris, 2014)

Cohort studies identify the study groups based on the exposure and, then, the researchers follow up study participants to measure outcomes or certain attributes or characteristics with respect to their health behaviour. The groups are then observed over a period of time in order to discover what happens to their individual members and to check whether there are any associations between behaviour and the development of disease. Longitudinal studies are a form of cohort studies, which study groups of people over time; they can be retrospective as well as prospective (Breslow, 2005, and Wolfgang and Iris, 2014)

3.2 Longitudinal Studies

Longitudinal studies (cohort studies) involve repeated observation of study participants over time. They represent the most comprehensive approach since they use all of the available information on the source population over the risk period. Incidence studies are a subgroup of longitudinal study in which the outcome measure is dichotomous. More generally, longitudinal studies may involve repeated assessment of categorical or continuous outcome measures over time (e.g. a series of linked cross-sectional studies in the same population). A simple longitudinal study may involve comparing the disease outcome measure or more usually changes in the measure, over time, between exposed and non-exposed groups. For example, rather than comparing the incidence of hypertension (as in an incidence study) or the prevalence at a particular time (as in a prevalence study), or the mean blood pressure at a particular point in time (as in a cross-sectional study), a longitudinal study might involve measuring baseline blood pressure in exposed and non-exposed persons and then comparing changes in blood pressure (i.e. the change from the baseline measure) over time in the two groups. One special type of longitudinal study is that of 'time series' comparisons in which variations in exposure levels and symptom levels are assessed over time with each individual serving as their own comparison.

*A*n analytic study in epidemiology is to identify and quantify the relationship between an exposure and a health outcome. A comparative study designed to reach causal inferences about hypothesised relationships between risk factors and outcome. Analytical studies identify and quantify associations, test hypotheses, identify causes and determine whether an association exists between variables, such as between an exposure and a disease. Statistical procedures are used to determine if a relationship is likely to have occurred by chance alone. Analytical studies usually compare two or more groups or sets of data.

Intervention studies involve intervening with a group of people, and include an equivalent group which acts as a 'control'. The most popular study of this kind is the randomised controlled trial (RCT). RCTs divide the population to be studied into groups on a random basis; one group is then subjected to a treatment, procedure or intervention, the other not. If the two groups are matched in terms of their characteristics, then any measurable differences between them should be due to the intervention. Ideally, the RCT should be carried out using a double-blind method: that is, neither the researcher nor the subject knows who is in the intervention or control arm of the study. They are used to determine the effectiveness of an intervention or the effectiveness of a health service

delivery. There are two major types of intervention studies; randominised controlled trials and non- randominised or quasi-experimental trials. Randomized controlled trials (RCTs) are the most common type of interventional study. These trials take a homogenous group of study participants and randomly divide them into two separate groups. For the randomization to be successful the two groups should be the same in all respects, both measured confounders and unmeasured factors. The intervention is then implemented in one group and not the other and comparisons of intervention efficacy between the two groups are analyzed. Theoretically, the only difference between the two groups through the entire study is the intervention. An excellent example is the intervention of a new medication to treat a specific disease among a group of patients. Additional methodological elements are utilized among RCTs to further strengthen the causal implication of the intervention's impact. These include allocation concealment, blinding, measuring compliance, controlling for co-interventions, measuring dropout, analyzing results by intention to treat, and assessing each treatment arm at the same time point in the same manner.

Non-randomized trials are interventional study designs that compare a group where an intervention was performed with a group where there was no intervention. These are convenient study designs that are most often performed prospectively and can suggest possible relationships between the intervention and the outcome. Drug trials are the most common type of intervention studies; their purpose is to discover the effects and effectiveness of new drugs developed by the pharmaceutical industry (Mathew,2014, Wolfgang and Iris, 2014)

SELF-ASSESSMENT EXERCISE
What do you understand by longitudinal studies?

4.0 CONCLUSION

Having successfully discuss and completed this unit it is assume that you have fully understood the types of epidemiological studies in public health.

5.0 SUMMARY

In this unit, you have learnt the cross-sectional studies, case-control studies, cohort studies, longitudinal studies, analytical studies and intervention studies use in public health

6.0 TUTOR-MARKED ASSIGNMENT

1. Differentiate between cross-sectional and case-control studies.
2. Describe cohort studies.Explain intervention studies use in public health.

7.0 REFERENCE/FURTHER READING

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UNIT 3 CAUSALITY AND CAUSAL INFERENCE

CONTENTS

1.0 INTRODUCTION

The epidemiologic meaning of cause suggests that a causal factor is any event, condition, or characteristic that increase the likelihood (risk) of disease, all other things being equal. To judge that an exposure is the causal agent of a disease, the epidemiologic reasoning is divided into two distinct stages.

2.0 OBJECTIVES

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

- describe the stage of Statistical inference
- describe stage of Causal inference.

3.0MAIN CONTENT

3.1 Statistical Inference Stage

This stage searches for a statistical association between exposure and disease. When the relationship between an exposure and a disease are studied in populations (not in individual), this exposure may be or may not be found statistically associated with the disease. If there is a statistical association, then it can be causal or non-causal in nature. Thus, all associations need not be causal associations but all causal associations must be statistical associations.

3.2 Causal Inference Stage

This stage involves the derivation of biological meaning of the observed statistical association. Statistical inference is not the same as causal inference, though there is a parallelism in the inferential process itself,

and statistical inference is generally employed in evaluating the data for use in causal inference. In statistical inference, data from a sample of observations are used to make inferences about the population from which they are assumed to derive. A statistical model, expressed in a null hypothesis (H0), is "tested" against data. Based on the data, the statistical model is either accepted or rejected as an adequate explanation of the data. Rejection is a stronger statement and is usually based on a more stringent criterion (a 5% significance level means that results as strong as those observed would occur by chance only 5% of the time, whereas a typical 80% level of statistical power means that a real relationship will not appear to be "significant" 20% of the time).

In practice, it is difficult to separate non-causal associations from causal ones. But by the help of some criteria, we can do it. Some of the well known criteria are:

1. Henle-Koch postulates (1840-1882), and
2. Hill's criteria (1965).

1. Henle-Koch's Postulates

- The agent should be present in every case of the disease under appropriate circumstances.
- The agent should not be present in any other disease.
- The agent must be isolated from the body of the diseased individual in pure culture, and it should induce disease in another susceptible animal.

It is quite clear that Henle-Koch postulates are not really compatible with the current multi-factorial model of causation (i.e., multiple causation theory of diseases, particularly for non-communicable diseases where a single agent rarely exists). Thus, these postulates are rarely used in practice.

2. Hill's Criteria for Causation

In his famous paper (Hill 1965) titled "The environment and disease: association or causation?" Sir Austin Bradford Hill put forward nine conditions for separating causal from non-causal associations:

- **Strength of the association:** Strong associations are more likely to be causal than weak associations. Weak associations are more likely to be explained by undetected biases. The association between smoking and lung cancer (large relative risks have been generated by several observational studies) is often used as an example for this condition. Note that, while this criterion is

reasonable, it does not rule out the possibility of a weak association being causal.

- **Consistency of the association:** Consistency refers to similar results emerging from several studies done in different populations. Lack of consistency, however, does not rule out a causal association.
- **Specificity of the association:** This criterion requires a single cause to produce a single effect. Several authors have found this to be a misleading criterion. Smoking, for instance, causes lung cancer but it is also associated with several other diseases.
- **Temporality:** This criterion denotes the sequence of events with regards to time. It is an absolute necessity for a causal association; the cause must precede the effect. In case-control studies, however, we did not actually know if an exposure precedes the disease under study. Therefore, the temporality is best to be explained in prospective studies where the exposure actually precedes the occurrence of the disease.
- **Biological gradient:** This implies the presence of a dose-response relationship (i.e., increasing dose must lead to increasing disease frequency). For instance, the higher the number of cigarettes smoked, the higher the risk of lung cancer. Response relationship can be tested statistically by the use of tendency tests, sometimes called linear trend tests (P for trend is now of greater use in regression analysis). Absence of a dose-response, again, does not rule out a causal association.
- **Plausibility:** This refers to biological plausibility of the observed association. There should be some biologically acceptable or relevant reason for the cause to produce a certain effect. But biological plausibility is reflection of available knowledge as of now; it may change with time.
- **Coherence:** Coherence implies that the association does not conflict with current knowledge about the disease (its natural history, biology, etc.). For example, the knowledge that smoking damages bronchial epithelium is compatible with the association between smoking and lung cancer.
- **Experimental evidence:** According to Hill, the strongest support for causation may be revealed by experimental (clinical trial) evidence where introduction or removal of an agent can lead to a change in the effect. While it is agreed that experimental studies offer stronger causal inference, it must be understood that many research questions can never be studied using experiments (for obvious ethical reasons).

- **Analogy:** A previous experience can be used as an analogy to make a causal inference. Hill uses the example of thalidomide; since we know that this drug causes congenital anomalies, it is not difficult to appreciate another drug causing anomalies.

These nine aspects have been used by several epidemiologists as criteria or checklist for deciding on causation; it is often said that all the nine conditions are necessary before causation can be inferred. Actually, Hill never used the word criteria anywhere in his paper, nor did he intend to offer a list of necessary conditions.

Here are nine different viewpoints from all of which we should study association before we cry causation. What I do not believe is that we can usefully lay down some hard-and-fast rules of evidence that must be obeyed before we accept cause and effect. None of my nine viewpoints can bring indisputable evidence for or against the cause-and-effect hypothesis.

SELF-ASSESSMENT EXERCISE
Differentiate between Statistical inference stage and Causal inference stage.

4.0 CONCLUSION

Having successfully discuss and completed this unit it is assume that you have fully understood the causality and causal inference in the study of epidemiology and public health.

5.0 SUMMARY

In this unit, you have learnt the causality and causal inference in epidemiology and public health.

6.0 TUTOR-MARKED ASSIGNMENT

1. Stage the nine conditions for separating causal from non-causal associations according to Hill's Criteria.

7.0 REFERENCES/FURTHER READING

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UNIT 4 ETHICAL CONSIDERATION IN CONDUCTING EPIDEMIOLOGICAL STUDIES

CONTENTS

1.0 INTRODUCTION

It is now obligatory that all clinical trials, as well as epidemiologic researches that studied human beings, to be reviewed and cleared by an ethical committee or Institutional**.** Review Board (IRB) which is now established in most of the Universities and Research **I**institutes interested in human researches. The aim of the committee or IRB is principally to protect the human beings involved in a research and respect the following things among them.

2.0 OBJECTIVES

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

- describe ethical consideration in conducting epidemiological studies.

3.0 MAIN CONTENT

Ethical consideration in conducting epidemiological studies:

Respect for Human Dignity:
This represents the cardinal principle of modern research ethics. This principle aspires to protecting the multiple and interdependent interests of the person from bodily to psychological to cultural integrity. This principle also forms the basis of most of the ethical obligations listed below.

Respect for Free and Informed Consent:
The voluntary consent of the human subject is absolutely essential. This means that the person involved should have legal capacity to give consent; should be so situated as to be able to exercise free power of choice, without the intervention of any element of force, fraud, deceit,

duress, over-reaching form of constraint or coercion; and should have sufficient knowledge and comprehension of the elements of the subject matter involved as to enable him to make an understanding and enlightened decision.

Respect for Vulnerable Persons:
Respect for human dignity entails high ethical obligations towards vulnerable persons (i.e., those with diminished competence and / or decision-making capacity make them vulnerable). Children, institutionalized persons or others who are vulnerable are entitled, on grounds of human dignity, caring, solidarity and fairness, to special protection against abuse, exploitation or discrimination. Ethical obligations to vulnerable individuals in the research enterprise will often translate into special procedures to protect their interests.

Respect for Privacy and Confidentiality:
Respect for human dignity also implies the principles of respect for privacy and confidentiality. In many cultures, privacy and confidentiality are considered fundamental to human dignity. From this point of view, there are general guidelines of privacy and confidentiality should be respected, and which includes:

- Limiting access, control and dissemination of personal information to those who have a legitimate need.
- Avoiding idle conversation about the patients.
- Using pseudonyms and altering other identifying data when presenting cases in conference and teaching situations.
- Keeping the nominal data of the subjects in special file out of reach by others.

Respect for Justice and Inclusiveness:
Justice connotes fairness and equity. Procedural justice requires that the ethics review process have fair methods, standards and procedures for reviewing research protocols, and that the process be effectively independent. Justice also concerns the distribution of benefits and burdens of research. The distributive justice also imposes duties neither to neglect nor discriminate against individuals and groups who may benefit from advances in research. Compensatory justice, which is another form of justice, with the attempt to reward the subjects for any losses that are not the consequence of their own action.

Balancing Harms and Benefits:
Harms-benefits analysis affects primarily the welfare and rights of human subjects.

Thus its analysis, balance and distribution are essential to the ethics of human research, and the modern research ethics now are requiring a favorable harms-benefit balance aiming to minimizing the harm and maximising the benefit.

Minimising Harm:
This principle is directly related to harms-benefits analysis. It is the duty to avoid, prevent or minimize harms to others. Research subjects must not be subjected to unnecessary risks of harm and their participation in research must be essential to achieving scientifically important aims that cannot be realized without the participation of human subjects. In addition, it should be kept in mind that the principle of minimizing harm requires that the research involve the smallest number of human subjects and the smallest number of tests on these subjects that will ensure scientifically valid data.

Maximizing Benefit:
Another principle related to the harms and benefits of research is beneficence. The principle of beneficence imposes a duty to benefit others and, in research ethics, a duty to maximize net benefits. Human researches are always intended to produce benefits for subjects themselves, for other individuals or society as a whole, or for the advancement of knowledge.

SELF-ASSESSMENT EXERCISE
Describe ethical consideration in conducting epidemiological studies.

4.0 CONCLUSION

Having successfully discuss and completed this unit it is assume that you have fully understood the ethical consideration in conducting epidemiological studies in the study of epidemiology and public health.

5.0 SUMMARY

In this unit, you have learnt the ethical consideration in conducting epidemiological studies in epidemiology and public health.

6.0 TUTOR-MARKED ASSIGNMENT

1. Describe ethical consideration when conducting epidemiological studies.

7.0 REFERENCES/FURTHER READING

MacMahon, B & Trichopoulos, D. (1996). *Epidemiology Principles & Methods.* (2nd ed.). Little Brown and Co.

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UNIT 5 SAMPLING METHODS

CONTENTS

1.0 INTRODUCTION

Sampling is the process of selecting units (e.g., people, organizations) from a population of interest so that by studying the sample we may fairly generalize our results back to the population from which they were chosen. Sampling methods are described as either probability or non-probability methods. In probability samples, each member of the population has an exactly equal chance of being selected while in nonprobability sampling, however, members are selected from the population in some nonrandom manner. When **c**onducting any of the studies, the researchers rarely get the opportunity to study the entire population. Instead, a sample of the population is studied.

2.0 OBJECTIVES

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

- explain the types of sampling methods use in epidemiology studies
- state the advantages of using sampling in epidemiology studies
- describe sample calculation for epidemiology studies.

3.0 MAIN CONTENT

3.1 Types of Sampling Methods Use in Epidemiology Studies

Probability sampling methods:

Probability methods include random sampling, systematic sampling, stratified and cluster sampling.

1) Simple random sampling

The basic sampling method is simple random sampling (SRS) technique, which is a self-weighting sampling design, meaning that each member of the population has an equal and known chance of being included in the sample. A convenient way to draw a simple random sample is to assign each population element a random number, sort the data set according to the random numbers, and finally select the required sample size from any sequential part of the population, normally beginning from the first element and continuing until the desired sample size is reached.

2) **Systematic random sampling**

Systematic sampling means that every one of the studied element is selected over the whole sampling frame. Sampling is started by selecting the first element from the range [1, r] and elements are then selected at the sampling interval **r** up to the end of the frame. A population may be arranged in a certain order that can be used for implicit stratification. However, this sampling procedure should be approached with caution. If the elements are in a random order, systematic sampling practically matches simple random sampling. However, if the population contains some (hidden) order or sequence, systematic sampling may yield a sample that consists of very similar elements that do not reflect the true population variation and thus the sample can lead to erroneous or biased results. In certain cases, proper arranging of the population can yield better samples than the use of a random order or the use of simple random sampling. If, for example, the focus of interest is a spatially correlated phenomenon among the population, systematic sampling from the geographically sorted population register would produce samples that would be much better distributed than ones obtained by simple random sampling.

3) Stratified sampling

It is commonly used probability method that is superior to random sampling because it reduces sampling error. In stratified sampling, the population is first divided into mutually exclusive sub-populations known as strata. Then, different sampling designs or sampling rates can be applied in different strata. Sometimes all elements in a certain stratum must be investigated, as in a census, while sampling only may be applied to another stratum. In household surveys, fairly basic demographic stratification criteria are used, e.g. geographical area, age or gender. Stratified sampling is often used when one or more of the stratums in the population have a low incidence relative to the

other stratums. The aim is to achieve as homogenous sub-populations as possible given the available information. Stratification is necessary for skewed populations when simple random sampling or other self-weighting designs are applied. Stratification basically requires that all population elements have information permitting construction of the strata. Ultimately, each element can only belong to one stratum.

4) Cluster sampling

In cluster sampling, either all elements from each selected cluster can be included in the sample, or a sub-selection can be made from within the selected clusters. The former case is called one-stage cluster sampling while the latter is known as two-stage cluster sampling. An example of cluster sampling would be a study of work conditions where the firms/enterprises are selected first and their employees are then selected for the examination. A firm is a cluster and if all its employees are examined, this will be a one stage cluster design, but if only some of the employees are selected, the design will be a two-stage cluster sampling. The process could comprise even more stages than this, depending on the population structure.

Non-probability sampling methods

These include convenience sampling, judgment sampling, quota sampling, and snowball sampling

5) Convenience sampling

This type of sampling is used in exploratory research where the researcher is interested in getting an inexpensive approximation of the truth. As the name implies, the sample is selected because they are convenient. This nonprobability method is often used during preliminary research efforts to get a gross estimate of the results, without incurring the cost or time required to select a random sample.

6) Judgment sampling

It is a common nonprobability method. The researcher selects the sample based on judgment. This is usually an extension of convenience sampling. For example, a researcher may decide to draw the entire sample from one "representative" city, even though the population includes all cities. When using this method, the researcher must be confident that the chosen sample is truly representative of the entire population.

7) Quota sampling

This sampling method is the nonprobability equivalent of stratified sampling. Like stratified sampling, the researcher first identifies the stratums and their proportions as they are represented in the population. Then convenience or judgment sampling is used to select the required number of subjects from each stratum. This differs from stratified sampling, where the stratums are filled by random sampling.

a. Snowball sampling

It is a special nonprobability method used when the desired sample characteristic is rare. It may be extremely difficult or cost prohibitive to locate respondents in these situations. Snowball sampling relies on referrals from initial subjects to generate additional subjects. While this technique can dramatically lower search costs, it comes at the expense of introducing bias because the technique itself reduces the likelihood that the sample will represent a good cross section from the population.

3.2 The Advantages of Using Sampling in Epidemiology Studies

Sampling offers the following advantages:

a) **Reduced cost:** The data collected from a small fraction of the population is actually of smaller expenditure than that collected from the entire population.
b) **Greater speed:** Data can be collected and summarized more quickly with a sample that with a complete census.
c) **Greater scope:** Collecting data from a sample can allow the researcher to get information about more factors with greater flexibility in the type of information collected.
d) **Greater accuracy:** Because of the reduced volume of work, the data collected is suspected to be of high quality data.

3.3 Sample Size Calculation for Epidemiology Studies

Before selecting a sample, the researcher must clearly define the target population. This population is called the target population, internal population, or study base. The target population is chosen in a way to answer the objectives of the study, and according to the sources of data available to the researcher. A distinction is made between this internal (target) population and the larger external population, about which additional generalization may be made. The extent to which the sample reflects the target is called the study's internal validity. The extent to

which the target population reflects the external population is called the study's external validity. By internal validity, we mean the extent to which the study is accurate with regard to the systematic errors, while the external validity means the extent to which the study findings can be generalized.

Estimating sample size is a very important aspect of study design in epidemiology, because without this calculation, sample size may be too large or too small. If sample size is too small, the experiment will lack the precision to provide reliable answers to the questions it is investigating. If sample size is too large, the needed time and cost will be increased.

The formulas used to calculate sample size vary from study to study and from problem to problem. The sample size you need when the outcome is binary (in categories such as diseased and non-diseased, etc) is different than when your outcome is continuous. For a continuous outcome, you need to specify the variability of your outcome measure and how much of a change you would consider clinically relevant. For a binary outcome, you still need to specify the clinically relevant change. But you don't need a measure of variability. What you need instead is an estimate in your control group of the probability for one level of your binary outcome, or you might need to specify the distribution (prevalence) of your explanatory (independent) variable in the control group or better in the target population. Accordingly, estimation of sample size requires a priori information in order to perform such calculation correctly. Most of the used statistical programs are now calculating the sample size when you supply the program by the information required. There are many available statistical websites to perform this function; the example of these available sites: http://calculators.stat.ucla.edu/powercalc/

It is desirable to determine, before conducting the study, whether your sample size will be large enough to have a reasonable probability of detecting and estimating an effect if exists. This is accomplished by calculating the power of the study. That is the probability that the study will yield a statistically significant departure from the null association. The power of the study depends on the following points:

1. The acceptable level for the alpha or Type I error (the error of rejecting the null hypothesis when it is true). By convention, this value is usually set at 0.05.
2. The disease rate in the non-exposed group in a cohort study or the exposure prevalence of the controls in a case-control study.

3. The specified value of the relative risk under the alternative (non-null) hypothesis.
4. The size of the population being studied (sample size).

Once these quantities have been determined, standard formulas are then available to calculate the statistical power of the study

There are still some limitations when you calculate sample size and study power. These limitations include:

- They are based on the presumption that the purpose of the study is to make a decision solely on the basis of the information obtained by the study, whereas in practice the study findings are usually evaluated in the context of the findings of previous studies.
- They assume that the purpose of the study is simply to distinguish between two, and only two, competing hypotheses: the null and an alternative.
- Power calculations depend on an arbitrary definition of statistical significance (the choice of the alpha error; by convention it is 0.05), which is increasingly discouraged in epidemiology, in favor of a weight of evidence approach to data interpretation.
- The choice of beta error rate is also arbitrary.
- The choice of alternative values of relative risk is often little more than a guess.

SELF-ASSESSMENT EXERCISE

State the advantages of using sampling in epidemiology studies

4.0 CONCLUSION

Having successfully discussed and completed this unit it is assume that you have fully understood the sampling methods use in conducting epidemiological studies in the study of epidemiology and public health.

5.0 SUMMARY

In this unit, you have learnt the types of sampling methods use in epidemiological studies in epidemiology and public health, the advantages of using sampling methods in epidemiology studies and sample calculation for epidemiology studies

6.0 TUTOR-MARKED ASSIGNMENT

1 Explain the types of sampling methods use in epidemiology studies.

2. Describe sample calculation for epidemiology studies.

7.0 REFERENCES/FURTHER READING

MacMahon B & Trichopoulos D. (1996). Epidemiology Principles & Methods. (2nd ed.). Little Brown and Co,

Rothman K.J, & Greenland S. (1998). Modem Epidemiology, 2nd Edition. Philadelphia: Lippincot-Raven.

Vannus H & Satcher D.(1997). Ethical complexities of conducting research in developing Countries. *NEJM, 337:1003-1005.*

UNIT 6 EXPERIMENTAL (INTERVENTION) STUDIES

CONTENTS

1.0 INTRODUCTION

Experimental study is "study in which conditions are under the direct control of the investigator". It is employed to test the efficacy of a preventive or therapeutic measure. Experimental studies can provide the strongest evidence about the existence of a cause-effect relationship . Experimental studies are ones where researchers introduce an intervention and study the effects. Experimental studies are usually randomized, meaning the subjects are grouped by chance. Randomized controlled trial (RCT) is when eligible people are randomly assigned to one of two or more groups. One group receives the intervention (such as a new drug) while the control group receives nothing or an inactive placebo. The researchers then study what happens to people in each group. Any difference in outcomes can then be linked to the intervention.

2.0 OBJECTIVES

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

- explain the concept of experimental (intervention) studies
- state the purpose for experimental (intervention) studies
- state the types of experimental (intervention) studies.

3.0 MAIN CONTENT

3.1 Concept of Experimental (intervention) Studies

Experimental study is "study in which conditions are under the direct control of the investigator". It is employed to test the efficacy of

a preventive or therapeutic measure. Experimental studies can provide the strongest evidence about the existence of a cause-effect relationship. Experimental studies are ones where researchers introduce an intervention and study the effects. Experimental studies are usually randomised, meaning the subjects are grouped by chance. Randomized controlled trial (RCT) is when eligible people are randomly assigned to one of two or more groups. One group receives the intervention (such as a new drug) while the control group receives nothing or an inactive placebo.

3.2 The Purpose of Experimental (Intervention) Studies

The purpose of experimental studies is to test the efficacy of specific treatments or preventive measures by assigning individual subjects to one of two or more treatment or prevention options. Intervention studies often test the efficacy of drugs, but one might also use this design to test the efficacy of differing management strategies or regimens.

3.3 The Types of Experimental (Intervention) Studies

There are two different types of experimental studies: *Therapeutic* and *Prevention Studies.*

In *therapeutic studies* (clinical *trials),* different medicines or medical procedures for a given disease are compared in a clinical setting. The Randomized Controlled Trial (RCT) is widely held as the ultimate study design; the “gold standard” against which all other designs are compared. The subjects are usually chosen from a large number of potential subjects. Sampling includes the use of a set of inclusion and exclusion criteria. After this, an informed consent is obtained from each participant. Randomization is then done to allocate subjects to either the treatment group or the placebo group. Randomisation achieves two important things:

1. Allocation to different groups (treatment and placebo) is done without bias because it is taken out of hands of the investigator, and
2. Randomization distributes known and unknown confounders equally between the two studied groups. Once randomization is done, intervention is begun. Ideally, intervention, either taking the treatment or placebo, should be done in a blinded fashion.

In conducting a randomized clinical trial, the researcher should consider the following four important points. Also, the reader of any published

RCT should take into consideration these points, and to be able to criticize them on a scientific basis:

- Appropriation of the control group.
- Randomized allocation.
- Blinded intervention and blind ascertainment of outcome.
- Data analysis by intention-to-treat principle.

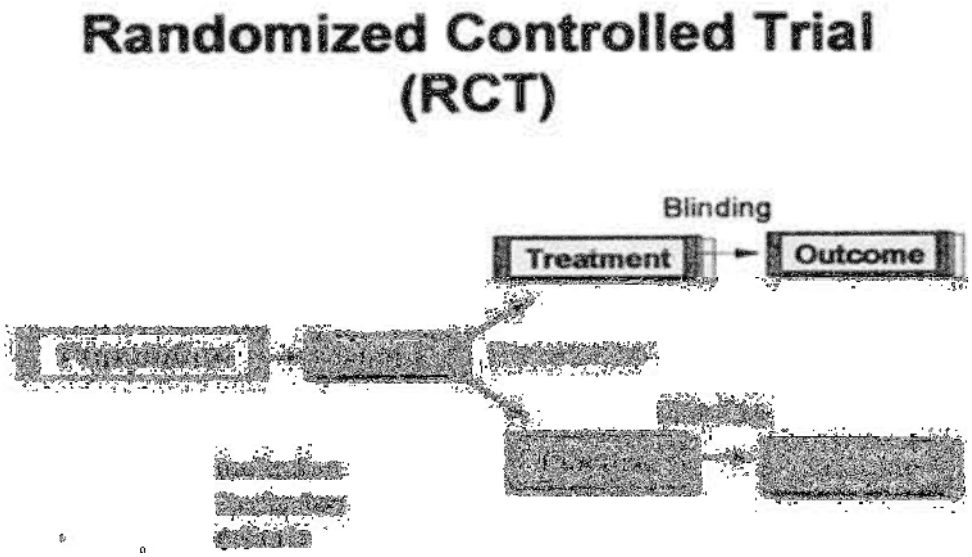

Figure 1

1. Appropriation of the control group:

In RCT, the test group takes the real treatment while the control group takes a placebo; many authors argue that it is unethical to do a placebo controlled study when some therapy is already existent. No patient should be denied some form of therapy even if it is not very effective. To solve this ethical problem, the following requirements for the test and control treatment should be considered:

a. They must be distinguishable from one another
b. They must be medically justifiable
c. There must be an ethical base for use of either treatment
d. Either treatments must be acceptable to study patients and to physicians administering
e. There must be reasonable doubt regarding the efficacy of the test treatment
f. There should be reason to believe that the benefits will outweigh the risks of the treatment.

2. Randomised allocation:

Once the eligible subject has agreed to participate in the trial, it is important that assignment to treatment or control group is done in a manner that is free of any selection bias. To avoid bias, neither the patient nor the physician should be aware of the group to which the patient will be allocated. This is done by randomizing blinded fashion (the best at this stage is the double blinded fashion).

Randomisation also ensures that the baseline characteristics of the test and the control groups are more or less similar in order to provide a valid basis for comparison. If allocation is not randomized, however, it is possible that subjects with favorable characteristics may be allocated to the treatment group while those with less favorable characteristics may be allocated to the control group. In this way, the trial is not a randomized.

3. Blinded intervention:

The aim of blinding is to ensure that outcome ascertainment is done without any bias. Blinding is logistically difficult but essential. Some authors use the word "masking" instead of blinding. A single-blinded trial is one in which the patient is not informed of the treatment assignment. A double-blinded trial is one in which neither the patient nor the physician responsible for the treatment is informed of the treatment assignment. Sometimes, the investigator analyzed the data did not also known anything about the treatment assignments and this is called triple blind technique. RCT usually report the effectiveness of blinding. Sometimes, known adverse effects of drugs may un-blind the physician (e.g. bradycardia due to beta blockers). Ideally, data collection, measurement, reading and classification procedures on individual patients should be made by persons who are completely blinded. For instance, if chest radiographs have to be read, the films can be sent to another site where they are read by radiologists who have no idea about the patients or their treatment groups. As far as possible, outcomes chosen should be objective and clinically relevant. Outcomes should be capable of being observed in a blinded fashion. For instance, pain is a very subjective outcome and difficult to measure in a blinded fashion. On the other hand, if the outcome is a biochemical parameter, then it is objective and can be easily measured in a blinded fashion.

4. Data analysis by intention-to-treat principle:

This is a very important issue in the analysis of RCT results. All patients allocated to each arm of the treatment regimen are analyzed together as representing that treatment arm, whether or not they received or completed the prescribed regimen. Failure to follow defeats the main purpose of randomisation and can invalidate the results. For instance, if a patient had been originally randomized to receive placebo, and if, for some reason, he actually ended up getting the study treatment, for the purposes of analysis, this patient will still be counted as belonging to the placebo group (effectiveness analysis). Effectiveness analysis is thus considered the results of all subjects according to their originally assigned treatment groups irrespective of failures in compliance, discontinuation or other reason of withdrawal. In contrast, efficacy analysis includes only subjects who completed the clinical trial protocol and completed the intended treatment. From a physiological perspective, however, efficacy analysis is more pertinent.

Trials that are conducted on healthy or apparently healthy individuals with the aim of preventing future morbidity or mortality are called *preventive studies*. Preventive studies include *community study*, in which the intervention is applied to groups, and *field study*, in which the intervention is applied to healthy individuals at usual or high risk of. In many respects the design of a clinical trial is analogous to a prospective cohort study, except that the investigators assign or allocate the exposure (treatment) under study.

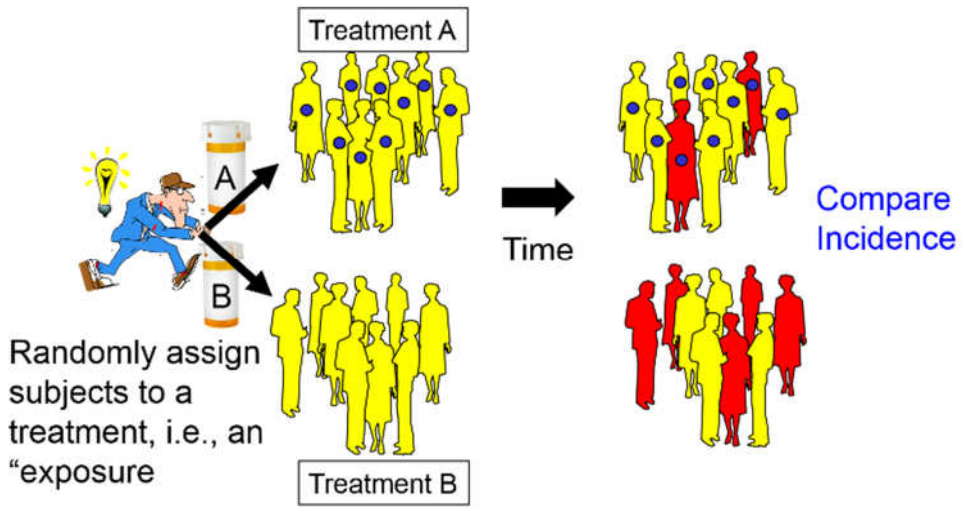

Figure 2

SELF-ASSESSMENT EXERCISE

1. Explain the concept of experimental (intervention) Studies.

4.0 CONCLUSION

Having successfully discussed and completed this unit it is assume that you have fully understood the experimental (intervention) studies in the study of epidemiology and public health.

5.0 SUMMARY

In this unit, you have learnt the concept of experimental (intervention) studies, the purpose of experimental (intervention) studies and the types of experimental (intervention) studies.

6.0 TUTOR-MARKED ASSIGNMENT

1. State the purpose for experimental (intervention) studies.
2. State the types of experimental (intervention) studies.

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UNIT 7 SCREENING

CONTENTS

1.0 INTRODUCTION

Screening is the initial examination of an individual to detect disease not yet under medical care. Screening may be concerned with different types of diseases with the purpose to separate healthy individuals into groups with either a high or low probability of developing the disease for which the screening test is being used. If screening is concerned with a single disease, it is called single phasic screening; and if screening is concerned with many diseases, it is called multiphasic screening. In addition, screening tests may be classified according to its aim to diagnostic testing and treatment testing.

The former is designed to test apparently healthy individuals to detect cases or those at high risk to develop a suspected disease while the latter is undertaken to evaluate the patient's response to, and the effectiveness of, therapy for a disease.

2.0 OBJECTIVES

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

- explain the word screening in epidemiological studies
- state the purpose of screening in epidemiological studies
- mention the criteria for effective screening
- state the screening test characteristics
- describe screening test
- differentiate positive predictive value and negative predictive value.

3.0 MAIN CONTENT

3.1 Screening in Epidemiological Studies

Screening in epidemiological studies is the initial examination of an individual to detect disease not yet under medical care. Screening may be concerned with different types of diseases with the purpose to separate healthy individuals into groups with either a high or low probability of developing the disease for which the screening test is being used. If screening is concerned with a single disease, it is called single phasic screening; and if screening is concerned with many diseases, it is called multiphasic screening

3.2 The Purpose of Screening in Epidemiological Studies

The purpose of screening as a public health intervention is intended to improve the health of a precisely defined target population. Within this population are individuals considered at risk of the effects of a condition, and screening is justified by the awareness of that condition as an important public health problem.

3.3 Criteria for Effective Screening

Screening program is a major focus of efforts to promote health and prevent disease. To be effective, however, the disease under investigation should fulfill the following criteria:

- The disease should have a considerable prevalence among the population being screened.
- The disease should be of sufficient concern to the community being screened (i.e., it should have a public health significance).
- The disease should have a treatment.
- The disease should have a preclinical period.
- In addition, it is of great importance to assure follow up evaluation for the screened individuals showing positive test.

3.4 Screening Test Characteristics

i. The test should be highly sensitive and specific (i.e., it should be valid and accurate).
ii. The test should be acceptable to a large number of individuals.
iii. The test should be simple (i.e., it should be accomplished easily and quickly.
iv. The test should be harmless to the individual being screened.
v. The test should be relatively inexpensive

vi. The test should be reliable (i.e., it gives the consistent results on repeating the test).

3.5 Screening Test Parameters

The screening test parameters are essential to measure the usefulness of the test. These parameters are the following:

- sensitivity,
- specificity,
- positive predictive value positive(PPV), and
- negative predictive value (NPV).

To determine these parameters, a fourfold (2X2) Table should be used.
Results of screening test for a disease in a population with known disease status.

3.5 Screening Test

Diagnosis
Diseased, Not diseases= Total
Positive a b a + b
Negative c d c + d
Total a + c b + d N that is:

- ✓ a = the number of diseased persons with positive screening test (the true-positive).
- ✓ b = the number of persons not diseased but with positive screening test (the false-positive).
- ✓ c = the number of diseased persons but with negative screening test (the false-negative).
- ✓ d = the number of diseased persons with negative screening test (the true-negative).
- ✓ N = the total number of persons (a + b + c + d).

i. Sensitivity

Sensitivity is defined as the ability of the test to identify correctly those individuals having the disease. Sensitivity is independent of the disease prevalence in the population being tested. Sensitivity represents the ratio of the number of individuals with the disease whose screening tests are positive to the total number of individuals with the disease under the study and is usually expressed as a percentage. According to the fourfold table, the sensitivity of the test is determined as:

Sensitivity (%) = a / a + c x 100

ii. Specificity

Specificity is defined as the ability of the test to identify correctly those individuals not having the disease. Specificity is independent of the disease prevalence in the population being tested. Specificity represents the ratio of the number of individuals without the disease whose screening test is negative to the total number of individuals without the disease under the study and is usually expressed as a percentage. According to the fourfold table, the specificity of the test is determined as:

Specificity (%) = b / b + d x 100

iii. Positive predictive value

The positive predictive value of the test represents the ability of the test to identify those individuals who truly have the disease (true-positives) among all individuals whose screening tests are positive. It is the ratio of the number of individuals with the disease whose screening tests are positive to the total number whose screening tests are positive and is usually expressed as a percentage. The positive predictive value is affected by disease prevalence and is increased by increasing the prevalence of the disease. According to the fourfold table, the positive predictive value of the test (PPV) is determined as:

PPV (%) = a / a + b x 100

iv. Negative predictive value

The negative predictive value of the test represents the ability of the test to identify those individuals who truly do not have the disease (true-negatives) among all individuals whose screening tests are negative. It is the ratio of the number of individuals without the disease whose screening tests are negative to the total number whose screening tests are negative and is usually expressed as a percentage. The negative predictive value is affected by disease prevalence and is decreased by increasing the prevalence of the disease. According to the fourfold table, the negative predictive value of the test (NPV) is determined as:

NPV (%) = d / c + d x 100

Both PPV and NPV are determined according to the results of a subsequent confirmatory test. It is of great importance to point that the probability of disease if the test is positive is related to the sensitivity and specificity of the test and to the prevalence of the disease under the study in general population from which the individuals being screened came.

3.6 The Yields of the Screening Service

The yield of a screening service is measured by the number of cases identified whose prognosis is improved as a result of their early detection. This is related to the total number of tests performed. Theoretically, the yields of screening may be improved by restricting it to high risk groups, like screening of infants for developmental and other abnormalities, women for breast cancer, youth for HIV/AIDS. If uptake of a screening procedure is low then yield will be correspondingly limited. Ultimately the yields of a screening service have to be balanced against the costs, in terms of staff and facilities, for screening and making the confirmatory diagnoses.

SELF-ASSESSMENT EXERCISE

1. Explain the word screening in epidemiological studies.

4.0 CONCLUSION

Having successfully discussed and completed this unit it is assume that you have fully understood screening in the study of epidemiology and public health.

5.0 SUMMARY

In this unit, you have learnt the concept of screening in epidemiological studies, purpose of screening in epidemiological studies, the criteria for effective screening, the screening test characteristics, the screening test and different between positive predictive value and negative predictive value in epidemiological studies.

6.0 TUTOR MARKED ASSIGNMENT

1. State the purpose of screening in epidemiological studies.
2. Mention the criteria for effective screening.
3. State the screening test characteristics.
4. Describe screening test.
5. Differentiate between positive predictive value and negative predictive value in epidemiological studies.

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UNIT 8 EPIDEMIOLOGY SURVEILLANCE

CONTENTS

1.0 INTRODUCTION

Epidemiologic surveillance dates back to the time of John Graunt, who published the Natural and Political Observations Made upon the Bills of Mortality in 1662. Graunt's approach for the analysis of death certificates (Bills of Mortality), that volumes of data should be reduced to a few tables and that profit may be gained by analyzing these tables, is consistent with the modern technique of population-based epidemiologic surveillance.

In the subsequent 300 years, the focus of health research shifted to sample-based studies: cross-sectional, cohort and case-control studies, and clinical trials. In recent decades, however, awareness of the limitations of sample-based epidemiologic studies has grown along with recognition of the importance of population-based surveillance systems for measuring the health status of a population, for early warning of emerging health risks and for program development. At the same time, biophysical and socioeconomic data have become of great importance in the understanding of relationships among human health, risk factors and interventions. From these points of views, it appears that epidemiologic surveillance may become the focus of the ongoing health researches using such well-maintained and well validated surveillance databases.

2.0 OBJECTIVES

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

- explain the word epidemiologic surveillance
- state the scope of epidemiologic surveillance
- explain the purpose of epidemiologic surveillance
- describe the types of surveillance:
- discuss the steps of epidemiologic surveillance
- develop a good surveillance system.

3.0 MAIN CONTENT

3.1 Explain Epidemiologic Surveillance

Epidemiologic surveillance is defined as the ongoing systematic collection, recording, analysis, interpretation, and dissemination of data reflecting the current health status of a community or population.

3.2 The Scope of Epidemiologic Surveillance

The scope of epidemiologic surveillance has evolved from an initial focus on infectious disease monitoring and intervention to a more inclusive scope that influences health status that includes chronic diseases, injuries, environmental exposures, and social factors. Surveillance of an epidemic requires a very specific definition of what constitutes a case that can be counted. The number of suspected cases, probable cases, and confirmed cases of a disease are actively sought and monitored. The number of cases, and the relationship between cases, is used during an outbreak investigation in an attempt to identify causes and those at risk, and to implement an intervention. Surveillance does not itself constitute investigation, research, risk management or evaluation, although it makes a significant contribution of information that is essential to all of these. Surveillance may, for example, generate hypotheses, which may later be tested by other methods.

3.3 Purpose of Surveillance:

The most familiar purpose for surveillance is the identification, as rapidly as possible, of unusual events, outbreaks of disease and emerging and re-emerging health issues. It is worth noting that, although high quality surveillance data are always desirable, for these “early warning” purposes, a balance must be struck between timeliness and high levels of validity. Another significant role for surveillance is to inform decisions governing the management of risks to health. This may involve public health programs, regulatory action or public policy responses, all of which are exercises in evidence-based decision making, with surveillance being one important source of evidence.

Merely monitoring the current status of disease prevalence, health indicators, or social markers does not protect the health of a community. Careful monitoring, however, creates a baseline measurement of threats to the public's health. It is this established baseline that enables public health workers to notice when an anomaly occurs. A sharp increase in the number of cases of a disease will instigate further investigation, intervention, and prevention measures.

3.4 Types of Surveillance:

Surveillance is based on both passive and active data collection processes. When a clinician or laboratory encounters a patient or sample indicating the presence of certain conditions or pathogens, there is a legal obligation to report the case to local public health officials. The result is a passive monitoring of the levels of the disease in the community.

Active surveillance, on the other hand, is commonly referred to as "case finding." This occurs when the data necessary to monitor levels of a medical or social condition is sought out actively. This is accomplished through a variety of means, ranging from clinical record reviews to community surveys.

3.5 Steps of Epidemiologic Surveillance

1. Data collection and recording

Epidemiologic surveillance uses a wide variety of data sources, depending upon the circumstance under investigation. For communicable diseases, local and state health departments typically rely on passive reporting. Other sources of data for epidemic surveillance include birth and death certificates; sentinel surveillance sites (i.e., the use of community-based health or occupational sites to monitor for specific health events); cancer, birth defects, and other registries; health interview surveys; and hospital or ambulatory care data collection systems.

The features that distinguish surveillance from other forms of health investigation are that data are collected routinely, frequently or continuously, and they are generated from the entire population or, less frequently, from a representative sample. In infectious disease surveillance, as well as in chronic disease surveillance, it is essential to clearly define the cases. Additionally, in chronic disease surveillance, it is better to define the cases according to the “International classification of diseases”, and in cancer cases, it is also important to confirm the diagnosis by histopathological examination. From these points of view, the following definitions are very important to be known:

- **Case:** A person who meets the case definition.
- **Case definition:** A set diagnostic criteria that must be fulfilled to be regarded as case of a particular disease. Case definition can be based on clinical and/or laboratory criteria or a combination of the two.

- **Suspect case:** A case that is classified as suspected, usually on clinical basis for reporting purposes.
- **Probable case:** A case that is classified as probable on clinical plus either epidemiological or laboratory basis for reporting purposes.
- **Confirmed case:** A case that is classified usually on laboratory basis as confirmed for reporting purposes. In Cancer, the confirmation of diagnosis is only by histopathology.
- **Epidemiologically-linked case:** A case in which the patient has had contact with one or more persons who either have/had the disease or have been exposed to a point source of infection.
- **Laboratory linked-case:** A case that is confirmed by one or more of the laboratory methods listed in the case definition under Laboratory Criteria for Diseases. Although other laboratory methods can be used in clinical diagnosis, only those listed are accepted as laboratory confirmation for national reporting purposes.

2. Data analysis and interpretation

The process of surveillance includes not only data collection, but also integration, analysis and interpretation to produce a "surveillance product" for a specific public health purpose or policy objective, as well as the dissemination of that product to those who need to know.

3. Information dissemination

The ongoing and timely information dissemination system helps to alert health professionals and the general public about forthcoming health risks (e.g. risk assessment) and to put our current knowledge of risk assessment and management into perspective so that the general public will know what health risks to avoid (e.g. publication of “Handbook or Handbill of Health Risks”) and what healthy activities to pursue (e.g. publication of “Handbook of
Healthy Practices, Hand washing, wearing of nose Mask”)

4. Public health practice

Surveillance information is actually utilized for the development and evaluation of programs and policies and to increase the impact of surveillance activities on society.

5. Computer Technology

The automated search and linkage techniques are essential to retrieve information from a vast array of data. Also automated

data analysis systems is essential to produce early warning signals for health and risk factor trends

3.6 Developing a Good Surveillance System

To develop a good surveillance system, the following activities are needed for setting up a good, comprehensive and long-term surveillance system:

1. Conducting a series of round table discussion sessions to identify the purposes and priorities for the comprehensive surveillance system.
2. Conducting an extensive literature review and literature survey to identify valid, reliable indicators of the biophysical and socioeconomic environments and health outcomes; using meta-analysis to prioritize risk variables based on relative risks and attributable risks.
3. Conducting a series of Delphi surveys (an initial survey to acquire indicators and subsequent surveys to rank indicators) among cross disciplinary teams of experts to identify the set of indicator measures favoured by the experts for each of the health, risk and intervention areas.
4. Conducting a series of experts' consensus workshops to refine the set of indicators and to develop ground rules and working definitions for the early warning and program development system for the chosen health outcomes.
5. Determining the availability of existing databases for these indicators, how to access such databases and how multiple databases can become part of a comprehensive surveillance system.
6. Evaluating the quality and developing methods for improving the quality of such existing databases.
7. Identifying gaps in data availability and developing methods for collecting additional information for the surveillance system.
8. Repeating steps 2-4 to identify rank and refine the set of statistics to be generated from the surveillance system.
9. Repeating steps 2-4 to identify rank and refine the methods of using surveillance data for public health.

The surveillance systems are now established in many countries not only for infectious diseases but also for chronic disease.

SELF-ASSESSMENT EXERCISE

1. Explain the epidemiologic surveillance

4.0 CONCLUSION

Having successfully discussed and completed this unit it is assume that you have fully understood epidemiology surveillance use in epidemiology and public health.

5.0 SUMMARY

In this unit, you have learnt the concept of epidemiologic surveillance, scope of epidemiologic surveillance, the purpose of epidemiologic surveillance, the types of surveillance, the steps of epidemiologic surveillance and developing a good surveillance system.

6.0 TUTOR MARKED ASSIGNMENT

1. State the scope of epidemiologic surveillance
2. Explain the Purpose of epidemiologic surveillance
3. Describe the types of surveillance
4. Discuss the steps of epidemiologic surveillance
5. Explain how to develop a good surveillance system.

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UNIT 9 BASIC MEASUREMENT IN EPIDEMIOLOGY

CONTENTS

1.0 INTRODUCTION

Measurement is the process of systematically assigning numbers to objects and their properties to facilitate the use of mathematics in studying and describing objects and their relationships. Some types of measurement are fairly concrete: for instance, measuring a person's weight in pounds or kilograms or his height in feet and inches or in meters. Note that the particular system of measurement used is not as important as the fact that we apply a consistent set of rules: we can easily convert a weight expressed in kilograms to the equivalent weight in pounds, for instance. Although any system of units may seem arbitrary (try defending feet and inches to someone who grew up with the metric system!), as long as the system has a consistent relationship with the property being measured, we can use the results in calculations. Measurement is not limited to physical qualities such as height and weight. Epidemiology focuses, among other things, on the measurement of mortality and morbidity in human populations. The first requirement is, therefore, the definition of what is to be measured and the establishment of criteria or standards by which it can be measured which is rate. In this unit, measuring the occurrence of an event or disease in a given population during a given period usually expressed per year, birth rate, growth rate, accident rate per 100 or per1000 population.

2.0 OBJECTIVES

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

- define rate
- identify the Measures of disease frequency in epidemiology
- explain the measurement of mortality
- explain the measurement of natality
- describe the measurement of disability
- discuss measurement of medical needs, health care facilities and utilization of health services.

3.0 MAIN CONTENT

3.1 Definition of Rate

In ordinary usage, a rate is a quantity measured and compared to another quantity measured such as a number of miles per hour or is the cost of something. Use in epidemiology, a rate is a measure of the frequency with which an event occurs in a defined population over a specified period of time. In general, a rate is equal to the number of cases which is the numerator over the number of cases which is the denominator or the entire population multiplies by the standard which is 1000 or 10, 000 as the case may be. E.g. Number of cases or event x 1000 or 1,0000 = Total population in the same area

3.2 To identify the Measures of Disease Frequency in Epidemiology

The measures of disease frequency in epidemiology are incidence and prevalence.

3.2.1 Incidence Measures the Rate of Occurrence of New Cases of a Disease or Condition

Incidence is the number of instances of a factor (disease, injury, health status etc) during a given period (day, month, year, decade) in a specified population (age group, community, country etc). Incidence can tell us how many cases of a particular factor have been suffered by a specified population in a given period of time. It is a measure of disease that allows us to determine a person's probability of being diagnosed with a disease during a given period of time or it might tell us how patterns of a condition within a population change over time. Incidence is usually expressed as a rate, something that is measured within a set number of people and in a time period. Incidence rate is defined as the number of new cases of a disease occurring over a particular time period in a community. Incidence may also relate to diseases, epidemics, admissions or deaths. Example:

$$\text{Incidence} = \frac{\text{number of new cases of a disease in a given time frame}}{\text{Population at risk}} \times 1000$$

Incidence narrates the rate at which a new disease is occurring in a well-defined group of previously healthy people, free of that disease.

To determine the incidence rates, a few basic criteria need to be fulfilled.

i. A good standard must exist on the basis of which a person can be classified as being disease or healthy which may be clinical or based on investigation.
ii. One should know the exact time of onset of the disease. That is the date of definitive diagnosis which does not include the time period when the disease was being suspected and investigated.
iii. The number in denominator (population at risk) should not include those who already have the disease and who are not at risk of developing the disease because of previous immunization.
iv. The time period for which the incidence rate is being calculated should be long enough to allow a true representation of the new cases for diseases occurring with high frequency, the time period is usually a year. For diseases of low frequency, the time period may span a number of years.

Incidence rates are useful for knowing the current situation, and assessing the impact of an intervention to control a disease.

Attack Rate-it is a specialized rate of incidence, equivalent to incidence in a population observed for a limited period of time such as in an epidemic situation. It is determined by dividing the number of new cases of a disease during the epidemic by the total population at risk during the same epidemic. The attack is expressed as percentages (%) and not per 1000.

Prevalence is the number of individuals with the disease either at a specific point in time, that is, the point prevalence or over a specified time period that is the period prevalence which includes both new and existing cases of disease. Prevalence is the study of how often diseases occur in different groups of people and why, and is used to plan and evaluate strategies to prevent illness and as a guide to the management of patients in whom disease has already developed. Epidemiology is often described as the basic science of public health. Epidemiology is the study of the distribution and determinants of health-related states or events in specified populations, and the application of this study to the control of health problems. The Centre for Disease Control (CDC) breaks this definition down into the important principles of epidemiology:

Study - a scientific discipline with sound methods of scientific inquiry at its foundation. Various methods can be used to carry out epidemiological investigations: surveillance and descriptive studies can

be used to study distribution; analytical studies are used to study determinants.

Distribution - the frequency (number of health events in a population and its relationship of that number to the size of the population - prevalence) and pattern (the occurrence of health-related events by time, place, and person - incidence) of health events in a population.

Determinants - the causes and other factors that influence the occurrence of disease and other health-related events.

Health-related states or events - these may include communicable and non-communicable diseases, chronic diseases, injuries, birth defects, maternal-child health, occupational health, and environmental health. More recently studies have included behaviours related to health and well-being and genetic markers of disease risk.

Specified populations - the epidemiologist is concerned about the collective health of the people in a community or population. A key feature of epidemiology is the measurement of disease outcomes in relation to a population at risk. Implicit in any epidemiological investigation is the notion of a target population about which conclusions are to be drawn and are often observations that can only be made on a study sample, which is selected in some way from the target population.

Application - Epidemiology is not just "the study of" health in a population; it also involves applying the knowledge gained by the studies to community-based practice. Epidemiology is the study (scientific, systematic, data-driven) of the distribution (frequency, pattern) and determinants (causes, risk factors) of health-related states and events (not just diseases) in specified populations (patient is community, individuals viewed collectively), and the application of (since epidemiology is a discipline within public health) this study to the control of health problems. Prevalence measures how much of a disease or condition there is in a population at a particular point in time.

The prevalence rate measures the number of people in a population who have a disease at a given time. This includes both the old cases and the new ones and is obtained by cross-sectional studies. For disease with an acute onset and short duration of illness, the prevalence rates are generally lower compared to those with a sub-acute onset and longer duration. Example

$$\text{Prevalence} = \frac{\text{number of total cases (new + old) of a disease at a given point in time or over a given time frame}}{} \times 1000$$

Total population
Other Commonly Used Measures of Disease Frequency in Epidemiology are:

A Crude Rate-it is defined as the total number of events, or count, divided by the mid-year total population of the selected geography and multiplied by a constant, which is a multiple of 10. Typical constants used for public health rates include 100, 1,000, 10,000, or 100,000. They are applied to the entire population and the population at risk alone. These are easy to calculate. Example crude death rate is equivalent to the number of deaths from all causes, at all ages, per 1000 population at the middle of a year =number of deaths in a year x 1000

Total population at mid-point of the same year
The measurement is crude because the denominator which is the total population is crude. It simply refers to the whole population, irrespective of whether it has a risk of death or not. Total population is not an ideal denominator for different ages. Therefore, crude rates of two populations cannot be compared if they are not similar in age or sex. For comparison we rely on specific rates.

There may be group specific according to age, sex, social status or disease specific. For example:

- ✓ Age Specific Death Rate (1-5 years)
  = number of deaths in children aged 1-5 in one year x 1000
  Total number of children aged 1-5 in the same year

- ✓ Cause Specific Death Rate
  = Number of death in children due to diarrhea in a year x 10,000
  Mid-year estimated population

- ✓ Stillbirth Rate- it is the number of stillborn infants after 28 weeks of gestation related to the number of births (live and still) during the same year/period. It is expressed in relation to 1000 total births.
  = number of stillborn infants in a year x 1000
  Total number of birth in the same year

- ✓ Pirinatal Mortality Rate (PMR)- Number of deaths occurring in the perinatal period including stillbirths plus the deaths occurring in the first seven days after birth in a given year to the total number of births (live and still) in the same year. It is expressed as rate per 1000 total births.
  PMR = number of stillbirth + deaths during the first week of life in a year x 1000

Total number of birth in a year

- ✓ Neonatal Mortality Rate (NMR)- It is the number of neonatal deaths in relation to 1000 live births per year.
  NMR= Number of deaths in neonates aged less than 28 days in a year x 1000
  Total number of live birth in a year

- ✓ Infant Mortality Rate (IMR)- it is the number of deaths of infants in a year in relation to 1000 live births during the same year
  IMR= number of deaths in children less than 1 year of age in a year x 1000
  Total number of live births in a year

- ✓ Post-Neonatal Mortality Rate (PNMR)
  PNMR =Number of deaths in children between 28 days and one year of age in a year x 1000
  Live birth in the same year

- ✓ Child Mortality Rate- It is computed as:
  CMR= Number of deaths in children aged 1-4 years during a year x 1000
  Total number of children aged 1-4 years at the middle of the same year
- ✓ Under 5 Mortality Rate- it is expressed as a sum of infant mortality rate and child mortality rate
  U5MR= number of under 5 deaths during a given period x 1000
  Total number deaths during the same period
  Indices Relating to Birth and Fertility
  Crude Birth Rate- it is the number of live births reported in a given year per 1000 of total population at the middle of the year
- ✓ CBR = Number of live births during the year X 1000
  Total estimated population at the middle of the year
  Natural Growth Rate- is a measurement of population growth in the absence of migration comprising addition of new born to the population and subtraction of deaths. The result is also known as natural rate of increase.

- ✓ GR = live birth –deaths during the year x 1000
  Mid-year population
  General Fertility Rate (GFR)- the general fertility rate is more informative as compared to the crude birth rate, since it uses the population capable of reproducing as a denominator.

Age Specific Birth/Fertility Rate (ASFR)- This is considered a more accurate number of fertility in a given population and is expressed as:

- ✓ Number of live birth to women of a particular age group x 1000
  Total number of women of the same age group in a population

Legitimate Birth Rate (General Marital Fertility Rate)- it is expressed as:

- ✓ GMFR = Number of live births to married women over a time period x 1000
  Number of married women (15-49 years) at the midpoint of the same period.

Pregnancy Rate is expressed as

- ✓ PR= Number of pregnancies in a year to married women in the age 15-49 years x 1000
  Number of married women in the age 15-49 years at the midpoint of the same period

Age Specific Marital Fertility Rate (ASMFR) is expressed as:

- ✓ Number of live births in a particular age group x 1000
  Midyear marital female population of the same age group

To Describe the Measurement of Disability

3.3 The Importance of Measuring Disability

The World Report on Disability estimates that there are about one billion people with disabilities in the world. There are a number of important reasons why we should collect data on disability:

- ➢ For advocacy, so that we can promote the full inclusion of people with disabilities in their societies on an equal basis with others.
- ➢ For programme planning, so that we know how many people with disabilities there are, and the contexts that they live in. We need to know this to plan programmes that adequately meet their needs.
- ➢ Because the Sustainable Development Goals (SDGs) describe the need for inclusive development that "Leaves no one behind". We must ensure that data on disability is included in all reporting on achievements towards the SDGs so that we can assess how far each goal is achieved for people with disabilities and ensure they are not left behind.

Persons with disabilities face higher risks and challenges in society, which are further exacerbated in conflict settings where resources are limited and subject to fierce competition. It is estimated that for every person who dies during a disaster, three people sustain injury which often results in long-term disabilities. The World Health Organization (WHO) and International Classification of Functioning, Disability and Health (ICF) describe disability as "an umbrella term for impairments, activity limitations and participation restrictions. It denotes the negative aspects of the interaction between a person's health condition(s) and that individual's contextual factors (environmental and personal factors)". They identify disabilities as a global public health issue and a human rights concern as persons with disabilities are faced with barriers in accessing services (i.e., health care, education, employment, social services), and experience widespread societal discrimination and inequalities. Underscoring its significance, disability has been incorporated in the global 2030 Sustainable Development Goals (SDGs) as a cross-cutting theme, nestled in various goals and targets. Targets focused on persons with disability range from poverty and hunger (SDGs 1 and 2), health and well-being. (SDG 3), sexual and reproductive health and reproductive rights (targets 3.7 and 5.6), education (SDG 4), gender equality and empowerment of women and girls with disabilities (SDG 5), availability of water and sanitation (SDG 6), access to energy (SDG 7), employment and decent work (SDG 8), access to information and communications technology (target 9.c), inequality (SDG 10), inclusive cities and human settlements (SDG 11), disasters, shocks and climate change (targets 1.5 and 11.5 and SDG 13) and finally violence against persons with disabilities, inclusive societies and institutions, representative decision-making, birth-registration and access to justice and information (SDG 16). Thus, studying the underlying risks and challenges facing these vulnerable populations is a key priority to design and implement effective interventions as a step towards sustainable development (Nadia et al, 2019).

3.4 Approaches to Measuring Disability

Disability takes many different forms and measuring it satisfactorily turns out to be quite difficult. One reason for this lies in the inherent complexity of the concept. Another lies in the differing administrative and political agendas of the users of census and survey data on disability, which lead them to focus on different aspects of "disability" and to seek to use the information in different ways.

There are three main approaches to measuring disability which are compatible with the international classification of functioning, disability and health (ICF) model.

The first approach to measuring disability is to directly ask people whether they view themselves as being disabled or having a disability. This approach is simple and quick, but is likely to severely underestimate the prevalence of disability as people may not consider themselves to be disabled, or fear stigma or discrimination if they are labelled as disabled. It is therefore recommended that direct questioning is not used to measure disability.

A second approach is to measure disability through self-reported functioning; that is, asking people whether they experience difficulties in different functional domains. The Washington Group on Disability Statistics, a United Nations City Group, have developed a short set of questions which aims to capture the proportion of the population living with different levels of functional limitation. These questions ask whether a person experiences difficulties in six basic functional domains: seeing, hearing, walking, cognition, communicating and self-care**:**

1. Do you have difficulty seeing, even if wearing glasses?
2. Do you have difficulty hearing, even if using a hearing aid?
3. Do you have difficulty walking or climbing steps?
4. Do you have difficulty remembering or concentrating?
5. Do you have difficulty (with self-care such as) washing all over or dressing?
6. Using your usual (customary) language, do you have difficulty communicating, for example understanding or being understood?

The MDS considers that disability is a continuum that ranges from low to high levels of severity and measures both what the person is capable of doing in their current environment (performance) and what they would be capable of doing in a fully inclusive and accessible environment (capacity).

Assessment of impairments or health conditions

Impairments or health conditions are components of disability that can be measured directly using objective testing. The Rapid Assessment of Avoidable Blindness (RAAB) for example, is designed to objectively measure visual impairment in the population. Impairment and health condition data are important for planning appropriate health and rehabilitative services amongst those who would benefit from these (e.g. provision of cataract surgery, hearing aids, mobility devices). This may

be particularly needed in low resource settings where inadequate access to health care is closely related to disability. However, it is important to recognize that impairment and health condition testing in isolation generally does not consider how it affects the individual's level of functioning or participation. This type of assessment may also be more resource intensive to undertake than gathering self-reported information. However, recent advances in technology are increasing the ability of non-clinical interviewers to undertake short impairment tests alongside self-reported functioning tools. One example is Peek Acuity, which allows the assessment of visual acuity and other eye measures by a non-specialist using a Smartphone.

World Health Organisation (2018) stated the components for measuring disability thus:

- Seeing (at a distance);
- Hearing;
- Mobility (walking or climbing steps);
- Cognition (remembering or concentrating);
- Self-care (washing or dressing);
- Energy and drive (sleeping);
- Household tasks;
- Community participation (joining community activities);
- Affect (feeling sad, low, worried or anxious);
- Interpersonal relationships (getting along with people who are close);
- Pain.

3.5 Measuring Disability

Disability involves the interaction of a person's functional status with their physical, cultural, and policy environments. If the environment in which one lives is designed for the full range of human functioning and incorporates appropriate accommodations and support mechanisms, then people with functional limitations would not be "disabled" in the sense that they would be able to fully participate in society.

Disability represents a complex process and is not a single, static state. It refers to the outcome of the interaction of a person and his/her environment (physical, social, cultural or legislative) and represents a measure of the negative impact of environmental factors on one's ability to participate. Article 31 of the United Nations Convention on the Rights of Persons with Disabilities (CRPD) mandates that ratifying states "collect appropriate information, including statistical and research data, to enable them to formulate and implement policies to give effect to the

present Convention". Currently, there is lack of consensus on how to measure disability, and disability prevalence estimates are still strongly influenced by each country's conceptual or legal definitions of disability and by the questions used to operationalize these definitions in disability, health and social surveys and censuses. Such conceptual and definitional variability has not only an immediate impact on disability estimates, but may contribute in the middle and long run to inconsistent or insufficient policy solutions and, ultimately, negatively impact the lives of those experiencing disability. A recent review of disability surveys carried out in all world regions shows that the definition proposed in the WHO International Classification of Functioning, Disability and Health (ICF), as the outcome of "the interaction between an individual with a health condition and that individual's contextual factors such as personal and environmental factors)",

The conventional approach to collecting information on disability is to screen the population at the outset to identify 'people with disabilities' and then to ask this sub-population follow-up questions about everyday problems that they face. Screeners may either be impairment or functioning questions. Impairment screeners are used to select a population of disabled individuals either by asking about the presence of an impairment or health condition, while functioning screeners target limitations in selected functioning domains because of a health condition, such as problems performing activities of daily living. This set has six standard basic functioning domains: seeing, hearing, walking or climbing steps, remembering or concentrating, washing all over or dressing and communicating. (http://www.sintef.no/home/projects/sintef-technology-and-society/2006/studies-on-living-conditions/).

Article 1 states that "Persons with disabilities include those who have long-term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others" In response to calls for improved disability data collection, the Model Disability Survey (MDS) project (http://www.who.int/disabilities/data/mds.pdf) was initiated by the WHO and the World Bank (WB) in 2011. The MDS conceptualizes disability as an outcome of interactions between a person with a health condition and environmental and personal factors, rather than just focusing on a person's health state, impairments or functional limitations.

The aims of the MDS are to:

- Achieve comparable and standardized prevalence estimates across countries,
- Provide the data needed to design appropriate interventions, programs and policies for persons with mild, moderate and severe levels of disability and
- Provide data needed to monitor the implementation by allowing for a direct comparison among people with disabilities of any level of severity and those without.

The International Classification of Functioning, Disability and Health (ICF) developed by the World Health Organization (WHO, 2001) provides a common language and a common point of reference in realizing this conceptualization of disability and recommended Short **S**et of Questions on Disability for Censuses. It is intended that these questions will identify the majority of persons in the population who are at greater risk than the general population of experiencing limited or restricted participation in society. The questions cover six functional domains or basic actions: seeing, hearing, walking, cognition, self-care, and communication. Ask the questions about difficulties a person may have when doing certain activities because of a health problem.

1. Do you have difficulty seeing, even if wearing glasses?
2. Do you have difficulty hearing, even if using a hearing aid?
3. Do you have difficulty walking or climbing steps?
4. Do you have difficulty remembering or concentrating?
5. Do you have difficulty with self-care such as washing or dressing?
6. Do you have difficulty communicating for example understanding or being understood by others)?

3.6 To Discuss Measurement of Medical Needs, Health Care Facilities and Utilization of Health Services

Measurement is the basis for assessing potential improvements in healthcare quality. In 1948, WHO defined health as “a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity”. Health can be considered in terms of a person’s body structure and function and the presence or absence of disease or a sign **that is health status**; their symptoms and what they can and cannot do that is the extent to which the condition affects the person’s normal life **that is quality of life**.

Health care is the prevention, treatment, and management of illness and the preservation of health through the services offered by health care organizations and professionals. It includes all the goods and services

designed to promote health, including "preventive, curative and palliative interventions, whether directed to individuals or to populations".

3.7 Discuss Measurement of Medical Needs

Health status can be measured using pathological and clinical measures and is usually observed by clinicians or measured using instruments. Types of disease measurement include:

- Signs - blood pressure, temperature, X-ray, tumour size
- Symptoms - disease specific checklists
- Co-morbidity - Charlson Index, ICED- index of co-existing disease (looks at both disease severity and functional severity), adverse events – pain, bleeding, readmission, complications (e.g. using Clavien-Dindo Classification of Surgical Complications).

It is always best to use an existing measure which has been tried and tested rather than inventing a new one. Use an existing standardized measure with proven reliability, validity and responsiveness.

3.8 Discuss Health Care Facilities

Health facilities are places that provide health care. They include hospitals, clinics, outpatient care centers, and specialized care centers, such as birthing centers and psychiatric care centers. An effective health care delivery system improves not only an individual's health but also the nation's health. The health care infrastructure is a complex system of facilities, insurance plans, professionals, technologies, and more. These facilities collaborate to deliver high-quality health care to patients and communities.

1 **Hospital** Hospitals primarily provide diagnostic and treatment services to patients who require intensive or immediate care. Most hospitals are in-patient facilities, requiring patients to stay under the supervision of specialized health care professionals until discharged. Hospitals are generally classified by the type of ownership, treatment, facility size, and length of a patient's stay. The majority of them are nonprofits, typically governed by a Federal/State health authority.

Most people are familiar with a general hospital, which admits patients for all types of medical conditions. Depending on a patient's diagnosis, a general hospital may refer him or her to an acute care hospital, such as a cancer treatment, children's, or

maternity hospital, or to a member of the hospital's outpatient facility network.

2 **Outpatient Clinic**-An outpatient clinic or facility is often for patients who need short-term care and can recover at home. Hospitals refer discharged patients to a network of outpatient clinics that specialize in services for ongoing conditions such as weight loss, drug or alcohol rehabilitation, and physical therapy. Outpatient clinics are typically more convenient and affordable for patients as well. Day surgery centers, urgent care clinics, and specialty clinics are often in close proximity to a patient's home, providing easier access to high-quality, non-emergency care.

3 **Long-Term Care Facility-**Long-term care facilities support people with short-term recovery, ongoing health conditions, or disabilities. They are designed to help patients' complete daily activities as safely and as independently as possible. Community and assisted living facilities care for seniors who are still relatively independent, while nursing home facilities care for patients who need full-time care.

4 **Clinical Lab-**A clinical laboratory, or lab, completes diagnostic tests ordered by physicians and primary care providers. Using biological specimens, such as blood, urine, or saliva, medical technicians run tests to help diagnose, treat, and monitor a patient's health. Clinical lab facilities can be organized by function or test specialisation. General clinical labs run common tests, while other labs, such as cancer clinics, run disease-specific tests. Test specialisation facilities run diagnostic tests for a certain field, such as public health or haematology.

5 **Hospice-**Hospice is another type of health care facility. A hospice facility cares for the terminally ill or people nearing the end of life. Typically, hospice care is for patients who have no more than six months to live. A team of professionals, such as physicians, nurses, spiritual advisors, and counsellors, supports both the patient and the patient's family during the transition. Depending on the care required and cost, hospice services can be accessed in a hospice facility, at the patient's home, in long-term facilities, or in the hospital.

6 **Ambulatory Surgical Centers**-Ambulatory surgical centers, also called outpatient surgical facilities, allow patients to receive certain surgical procedures outside a hospital environment. These environments often offer surgeries at a lower cost than hospitals

while also reducing the risk of exposure to infection since patients are there for surgery, not to recover from sickness and disease. Ambulatory surgical centers don't provide diagnostic services or clinic hours. Instead, they take patients who have been referred for surgery by a hospital or physician they're designed to be "all business" when it comes to surgical care.

7 **Birth Centers-**A birth center is a healthcare facility for childbirth that focuses on the midwifery model, according to the American Association of Birth Centers. They aim to create a birth environment that feels more comfortable to the mother and allows for a cost-effective, family-inclusive birth. Birth centers are not typically equipped with the same contingency equipment and staff as a hospital, such as surgeons in case of a C-section or a neonatal intensive care unit. As a result, birth centers accommodate only healthy pregnancies without any known risk or complication factors. These facilities are guided by principles of prevention, sensitivity, safety, cost-effectiveness and appropriate medical intervention when needed.

8 **Blood banks-**Blood banks allow donors to donate blood and platelets while also storing and sorting blood into components that can be used most effectively by patients. "Red blood cells carry oxygen, platelets help the blood clot and plasma has specific proteins that allows proper regulation of coagulation and healing," Sometimes patients need these particular components specifically, and sometimes they just need lots of blood. For example, a single car accident victim could require as many as 100 pints of blood. Blood is essential for human life, and it can't be manufactured only donated. So these facilities work to build the supply for patients who need it.

9 **Clinics and medical offices-**The definition of a clinic is "a facility for diagnosis and treatment of outpatients." There are many healthcare facilities that fit that definition across a wide variety of treatment specialties. Many people go to a clinic for routine doctor's appointments and checkups. These healthcare facilities can be a physician's private practice, a group practice setting or a corporately owned clinic that may be connected to a larger healthcare system or hospital. Clinics cover a lot of ground in healthcare. For example, you could visit a dental clinic to have a toothache investigated, a physical therapy clinic to recover from an athletic injury or a paediatric speech therapy clinic to help your child overcome an articulation disorder.

The goal of these clinics is to give people preventative care and important diagnoses with as much convenience as possible. These clinics allow patients to get a flu shot or receive a prescription without making an appointment at their physician's office. While many medical providers believe that a continued relationship with a provider is better for patients' long-term health.

10 **Diabetes education centers**-Diabetes is a very serious illness. Patients with diabetes need to manage the disease and typically make lifestyle adjustments to keep it from becoming life-threatening. Since diabetes is so widespread, diabetes education centers rose up to help patients manage their disease and to help people at risk for diabetes to avoid it, if possible. Diabetes education centers typically offer classes, education, support groups and a variety of resources to help patients manage their diabetes and live as complication-free as possible.

11 **Dialysis Centers**-Patients with kidney disease often needs regular treatments of dialysis. Dialysis is a process that filters and cleans the blood artificially for the kidneys normally take on. When kidneys are not able to filter the blood the way they are supposed to, patients might need dialysis as often as three times a week to avoid serious complications. With such high demand, dialysis facilities rose up to meet patient needs and avoid undue strain on hospitals.

12 **Imaging and radiology centers-**These facilities, much like their hospital counterparts, offer diagnostic imaging services to patients. Diagnostic imaging includes CT scans, ultrasounds, X-rays, MRIs and more. While hospitals and even clinics have imaging centers, outpatient facilities help keep costs lower and allow more convenient scheduling for patients. Hospital facilities will likely handle imaging for urgent cases, such as an MRI for a brain injury. But any imaging that can be scheduled in advance, such as ultrasounds to monitor a pregnancy, could take place at an imaging center.

13. **Mental health and addiction treatment centers-**This type of healthcare facility is a grouping for many different types of facilities. Mental health treatment facilities sometimes exist as a general institution for any mental health issue and are sometimes specialized. Examples of these kinds of facilities are suicidal thoughts (or suicidal ideation) treatment, depression treatment, trauma and post-traumatic stress disorder (PTSD) treatment,

treatment for anxiety disorders, behavioural disorders and more. You can find inpatient or outpatient versions of many mental health facilities, designed to assist patients through different stages of their healing processes. At the acute-care level, you can find mental health wards in hospitals as well as hospitals specifically devoted to mental health and long-term care facilities. Addiction treatment centers typically deal with drug and alcohol addictions, as well as problematic behavioural addictions like gambling, work, shopping or the internet.

14. **Nursing homes**-Nursing homes offer a living situation for patients whose medical needs are not severe enough for hospitalization, but are too serious to manage at home. Some nursing homes offer services for heavier medical needs, such as speech and occupational therapy. Other nursing homes try to create a homier atmosphere, and might operate like an apartment complex with medical staff on hand. According to the National Care Planning Council (NCPC), nursing homes enable patients with injuries, acute illnesses or postoperative care needs to recover in an environment outside the hospital. These facilities offer long-term medical care ranging from simple to complex levels of need in an environment built for residents to live in long term instead of just staying a few weeks or months. Many people picture elderly patients in a nursing home. For the most part that's true over 80 percent of patients are over the age of 65. But there are also younger patients in nursing homes that may have serious long-term illnesses and need care beyond what their families can provide.

15 **Orthopaedic and other rehabilitation centers:** Orthopaedic medicine deals with muscles and bones. Physical therapists are typically the practitioner patients see for problems in these areas of the body. If you are experiencing chronic lower back pain, for example, you might see a physical therapist at an orthopaedic center or clinic to get a diagnosis and a plan of treatment. Orthopaedic centers deal in everything from athletic injuries to therapy for patients with disabilities. They typically offer evaluation and diagnosis of the problem, as well as prevention, treatment and rehabilitation work involving bone, tendon, ligament, muscle and joint conditions. These healthcare facilities have a variety of names depending on their specialization. They might simply be called outpatient physical therapy centers. Or you could find paediatric physical therapy clinics, sports medicine centers or geriatric physical therapy clinics. There are also rehabilitation centers where patients can receive various

therapies to help restore their abilities after an illness or injury. Physical therapy, occupational therapy and speech therapy are all processes that help people gain or regain skills they need to move around, work or speak in daily life. Practitioners at rehabilitation centers work with people to help them recover as much of their mobility and independence as possible. Outpatient rehab centers can relieve the strain on hospital rehabilitation floors.

16 **Urgent care-**Urgent care (UR) facilities exist for on-demand healthcare needs that are not severe enough for the emergency room, but are too severe or concerning to wait for a scheduled appointment at the doctor's office. Urgent care is a common choice when children get sick, for example, and need an immediate diagnosis or relief from symptoms. Providers in the UR are experts in acute care. They can set broken bones and treat limb fractures; diagnose a viral illness; run strep tests, blood tests and urine labs and provide treatment for injuries. If a problem is too severe, then urgent care practitioners will call an ambulance or refer patients to a hospital or specialist.

17 **Tele-health-**While tele-health isn't really a type of healthcare facility; it is worth mentioning in its potential for serious growth in the coming years. Tele-health, telemedicine and remote healthcare can represent a digital type of healthcare facility. Tele-health refers to the use of electronic communication technology to facilitate long-distance health care and health education, according to the federal Health Resources and Services Administration (HRSA). Many people lack easy access to physicians and specialty clinics. Whether through their physical location, physical ability, living situation or transportation choices, and many patients have a hard time getting to a medical practitioner face to face. Those patient limitations, the push to lower costs in healthcare, and new technological capabilities have all come together to motivate tele-health applications. This might look like live video conferencing between patient and physician. Or a patient with an illness might wear a device to allow remote monitoring from their medical team. For quick consultations, tele-health can be an ideal option even for patients with easy access to their doctors. "When you log into a web-based service, the doctor or nurse practitioner can prescribe medications, suggest home care strategies or recommend additional medical care,"

3.9 Discuss Utilisation of Health Services

Health Care Utilisation is the quantification or description of the use of services by persons for the purpose of preventing and curing health problems, promoting maintenance of health and well-being, or obtaining information about one's health status and prognosis. *Utilization* of *service* is the actual coverage and it is categorised into ambulatory *medical care services* (outpatient and home); inpatient *services* (hospital); and preventive *services*. Ideally, need is the major determinant of health-care utilisation, but other factors clearly have an impact. They include poverty and its correlates, geographic area of residence, race and ethnicity, sex, age, language spoken, and disability status

Satisfaction can be defined as the extent of an individual's experience compared with his or her expectations. Patients' satisfaction is related to the extent to which general health care needs and condition-specific needs are met. Evaluating to what extent patients are satisfied with health services is clinically relevant, as satisfied patients are more likely to comply with treatment, take an active role in their own care, to continue using medical care services and stay within a health provider where there are some choices and maintain with a specific system. In addition, health professionals may benefit from satisfaction surveys that identify potential areas for service improvement and health expenditure may be optimized through patient-guided planning and evaluation.

Measures of supply and demand' and 'Study design for assessing effectiveness, efficiency and acceptability of services including measures of structure, process, service quality, and outcome of health care. They may include:

- Patient satisfaction and experience and patient reported outcome measures. There are many tried and tested patient surveys in existence to capture satisfaction and experience as used by the Care Quality Commission and Picker Institute in national performance monitoring.
- Quality of health care can also be measured in terms of process as well as outcomes such as the implementation of guidelines, latest evidence and criteria for treatment and referral. In addition quality can be assessed by external organizations such as the Care Quality Commission through their monitoring and inspection processes and Monitor.
- Quantity or productivity of health care organizations throughput of patients, bed occupancy and waiting times are commonly used measures.

- Financial performance is now considered a key aspect of health care performance.

SELF-ASSESSMENT EXERCISE
Discuss health care facilities.

4.0 CONCLUSION

Having successfully discuss the basic measurement in epidemiology and completed this unit it is assume that you have fully understood the basic measurement in epidemiological in public health.

5.0 SUMMARY

In this unit, you have learnt the definition of rate, measurement of births and disease frequency such as crude birth rate, infant mortality rate, morbidity, mortality, natality, disability and measurement of medical needs, health care facilities and utilization of health services in epidemiology

6.0 TUTOR-MARKED ASSIGNMENT

1. Explain the word rate in epidemiology.
2. State the formula for working: (a) morbidity rate (b) mortality rate (c) infant mortality rate.

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UNIT 10 BASIC CONCEPTS' IN EPIDEMIOLOGY

CONTENTS

1.0 INTRODUCTION

Epidemiology is the study (scientific, systematic, data-driven) of the distribution (frequency, pattern) and determinants (causes, risk factors) of health-related states and events (not just diseases) in specified populations (patient is community, individuals viewed collectively), and the application of.

2.0 OBJECTIVES

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

- define the various basic concepts in epidemiology.

3.0 MAIN CONTENT

3.1 Explain the Basic Concepts in Epidemiology

- Epidemiology is the study of the distribution and determinants of health and disease in human population to enable health services to be planned rationally, disease surveillance to be carried out, and preventive and control programmes to be implemental and evaluated.
- **Distribution** - Epidemiology is concerned with the frequency and pattern of health events in a population.
- **Determinants** - Epidemiology is also used to search for causes and other factors that influence the occurrence of health-related events.\
- **Agent**. A factor, such as a microorganism, chemical substance, or form of radiation, whose presence, excessive presence, or (in deficiency diseases) relative absence is essential for the occurrence of a disease.

- **Airborne Transmission.** Airborne transmission refers to situations where droplet nuclei (residue from evaporated droplets) or dust particles containing microorganisms can remain suspended in air for long periods of time. These organisms must be capable of surviving for long periods of time outside the body and must be resistant to drying. Airborne transmission allows organisms to enter the upper and lower respiratory tracts. Fortunately, only a limited number of diseases are capable of airborne transmission. Diseases capable of airborne transmission include: Influenza, Whooping cough, Pneumonia, Tuberculosis, Polio among others
- **Analytic Study.** A comparative study intended to identify and quantify associations, test hypotheses, and identify causes. Two common types are cohort study and case-control study.
- **Association.** Statistical relationship between two or more events, characteristics, or other variables.
- **Attack rate**. The percentage of ill persons out of all persons reporting a risk behavior. It is a variant of an incident rate, applied to a narrowly defined population observed for a limited period of time, such as during an epidemic.
- **Carrier.** A person or animal without apparent disease that harbours a specific infectious agent and is capable of transmitting the agent to others. The carrier state may occur in an individual with an infection that is unapparent throughout its course (known as asymptomatic carrier), or during the incubation period, convalescence, and post convalescence of an individual with a clinically recognizable disease. The carrier state may be of short or long duration (transient carrier or chronic carrier).
- **Case.** In epidemiology, a countable instance in the population or study group of a particular disease, health disorder, or condition under investigation. Sometimes, an individual with the particular disease.
- **Case-control study.** A type of observational analytic study. Enrollment into the study is based on presence (``case'') or absence (``control'') of disease. Characteristics such as previous exposure are then compared between cases and controls.
- **Case definition.** A set of standard criteria for deciding whether a person has a particular disease or health-related condition, by specifying clinical criteria and limitations on time, place and person. For example, all persons who attended the church bazaar on February 20 who exhibited signs of diarrhea, vomiting, and abdominal cramps within 72 hours after the bazaar.
- **Case-fatality rate.** The proportion of persons with a particular condition (cases) who die from that condition. The denominator

is the number of incident cases; the numerator is the number of cause-specific deaths among those cases.

- **Case report study.** A type of descriptive study that consists of a careful, detailed profile of an individual patient.
- **Case series study**. A type of descriptive study that describes characteristics of number of patients with a given disease
- **Causality.** The relating of causes to the effects they produce. Some of the criteria for inferring a causal relationship between an implicated food and illness include: strength of association, consistency of the observed association, temporal sequence of events biological plausibility of the observed association, effect of removing the exposure, dose-response relationships, and the exclusion of alternate explanations.
- **Cause of disease.** A factor (characteristic, behaviour, event, etc.) that directly influences the occurrence of disease. A reduction of the factor in the population should lead to a reduction in the occurrence of disease.
- **Cause-specific mortality rate.** The mortality rate from a specified cause for a population. The numerator is the number of deaths attributed to a specific cause during a specified time interval; the denominator is the size of the population at the midpoint of the time interval.
- **Census.** The enumeration of an entire population, usually with details being recorded on residence, age, sex, occupation, ethnic group, marital status, birth history, and relationship to head of household.
- **Class interval.** A span of values of a continuous variable that are grouped into a single category for a frequency distribution of that variable
- **Clinical trial.** A clinical trial is an experimental study with patients as subjects. The goal either is to evaluate a potential cure to prevent disease sequelae such as death or disability.
- **Cluster.** An aggregation of cases of a disease or other health-related condition, particularly cancer and birth defects which are closely grouped in time and place. The number of cases may or may not exceed the expected number; frequently the expected number is not known. Cases are more likely to represent a cluster if they involve:
  1. A specific disease or condition,
  2. A rare type of disease or condition, or
  3. A disease or condition in a group not usually affected by that particular disease or condition, such as a cancer in children that is normally seen in adults.
- **Cohort**. A well-defined group of people who have had a common experience or exposure, who are then followed up for

the incidence of new diseases or events. For example, a group of people born during a particular period or year is called a birth cohort.

- **Cohort study**. A type of observational analytic study where enrollment into the study is based on exposure characteristics or membership in a group. Disease, death, or other health-related outcomes are then ascertained and compared.
- **Common source outbreak**. An outbreak that results from a group of persons being exposed to a common noxious influence, such as an infectious agent or toxin. If the group is exposed over a relatively brief period of time, so that all cases occur within one incubation period, then the common source outbreak is further classified as a point source outbreak. In some common source outbreaks, persons may be exposed over a period of days, weeks, or longer, with the exposure being either intermittent or continuous
- **Communicable disease**. An infectious disease transmitted from an infected person, animal, or reservoir to a susceptible host through an intermediate plant, animal, or the inanimate environment.
- **Zoonoses**. An infectious disease that is transmissible under normal conditions from
- **Virulence.** The proportion of persons with clinical disease, who after becoming infected, become severely ill or die animals to humans
- **Vector.** An animate intermediary in the indirect transmission of an agent that carries the agent from a reservoir to a susceptible host
- **Contact.** Exposure to a source of an infection, or a person so exposed
- **Contagious.** Capable of being transmitted from one person to another by contact or close proximity
- **Crude mortality rate.** The mortality rate from all causes of death for a population
- **Cross-sectional study.** A type of descriptive study in which a set of individuals are studied at a single point in time or over a defined period of time for the prevalence of disease. Both risk factors and disease status are ascertained at the same time.
- **Droplet.** The residue of dried droplets that may remain suspended in the air for long periods, may be blown over great distances, and are easily inhaled into the lungs and exhaled.
- **Endemic disease.** The constant presence of a disease or infectious agent within a given geographic area or population group; may also refer to the usual prevalence of a given disease within such area or group

- **Environmental factor.** An extrinsic factor (geology, climate, insects, sanitation, health services, etc.) that affects the agent and the opportunity for exposure
- **Epidemic.** The occurrence of more cases of disease than expected in a given area or among a specific group of people over a particular period of time
- **Frequency distribution.** A complete summary of the frequencies of the values or categories of a variable; often displayed in a two column table: the left column lists the individual values or categories, the right column indicates the number of observations in each category.
- **Health indicator.** A measure that reflects, or indicates, the state of health of persons in a defined population, e.g., the infant mortality rate
- **High-risk group.** A group in the community with an elevated risk of disease
- **Host.** A person or other living organism that can be infected by an infectious agent under natural conditions
- **Host factor.** An intrinsic factor (age, race, sex, behaviours, etc.) that influences an individual's exposure, susceptibility, or response to a causative agent.
- **Hyperendemic disease.** A disease that is constantly present at a high incidence and/or prevalence rate.
- **Immune.** Refers to someone who shows no clinical signs of infection after exposure to a pathogen
- **Immunity, active.** Resistance developed in response to stimulus by an antigen (infecting agent or vaccine) and usually characterized by the presence of antibody produced by the host.
- **Herd Immunity** The resistance of a group to invasion and spread of an infectious agent, based on the resistance to infection of a high proportion of individual members of the group. The resistance is a product of the number susceptible and the probability that those who are susceptible will come into contact with an infected person.
- **Passive Immunity.** Immunity conferred by an antibody produced in another host and acquired naturally by an infant from its mother or artificially by administration of an antibody-containing preparation (antiserum or immune globulin).
- **Incidence rate.** A measure of the frequency with which an event, such as a new case of illness occurs in a population over a period of time. The denominator is the population at risk; the numerator is the number of new cases occurring during a given time period.
- **Incubation period.** A period of subclinical or unapparent pathologic changes following exposure, ending with the onset of symptoms of infectious disease

- **Mode.** A measure of central location, the most frequently occurring value in a set of observations
- **Morbidity.** Any departure, subjective or objective, from a state of physiological or psychological well-being
- **Mortality rate.** A measure of the frequency of occurrence of death in a defined population during a specified interval of time
- **Infant mortality rate.** A ratio expressing the number of deaths among children less than one year of age reported during a given time period divided by the number of births reported during the same time period. The infant mortality rate is usually expressed per 1,000 live births.
- **Incidence.** Incidence is defined simply as the number of new events (e.g., new cases of a disease) in a defined population within a specified period of time.
- **Neonatal mortality rate.** A ratio expressing the number of deaths among children from birth up to but not including 28 days of age divided by the number of live births reported during the same time period. The neonatal mortality rate is usually expressed per 1,000 live births.
- **Postneonatal mortality rate.** A ratio expressing the number of deaths among children from 28 days up to but not including 1 year of age during a given time period divided by the number of lives births reported during the same time period. The postneonatal mortality rate is usually expressed per 1,000 live births.
- **Pandemic.** An outbreak of disease occurring over a very wide area or several countries usually affecting a large proportion of the population. An example is the Covid 19 pandemic of 2019
- **Parity.** Parity is defined as the total number of live births ever had by the woman. This number is distinguished from gravidity, which is the total number of times she has been pregnant.
- **Prevalence.** The number or proportion of cases or events or conditions in a given population
- **Prevalence rate.** The proportion of persons in a population who have a particular disease or attribute at a specified point in time or over a specified period of time. Prevalence rates do not differentiate between old and new cases of disease.
- **Random sample.** A sample derived by selecting individuals such that each individual has the same probability of selection.
- **Range.** In statistics, the difference between the largest and smallest values in a distribution. In common use, the span of values from smallest to largest.
- **Rate.** An expression of the frequency with which an event occurs in a defined population.

- **Rate ratio.** A comparison of two groups in terms of incidence rates, person-time rates, or mortality rates.
- **Ratio.** The value obtained by dividing one quantity by another.
- **Reservoir.** The habitat, in which an infectious agent normally lives, grows and multiplies; reservoirs include human reservoirs, animals reservoirs, and environmental reservoirs.
- **Risk.** The probability that an event will occur, e.g. that an individual will become ill or die within a stated period of time or age.
- **Risk factor.** An aspect of personal behaviour or lifestyle, an environmental exposure, or an inborn or inherited characteristic that is associated with an increased occurrence of disease or other health-related event or condition.
- **Sample.** A selected subset of a population. A sample may be random or non-random and it may be representative or non-representative.
- **Source.** The object, animal, or person from which infection is acquired
- **Sporadic.** A disease that occurs infrequently and irregularly
- **Transmission of infection.** Any mode or mechanism by which an infectious agent is spread through the environment or to another person. There are two types of transmission: direct and indirect.
- **Trend.** A long-term movement or change in frequency, usually upwards or downwards.
- **Type I Errors.** Type I errors occur when the null hypothesis is rejected when it is true.
- **Validity.** The degree to which a measurement actually measures or detects what it is supposed to measure.
- **Variable.** Any characteristic or attribute that can be measured.
- **Variance.** A measure of the dispersion shown by a set of observations, defined by the sum of the squares of deviations from the mean, divided by the number of degrees of freedom in the set of observations.
- **Vector.** An animate intermediary in the indirect transmission of an agent that carries the agent from a reservoir to a susceptible host
- **Vector-borne transmission. Vectors** are animals that are capable of transmitting diseases. Examples of vectors are flies, mites, fleas, ticks, rats, dogs, mosquito.
- **Vehicle.** An inanimate intermediary in the indirect transmission of an agent that carries the agent from a reservoir to a susceptible host.
- **Virulence.** The proportion of persons with clinical disease, who after becoming infected, become severely ill or die.

SELF-ASSESSMENT EXERCISE
Explain the following concepts in epidemiology
(a). Contact & (b). Source.

4.0 CONCLUSION

Having successfully discuss the basic concepts in epidemiology and completed this unit it is assume that you have fully understood the basic concepts in epidemiology in public health.

5.0 SUMMARY

In this unit, you have learnt the basic concepts in epidemiology in public health.

6.0 TUTOR-MARKED ASSIGNMENT

Explain the following concepts in epidemiology:

1. Incidence
2. Prevalence
3. Pandemic
4. Sporadic
5. Isolation
6. Quarantine
7. Surveillance
8. Virulence

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MODULE 2 EPIDEMIOLOGY OF COMMUNICABLES

UNIT 1 EPIDEMIOLOGY OF COMMUNICABLE DISEASE

CONTENTS

1.0 INTRODUCTION

Communicable diseases are diseases that can be spread from one person to another and cause a large number of people to get sick. They are caused by germs like **bacteria**, **viruses**, fungi, parasites or toxins. Communicable diseases are illnesses caused by viruses or bacteria that people spread to one another through contact with contaminated surfaces, bodily fluids, blood products, insect bites, or through the air. There are many examples of communicable diseases, some of which require reporting to appropriate health departments or government

agencies in the locality of the outbreak such as HIV, hepatitis A, B and C, measles, salmonella among others.

2.0 OBJECTIVES

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

- explain the epidemiology of communicable disease
- classify communicable diseases
- explain the causes of communicable diseases
- explain the mode of transmission of communicable diseases
- determine the control and prevention of communicable diseases.

3.0 MAIN CONTENT

3.1 Define Communicable Disease

Communicable diseases are diseases that can be spread from one person to another and cause a large number of people to get sick. They are caused by germs like **bacteria**, **viruses**, fungi, parasites or toxins. Communicable diseases are illnesses caused by viruses or bacteria that people spread to one another through contact with contaminated surfaces, bodily fluids, blood products, insect bites, or through the air. There are many examples of communicable diseases, some of which require reporting to appropriate health departments or government agencies in the locality of the outbreak such as HIV, hepatitis A, B and C, measles, salmonella among others

3.2 Causes of Communicable Diseases

Communicable, or infectious diseases, are caused by microorganisms such as bacteria, viruses, parasites and fungi that can be spread, directly or indirectly, from one person to another. Some are transmitted through bites from insects while others are caused by ingesting contaminated food or water.

3.3 Classification of Communicable Diseases

Communicable diseases can be classified in different ways into groups with similar characteristics. Classification will help you to select and apply appropriate prevention and control measures that are common to a class of communicable diseases. In this section you will learn the basis for each way of classifying communicable diseases and its relevance to your practice. This will be clarified using examples of communicable

diseases that you may already be familiar with. Epidemiologic classification is based on the main mode of transmission of the infectious agent. The importance of this classification for you is that it enables you to select prevention and control measures which are common to communicable diseases in the same class, so as to interrupt the mode of transmission. To clarify the importance of epidemiologic classification, consider the following example Based on the mode of transmission of the infection.

3.4 Mode of Transmission of Communicable Diseases

The mode of transmission of the infectious agent of communicable diseases can be classified as follows:

1. **Waterborne diseases:** transmitted by ingestion of contaminated water.
2. **Food borne diseases:** transmitted by the ingestion of contaminated food.
3. **Airborne diseases:** transmitted through the inhalation of polluted/contaminated air.
4. **Vector-borne diseases:** transmitted by vectors, such as mosquitoes and flies.
5. **Contact borne disease:** transmitted by direct contact with an infected person.
6. **Waterborne diseases:** transmitted by ingestion of contaminated water.

3.5 Control and Prevention of Communicable Diseases

- Handle & Prepare Food Safely
- Wash Hands Often
- Clean & Disinfect Commonly Used Surfaces
- Cough & Sneeze Into Your Sleeve
- Don't Share Personal Items.
- Get Vaccinated
- Avoid Touching Wild Animals.

4.0 CONCLUSION

We have successfully discussed the concept of communicable diseases, causes of communicable diseases, classification of communicable diseases, and mode of transmission of communicable diseases, control and prevention of communicable diseases.

5.0 SUMMARY

5.0 SUMMARY

In this unit, you have learnt the concept of communicable diseases, causes of communicable diseases, classification of communicable diseases, and mode of transmission of communicable diseases, control and prevention of communicable diseases in epidemiology

6.0 TUTOR-MARKED ASSIGNMENT

1. Explain concept of communicable diseases.
2. State the causes of communicable diseases.
3. Discuss classification of communicable diseases.
4. Explain the mode of transmission of communicable diseases.
5. How do you control and prevent communicable diseases?

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UNIT 2 ESCHERICHIA COLI O157:H7 INFECTION

CONTENTS

1.0 INTRODUCTION

Escherichia coli O157:H7 Infection. *Escherichia coli (E. coli)* are bacteria that are commonly found in the gut of humans and warm-blooded animals. Most strains of *E. coli* are harmless. Some strains however, such as Shiga toxin-producing *E. coli* (STEC), can cause severe food borne disease. It is transmitted to humans primarily through consumption of contaminated foods, such as raw or under cooked ground meat products, raw milk, and contaminated raw vegetables and sprouts.

2.0 OBJECTIVES

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

- explain Escherichia *coli (E. coli)*
- outline the mode of transmission of Escherichia *coli (E. coli)*
- state the signs and symptoms of Escherichia *coli (E. coli)*
- state the control and prevention of Escherichia *coli (E. coli).*

3.0 MAIN CONTENT

1.1 Escherichia *coli (E. coli)*

These are bacteria that are commonly found in the gut of humans and warm-blooded animals. Most strains of *E. coli* are harmless. Some strains however, such as Shiga toxin-producing *E. coli* (STEC), can cause severe food borne disease. It is transmitted to humans primarily through consumption of contaminated foods, such as raw or under cooked ground meat products, raw milk, and contaminated raw vegetables and sprouts.

3.2 Mode of Transmission of Escherichia *Coli (E. Coli)*

It is transmitted to humans primarily through consumption of contaminated foods, such as raw or undercooked ground meat products, raw milk, and contaminated raw vegetables and sprouts. STEC produces toxins, known as Shiga-toxins because of their similarity to the toxins produced by Shigella dysenteriae.

3.3 Signs and Symptoms of Escherichia *Coli (E. Coli*) Infection

Signs and Symptoms of the diseases caused by STEC include abdominal cramps and diarrhea that may in some cases progress to bloody diarrhoea (haemorrhagic colitis). Fever and vomiting may also occur. The incubation period can range from 3 to 8 days, with a median of 3 to 4 days. Most patients recover within 10 days, but in a small proportion of patients (particularly young children and the elderly), the infection may lead to a life-threatening disease, such as haemolytic uraemic syndrome (HUS). HUS is characterized by acute renal failure, haemolytic anaemia and thrombocytopenia (low blood platelets). It is estimated that up to 10% of patients with STEC infection may develop HUS, with a case-fatality rate ranging from 3 to 5%. Overall, HUS is the most common cause of acute renal failure in young children. It can cause neurological complications (such as seizure, stroke and coma) in 25% of HUS patients and chronic renal sequelae, usually mild, in around 50% of survivors.

Sources and Transmission of Escherichia coli O157:H7 Infection

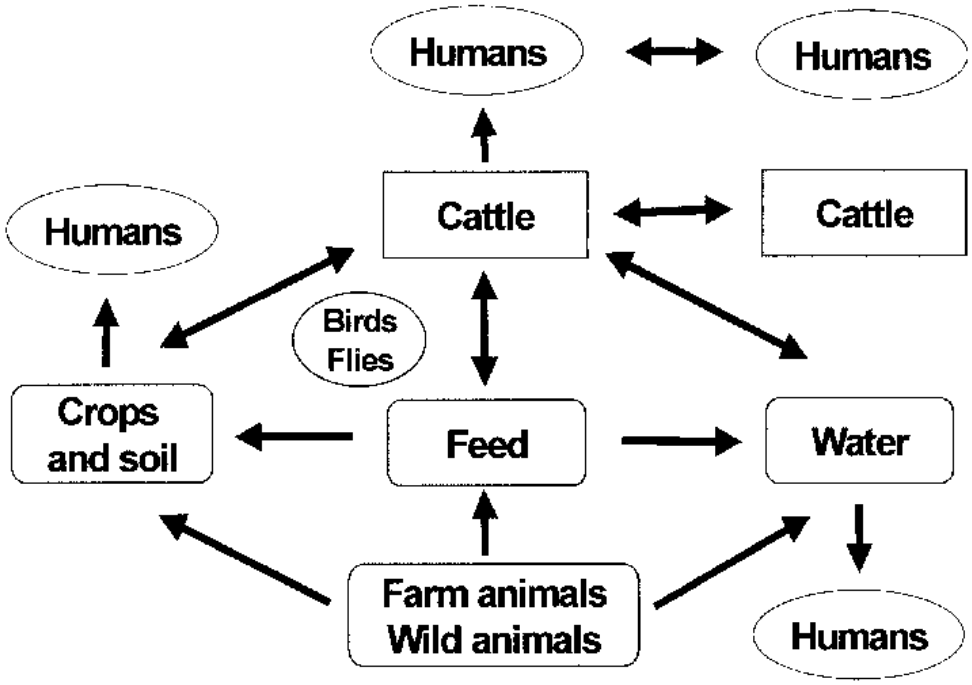

Figure 1 Transmission of Escherichia coli O157:H7 Infection

Most available information on STEC relates to serotype O157:H7, since it is easily differentiated biochemically from other *E. coli* strains. The reservoir of this pathogen appears to be mainly cattle. In addition, other ruminants such as sheep, goats, deer are considered significant reservoirs, while other mammals (such as pigs, horses, rabbits, dogs, and cats) and birds (such as chickens and turkeys) have been found infected.

3.4 Mode of Transmission of Escherichia *coli (E. coli)*

E. coli O157:H7 is transmitted to humans primarily through consumption of contaminated foods, such as raw or undercooked ground meat products and raw milk. Faecal contamination of water and other foods, as well as cross-contamination during food preparation with beef and other meat products, contaminated surfaces and kitchen utensils, will also lead to infection. Examples of foods implicated in outbreaks of *E. coli* O157:H7 include undercooked hamburgers, dried cured salami, unpasteurized fresh-pressed apple cider, yogurt, and cheese made from raw milk.

An increasing number of outbreaks are associated with the consumption of fruits and vegetables including sprouts, spinach, lettuce, coleslaw, and salad whereby contamination may be due to contact with faeces from domestic or wild animals at some stage during cultivation or handling. STEC has also been isolated from bodies of water such as ponds and streams, wells and water troughs, and has been found to

survive for months in manure and water-trough sediments. Waterborne transmission has been reported, both from contaminated drinking-water and from recreational waters.

Person-to-person contact is an important mode of transmission through the oral-faecal route. An asymptomatic carrier state has been reported, where individuals show no clinical signs of disease but are capable of infecting others. The duration of excretion of STEC is about 1 week or less in adults, but can be longer in children. Visiting farms and other venues where the general public might come into direct contact with farm animals has also been identified as an important risk factor for STEC infection.

3.5 Control and Prevention ~~Of~~of Escherichia *Coli (E. coli)*

Persons who experience bloody diarrhea or severe abdominal cramps should seek medical care from health facility (hospital or clinic). The prevention of infection requires control measures at all stages of the food chain, from agricultural production on the farm to processing, manufacturing and preparation of foods in both commercial establishments and household kitchens. The number of cases of disease might be reduced by various mitigation strategies for ground beef for example, screening the animals pre-slaughter to reduce the introduction of large numbers of pathogens in the slaughtering environment. Good hygienic slaughtering practices reduce contamination of carcasses by faeces, but do not guarantee the absence of STEC from products. Education in hygienic handling of foods for workers at farms, abattoirs and those involved in the food production is essential to keep microbiological contamination to a minimum. The only effective method of eliminating STEC from foods is to introduce a bactericidal treatment, such as heating (for example, cooking or pasteurization) or irradiation.

Preventive measures for *E. coli* O157:H7 infection is similar to those recommended for other food borne diseases. Basic good food hygiene practice, as described in the WHO "*Five keys to safer food*", below can prevent the transmission of pathogens responsible for many food borne diseases, and also protect against food borne diseases caused by STEC. The five keys to safer food are:

- Keep clean.
- Separate raw and cooked.
- Cook thoroughly.
- Keep food at safe temperatures.
- Use safe water and raw materials.

Such recommendations should in all cases be implemented, especially "cook thoroughly" so that the centre of the food reaches at least 70 °C. Make sure to wash fruits and vegetables carefully, especially if they are eaten raw. If possible, vegetables and fruits should be peeled. Vulnerable populations such as small children and the elderly should avoid the consumption of raw or undercooked meat products, raw milk, and products made from raw milk.

Regular hand washing, particularly before food preparation or consumption and after toilet contact, is highly recommended, especially for people who take care of small children, the elderly or immune compromised individuals, as the bacterium can be passed from person to person, as well as through food, water and direct contact with animals.

A number of STEC infections have been caused by contact with recreational water. Therefore, it is also important to protect such water areas, as well as drinking-water sources, from animal waste
Producers of fruits and vegetables; WHO's *"Five keys to growing safer fruits and vegetables*" provides rural workers who grow fresh fruits and vegetables for themselves, their families and for sale in local markets, with key practices to prevent microbial contamination of fresh produces during planting, growing, harvesting and storing. The five keys to growing safer fruits and vegetables are:

- Practice good personal hygiene.
- Protect fields from animal faecal contamination.
- Use treated faecal waste.
- Evaluate and manage risks from irrigation water.
- Keep harvest and storage equipment clean and dry.

In a nutshell follow the following steps to prevent a STEC infection.

1. **Practice proper hygiene, especially good** hand washing.
- Wash your hands thoroughly after using the bathroom and changing diapers.
- Wash your hands thoroughly before and after preparing or eating food.
- Wash your hands thoroughly after contact with animals or their environments (at farms, petting zoos, fairs, even your own backyard).
- Wash your hands thoroughly before preparing and feeding bottles or foods to an infant or toddler, before touching an infant or toddler's mouth, and before touching pacifiers or other things that go into an infant or toddler's mouth.

- Keep all objects that enter infants' and toddlers' mouths such as pacifiers and teethers clean.
- If soap and water aren't available, use an alcohol-based hand sanitizer with at least 60% alcohol check the product label to be sure. These alcohol-based products can quickly reduce the number of germs on hands in some situations, but they are not a substitute for washing with soap and running water.

2. **Follow the** five steps to food safety **when preparing food:**
   - Keep clean.
   - Separate raw and cooked.
   - Cook thoroughly.
   - Keep food at safe temperatures.
   - Use safe water and raw materials.

3. **Wash fruits and vegetables well under running water,** unless the package says the contents have already been washed**.**

4. **Cook meats thoroughly:**
   - To kill harmful germs, cook beef steaks and roasts to an internal temperature of at least 145°F (62.6˚C) and allow to rest for 3 minutes after you remove meat from the grill or stove.
   - Cook ground beef and pork to a minimum internal temperature of 160°F (70˚C).
   - **Always use a food thermometer** to check that the meat has reached a safe internal temperature external icon because you can't tell whether meat is safely cooked by looking at its color.
5. **Don't cause cross-contamination** in food preparation areas. Thoroughly wash hands, counters, cutting boards, and utensils after they touch raw meat.
6. **Avoid** raw milk, unpasteurized dairy products, and unpasteurized juices such as fresh apple cider.
7. **Don't swallow water when** swimming and when playing in lakes, ponds, streams, swimming pools, and backyard "kiddie" pools.

SELF-ASSESSMENT EXERCISE

1. Describe the control and prevention of Escherichia *coli (E. coli*) in your community.

4.0 CONCLUSION

We have successfully discussed the escherichia coli o157:h7 infection, the mode of transmission of Escherichia *coli (E.*, the signs and symptoms of Escherichia *coli (E. coli)* and the control and prevention of Escherichia *coli (E. coli)* in the community

5.0 SUMMARY

In this unit, you have learnt the concept of escherichia coli o157:h7 infection, the mode of transmission of Escherichia *coli (E.*, the signs and symptoms of Escherichia *coli (E. coli)* and the control and prevention of Escherichia *coli (E. coli)* in the community

6.0 TUTOR-MARKED ASSIGNMENT

1 Explain Escherichia *coli (E. coli).*
2. Outline the mode of transmission of Escherichia *coli (E. coli).*
3 State the signs and symptoms of Escherichia *coli (E. coli).*

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UNIT 3 GIARDIASIS (GIARDIA LAMBLIA)

CONTENTS

1.0 INTRODUCTION

Giardiasis is an infection of the small intestine that is caused by the parasite, Giardia duodenalis, also known as *Giardia lamblia* and *Giardia intestinalis*. It is the most common cause of parasitic gastrointestinal disease; it is estimated that 20,000 cases of giardiasis occur each year, and there is 20% to 40% prevalence in the world's population. Giardia lamblia exists in two forms, an active form called a trophozoite, and an inactive form called a cyst. The active trophozoite attaches to the lining of the small intestine with a "sucker" and is responsible for causing the signs and symptoms of giardiasis. The trophozoite cannot live long outside of the body; therefore it cannot spread the infection to others.

The inactive cyst, on the other hand, can exist for prolonged periods outside the body. When it is ingested, stomach acid activates the cyst, and the cyst develops into the disease-causing trophozoite. It takes ingestion of only ten cysts to cause infection. Trophozoites are important not only because they cause the symptoms of giardiasis, but also because they produce the cysts that exit the body in the feces and spread the infection to others. Cysts of Giardia are present in the feces of infected persons. Thus, the infection is spread from person to person by contamination of food with feces, or by direct fecal-oral contamination. Cysts also survive in water, for example in fresh water lakes and streams. As a result, giardiasis is the most common cause of water-borne, parasitic illness.

2.0 OBJECTIVES

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

- to explain Giardiasis
- to state the causes Giardioasis
- to mention the mode of transmission of Giardiasis
- to describe signs and symptoms of Giardiasis

- to outline the control and prevention of Giardiasis in the community

3.0 MAIN CONTENT

3.1 Concept of Giardiasis

Giardiasis is an infection of the small intestine that is caused by the parasite, Giardia duodenalis, also known as *Giardia lamblia* and *Giardia intestinalis*. It is the most common cause of parasitic gastrointestinal disease; it is estimated that 20,000 cases of giardiasis occur each year, and there is 20% to 40% prevalence in the world's population. Giardia lamblia exists in two forms, an active form called a trophozoite, and an inactive form called a cyst. The active trophozoite attaches to the lining of the small intestine with a "sucker" and is responsible for causing the signs and symptoms of giardiasis. The trophozoite cannot live long outside of the body; therefore it cannot spread the infection to others.

The inactive cyst, on the other hand, can exist for prolonged periods outside the body. When it is ingested, stomach acid activates the cyst, and the cyst develops into the disease-causing trophozoite. It takes ingestion of only ten cysts to cause infection. Trophozoites are important not only because they cause the symptoms of giardiasis, but also because they produce the cysts that exit the body in the feces and spread the infection to others. Cysts of Giardia are present in the feces of infected persons. Thus, the infection is spread from person to person by contamination of food with feces, or by direct fecal-oral contamination. Cysts also survive in water, for example in fresh water lakes and streams. As a result, giardiasis is the most common cause of water-borne, parasitic illness.

3.2 The Causes of Giardioasis

Giardiasis is a common illness caused by a parasite *call Giardia lamblia* that may result in diarrhea and stomach cramps. *Giardia* is a tiny parasite (germ) that causes the diarrheal disease

3.3 Mode of Transmission of Giardioasis

You can get giardiasis if you swallow *Giardia* germs. *Giardia* spreads easily and can spread from person to person or through contaminated water, food, surfaces, or objects. The most common way people get sick is by swallowing contaminated drinking water or recreational water (for example, lakes, rivers, or pools). The Giardia parasite can spread

through contaminated water, food and surfaces and from contact with someone who has it. It also spreads via surfaces contaminated with *Giardia* cysts, or hard shells that contain the parasite. Even though parasites need a host (another living thing) to survive, *Giardia's* shell enables the parasite to live on its own for extended periods. You can get giardiasis through:

- Drinking from untreated water sources (such as lakes, streams or swimming pools).
- Traveling to countries with poor sanitation practices.
- Working closely with young children (such as in a child care center).
- Swallowing the parasite after touching a surface (such as a doorknob or toy) contaminated with tiny amounts of infected feces.
- Having sex, especially anal sex, with an infected person

Figure 2: Who is at risk for giardiasis?

Giardiasis occurs where there is inadequate sanitation or inadequate treatment of drinking water. Giardiasis is one of the causes of "traveler's diarrhea" that occurs during travel to less-developed countries. Giardiasis is a common cause of outbreaks of diarrhea in day-care centers because of the high probability of fecal-oral contamination from children; the children, their families, and day care center workers, all are at risk for infection. In fact, children are three times more likely to develop giardiasis than adults. Hikers exploring back-country areas who drink from contaminated fresh water lakes also are at risk for developing giardiasis. Individuals who practice anal/oral sex also may become infected.

3.4 Signs and Symptoms of Giardiasis

Signs and symptoms of giardiasis can vary, and some people may be infected without showing any symptoms. Symptoms, when they occur, can last two weeks or longer. The most common symptoms are:

- ✓ diarrhea**,**
- ✓ gas,
- ✓ fatty or foul-smelling stools (they may float), and
- ✓ stomach or abdominal cramping.
- ✓ Abdominal pain, particularly cramping
- ✓ loss of weight.

3.5 The Control and Prevention of Giardiasis in the Community

Giardia parasites are microscopic (too tiny to see without a microscope). It's hard to avoid something you can't see. But there are several ways you can minimize your risk of getting giardiasis. Wash your hands often with soap and clean, running water for at least 20 seconds. Always wash your hands:

- ✓ Before and after you eat.
- ✓ After using the toilet.
- ✓ After coming in contact with your own or someone else's germs (such as changing a diaper).
- ✓ **Only drink from safe water sources.** Water can contain parasites, even if it looks clean.
- ✓ Do not drink untreated water, such as from wells, pools, lakes or rivers.
- ✓ Washing all fruits and vegetables under hot water can prevent giardiasis.
- ✓ Do not eat raw or undercooked meat.
- ✓ Practicing safe sex can prevent a wide range of sexually transmitted diseases.
- ✓ To prevent giardiasis, use protection during oral-anal sex, and wash your hands right after sex.
- ✓ These practices can ensure you don't come into contact with infected feces.

4.0 CONCLUSION

We have successfully discussed the giardiasis (giardia lamblia) infection, the causes, mode of transmission of giardiasis (giardia

lamblia), the signs and symptoms of giardiasis (giardia lamblia) and the control and prevention of giardiasis (giardia lamblia) in the community.

5.0 SUMMARY

In this unit, you have learnt the concept giardiasis (giardia lamblia) infection, the causes, mode of transmission of giardiasis (giardia lamblia), the signs and symptoms of giardiasis (giardia lamblia) infection and the control and prevention of giardiasis (giardia lamblia) in the community

6.0 TUTOR-MARKED ASSIGNMENT

1 Explain Giardiasis
2. State the causes of Giardioasis
3. Mention the mode of transmission of Giardiasis
4 Describe the signs and symptoms of Giardiasis
5 Outline the control and prevention measures of Giardiasis in the community

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UNIT 4 TYPHOID FEVER

CONTENTS

1.0 INTRODUCTION

Typhoid fever, also known as enteric fever, is a potentially fatal multi-systemic illness caused primarily by Salmonella enterica serotype *typhi* and *S enterica* serotypes *paratyphi* A, B, and C Typhoid fever is a bacterial infection that can spread throughout the body, affecting many organs. Without prompt treatment, it can cause serious complications and can be fatal. Worldwide, typhoid fever affects an estimated 11 to 21 million people and paratyphoid fever affects an estimated 5 million people each year. Typhoid fever and paratyphoid fever are most common in parts of the world where water and food may be unsafe and sanitation is poor

2.0 OBJECTIVES

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

- explain typhoid fever
- state the causes Typhoid fever
- mention the mode of transmission of Typhoid fever
- describe signs and symptoms of Typhoid fever
- enumerate the control and prevention of Typhoid fever in the community.

3.0 MAIN CONTENT

3.1 Concept of Typhoid Fever

Typhoid fever is a bacterial infection that can spread throughout the body, affecting many organs. Without prompt treatment, it can cause serious complications and can be fatal. It's caused by a bacterium called

Salmonella typhi, which is related to the bacteria that cause salmonella food poisoning.

3.2 Cause of Typhoid Fever

Typhoid fever is a life-threatening illness caused by the Salmonella enterica serotype Typhi bacteria. It can also be caused by Salmonella paratyphi bacteria. Paratyphoid fever is a life-threatening illness caused by Salmonella Paratyphi bacteria. The bacteria are deposited in water or food by a human carrier and are then spread to other people in the area

3.3 Signs and Symptoms

The incubation period is usually 1-2 weeks, and the duration of the illness is about 3-4 weeks. Symptoms include:

- ✓ Poor appetite
- ✓ Headaches
- ✓ Generalized aches and pains
- ✓ Fever as high as 104 degrees Farenheit
- ✓ Lethargy
- ✓ Diarrhea
- ✓ Chest congestion develops in many people
- ✓ abdominal pain and discomfort are common.
- ✓ The fever becomes constant
- ✓ About 10% of people have recurrent symptoms after feeling better for one to two weeks
- ✓ Relapses are actually more common in individuals treated with antibiotics

3.4 Mode of Transmission

Typhoid fever is contracted by the ingestion of contaminated food or water. These diseases are spread through sewage contamination of food or water and through person-to-person contact. People who are currently ill and people who have recovered but are still passing the bacteria in their poop (stools) can spread Salmonella Typhi or Salmonella Paratyphi. You can get typhoid fever or paratyphoid fever if

- ✓ You eat food or drink a beverage that has been touched by a person who is shedding Salmonella Typhi or Salmonella Paratyphi in their stool and who has not washed their hands thoroughly after going to the toilets.
- ✓ Sewage contaminated with Salmonella Typhi or Salmonella Paratyphi gets into water you drink.

- ✓ Sewage contaminated with Salmonella Typhi or Salmonella Paratyphi gets into water used to rinse food you eat raw.

3.5 Contron and Prevention

Refer the person with the signs and symptoms of typhoid fever to the clinic or hospital for proper treatment:

- ✓ Get vaccinated against typhoid fever. Typhoid vaccines are only 50–80% effective, so you should still be careful about what you eat and drink to decrease your risk of getting typhoid fever.
- ✓ Practice safe eating and drinking habits. Carefully select what you eat and drink when you travel. You can reduce your risk while traveling in countries where typhoid and paratyphoid fever are common.
- ✓ Boiling, cooking, or peeling food before eating
- ✓ Only drinking water that is bottled or has been boiled
- ✓ Avoiding drinks with ice, unless the ice is made from bottled or boiled water
- ✓ Washing your hands with soap and water before eating, drinking, or preparing food
- ✓ Not eating food prepared by anyone who is sick or was recently sick

4.0 CONCLUSION

We have successfully discussed typhoid fever infection, the causes, mode of transmission , the signs and symptoms and the control and prevention of typhoid fever infection in the community

5.0 SUMMARY

In this unit, you have learnt the concept of typhoid fever infection, the causes, mode of transmission, the signs and symptoms and the control and prevention of typhoid fever infection in the community

6.0 TUTOR-MARKED ASSIGNMENT

1 What is typhoid fever?
2. State the causes of typhoid fever
3. Mention the mode of transmission of typhoid fever
4 Describe the signs and symptoms of typhoid fever
5 Outline the control and prevention measures of typhoid fever.

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UNIT 5 CHOLERA

CONTENT

1.0 INTRODUCTION

Cholera is an intestinal infection caused by *Vibrio cholerae*. The hallmark of the disease is profuse secretory diarrhea. Cholera can be endemic, epidemic, or pandemic. Despite all the major advances in research, the condition still remains a challenge to the modern medical world. Although the disease may be asymptomatic or mild, severe cholera can cause dehydration and death within hours of onset.

2.0 OBJECTIVES

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

- explain Cholera
- state the causes Cholera
- mention the mode of transmission of Cholera.

3.0 MAIN CONTENT

3.1 Concept of Cholera

Cholera is an intestinal infection caused by *Vibrio cholerae*. The hallmark of the disease is profuse secretory diarrhea. Cholera can be endemic, epidemic, or pandemic. Despite all the major advances in research, the condition still remains a challenge to the modern medical world. Although the disease may be asymptomatic or mild, severe cholera can cause dehydration and death within hours of onset.

3.2 Cause

Vibrio cholerae, the bacterium that causes cholera, is usually found in food or water contaminated by feces from a person with the infection. Common sources include:

- ✓ Municipal water supplies
- ✓ Ice made from municipal water
- ✓ Foods and drinks sold by street vendors
- ✓ Vegetables grown with water containing human wastes
- ✓ Raw or undercooked fish and seafood caught in waters polluted with sewage
- ✓ When a person consumes the contaminated food or water, the bacteria release a toxin in the intestines that produces severe diarrhea.

3.3 Signs and Symptoms

Figure 3 Signs and Symptoms of Cholera Disease

Symptoms of cholera can begin as soon as a few hours or as long as five days after infection. Often, symptoms are mild. But sometimes they are very serious. About one in 20 people infected have severe watery diarrhea accompanied by vomiting, which can quickly lead to dehydration. Although many infected people may have minimal or no symptoms, they can still contribute to spread of the infection. Signs and symptoms of dehydration include:

- ✓ Rapid heart rate
- ✓ Loss of skin elasticity (the ability to return to original position quickly if pinched)
- ✓ Dry mucous membranes, including the inside of the mouth, throat, nose, and eyelids
- ✓ Low blood pressure
- ✓ Thirst
- ✓ Muscle cramps
- ✓ Signs and symptoms of cholera dehydration include irritability, fatigue, sunken eyes, a dry mouth, extreme thirst, dry and

shriveled skin that's slow to bounce back when pinched into a fold, little or no urinating, low blood pressure, and an irregular heartbeat. If not treated, dehydration can lead to shock and death in a matter of hours.

3.4 Mode of Cholera Transmission

The mode of Cholera Transmission is through the consumption of contaminated water or food by faeces or vomitus from cholera patient.

3.5 Control and Prevention of Cholera

Refer the person who shows the signs and symptoms of cholera to the clinic or hospital immediately for proper treatment. There is a vaccine for cholera. Both the CDC and the World Health Organisation have specific guidelines for who should be given this vaccine. You can protect yourself and your family by using only water that has been boiled, water that has been chemically disinfected, or bottled water. Be sure to use bottled, boiled, or chemically disinfected water for the following purposes

- ✓ Drinking
- ✓ Preparing food or drinks
- ✓ Making ice
- ✓ Brushing your teeth
- ✓ Washing your face and hands
- ✓ Washing dishes and utensils that you use to eat or prepare food
- ✓ Washing fruits and vegetables
- ✓ You should also avoid raw foods, including:

1. Unpeeled fruits and vegetables
2. Unpasteurised milk and milk products
3. Raw or undercooked meat or shellfish
4. Fish caught in tropical reefs, which may be contaminated

SELF-ASSESSMENT EXERCISE

How do you control and prevent cholera infection in the school community?

4.0 CONCLUSION

We have successfully discussed cholera infection, the causes, mode of transmission, the signs and symptoms and the control and prevention of cholera infection in the community

5.0 SUMMARY

In this unit, you have learnt the concept of cholera infection, the causes, mode of transmission, the signs and symptoms and the control and prevention of cholera infection in the community

6.0 TUTOR-MARKED ASSIGNMENT

1 What is cholera infection?
2. What causes cholera?
3. How does cholera infection transmitted o man?
4 Describe the signs and symptoms of cholera infection.

7.0 REFERENCES/FURTHER READING

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UNIT 6 HEPATITIS A

1.0 INTRODUCTION

Hepatitis refers to inflammation of the liver caused by exposure to toxins, alcohol misuse, immune diseases, or infection. Hepatitis A is a type of hepatitis that results from infection by the hepatitis A virus (HAV). This is an acute type of hepatitis, which usually requires no treatment. According to the World Health Organization (WHO) Trusted Source, 1.4 million cases of hepatitis A occur around the world each year. This highly contagious form of hepatitis can be spread through contaminated food or water. It generally is not serious and usually causes no long-term effects. A hepatitis A infection usually goes away on its own.

2.0 OBJECTIVES

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

- explain Hepatitis A
- state the causes Hepatitis A
- describe the signs and symptoms of Hepatitis A
- mention the mode of transmission of Hepatitis A
- enumerate the control and prevention of Hepatitis A in the school community.

3.0 MAIN CONTENT

3.1 Concept of Hepatitis A

Hepatitis refers to inflammation of the liver caused by exposure to toxins, alcohol misuse, immune diseases, or infection. Hepatitis A is a type of hepatitis that results from infection by the hepatitis A virus (HAV). This is an acute type of hepatitis, which usually requires no treatment. According to the World Health Organization (WHO) Trusted Source, 1.4 million cases of hepatitis A occur around the world each

year. This highly contagious form of hepatitis can be spread through contaminated food or water. It generally is not serious and usually causes no long-term effects. A hepatitis A infection usually goes away on its own.

3.2 Causes of Hepatitis A

People develop hepatitis A infection after contracting Hepatitis A Virus. This virus is typically transmitted by ingesting food or liquid contaminated with fecal matter that contains the virus. Once transmitted, the virus spreads through the bloodstream to the liver, where it causes inflammation and swelling. In addition to transmission from eating food or drinking water containing HAV, the virus can also be spread by close personal contact with an infected person. HAV is contagious, and a person who has hepatitis A can easily pass the disease to others living in the same household. You can contract hepatitis A by:

- ✓ eating food prepared by someone with the hepatitis A virus
- ✓ eating food handled by preparers who don't follow strict hand-washing routines before touching food that you eat
- ✓ eating sewage-contaminated raw shellfish
- ✓ not using condoms when having sex with someone who has the hepatitis A virus
- ✓ drinking polluted water
- ✓ coming in contact with hepatitis A-infected fecal matter
- ✓ If you contract the virus, you will be contagious two weeks before symptoms even appear. The contagious period will end about one week after symptoms appear.

3.3 Signs and Symptoms of Hepatitis A

Children under the age of 6 typically show no signs and symptoms when they contract the virus. Older children, teens, and adults usually develop mild symptoms, which can include:

- ✓ flu-like symptoms (fever, fatigue, body aches)
- ✓ abdominal pain (especially in the right upper quadrant)
- ✓ light-colored stool
- ✓ dark urine
- ✓ loss of appetite
- ✓ unexplained weight loss
- ✓ jaundice (yellowing of skin or eyes)
- ✓ Symptoms usually appear 15 to 50 days after you contract the virus.

Mode of Transmission of Hepatitis A

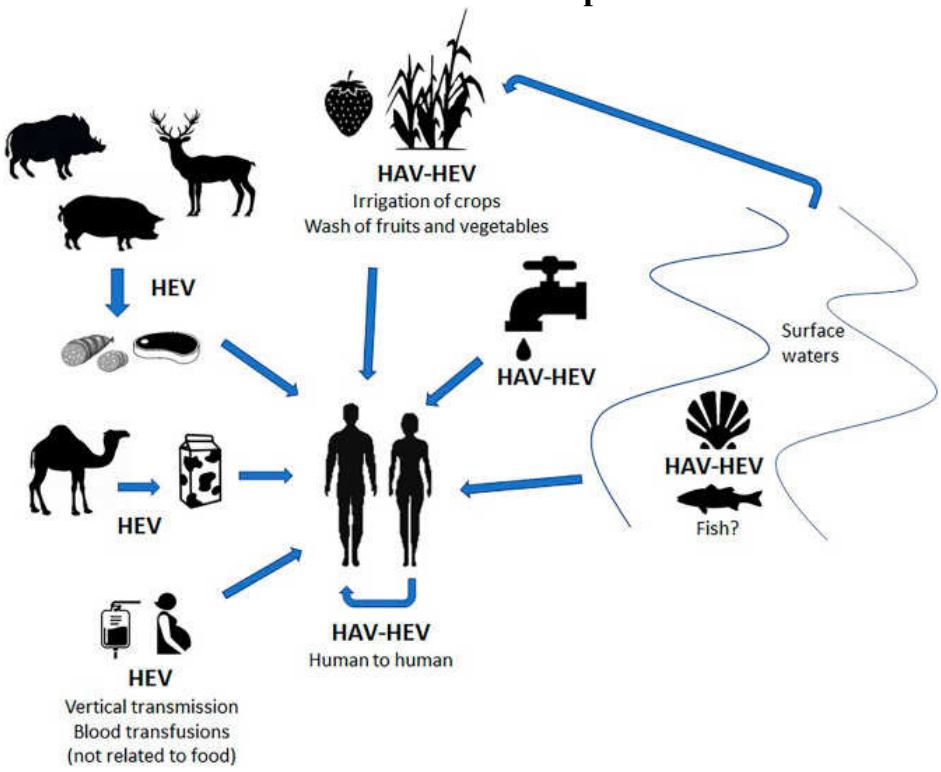

Figure 5 Transmission of Hepatitis A

Hepatitis A is usually spread from person to person, making it highly contagious. However, certain factors can increase your risk of contracting it, including:

- ✓ living in an area where hepatitis A is common, including most countries with low sanitation standards or a lack of safe water
- ✓ injecting or using illegal drugs
- ✓ living in the same household as someone who is hepatitis A-positive
- ✓ having sexual activity with someone who is hepatitis A-positive
- ✓ being HIV-positive
- ✓ The WHO Trusted Source reports that more than 90 percent of children living in countries where there are low sanitation standards will have had a hepatitis A infection by age 5

3.4 Control and Prevention of Hepatitis A

There is no formal treatment for hepatitis A. Because it's a short-term viral infection that goes away on its own, treatment is typically focused on reducing your symptoms. After a few weeks of rest, the symptoms of

hepatitis A usually begin to improve. To ease your symptoms, you should:

- ✓ avoid alcohol
- ✓ maintain a healthy diet
- ✓ drink plenty of water

The No. 1 way to avoid getting hepatitis A is by getting the hepatitis A vaccine. This vaccine is given in a series of two injections, 6 to 12 months apart. If you're traveling to a country where hepatitis A transmission is more common, get your vaccination at least two weeks before traveling. It usually takes two weeks after the first injection for your body to start building immunity to hepatitis A. If you are not traveling for at least a year, it is best to get both injections before leaving.

Check your destination on the Centers for Disease Control and Prevention site to see if you should get a hepatitis A vaccination. To limit your chance of contracting hepatitis A, you should also:

- ✓ thoroughly wash your hands with soap and warm water before eating or drinking, and after using the restroom
- ✓ drink bottled water rather than local water in developing countries, or in countries where there is a high risk of contracting hepatitis A
- ✓ dine at established, reputable restaurants, rather than from street vendors
- ✓ avoid eating peeled or raw fruit and vegetables in an area with low sanitation or hygienic standards

SELF-ASSESSMENT EXERCISE

How do you control and prevent hepatitis A infection in the school community?

4.0 CONCLUSION

We have successfully discussed hepatitis A infection, the causes, mode of transmission, the signs and symptoms and the control and prevention of hepatitis A infection in the school community.

5.0 SUMMARY

In this unit, you have learnt the concept of hepatitis A infection, the causes, and mode of transmission, the signs and symptoms and the control and prevention of hepatitis A infection in the school community.

6.0 TUTOR-MARKED ASSIGNMENT

1 What is hepatitis A?
2. What causes hepatitis A?
3. How does hepatitis A infection transmitted o man?
4. Describe the signs and symptoms of hepatitis A infection.

7.0 REFERENCES/FURTHER READING

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UNIT 7 DYSENTERY

1.0 INTRODUCTION

Dysentery is an infection of the intestines that causes diarrhea containing blood or mucus or Dysentery is an infection in your intestines that causes bloody diarrhea. It can be caused by a parasite or bacteria.

2.0 OBJECTIVES

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

- explain Dysentery
- state the causes Dysentery
- describe the signs and symptoms of Dysentery
- outline the mode of transmission of Dysentery
- mention the control and prevention measures of Dysentery the school community.

3.0 MAIN CONTENT

3.1 Concept of Dysentery

Many people have spent a tropical vacation with a bad stomach bug. They might have had dysentery, a painful intestinal infection that is usually caused by bacteria or parasites. Dysentery is defined as diarrhea in which there is blood, pus, and mucous, usually accompanied by abdominal pain. It usually lasts for 3 to 7 days. There are two main types of dysentery. The first type, amoebic dysentery or intestinal amoebiasis, is caused by a single-celled, microscopic parasite living in the large bowel. The second type, bacillary dysentery, is caused by invasive bacteria. Both kinds of dysentery occur mostly in hot countries. Poor hygiene and sanitation increase the risk of dysentery by spreading the parasite or bacteria that cause it through food or water contaminated from infected human feces. Dysentery is an intestinal inflammation,

primarily of the colon. It can lead to mild or severe stomach cramps and severe diarrhea with mucus or blood in the feces. Without adequate hydration, it can be fatal. Infection with the Shigella bacillus, or bacterium, is the most common cause.

3.2 Causes of Dysentery

Dysentery can have a number of causes. Bacterial infections are by far the most common causes of dysentery. These infections include Shigella, Campylobacter, E. coli, and Salmonella species of bacteria. The frequency of each pathogen varies considerably in different regions of the world. Dysentery is rarely caused by chemical irritants or by intestinal worms. The Shigella and Campylobacter bacteria that cause bacillary dysentery are found all over the world. They penetrate the lining of the intestine, causing swelling, ulcerations, and severe diarrhea containing blood and pus. Intestinal amoebiasis is caused by a protozoan parasite, Entamoeba histolytica. The amoeba can exist for long periods of time in the large bowel (colon). In the vast majority of cases, amoebiasis causes no symptoms only 10% of infected individuals become ill.

3.3 Mode of Transmission of Dysentery

People can become infected after ingesting water or food contaminated with somebody's excreted parasites. People are at high risk of acquiring the parasite through food and water if the water for household use is not separated from waste water. The parasites can also enter through the mouth when hands are washed in contaminated water. If people neglect to wash properly before preparing food, the food may become contaminated. Fruits and vegetables can be contaminated if washed in polluted water or grown in soil fertilized by human waste.

Having sex that involves anal contact may spread amoebic and bacillary dysentery. This is especially true if the sex included direct anal-oral contact, or oral contact with an object (e.g., fingers) that touched or was in the anus of an infected person

3.4 Signs and Symptoms of Dysentery

Symptoms can show up 1-3 days after you get infected. In some people, the symptoms take longer to appear. Others never get symptoms. Each type of dysentery has slightly different symptoms. The main signs and symptom of dysentery is frequent near-liquid diarrhea flecked with blood, mucus, or pus. Other symptoms include:

- ✓ sudden onset of high fever (at least 100.4°F or 38°C) and chills
- ✓ abdominal pain
- ✓ cramps and bloating
- ✓ flatulence (passing gas)
- ✓ urgency to pass stool
- ✓ feeling of incomplete emptying
- ✓ loss of appetite
- ✓ weight loss
- ✓ headache
- ✓ fatigue
- ✓ nausea
- ✓ vomiting
- ✓ dehydration

Other symptoms may be intermittent and may include recurring low fevers, abdominal cramps, increased gas, and milder and firmer diarrhea. You may feel weak and tired, or lose weight over a prolonged period (emaciation). Mild cases of bacillary dysentery may last 4 to 8 days, while severe cases may last 3 to 6 weeks. Amoebiasis starts more gradually and usually lasts about 2 weeks.

Bacillary dysentery symptoms begin within 2 to 10 days of infection. In children, the illness starts with fever, nausea, vomiting, abdominal cramps, and diarrhea. Episodes of diarrhea may increase to as much as once an hour with blood, mucus, and pus in the child's stool. Vomiting and diarrhea may result in rapid and severe dehydration, which may lead to shock and death if not treated. Signs of dehydration include an extremely dry mouth, sunken eyes, and poor skin tone. Children and infants will be thirsty, restless, irritable, and possibly lethargic. Children may not be able to produce tears or urine, the latter appearing very dark and concentrated.

Complications from bacillary dysentery include delirium, convulsions, and coma. A very severe infection like this can be fatal within 24 hours. However, the vast majority of infections are self-limited and resolve spontaneously without treatment. People with amoebic dysentery may experience other problems associated with amoebiasis. The most frequent complication results when parasites spread to the liver, causing an amoebic abscess. In this case, you would have a high fever and experience weight loss and right shoulder or upper abdominal pain. If the infection of the bowel is especially virulent, the intestinal ulcerations may lead to bowel perforation and death. The parasites may rarely spread through the bloodstream, causing infection in the lungs, brain, and other organs.

3.5 Control and Prevention of Dysentery

Refer the person immediately to the health centre for proper treatment. Hand washing is the most important way to stop the spread of infection. You are infectious to other people while you are ill and have symptoms. Take the following steps to avoid passing the illness on to others:

- ✓ Wash your hands thoroughly with soap and water after going to the toilet.
- ✓ Stay away from work or school until you have been completely free from any symptoms for at least 48 hours.
- ✓ Help young children to wash their hands properly.
- ✓ Do not prepare food for others until you have been free of symptoms for at least 48 hours.
- ✓ Do not go swimming until you have been free of symptoms for at least 48 hours.
- ✓ Where possible, stay away from other people until your symptoms have stopped.
- ✓ Wash all dirty clothes, bedding and towels on the hottest cycle of your washing machine.
- ✓ Clean toilet seats and toilet bowls, flush handles, taps and sinks with detergent and hot water after use, followed by a household disinfectant.
- ✓ Avoid sexual contact until you have been free of symptoms for at least 48 hours.

SELF-ASSESSMENT EXERCISE

How do you control and prevent dysentery infection in the school community?

4.0 CONCLUSION

We have successfully discussed dysentery infection, the causes, mode of transmission, the signs and symptoms and the control and prevention of hepatitis A infection in the school community.

5.0 SUMMARY

In this unit, you have learnt the concept of dysentery infection, the causes, and mode of transmission, the signs and symptoms and the control and prevention of dysentery infection in the school community.

6.0 TUTOR-MARKED ASSIGNMENT

1 What is dysentery infection?
2. What causes dysentery infection?
3. How does dysentery infection transmitted to man?
4 Describe the signs and symptoms of dysentery infection.

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UNIT 8 POLIOMYELITIS

Figure 7 **Children with Poliomyelitis**

1.0 INTRODUCTION

Polio is a viral disease which may affect the spinal cord causing muscle weakness and paralysis. Poliomyelitis (polio) is a highly infectious viral disease that largely affects children under 5 years of age. Poliomyelitis is an acute viral infection due to a poliovirus (serotypes 1, 2 and 3). Human-to-human transmission is direct (faecal-oral) or indirect (ingestion of food and water contaminated by stool). Humans are the only reservoir of the virus. In principle the disease can be eradicated by mass vaccination.

2.0 OBJECTIVES

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

- explain poliomyelitis
- state the causes of poliomyelitis
- describe the signs and symptoms of poliomyelitis
- outline the mode of transmission of poliomyelitis
- mention the control and preventive measures for poliomyelitis in the school community.

3.0 MAIN CONTENT

3.1 Concept of Poliomyelitis

Poliomyelitis, commonly called polio, is a highly infectious disease, caused by the poliomyelitis virus. The vast majority of poliovirus infections do not produce symptoms, but 5 to 10 out of 100 people infected with polio may have some flu-like symptoms. In 1 in 200 cases, the virus destroys parts of the nervous system, causing permanent paralysis in the legs or arms. Although very rare, the virus can attack the parts of the brain that help you breathe, which can cause death. Despite efforts to eradicate it, there continues to exist children with permanent paralysis due to this virus in some developing countries. Because of the risk of importation, the main risk factor for children under 5 years of age to acquire this disease is low vaccination coverage

3.2 Causes of Poliomyelitis

A virus called poliovirus causes polio. The virus enters the body through the mouth or nose, getting into the digestive and respiratory (breathing) systems. It multiplies in the throat and intestines. From there, it can enter the bloodstream.

3.3 Mode of Poliomyelitis Transmission

The polio virus enters the body through the mouth, usually from hands contaminated with the stool of an infected person. Polio is more common in infants and young children and occurs under conditions of poor hygiene. The virus spreads from person to person and can infect a person’s spinal cord, causing paralysis (can’t move parts of the body). Polio is spread when the stool of an infected person is introduced into the mouth of another person through contaminated water or food (fecal-

oral transmission). Oral-oral transmission by way of an infected person's saliva may account for some cases.

3.4 Signs and Symptoms

Symptoms such as fever, muscle weakness, headache, nausea and vomiting; One to two percent of infected persons develop severe muscle pain and stiffness in the neck and back. Less than one percent of polio cases result in paralysis. **Most people** who get infected with poliovirus about 72 out of 100 **will not have any visible symptoms.** may include:

- ✓ Sore throat
- ✓ Fever
- ✓ Tiredness
- ✓ Nausea
- ✓ Headache
- ✓ Stomach pain

A smaller proportion of people with poliovirus infection **will develop other, more serious symptoms** that affect the brain and spinal cord:

- ✓ **Paresthesia that is** feeling of pins and needles in the legs
- ✓ **Meningitis** that is infection of the covering of the spinal cord and/or brain occurs in about 1 out of 25 people with poliovirus infection
- ✓ **Paralysis** that is can't move parts of the body or weakness in the arms, legs, or both, occurs in about 1 out of 200 people with poliovirus infection
- ✓ Paralysis is the most severe symptom associated with polio, because it can lead to permanent disability and death. Between 2 and 10 out of 100 people who have paralysis from poliovirus infection die, because the virus affects the muscles that help them breathe.

3.5 Control and Prevention

Refer all those who show the signs and symptoms of poliomyelitis to the health centre for proper treatment. The best way to prevent polio is by vaccination. The inactivated polio vaccine (IPV) is given as a shot and the oral polio vaccine (OPV). Children should receive four doses of IPV vaccine starting at birth. Vaccination schedule:

1. 1 dose at birth
2. a second dose 4 or more weeks after the first dose
3. a third dose 4 or more weeks after the second dose
4. a fourth dose 6 or more months after the third dose
5. and a booster dose at 5 years

4.0 CONCLUSION

We have successfully discussed poliomyelitis, the causes, mode of transmission, the signs and symptoms and the control and prevention of poliomyelitis in the school community.

SELF-ASSESSMENT EXERCISE
How do you control and prevent poliomyelitis in the school community?

5.0 SUMMARY

In this unit, you have learnt the concept of poliomyelitis, the causes, mode of transmission, the signs and symptoms, the control and prevention of poliomyelitis in the school community.

6.0 TUTOR-MARKED ASSIGNMENT

1 What is poliomyelitis?
2. What causes poliomyelitis?
3. How does poliomyelitis transmitted to man?
4 Describe the signs and symptoms of poliomyelitis.

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UNIT 9 SALMONELLA

CONTENTS

1.0 INTRODUCTION

Salmonella are a group of bacteria that can cause gastrointestinal illness and fever called salmonellosis. Salmonellosis is a disease caused by the bacteria *Salmonella*. It is usually characterized by acute onset of fever, abdominal pain, diarrhea, nausea and sometimes vomiting. Salmonella can be spread by food handlers who do not wash their hands and/or the surfaces and tools they use between food preparations steps, and when people eat raw or undercooked foods.

2.0 OBJECTIVES

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

- explain salmonellosis
- state the causes of salmonellosis
- describe the signs and symptoms of salmonellosis
- outline the mode of transmission of salmonellosis
- mention the control and preventive measures for salmonellosis in the school community.

3.0 MAIN CONTENT

3.1 Concept of Salmonella

Salmonella are bacteria that make people sick. They were first discovered by an American scientist named Dr. Daniel E. Salmon in 1885. Salmonella can cause gastrointestinal illness and fever called salmonellosis. Salmonellosis is a disease caused by the bacteria *Salmonella*. It is usually characterized by acute onset of fever, abdominal pain, diarrhea, nausea and sometimes vomiting. Salmonella can be spread by food handlers who do not wash their hands and/or the

surfaces and tools they use between food preparations steps, and when people eat raw or undercooked foods.

3.2 Causes of Salmonellosis

Salmonella cause an illness called salmonellosis.

3.3 Mode of Salmonella Transmission

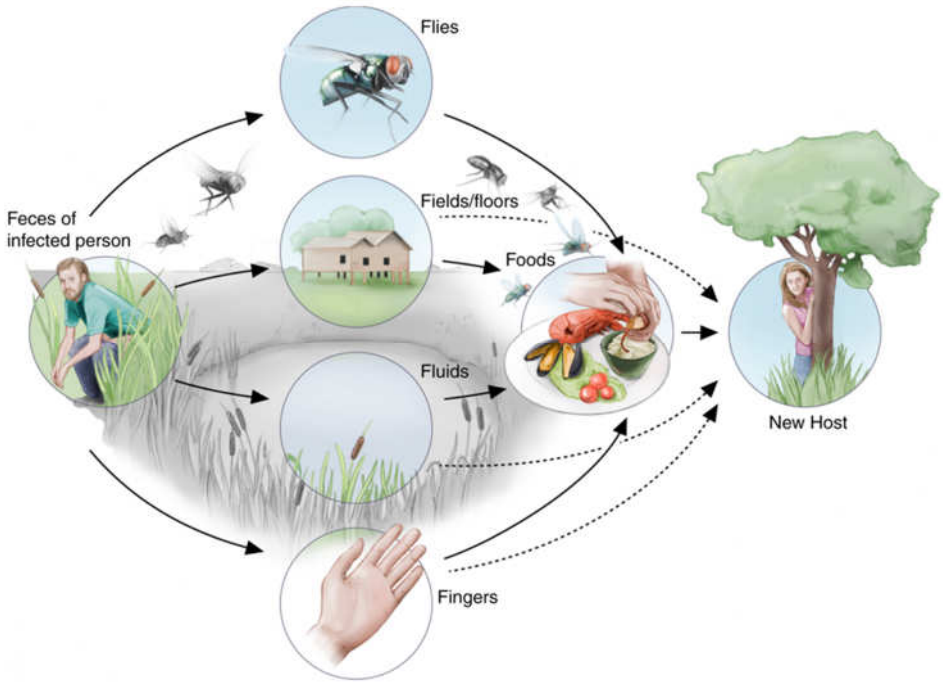

Figure 8 Salmonella Transmission

Salmonella food poisoning is usually acquired from eating contaminated foods. It is possible to spread the infection from person to person through fecal-oral cross-contamination, meaning that fecal material contaminates the hands of an infected person who then contaminates foods that are consumed by others.

Salmonella can be found in many foods including beef, chicken, eggs, fruits, pork, sprouts, vegetables, and even processed foods, such as nut butters, frozen pot pies, chicken nuggets, and stuffed chicken entrees. When you eat a food that is contaminated with *Salmonella*, it can make you sick. Contaminated foods usually look and smell normal, which is why it is important to know how to prevent Salmonella infection.

3.4 Signs and Symptoms of Salmonella Poisoning

Salmonella illness causes an inflammation of the gastrointestinal tract; this is known as gastroenteritis.

- ✓ Symptoms of Salmonella poisoning usually begin 12-72 hours after infection.
- ✓ Diarrhea, abdominal cramping, and fever are common symptoms.
- ✓ The diarrhea is typically loose and not bloody.
- ✓ Nausea
- ✓ Vomiting
- ✓ Headache
- ✓ Muscle aches.

3.5 Control and Prevention of Salmonella

- ✓ Refer the person to the nearest clinic or hospital for immediate treatment
- ✓ Wash hands with warm, soapy water for 20 seconds before and after handling uncooked eggs, raw meat, poultry, and seafood and their juices.
- ✓ Wash utensils, cutting boards, dishes, and countertops with hot, soapy water after preparing each food item and before you go on to prepare the next item.
- ✓ Don’t wash raw poultry, meat, and eggs before cooking. Germs can spread to other foods, utensils, and surfaces.
- ✓ Sanitize food contact surfaces with a freshly made solution of one tablespoon of unscented, liquid chlorine bleach in one gallon of water.
- ✓ Keep raw meat, poultry, seafood, and eggs separate from other foods in your grocery cart and in your refrigerator. Keep eggs in the original carton and store them in the main part of the refrigerator, not in the door.
- ✓ Keep raw meat, poultry, and seafood separate from ready-to-eat foods, such as salads and deli meat.
- ✓ Use separate cutting boards and plates for produce and for raw meat, poultry, seafood, and eggs.
- ✓ Never place cooked food on a plate that previously held raw meat, poultry, seafood, or eggs.
- ✓ Use a food thermometer to ensure that foods are cooked to a safe internal temperature:
    - 145°F for beef, veal, lamb, and fish (let the meat rest for 3 minutes before carving or eating).
    - 145°F for pork and ham (let the meat rest for 3 minutes before carving or eating).
    - 160°F for ground beef, ground pork, ground veal, and ground lamb.
    - 160°F for egg dishes.
    - 165°F for poultry (chicken, turkey, duck), including ground chicken and ground turkey.

- 165°F for casseroles.
- Microwave food to 165°F or above.
- Keep your refrigerator at 40°F or colder.
- Refrigerate or freeze perishables, prepared foods, and leftovers within 2 hours (or 1 hour if the temperature is 90°F or hotter.

SELF-ASSESSMENT EXERCISE

How do you control and prevent salmonellosis in the school community?

4.0 CONCLUSION

We have successfully discussed salmonella, the causes, mode of transmission, the signs and symptoms and the control and prevention of salmonella in the school community.

5.0 SUMMARY

In this unit, you have learnt the concept of salmonella, the causes, mode of transmission, the signs and symptoms, the control and prevention of salmonella in the school community.

6.0 TUTOR-MARKED ASSIGNMENT

1 What is salmonellosis?
2. What causes salmonellosis?
3. How does salmonellosis transmitted to man?
4 Describe the signs and symptoms of salmonellosis.

7.0 REFERENCES/FURTHER READING

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UNIT 10 CLOSTRIDIUM PERFRINGENS

CONTENTS

1.0 INTRODUCTION

Clostridium perfringens is bacteria that can infect the bowel in people and animals. The illness that results from a toxin produced by the bacteria is called *Clostridium perfringens* enteritis. Most people infected with these bacteria do not get severe illness. However, in rare cases the infection can cause symptoms.

2.0 OBJECTIVES

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

- explain Clostridium perfringens
- state the causes of Clostridium perfringens
- describe the signs and symptoms of Clostridium perfringens
- outline the mode of transmission of Clostridium perfringens
- mention the control and preventive measures for Clostridium perfringens in the school community.

3.0 MAIN CONTENT

3.1 Concept of Clostridium Perfringens

In most cases, C. perfringens food poisoning results when you eat improperly cooked and stored foods. Normally, bacteria are found on food after cooking, and these bacteria can multiply and cause C. perfringens food poisoning if the foods sit out and cool before refrigerating. C. perfringens food poisoning is caused by infection with the Clostridium perfringens (*C. perfringens)* bacterium. *C.* perfringens is found frequently in the intestines of humans and many animals and is present in soil and areas contaminated by human or animal feces.

3.2 Causes C. Perfringens

In most cases, C. perfringens food poisoning results when you eat improperly cooked and stored foods. Normally, bacteria are found on food after cooking, and these bacteria can multiply and cause C. perfringens food poisoning if the foods sit out and cool before refrigerating. Commonly infected foods include meats, meat products, and gravy.

3.3 Mode of *Clostridium Perfringens* Transmission

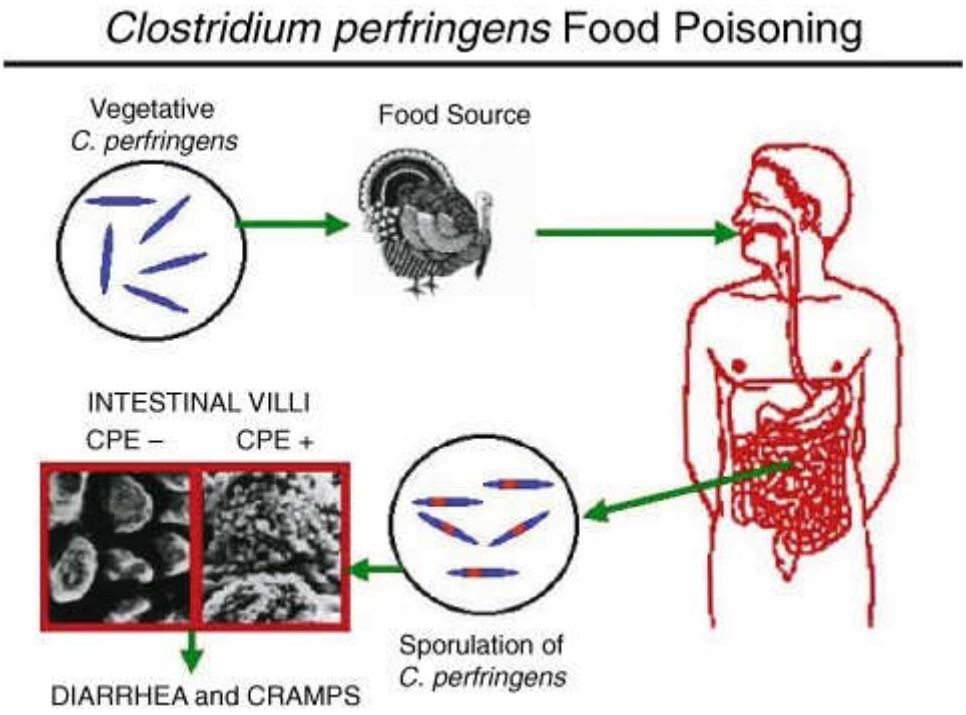

Figure 9 *Clostridium Perfringens* **Transmission**

The *Clostridium perfringens* toxin must be swallowed to cause disease. This usually happens when someone eats food that has been stored at the wrong temperature after cooking. *Clostridium perfringens* is found in the stool (feces) of infected people.

Food that is most likely to be contaminated

Clostridium perfringens is most commonly found in meat, poultry, cooked dried beans and gravies. Because the bacteria also live in the soil, contamination from unwashed vegetables is also possible.

3.4 Signs and Symptoms of *Clostridium Perfringens*

Illness usually begins suddenly and includes watery diarrhea and abdominal pain. There is usually no fever. Symptoms appear between six and 24 hours after ingestion and last approximately 24 hours. The illness is most serious for the elderly.

3.5 Control and Prevention Clostridium Perfringens

Refer all persons who show the signs and symptoms of *Clostridium perfringens to the clinics or hospitals for proper diagnosis and treatment* Always wash your hands thoroughly with soap and water before eating, before handling food, after using the toilet, after changing diapers and after handling your pets or cleaning up after them. Cook all food from animal sources thoroughly, especially poultry. If the meat or poultry is still pink in the center, it is not cooked enough. When serving foods buffet-style, keep hot foods hot and cold foods cold. Leftover portions of foods should be divided up for storage and cooled in a refrigerator rather than being left at room temperature. Wash all fruits and vegetables before eating. Carefully follow “keep refrigerated,” “sell by” and “use by” dates. Use only clean utensils, dishes and cutting boards to prepare food that is already cooked or will be eaten raw. Anything you use to prepare raw meat, seafood, or poultry including your hands and the table or counter top, should be washed thoroughly before you touch any other food. If you are taking care of someone who has diarrhea, scrub your hands with plenty of soap and water after cleaning the bathroom, helping the person use the toilet, or changing diapers, soiled clothes or soiled sheets. If you or your child has persistent diarrhea with or without a fever, or if the diarrhea is severe or contains blood, call your doctor or health center for advice.

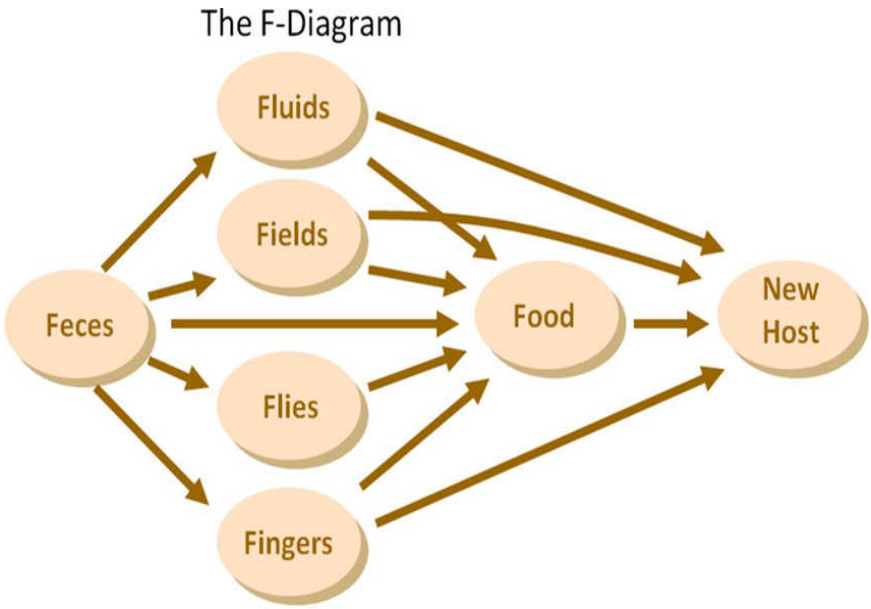

Figure10. Faecal-Oral Transmission Routes

SELF-ASSESSMENT EXERCISE

What is salmonellosis?

4.0 CONCLUSION

We have successfully discussed *Clostridium perfringens*, the causes, mode of transmission, the signs and symptoms and the control and prevention of *Clostridium perfringens* in the school community

5.0 SUMMARY

In this unit, you have learnt the concept of *Clostridium perfringens*, the causes, mode of transmission, the signs and symptoms, the control and prevention of *Clostridium perfringens* in the school community

6.0 TUTOR-MARKED ASSIGNMENT

1. What causes *Clostridium perfringens*?
2. How does *Clostridium perfringens* transmitted to man?
3 Describe the signs and symptoms of *Clostridium perfringens*.
4 How do you control and prevent *Clostridium perfringens* in the school community?

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UNIT 11 CORONAVIRUS (COVID-19)

CONTENTS

1.0 INTRODUCTION

Coronaviruses (CoV) are a large family of viruses that cause illness in humans and animals ranging from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS-CoV) and Severe Acute Respiratory Syndrome (SARS-CoV) and COVID-19. A novel coronavirus (nCoV) is a new strain that has not been previously identified in humans. Early reports suggest the new virus is more contagious than the one causing SARS but less likely to cause severe symptoms.

2.0 OBJECTIVES

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

- explain COVID-19
- state the causes of COVID-19
- describe the signs and symptoms of COVID-19
- outline the mode of transmission of COVID-19
- mention the control and preventive measures for COVID-19 in the school and the community.

3.0 MAIN CONTENT

3.1 Concept of Clostridium Perfringens

Coronavirus disease 2019 (COVID-19) is defined as illness caused by a novel coronavirus now called severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2; formerly called 2019-nCoV), which was first identified amid an outbreak of respiratory illness cases in Wuhan City, Hubei Province, China. It was initially reported to the WHO on December 31, 2019. On January 30, 2020, the WHO declared the

COVID-19 outbreak a global health emergency. On March 11, 2020, the WHO declared COVID-19 a global pandemic, its first such designation since declaring H1N1 influenza a pandemic in 2009.

3.2 Cause of Covid 19

Coronavirus disease 2019 (COVID-19) is defined as illness caused by a novel coronavirus called severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2; formerly called 2019-nCoV), which was first identified amid an outbreak of respiratory illness cases in Wuhan City, Hubei Province, China or it is cause by Coronaviruses

3.3 Signs and Symptoms of Covid 19

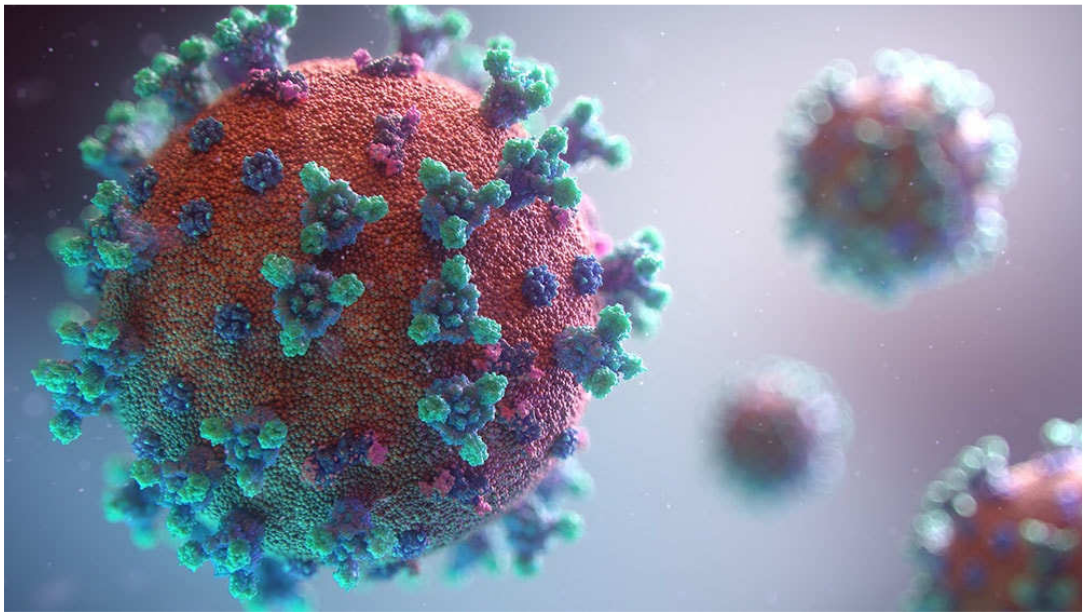

Figure 11. Covid 19 Structure

Coronaviruses are relatively simple structures, and their form helps us to understand how they work. They are spherical and coated with spikes of protein. These spikes help the virus bind to and infect healthy cells. Most common signs and symptoms are:

- ✓ Fever
- ✓ dry cough
- ✓ tiredness and Less common symptoms:
- ✓ aches and pains
- ✓ sore throat
- ✓ diarrhea
- ✓ conjunctivitis
- ✓ headache

- ✓ loss of taste or smell
- ✓ a rash on skin, or discolouration of fingers or toes

3.4 Mode of transmission

The disease is transmitted through air and direct contact with an infected person or formite used by an infected person

3.5 Control and Prevention of COVID19

Figure 12 wearing of mask of nose and mouth

Figure 13 hand washing with soap and water

Refer the person with the signs and symptoms of Covid 19 to the hospital for expert management. Hand washing with soap is one of the

cheapest, most effective things you can do to protect yourself and others against corona virus disease.

To prevent the spread of COVID-19:

- ✓ Clean your hands often. Use soap and water, or an alcohol-based hand rub.
- ✓ Maintain a safe distance from anyone who is coughing or sneezing.
- ✓ Wear a mask when physical distancing is not possible.
- ✓ Don't touch your eyes, nose or mouth with hands
- ✓ Cover your nose and mouth with your bent elbow or a tissue when you cough or sneeze.
- ✓ Stay home if you feel unwell.
- ✓ If you have a fever, cough and difficulty breathing, seek medical attention.

SELF-ASSESSMENT EXERCISE
What is coronavirus (covid-19)?

4.0 CONCLUSION

We have successfully discussed coronavirus (covid-19), the causes, mode of transmission, the signs and symptoms and the control and prevention of coronavirus (covid-19) in the school community

5.0 SUMMARY

In this unit, you have learnt the concept of coronavirus (covid-19), the causes, mode of transmission, the signs and symptoms, the control and prevention of coronavirus (covid-19) in the school and the community

6.0 TUTOR-MARKED ASSIGNMENT

1. What causes coronavirus (covid-19)?
2. How does coronavirus (covid-19) transmitted to man?
3 Describe the signs and symptoms of coronavirus (covid-19).
4 How do you control and prevent *Clostridium perfringens* in the school community?

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UNIT 12 TUBERCULOSIS (TB)

1.0 INTRODUCTION

Tuberculosis (TB) is an air borne disease caused by a bacterium called *Mycobacterium tuberculosis*. The bacteria usually attack the lungs, but TB bacteria can attack any part of the body such as the kidney, spine, and brain. Not everyone infected with TB bacteria becomes sick. As a result, two TB-related conditions exist: latent TB infection (LTBI) and TB disease. If not treated properly, TB disease can be fatal.

2.0 OBJECTIVES

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

- explain Tuberculosis (TB
- mention the two types of Tuberculosis (TB
- state the causes of Tuberculosis (TB
- describe the signs and symptoms of Tuberculosis (TB
- outline the mode of transmission of Tuberculosis (TB
- mention the control and preventive measures for Tuberculosis (TB).

3.0 MAIN CONTENT

3.1 Concept of Clostridium Perfringens

Tuberculosis (TB) is a contagious infection that usually attacks your lungs. It can also spread to other parts of your body, like your brain and spine. A type of bacteria called Mycobacterium tuberculosis causes it

3.2 Tuberculosis Types

There are three forms of Tuberculosis disease:

✓ **Latent TB.** You have the germs in your body, but your immune system keeps them from spreading. You do not have any symptoms, and you are not contagious. But the infection is still alive and can one day become active. If you are at high risk for re-activation for instance, if you have HIV, you had an infection in the past 2 years, your chest X-ray is unusual, or your immune system is weakened your doctor will give you medications to prevent active TB.

- ✓ **Active TB.** Active TB is an illness in which the TB bacteria are rapidly multiplying and invading different organs of the body. The typical symptoms of active TB variably include cough, phlegm, chest pain, weakness, weight loss, fever, chills and sweating at night. A person with active pulmonary TB disease may spread TB to others by airborne transmission of infectious particles coughed into the air.
- ✓ Miliary TB. Miliary TB is a rare form of active disease that occurs when TB bacteria find their way into the bloodstream. In this form, the bacteria quickly spread all over the body in tiny nodules and affect multiple organs at once. This form of TB can be rapidly fatal

3.3 Causes of Tuberculosis

M. tuberculosis bacteria cause TB. They can spread through the air in droplets when a person with pulmonary TB coughs, sneezes, spits, laughs, or talks.

Tuberculosis Risk Factors

You are more likely to get TB if:

- ✓ A friend, co-worker, or family member has active TB.
- ✓ You live in or have traveled to an area where TB is common
- ✓ You are part of a group in which TB is more likely to spread, or you work or live with someone who is. This includes homeless people, people who have HIV, people in jail or prison, and people who inject drugs into their veins.
- ✓ You work or live in a hospital or nursing home.
- ✓ You are a health care worker for patients at high risk of TB.
- ✓ You're a smoker.

A healthy immune system fights the TB bacteria. But you might not be able to fend off active TB disease if you have:

- ✓ HIV or AIDS
- ✓ Diabetes
- ✓ Severe kidney disease
- ✓ Head and neck cancers
- ✓ Cancer treatments such as chemotherapy
- ✓ Low body weight and poor nutrition
- ✓ Medications for organ transplants

Certain drugs to treat rheumatoid arthritis, Crohn's disease, and psoriasis

3.4 Tuberculosis Signs and Symptoms

Latent TB doesn't have symptoms. A skin or blood test can tell if you have it.

Signs of active TB disease include:

- ✓ A cough that lasts more than 3 weeks
- ✓ Chest pain
- ✓ Coughing up blood
- ✓ Feeling tired all the time
- ✓ Night sweats
- ✓ Chills
- ✓ Fever
- ✓ Loss of appetite
- ✓ Weight loss

If you have any of these symptoms, see your doctor to get tested. Get medical help right away if you have chest pain.

3.5 Mode of Tuberculosis Transmission

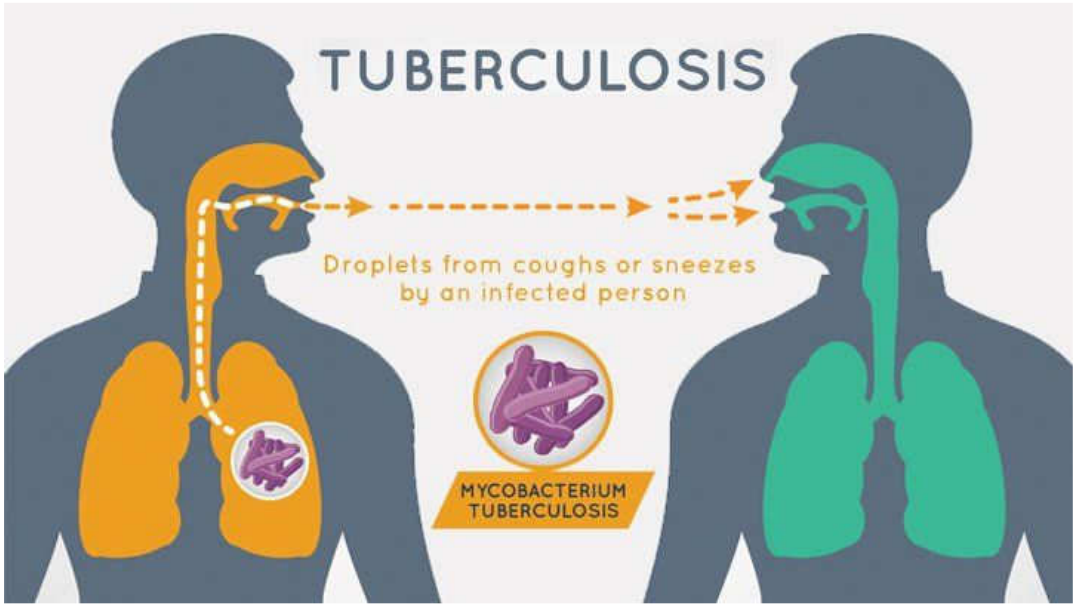

Figure 14 **Tuberculosis Transmission**

When someone who has TB coughs, sneezes, talks, laugh, or sing, they release tiny droplets that contain the germs. If you breathe in these germs, you can get it. TB isn't easy to catch. You usually have to spend a long time around someone who has a lot of the bacteria in their lungs. You're most likely to catch it from co-workers, friends, and family members. **12.6**

3.6 Tuberculosis Tests and Diagnosis

There are two common tests for tuberculosis:

- ✓ **Skin test.** This is also known as the Mantoux tuberculin skin test. A technician injects a small amount of fluid into the skin of your lower arm. After 2 or 3 days, they will check for swelling in your arm. If your results are positive, you probably have TB bacteria. But you could also get a false positive. If you have gotten a tuberculosis vaccine called bacillus Calmette-Guerin (BCG), the test could say that you have TB when you really don't. The results can also be false negative, saying that you don't have TB when you really do, if you have a very new infection. You might get this test more than once.
- ✓ **Blood test.** These tests, also called interferon-gamma release assays (IGRAs), measure the response when TB proteins are mixed with a small amount of your blood.

Those tests don't tell you if your infection is latent or active. If you get a positive skin or blood test, your doctor will learn which type you have with:

- ✓ A chest X-ray or CT scan to look for changes in your lungs
- ✓ Acid-fast bacillus (AFB) tests for TB bacteria in your sputum, the mucus that comes up when you cough

3.7 Tuberculosis Treatment

Your treatment will depend on your infection.

- ✓ If you have **latent TB,** your doctor will give you medication to kill the bacteria so the infection doesn't become active. You might get isoniazid, rifapentine, or rifampin, either alone or combined. You'll have to take the drugs for up to 9 months. If you see any signs of active TB, call your doctor right away.
- ✓ A combination of medicines also treats **active TB.** The most common are ethambutol, isoniazid, pyrazinamide, and rifampin. You'll take them for 6 to 12 months.
- ✓ If you have **drug-resistant TB,** your doctor might give you one or more different medicines. You may have to take them for much longer, up to 30 months, and they can cause more side effects.

- ✓ Whatever kind of infection you have, it's important to finish taking all of your medications, even when you feel better. If you quit too soon, the bacteria can become resistant to the drugs.

3.8 Tuberculosis Medication Side Effects

TB drugs can have side effects. Common isoniazid side effects include:

- ✓ Numbness and tingling in your hands and feet
- ✓ Upset stomach, nausea, and vomiting
- ✓ Loss of appetite
- ✓ Weakness

Ethambutol side effects may include:

- ✓ Chills
- ✓ Painful or swollen joints
- ✓ Belly pain, nausea, and vomiting
- ✓ Loss of appetite
- ✓ Headache
- ✓ Confusion

Some pyrazinamide side effects include:

- ✓ Lack of energy
- ✓ Nausea and vomiting
- ✓ Loss of appetite
- ✓ Muscle or joint pain

Common rifampin side effects include:

- ✓ Skin rash
- ✓ Upset stomach, nausea, and vomiting
- ✓ Diarrhea
- ✓ Loss of appetite
- ✓ Inflamed pancreas

3.8 Tuberculosis Complications

Tuberculosis infection can cause complications such as:

- ✓ Joint damage
- ✓ Lung damage
- ✓ Infection or damage of your bones, spinal cord, brain, or lymph nodes
- ✓ Liver or kidney problems
- ✓ Inflammation of the tissues around your heart

3.9 Tuberculosis Prevention

To help stop the spread of TB:

- ✓ If you have a latent infection, take all of your medication so it doesn't become active and contagious.
- ✓ If you have active TB, limit your contact with other people. Cover your mouth when you laugh, sneeze, or cough. Wear a surgical mask when you're around other people during the first weeks of treatment.
- ✓ If you're traveling to a place where TB is common, avoid spending a lot of time in crowded places with sick people.
- ✓ Children in countries where TB is common often get the BCG vaccine. Other vaccines are being developed and tested.

SELF-ASSESSMENT EXERCISE
What is Tuberculosis?

4.0 CONCLUSION

We have successfully discussed Tuberculosis as one of the infectious diseases, the causes, mode of transmission, the signs and symptoms and the control and prevention of Tuberculosis in the school community and the general public.

5.0 SUMMARY

In this unit, you have learnt the concept of Tuberculosis, the causes, mode of transmission, the signs and symptoms, the control and prevention of Tuberculosis in the school and the community

6.0 TUTOR-MARKED ASSIGNMENT

1. Mention the three types of Tuberculosis
2. What causes Tuberculosis?
3. How does Tuberculosis transmitted to man?
4. Describe the signs and symptoms of Tuberculosis.
5. How do you control and prevent Tuberculosis in the school and the general community?

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UNIT13 YELLOW FEVER

CONTENTS

1.0 INTRODUCTION

Vectors are living organisms that can transmit infectious pathogens between humans, or from animals to humans. Many of these vectors are bloodsucking insects, which ingest disease-producing microorganisms during a blood meal from an infected host (human or animal) and later transmit it into a new host, after the pathogen has replicated. Often, once a vector becomes infectious, they are capable of transmitting the pathogen for the rest of their life during each subsequent bite/blood meal call Vector-borne diseases. Vector-borne diseases are human illnesses caused by parasites, viruses and bacteria that are transmitted by vectors to human or animal. Every year there are more than 700,000 deaths from diseases such as malaria, dengue, schistosomiasis, human African trypanosomiasis, leishmaniasis, Chagas disease, yellow fever, Japanese encephalitis and onchocerciasis.

2.0 OBJECTIVES

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

- explain Yellow Fever
- state the causes of Yellow Fever
- describe the signs and symptoms of Yellow Fever
- outline the mode of transmission of Yellow Fever
- mention the control and preventive measures for Yellow Fever.

3.0 MAIN CONTENT

3.1 Concept of Yellow Fever

Yellow fever is an acute viral haemorrhagic disease transmitted by infected mosquitoes. The "yellow" in the name refers to the jaundice that affects some patients.

3.2 Cause of Yellow Fever

It is caused by virus which is endemic in tropical areas of Africa and Central and South America.

3.3 Signs and Symptoms

Signs and symptoms of yellow fever include fever, headache, jaundice, muscle pain, nausea, vomiting and fatigue

3.4 Route of Yellow Fever Transmission

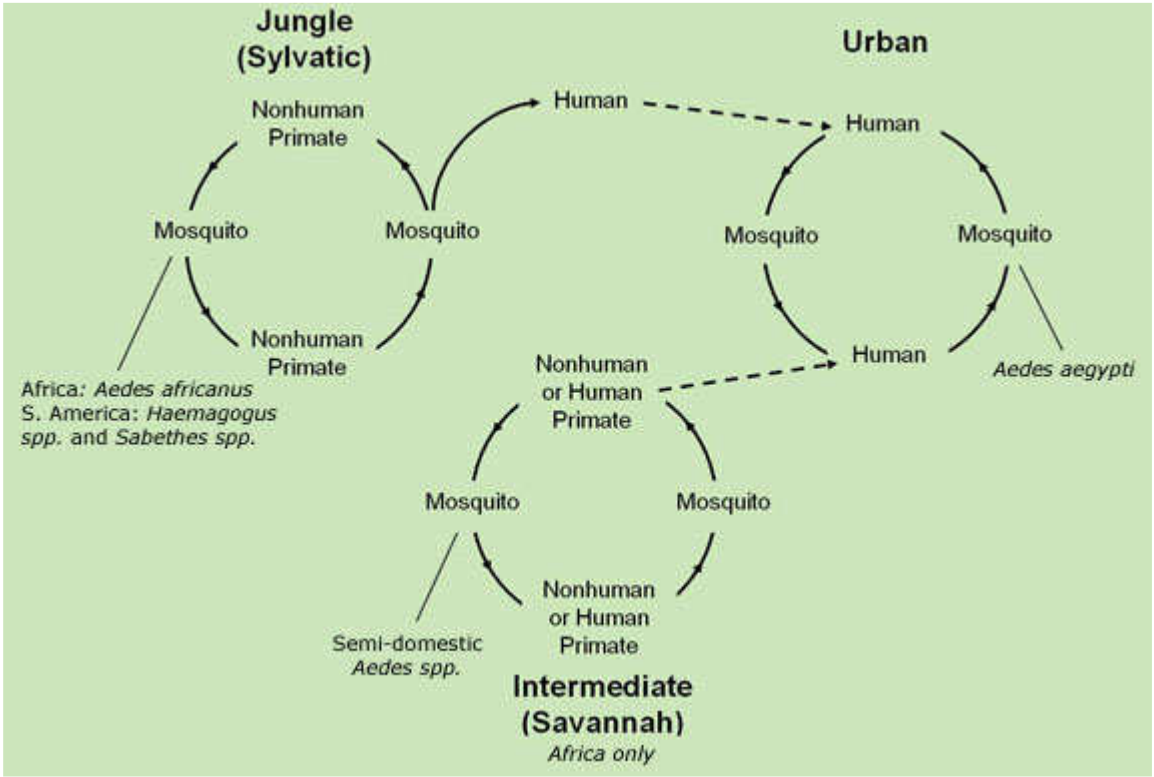

Figure 15 Yellow Fever Transmission

The yellow fever virus is an arbovirus of the flavivirus genus and is transmitted by mosquitoes, belonging to the Aedes and Haemogogus species. The different mosquito species live in different habitats, some

breed around houses (domestic), others in the jungle (wild), and some in both habitats (semi-domestic). There are 3 types of transmission cycles:

- Sylvatic (or jungle) yellow fever: In tropical rainforests, monkeys, which are the primary reservoir of yellow fever, are bitten by wild mosquitoes of the Aedes and Haemogogus species, which pass the virus on to other monkeys. Occasionally humans working or travelling in the forest are bitten by infected mosquitoes and develop yellow fever.
- Intermediate yellow fever: In this type of transmission, semi-domestic mosquitoes (those that breed both in the wild and around households) infect both monkeys and people. Increased contact between people and infected mosquitoes leads to increased transmission and many separate villages in an area can develop outbreaks at the same time. This is the most common type of outbreak in Africa.
- Urban yellow fever: Large epidemics occur when infected people introduce the virus into heavily populated areas with high density of Aedes aegypti mosquitoes and where most people have little or no immunity, due to lack of vaccination or prior exposure to yellow fever. In these conditions, infected mosquitoes transmit the virus from person to person.

3.5 Control and Prevention

Good and early supportive treatment in hospitals improves survival rates. There is currently no specific anti-viral drug for yellow fever but specific care to treat dehydration, liver and kidney failure, and fever improves outcomes. Associated bacterial infections can be treated with antibiotics. The most effective way to prevent infection from Yellow Fever virus is to prevent mosquito bites. Mosquitoes bite during the day and night. Use insect repellent, wear long-sleeved shirts and pants, treat clothing and gear, and get vaccinated before traveling, if vaccination is recommended for you.

1. Vaccination

Vaccination is the most important means of preventing yellow fever. The yellow fever vaccine is safe, affordable and a single dose provides life-long protection against yellow fever disease. Several vaccination strategies are used to prevent yellow fever disease and transmission: routine infant immunization; mass vaccination campaigns designed to increase coverage in countries at risk; and vaccination of travellers going to yellow fever endemic areas. In high-risk areas where vaccination coverage is low, prompt recognition and control of outbreaks using mass

immunization is critical. It is important to vaccinate most (80% or more) of the population at risk to prevent transmission in a region with a yellow fever outbreak. There have been rare reports of serious side-effects from the yellow fever vaccine. The risk of AEFI is higher for people over 60 years of age and anyone with severe immunodeficiency due to symptomatic HIV/AIDS or other causes, or who have a thymus disorder. People over 60 years of age should be given the vaccine after a careful risk-benefit assessment. People who are usually excluded from vaccination include:

- infants aged less than 9 months;
- pregnant women except during a yellow fever outbreak when the risk of infection is high;
- people with severe allergies to egg protein; and
- people with severe immunodeficiency due to symptomatic HIV/AIDS or other causes, or who have a thymus disorder.

In accordance with the International Health Regulations (IHR), countries have the right to require travelers to provide a certificate of yellow fever vaccination. If there are medical grounds for not getting vaccinated, this must be certified by the appropriate authorities. The IHR are a legally binding framework to stop the spread of infectious diseases and other health threats. Requiring the certificate of vaccination from travelers is at the discretion of each State Party, and it is not currently required by all countries.

2. Vector control

The risk of yellow fever transmission in urban areas can be reduced by eliminating potential mosquito breeding sites, including by applying larvicides to water storage containers and other places where standing water collects. Both vector surveillance and control are components of the prevention and control of vector-borne diseases, especially for transmission control in epidemic situations. For yellow fever, vector surveillance targeting *Aedes aegypti* and other *Aedes* species will help inform where there is a risk of an urban outbreak.

Understanding the distribution of these mosquitoes within a country can allow a country to prioritize areas to strengthen their human disease surveillance and testing, and to consider vector control activities. There is currently a limited public health arsenal of safe, efficient and cost-effective insecticides that can be used against adult vectors. This is mainly due to the resistance

of major vectors to common insecticides and the withdrawal or abandonment of certain pesticides for reasons of safety or the high cost of re-registration.

Personal preventive measures such as clothing minimizing skin exposure and repellents are recommended to avoid mosquito bites. The use of insecticide-treated bed nets is limited by the fact that *Aedes* mosquitos bite during the daytime.

3. **Epidemic preparedness and response**

Prompt detection of yellow fever and rapid response through emergency vaccination campaigns are essential for controlling outbreaks. However, underreporting is a concern the true number of cases is estimated to be 10 to 250 times what is now being reported. WHO recommends that every at-risk country have at least one national laboratory where basic yellow fever blood tests can be performed. A confirmed case of yellow fever in an unvaccinated population is considered an outbreak. A confirmed case in any context must be fully investigated. Investigation teams must assess and respond to the outbreak with both emergency measures and longer-term immunisation plans.

SELF-ASSESSMENT EXERCISE

What is yellow fever?

4.0 CONCLUSION

We have successfully discussed yellow fever as one of the infectious diseases, the causes, mode of transmission, the signs and symptoms and the control and prevention of yellow fever in the school community and the general public.

5.0 SUMMARY

In this unit, you have learnt the concept of yellow fever, the causes, mode of transmission, the signs and symptoms, the control and prevention of yellow fever in the school and the community.

6.0 TUTOR-MARKED ASSIGNMENT

1. What causes yellow fever?
2. How does yellow fever transmitted to man?
3. Describe the signs and symptoms of yellow fever disease.
4. How do you control and prevent yellow fever in the school and in the general community?

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UNIT 14 MALARIA FEVER

CONTENTS

1.0 INTRODUCTION

Malaria is a parasitic infectious disease transmitted by an infected Anopheline mosquito and is a life-threatening disease. It's typically transmitted through the bite of an infected *Anopheles* mosquito. Infected mosquitoes carry the *Plasmodium* parasite. When this mosquito bites you, the parasite is released into your bloodstream. Once the parasites are inside your body, they travel to the liver, where they mature. After several days, the mature parasites enter the bloodstream and begin to infect red blood cells.

Within 48 to 72 hours, the parasites inside the red blood cells multiply, causing the infected cells to burst open. The parasites continue to infect red blood cells, resulting in symptoms that occur in cycles that last two to three days at a time. Malaria is typically found in tropical and subtropical climates where the parasites can live.

2.0 OBJECTIVES

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

- explain Malaria Fever
- state the causes of Malaria Fever
- describe the signs and symptoms of Malaria Fever
- outline the mode of transmission of Malaria Fever
- mention the control and preventive measures for Malaria Fever.

3.0 MAIN CONTENT

3.1 Concept of Malaria Fever

Malaria is an infectious disease caused by protozoan parasites from the Plasmodium family that can be transmitted by the bite of the Anopheles mosquito or by a contaminated needle or transfusion. Falciparum malaria is the most deadly type. Malaria is caused by *Plasmodium* parasites. The parasites are spread to people through the bites of infected female *Anopheles* mosquitoes, called "malaria vectors." There are 5 parasite species that cause malaria in humans, and 2 of these species *P. falciparum* and *P. vivax* pose the greatest threat.

In 2018, *P. falciparum* accounted for 99.7% of estimated malaria cases in the WHO African Region 50% of cases in the WHO South-East Asia Region, 71% of cases in the Eastern Mediterranean and 65% in the Western Pacific. *P. vivax* is the predominant parasite in the WHO Region of the Americas, representing 75% of malaria cases.

3.2 Causes of Malaria

Malaria is a life-threatening disease caused by parasites that are transmitted to people through the bites of infected female Anopheles mosquitoes**.** Malaria can occur if a mosquito infected with the *Plasmodium* parasite bites you. There are four kinds of malaria parasites that can infect humans: *Plasmodium vivax*, *P. ovale*, *P. malariae*, and *P. falciparum*. *P. falciparum* causes a more severe form of the disease and those who contract this form of malaria have a higher risk of death. An infected mother can also pass the disease to her baby at birth. This is known as congenital malaria.

3.3 Transmission of Malaria

In most cases, malaria is transmitted through the bites of female *Anopheles* mosquitoes. There are more than 400 different species of *Anopheles* mosquito; around 30 are malaria vectors of major importance. All of the important vector species bite between dusk and dawn. The intensity of transmission depends on factors related to the parasite, the vector, the human host, and the environment. Malaria is transmitted by blood, so it can also be transmitted through:

- an organ transplant
- a transfusion
- use of shared

Transmission is more intense in places where the mosquito lifespan is longer (so that the parasite has time to complete its development inside the mosquito) and where it prefers to bite humans rather than other animals. The long lifespan and strong human-biting habit of the African vector species is the main reason why approximately 90% of the world's malaria cases are in Africa.

Transmission also depends on climatic conditions that may affect the number and survival of mosquitoes, such as rainfall patterns, temperature and humidity. In many places, transmission is seasonal, with the peak during and just after the rainy season. Malaria epidemics can occur when climate and other conditions suddenly favour transmission in areas where people have little or no immunity to malaria. They can also occur when people with low immunity move into areas with intense malaria transmission, for instance to find work, or as refugees.

3.4 Signs and Symptoms of Malaria

The signs and symptoms of malaria typically develop within 10 days to 4 weeks following the infection. In some cases, symptoms may not develop for several months. Some malarial parasites can enter the body but will be dormant for long periods of time. Common signs and symptoms of malaria include:

- shaking chills that can range from moderate to severe
- high fever
- profuse sweating
- headache
- nausea
- vomiting
- abdominal pain
- diarrhea
- anemia
- muscle pain
- convulsions
- coma
- bloody stools

3.5 Malaria Diagnoses

Your doctor will be able to diagnose malaria. During your appointment, your doctor will review your health history, including any recent travel to tropical climates. A physical exam will also be performed. Your doctor will be able to determine if you have an enlarged spleen or liver.

If you have symptoms of malaria, your doctor may order additional blood tests to confirm your diagnosis. These tests will show:

- whether you have malaria
- what type of malaria you have
- if your infection is caused by a parasite that is resistant to certain types of drugs
- if the disease has caused anemia
- if the disease has affected your vital organ

3.6 Route of Malaria Transmission

Malaria Transmission Cycle

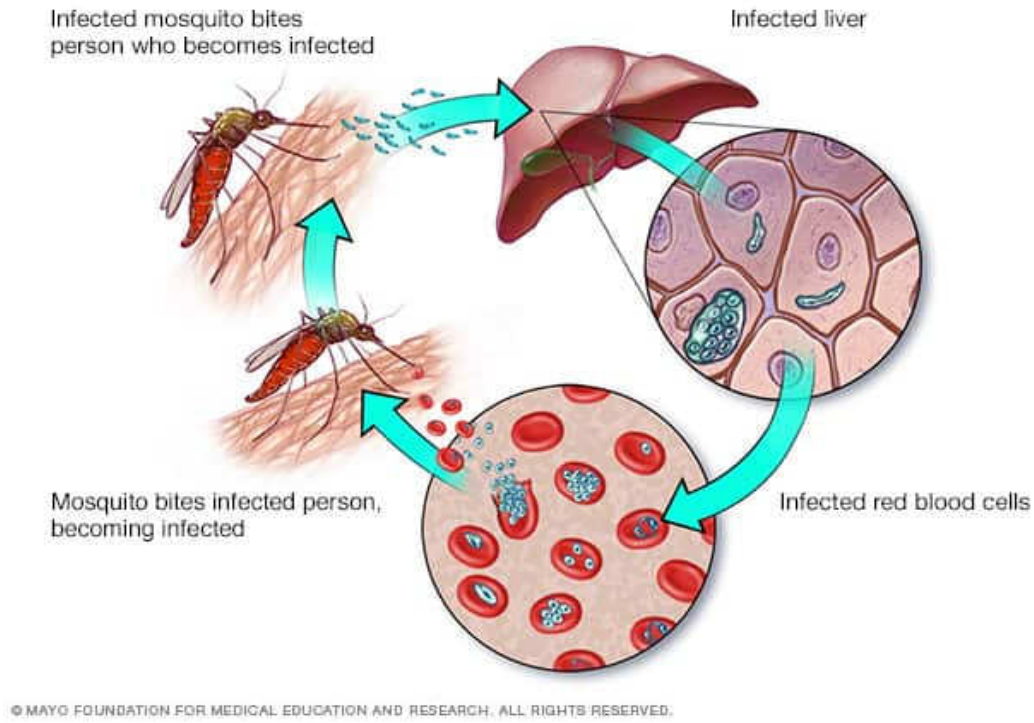

Figure 16 **Malaria Transmission**

Malaria spreads when a mosquito becomes infected with the disease after biting an infected person, and the infected mosquito then bites a non-infected person. The malaria parasites enter that person's bloodstream and travel to the liver. When the parasites mature, they leave the liver and infect red blood cells. When Anopheles mosquito bites and sucks out the infected red blood cells from an infected person and then bites an uninfected person in the process it regurgitates the mosquito parasite into the new host before sucking out the blood.

3.7 Life-Threatening Complications of Malaria

Malaria can cause a number of life-threatening complications. These include the following:

- swelling of the blood vessels of the brain, or cerebral malaria
- an accumulation of fluid in the lungs that causes breathing problems, or pulmonary edema
- organ failure of the kidneys, liver, or spleen
- anemia due to the destruction of red blood cells
- low blood sugar

3.8 Control and Prevention of Malaria

Refer the person to the hospital for proper treatment

- There's no vaccine available to prevent malaria.
- Apply mosquito repellent with DEET (diethyltoluamide) to exposed skin.
- Drape mosquito netting over beds.
- Put screens on windows and doors.
- Treat clothing, mosquito nets, tents, sleeping bags and other fabrics with an insect repellent called permethrin.
- Wear long pants and long sleeves to cover your skin.
- Sleeping under an insecticide-treated net (ITN) can reduce contact between mosquitoes and humans by providing both a physical barrier and an insecticidal effect
- Proper environmental sanitation of the residence
- Effective surveillance is required at all points on the path to malaria elimination received
- Malaria elimination or the interruption of local transmission of a specified malaria parasite species in a defined geographical area as a result of deliberate activities

Who Response

The *"Global Vector Control Response (GVCR) 2017–2030"* was approved by the World Health Assembly in 2017. It provides strategic guidance to countries and development partners for urgent strengthening of vector control as a fundamental approach to preventing disease and responding to outbreaks. To achieve this a re-alignment of vector control programmes is required, supported by increased technical capacity, improved infrastructure, strengthened monitoring and surveillance systems, and greater community mobilization. Ultimately, this will support implementation of a comprehensive approach to vector control that will enable the achievement of disease-specific national and

global goals and contribute to achievement of the Sustainable Development Goals and Universal Health Coverage.

WHO Secretariat provides strategic, normative and technical guidance to countries and development partners for strengthening vector control as a fundamental approach based on GVCR to preventing disease and responding to outbreaks. Specifically WHO responds to vector-borne diseases by:

- providing evidence-based guidance for controlling vectors and protecting people against infection;
- providing technical support to countries so that they can effectively manage cases and outbreaks;
- supporting countries to improve their reporting systems and capture the true burden of the disease;
- providing training (capacity building) on clinical management, diagnosis and vector control with support from some of its collaborating centres; and
- supporting the development and evaluation of new tools, technologies and approaches for vector-borne diseases, including vector control and disease management technologies.
- A crucial element in reducing the burden of vector-borne diseases is behavioural change.

WHO works with partners to provide education and improve public awareness, so that people know how to protect themselves and their communities from mosquitoes, ticks, bugs, flies and other vectors.

SELF-ASSESSMENT EXERCISE
What is malaria fever?

4.0 CONCLUSION

We have successfully discussed malaria fever as one of the infectious diseases, the causes, mode of transmission, the signs and symptoms and the control and prevention of malaria fever in the school community and the general public.

5.0 SUMMARY

In this unit, you have learnt the concept of malaria fever , the causes, mode of transmission, the signs and symptoms, the control and prevention of malaria fever in the school and the community

6.0 TUTOR-MARKED ASSIGNMENT

1. What causes malaria fever?
2. How does yellow fever transmitted to man?
3. Describe the signs and symptoms of yellow fever disease.
4. How do you control and prevent yellow fever in the school and in the general community?

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UNIT 15 CONTACT DISEASES

CONTENTS

1.0 INTRODUCTION

Contact diseases are diseases transmitted by direct or indirect contact with an infected person or his/her formite example HIV/AIDS and Covid19. Contact Diseases are transmitted when an infected person has direct bodily contact with an uninfected person and the microbe is passed from one to the other. Contact transmission is the most common form of transmitting diseases and virus. There are two types of contact transmission: direct and indirect.

- ✓ Direct contact transmission occurs when there is physical contact between an infected person and a susceptible person. Illnesses that spread this way are measles, pertussis, Neisseria meningitidis and mycoplasma pneumoniae.
- ✓ Indirect contact transmission occurs when there is no direct human-to-human contact. Contact occurs from a reservoir to contaminated surfaces or objects, or to vectors such asmoquitoes, flies, mites, fleas, ticks, rodents or dogs.

2.0 OBJECTIVES

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

- explain Contact diseases
- state the causes of Contact diseases
- mention at least five(5) diseases that can be transmitted through contact
- describe the signs and symptoms of Contact diseases
- outline the mode of transmission of Contact diseases
- mention the control and preventive measures for Contact diseases

3.0 MAIN CONTENT

3.1 Concept of Malaria Fever

Contact Diseases are transmitted when an infected person has direct bodily contact with an uninfected person and the microbe is passed from one to the other. Contact diseases can also be spread by indirect contact with an infected person's environment or personal items. Types of direct contact include.

3.2 Causes of Contact Disease

Contact diseases are caused by microorganisms such as bacteria, viruses, parasites and fungi that can be spread, directly or indirectly, from one person to another. Some are transmitted through bites from insects while others are caused by ingesting contaminated food or water.

3.3 Transmission of Contact Disease

Infectious diseases commonly spread through the direct transfer of bacteria, viruses or other germs from one person to another. This can happen when an individual with the bacterium or virus touches, kisses, or coughs or sneezes on someone who isn't infected. Person-to-person contact .The spray of droplets during coughing and sneezing can spread an infectious disease Indirect contact Airborne transmission Contaminated objects Food and drinking water. Animal-to-person contact. Zoonosis occurs when diseases are transferred from animals to people. Zoonotic diseases include:

- ✓ anthrax (from sheep)
- ✓ rabies (from birds and dogs)
- ✓ West Nile virus (from birds)
- ✓ plague (from rodents) and
- ✓ Environmental reservoirs such as Soil, water, and vegetation containing infectious organisms that are transferred to people eg. Hookworm,

3.4 Factors Involved in the Transmission of Contact Diseases

Transmission is a process in which several events happen one after the other in the form of a chain. Hence, this process is known as a chain of transmission. Six major factors are identified: the infectious agent, the reservoir, the route of exit, the mode of transmission, the route of entry and the susceptible host. We will now consider each of these factors in turn.

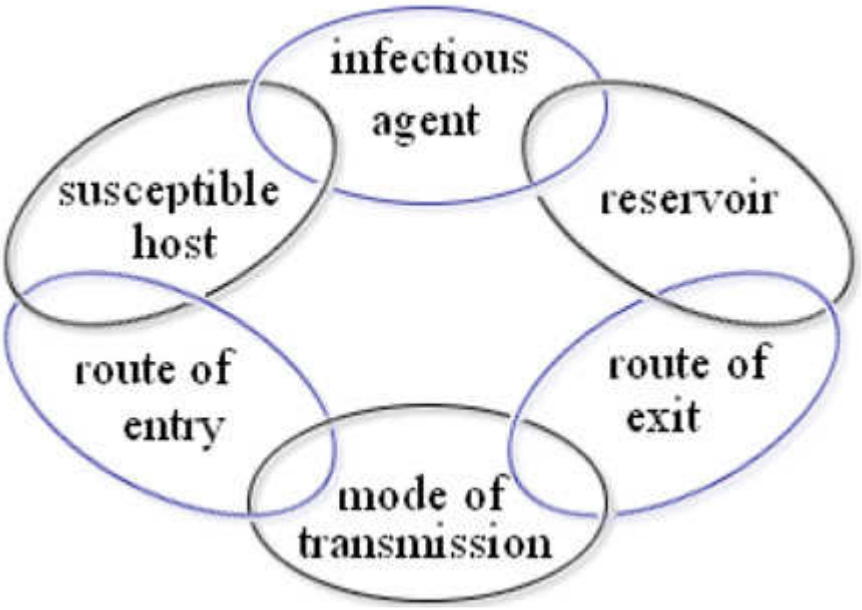

Figure 19. Factors involved in the Chain of Communicable Disease Transmission.

- Infectious agents examples are bacteria, viruses, helminthes protozoa among others
- Reservoirs of infectious agents-Many infectious agents can survive in different organisms, or on non-living objects, or in the environment. Some can only persist and multiply inside human beings, whereas others can survive in animals. The place where the infectious agent is normally present before infecting a new human is called a reservoir without which infectious agents cannot survive and hence cannot be transmitted to other people. Non-living things like water, food and soil can also be reservoirs for infectious agents, but they are called vehicles not infected hosts because they are not alive.
- Route of exit-Before an infectious agent can be transmitted to other people, it must first get out of the infected host. The site on the infected host through which the infectious agent gets out is called the route of exit examples respiratory tract the nose and mouth. Gastrointestinal tract and skin.
- Modes of transmission-Once an infectious agent leaves a reservoir, it must get transmitted to a new host if it is to multiply and cause disease. The route by which an infectious agent is transmitted from a reservoir to another host is called the mode of transmission. It is important for you to identify different modes of transmission, because prevention and control measures differ depending on the type. Various direct and indirect modes of transmission are summarised in Table 1.3 and discussed below it.
- Direct modes of transmission-Direct transmission refers to the transfer of an infectious agent from an infected host to a new

host, without the need for intermediates such as air, food, water or animals which can occur in two main ways:

- ✓ Person to person: The infectious agent is spread by direct contact between people through touching, biting, kissing, sexual intercourse or direct projection of respiratory droplets into another person's nose or mouth during coughing, sneezing or talking example HIV from an infected person to others through sexual intercourse.
- ✓ Transplacental transmission: This refers to the transmission of an infectious agent from a pregnant woman to her fetus through the placenta. An example is mother-to-child transmission (MTCT) of HIV.

- ➢ Indirect modes of transmission-Indirect transmission is when infectious agents are transmitted to new hosts through intermediates such as air, food, water, objects or substances in the environment, or other animals. Indirect transmission has three subtypes:
  - Airborne transmission: The infectious agent is transmitted in dried secretions from the respiratory tract, which remain suspended in the air for some time. Example, infectious agent causing tuberculosis can enter a new host through airborne transmission.
  - Vehicle-borne transmission: A vehicle is any non-living substance or object that can be contaminated by an infectious agent, which then transmits it to a new host.
  - Vector-borne transmission: A vector is an organism, usually an arthropod, which transmits an infectious agent to a new host such as houseflies, mosquitoes, lice and ticks.
- ➢ Route of entry-Successful transmission of the infectious agent requires it to enter the host through a specific part of the body before it can cause disease. The site through which an infectious agent enters the host is called the route of entry
- ➢ Susceptible hosts and risk factors-After an infectious agent gets inside the body it have to multiply in order to cause the disease. In some hosts, infection leads to the disease developing, but in others it does not. Individuals who are likely to develop a communicable disease after exposure to the infectious agents are called susceptible hosts. Factors that increase the susceptibility of a host to the development of a communicable disease are called risk factors. Some risk factors arise from outside the individual example, poor personal hygiene, and poor control of reservoirs of infection in the environment increase the exposure of susceptible hosts to infectious agents, which makes the disease to develop. Some people in a community are more likely to develop the

disease than others, even though they all have the same exposure to infectious agents. This is due to a low level of immunity within the more susceptible individuals. Immunity refers to the resistance of an individual to communicable diseases, because their white blood cells and antibodies (defensive proteins) are able to fight the infectious agents successfully. Low levels of immunity could be due to:

- diseases like HIV/AIDS which suppress immunity
- poorly developed or immature immunity, as in very young children
- not being vaccinated
- poor nutritional status (e.g. malnourished children)
- pregnancy.

3.5 Prevention of Contact Disease Transmission

Delaware's Division of Public Health (DPH) recommends frequent and thorough hand washing as the best method to prevent disease transmission. DPH also recommends regular disinfection of frequently touched surfaces such as doorknobs, handles, handrails, restroom surfaces, medical instruments, computer keyboards, phones, office supplies and children's toys. Using barriers such as gloves, masks or condoms can help avoid the spread of germs. Many infections can be prevented by keeping healthy with attention to good personal hygiene.

✓

Figure17. A child with measles case

Figure18. A child with pertussis (whooping cough) case

.

Measures targeting the mode of transmission-The measures that can be applied to interrupt transmission of infectious agents in water, food, and other vehicles are:

Water-measures to prevent transmission of infection due to contaminated water include boiling the water, or adding chemicals like chlorine. Adding chlorine is one method of disinfecting water. Physical agents can also be used, for example filtering water through a box of sand, or pouring it through several layers of fine cloth. Faecal contamination of water can also be prevented by protecting water sources through proper use of latrines

Vectors-measures against vectors include preventing breeding of vectors, through proper disposal of faeces and other wastes, eradication of breeding sites, and disinfestations. Disinfestations is the procedure of destroying or removing small animal pests, particularly arthropods and rodents, present upon the person, the clothing, or in the environment of an individual, or on domestic animals. Disinfestations is usually achieved by using chemical or physical agents, e.g. spraying insecticides to destroy mosquitoes, and removing lice from the body and clothing.

Measures targeting the susceptible host- vaccination refer to administration of vaccines to increase the resistance of the susceptible host against specific vaccine-preventable infections. For instance, measles vaccination helps to protect the child from measles infection, and BCG vaccination gives some protection against tuberculosis.

Chemoprophylaxis refers to the drugs given to exposed and susceptible hosts to prevent them from developing an infection. For instance, individuals from non-malarial areas who are going to a malaria endemic area should take a prophylactic drug to prevent them from developing the disease if they become infected with malaria parasites from a mosquito bite.

Maintaining a healthy lifestyle-Proper nutrition and exercise improves a person's health status, supports the effective functioning of their immune system, and increases resistance to infection.

Measures taken to decrease contact with reservoirs of infection include:

- Condom use to prevent transmission of HIV and other sexually transmitted infections (STIs).
- Use of insecticide treated nets (ITNs) over the bed at night, insect repellants and wearing protective clothing to prevent diseases transmitted by mosquitoes/insect vectors.
- Wearing surgical or very clean gloves and clean protective clothing while examining patients, particularly if they have wounds, or the examination involves the genital area.

- Keeping personal hygiene, like taking a daily bath and washing your hands frequently. Hand washing with soap and water is the simplest and one of the most effective ways to prevent transmission of many communicable diseases. When to wash hands with soap and clean water:

✓ After using the toilet
✓ After handling animals or animal waste
✓ After changing a diaper (nappy) or cleaning a child's bottom
✓ Before and after preparing food
✓ Before eating
✓ After blowing the nose, coughing, or sneezing
✓ Before and after caring for a sick person
✓ After handling waste material.

Further Prevention and control of Contact borne diseases

- Treatment of cases
- Treatment of contacts and source of infection
- Health education on safe sex
- Controlling STDs among commercial sex workers by:
  - Monthly check up and treatment of cases
  - Provision of condom
- Screening of pregnant women and early treatment to prevent congenital syphilis
- Screening of blood before transfusion
- Investigation of contacts, source of infection and treatment
- Thorough washing of genitalia with soap and water promptly after intercourse is very effective.
- Sex education for high risk groups.

SELF-ASSESSMENT EXERCISE
What are contact diseases?

4.0 CONCLUSION

We have successfully discussed contact diseases infectious diseases, the causes, mode of transmission, the signs and symptoms and the control and prevention of contact diseases in the school community and the general public.

5.0 SUMMARY

In this unit, you have learnt the concept of contact diseases, the causes, mode of transmission, the signs and symptoms, the control and prevention of contact diseases in the school and the community.

6.0 TUTOR-MARKED ASSIGNMENT

1. Enumerate at least 5 contact diseases known to you
2. Describe the signs and symptoms of yellow fever disease.
3. How do you control and prevent yellow fever in the school and in the general community?

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UNIT 16 EPIDEMIOLOGY OF NON-COMMUNICABLE DISEASES:CERVICAL CANCER

CONTENTS

1.0 INTRODUCTION

Non-Communicable Diseases are diseases of long duration. These are non-infectious conditions that cannot be transmitted to other individuals. Some Non-Communicable Diseases progress slowly and cause chronic symptoms requiring long term care and control while others progress rapidly. They affect adult men and women but children are vulnerable as well. People may appear healthy but still suffer from these conditions. One of the most serious concerns about Non-Communicable Diseases is that they affect people in the productive ages of their life. They also cause "premature deaths" that is, a death occurring before the average life expectancy. Non-Communicable Diseases affect persons at any age but older individuals are more vulnerable to Non-Communicable Diseases In this unit you will learn about common Non-communicable diseases such as cervical cancer.

2.0 OBJECTIVES

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

- explain causes of Cervical Cancer
- describe the signs and symptoms of Cervical Cancer
- outline the mode of transmission of Contact diseases
- mention the control and preventive measures for Cervical Cancer diseases.

3.0 MAIN CONTENT

3.1 Concept of Cervical Cancer

Cervical cancer is a type of cancer that starts in the cervix. The cervix is a hollow cylinder that connects the lower part of a woman's uterus to her vagina. Most cervical cancers begin in cells on the surface of the cervix that is the entrance to the womb. The cervix is the narrow part of the lower uterus, often referred to as the neck of the womb.

3.2 Cause of Cervical Cancer

Cancer is the result of the uncontrolled division and growth of abnormal cells. Most of the cells in our body have a set lifespan, and, when they die, the body generates new cells to replace them. Abnormal cells can have two problems:

- they do not die
- they continue dividing

This results in an excessive buildup of cells, which eventually forms a lump, or tumor. Scientists are not completely sure why cells become cancerous. However, some risk factors might increase the risk of developing cervical cancer. These include:

- **HPV:** This is a sexually transmitted virus. More than 100 different types of HPV can occur, at least 13 of which may cause cervical cancer.
- **Having many sexual partners or becoming sexually active early:** The transmission of cancer-causing HPV types nearly always occur as a result of sexual contact with an individual who has HPV. Women who have had many sexual partners generally have a higher risk of HPV infection. This increases their risk of developing cervical cancer.
- **Smoking:** This increases the risk of cervical cancer, as well as other types.
- **A weakened immune system:** The risk of cervical cancer is higher in those with HIV or AIDS, and people who have undergone a transplant, leading to the use of immunosuppressive medications.
- **Birth control pills:** Long-term use of some common contraceptive pills slightly raises a woman's risk.
- **Other sexually transmitted diseases (STD):** Chlamydia, gonorrhea, and syphilis increase the risk of developing cervical cancer.

- **Socio-economic status:** Rates appear to be higher in areas where income are low.

Stages

Working out the stage of a cancer is important, as it helps a person decide the most effective type of treatment. Staging aims to assess how far the cancer has spread and whether it has reached nearby structures or more distant organs. A 4-stage system is the most common way to stage cervical cancer.

a. **Stage 0:** Precancerous cells are present.
b. **Stage 1:** Cancer cells have grown from the surface into deeper tissues of the cervix, and possibly into the uterus and to nearby lymph nodes
c. **Stage 2:** The cancer has now moved beyond the cervix and uterus, but not as far as the walls of the pelvis or the lower part of the vagina. It may or may not affect nearby lymph nodes.
d. **Stage 3:** Cancer cells are present in the lower part of the vagina or the walls of the pelvis, and it may be blocking the urethras, the tubes that carry urine from the bladder. It may or may not affect nearby lymph nodes.
e. **Stage 4:** The cancer affects the bladder or rectum and is growing out of the pelvis. It may or may not affect the lymph nodes. Later in stage 4, it will spread to distant organs, including the liver, bones, lungs, and lymph nodes.

Undergoing screening and seeking medical attention if any symptoms occur can help a person access early treatment and increase the chances of survival

Those at risk

Risk factors for HPV include:

- a high number of sexual partners
- first sexual intercourse at a young age
- a weakened immune system

3.3 Symptoms of Cervical Cancer

Many women with cervical cancer don’t realize they have the disease early on, because it usually does not cause symptoms until the late stages. When symptoms do appear, they are easily mistaken for common conditions like menstrual periods and urinary tract infections (UTIs). Typical cervical cancer signs and symptoms are:

- bleeding between periods
- bleeding after sexual intercourse
- bleeding in post-menopausal women
- discomfort during sexual intercourse
- vaginal discharge with a strong odour
- vaginal discharge tinged with blood
- pelvic pain
- needing to urinate more often
- pain during urination

Cervical Cancer and Pregnancy

It's rare to get diagnosed with cervical cancer while you are pregnant, but it can happen. Most cancers found during pregnancy are discovered at an early stage. Treating cancer while you are pregnant can be complicated. Your doctor can help you decide on a treatment based on the stage of your cancer and how far along you are in your pregnancy. If the cancer is at a very early stage, you may be able to wait to deliver before starting treatment. For a case of more advanced cancer where treatment requires a hysterectomy or radiation, you will need to decide whether to continue the pregnancy. Doctors will try to deliver your baby as soon as it can survive outside the womb.

Cervical Cancer Treatment

Once the signs and symptoms of cervical cancer are suspected or observed, the woman should see her doctor without delay for appropriate treatment in the hospital. Cervical cancer is very treatable if you catch it early. The four main treatments are:

- surgery
- radiation therapy
- chemotherapy
- targeted therapy

Sometimes these treatments are combined to make them more effective.

Surgery

The purpose of surgery is to remove as much of the cancer as possible. Sometimes the doctor can remove just the area of the cervix that contains cancer cells. For cancer that's more widespread, surgery may involve removing the cervix and other organs in the pelvis.

Radiation therapy
Radiation kills cancer cells using high-energy X-ray beams. It can be delivered through a machine outside the body. It can also be delivered from inside the body using a metal tube placed in the uterus or vagina.

Chemotherapy
Chemotherapy uses drugs to kill cancer cells throughout the body. Doctors give this treatment in cycles. You will get chemo for a period of time. You will then stop the treatment to give your body time to recover.

Targeted therapy
Bevacizumab (Avastin) is a newer drug that works in a different way from chemotherapy and radiation. It blocks the growth of new blood vessels that help the cancer grow and survive. This drug is often given together with chemotherapy. If your doctor discovers precancerous cells in your cervix they can be treated.

3.3 Cervical Cancer Test

A Pap smear is a test doctors use to diagnose cervical cancer. To perform this test, your doctor collects a sample of cells from the surface of your cervix. These cells are then sent to a lab to be tested for precancerous or cancerous changes. If these changes are found, your doctor may suggest a colposcopy, a procedure for examining your cervix. During this test, your doctor might take a biopsy, which is a sample of cervical cells.

3.4 Cervical Cancer Risk Factors

HPV is the biggest risk for cervical cancer. Other factors that can also increase your risk include:

- human immunodeficiency virus (HIV)
- chlamydia
- smoking
- obesity
- a family history of cervical cancer
- a diet low in fruits and vegetables
- taking birth control pills
- having three full-term pregnancies
- being younger than 17 when you got pregnant for the first time

Even if you have one or more of these factors, you are not destined to get cervical cancer.

3.5 Cervical Cancer Control and Prevention

For cervical cancer that's caught in the early stages, when it's still confined to the cervix, the five-year survival rate is 92 percent. Once the cancer has spread within the pelvic area, the five-year survival rate drops to 56 percent. If the cancer spreads to distant parts of the body, survival is just 17 percent. Routine testing is important for improving the outlook of women with cervical cancer. When this cancer is.

One of the easiest ways to prevent cervical cancer is by getting screened regularly with a Pap smear and/or HPV test. Screening picks up precancerous cells, so they can be treated before they turn into cancer. HPV infection causes most cervical cancer cases. The infection is preventable with the vaccines Gardasil and Cervarix. Vaccination is most effective before a person becomes sexually active. Both boys and girls can be vaccinated against HPV. Here are a few other ways you can reduce your risk of HPV and cervical cancer:

- always use a condom or other barrier method when you have vaginal, oral, or anal sex
- Having fewer sexual partners. The more sexual partners a woman has, the higher the risk of transmitting the HPV virus becomes. This can lead to a higher risk of developing cervical cancer.
- Delaying first sexual intercourse.The younger a woman is when she has sexual intercourse for the first time, the higher the risk of HPV infection becomes. The longer she delays it, the lower her risk.
- Stopping smoking. Women who smoke and have HPV face a higher risk of developing cervical cancer than people who do not.

An abnormal Pap smear result indicates you have precancerous cells in your cervix.

Screening

Vaccination against HPV is one of the best preventive measures, in addition to regular Pap tests to protect against cervical cancer. The Pap test, or smear, is one of the most reliable cancer-screening tests available. These tests can detect abnormal cells and precancerous changes on the cervix. Early detection allows these abnormal cells and changes to be treated before they develop into cancer.

Your doctor can perform a Pap smear during a routine pelvic exam. It involves swabbing the cervix to collect cells for examination under a microscope. Doctors may also do an HPV test the same time they do a pap test. This involves swabbing the cervix, then examining the cells for evidence for HPV DNA.

Vaccination
Vaccination against HPV is advised for females ages 9 to 26 for prevention of HPV infection, cervical cancer, as well as genital warts. It's only effective when given to people before they become infected with the virus. This is why it's recommended that a person gets it before they are sexually active.

Gardasil is one such vaccine, and it guards against the two most common high-risk types of HPV, strain 16 and 18. These two strains are responsible for 70 percent Trusted Source of cervical cancers. It also guards against strain 6 and 1, which cause 90 percent of genital warts. Because men can carry HPV, they should also talk to their doctors about being vaccinated. According to the CDC, preteen boys and girls should be vaccinated at age 11 or 12. They get the vaccine in a series of three shots over an eight-month period. Young women can get the vaccine through age 26 and young men through age 21 if they have not already been exposed to HPV.

SELF-ASSESSMENT EXERCISE

What is cervical cancer?

4.0 CONCLUSION

Having successfully discuss and completed this unit it is assume that you have fully understood the epidemiology of Non-communicable diseases, that is cervical cancer.

5.0 SUMMARY

In this unit, you have learnt the epidemiology of cervical cancer as a Non-communicable diseases, in public health.

6.0 TUTOR-MARKED ASSIGNMENT

1. Describe the signs and symptoms of cervical cancer.
2. Describe the prevention and control measures for cervical cancer.

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UNIT 17 BREAST CANCER

CONTENTS

1.0 INTRODUCTION

Breast cancer is the common term for a set of breast tumor subtypes with distinct molecular and cellular origins and clinical behaviour. Most of these are epithelial tumors of ductal or lobular origin. Breast cancer is an invasive tumor that develops in the mammary gland. Worldwide, breast cancer is the most frequently diagnosed life-threatening cancer in women and the leading cause of cancer death among women.

2.0 OBJECTIVES

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

- explain breast cancer
- explain causes of breast Cancer
- mention the types of breast Cancer
- describe the signs and symptoms of breast Cancer
- state the control and preventive measures for breast Cancer.

3.0 MAIN CONTENT

3.1 Concept of Cervical Cancer

Breast cancer is the most common invasive cancer in women and the second leading cause of cancer death in women after lung cancer. Advances in screening and treatment for breast cancer have improved survival rates dramatically since 1989. According to the American Cancer Society (ACS), there are more than 3.1 million breast cancer survivors in the United States. The chance of any woman dying from breast cancer is around 1 in 38 (2.6%). The ACS estimate that 268,600 women received a diagnosis of invasive breast cancer, and 62,930 people received a diagnosis of noninvasive cancer in 2019.In the same

year, the ACS report that 41,760 women died as a result of breast cancer. However, due to advances in treatment, death rates from breast cancer have been decreasing since 1989. Awareness of the symptoms and the need for screening are important ways of reducing the risk. In rare instances, breast cancer can also affect men

3.1.1 Types of Breast Cancer

- Angiosarcoma
- Ductal carcinoma in situ (DCIS)
- Inflammatory breast cancer
- Invasive lobular carcinoma
- Lobular carcinoma in situ (LCIS)
- Male breast cancer
- Paget's disease of the breast
- Recurrent breast cancer

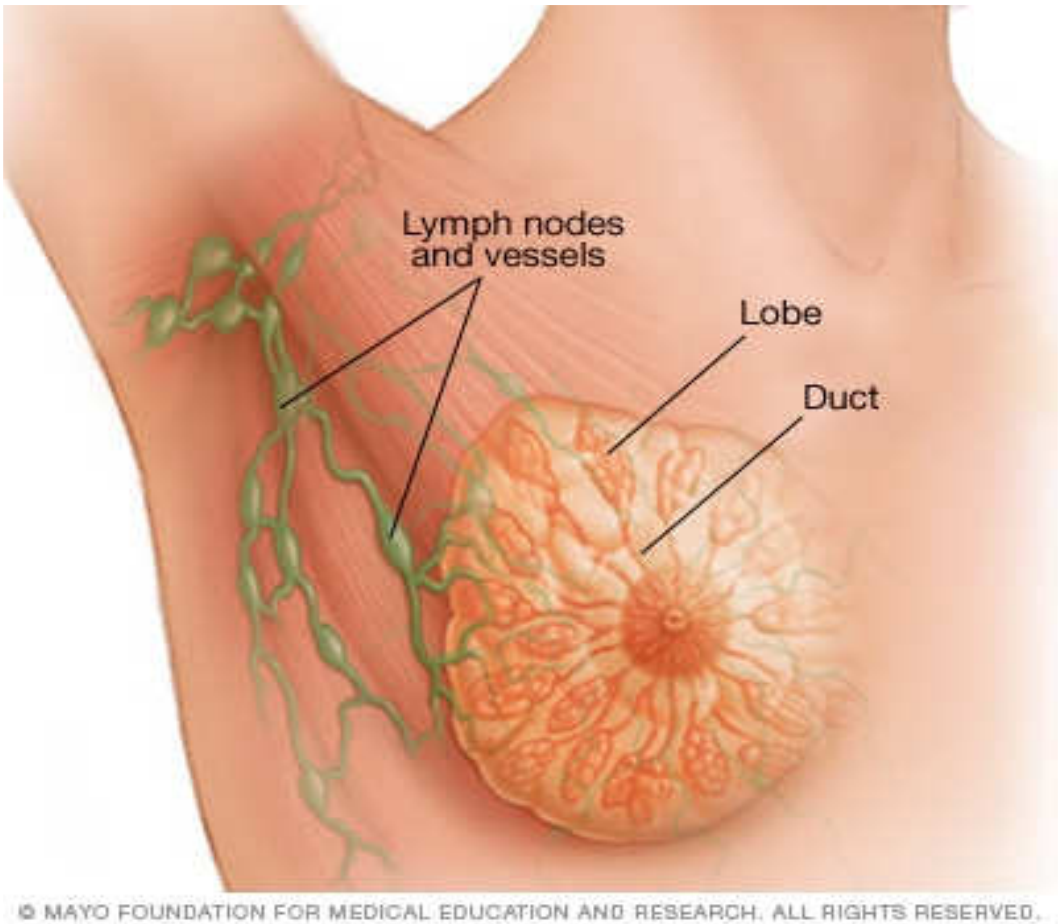

Figure 20 Breast Cancer.

3.1.2 Cause of Breast Cancer

The causes of breast cancer are unknown, although medical professionals have identified a number of risk factors responsible for many different types of breast cancer. Doctors know that breast cancer occurs when some breast cells begin to grow abnormally. These cells divide more rapidly than healthy cells do and continue to accumulate, forming a lump or mass. Cells may spread (metastasize) through your breast to your lymph nodes or to other parts of your body.
Breast cancer most often begins with cells in the milk-producing ducts (invasive ductal carcinoma). Breast cancer may also begin in the glandular tissue called lobules (invasive lobular carcinoma) or in other cells or tissue within the breast. Researchers have identified hormonal, lifestyle and environmental factors that may increase your risk of breast cancer. But it's not clear why some people who have no risk factors develop cancer, yet other people with risk factors never do. It's likely that breast cancer is caused by a complex interaction of your genetic makeup and your environment.

3.1.3 Risk Factors

A breast cancer risk factor is anything that makes it more likely you will get breast cancer. But having one or even several breast cancer risk factors does not necessarily mean you will develop breast cancer. Many women who develop breast cancer have no known risk factors other than simply being women. Factors that are associated with an increased risk of breast cancer include:

- **Being female.** Women are much more likely than men are to develop breast cancer.
- **Increasing age.** Your risk of breast cancer increases as you age.
- **A personal history of breast conditions.** If you have had a breast biopsy that found lobular carcinoma in situ (LCIS) or atypical hyperplasia of the breast, you have an increased risk of breast cancer.
- **A personal history of breast cancer.** If you have had breast cancer in one breast, you have an increased risk of developing cancer in the other breast.
- **A family history of breast cancer.** If your mother, sister or daughter was diagnosed with breast cancer, particularly at a young age, your risk of breast cancer is increased. Still, the majority of people diagnosed with breast cancer have no family history of the disease.
- **Inherited genes that increase cancer risk.** Certain gene mutations that increase the risk of breast cancer can be passed from parents to children. The most well-known gene mutations are referred to as BRCA1 and BRCA2. These genes can greatly

increase your risk of breast cancer and other cancers, but they don't make cancer inevitable.

- **Radiation exposure.** If you received radiation treatments to your chest as a child or young adult, your risk of breast cancer is increased.
- **Obesity.** Being obese increases your risk of breast cancer.
- **Beginning your period at a younger age.** Beginning your period before age 12 increases your risk of breast cancer.
- **Beginning menopause at an older age.** If you began menopause at an older age, you're more likely to develop breast cancer.
- **Having your first child at an older age.** Women who give birth to their first child after age 30 may have an increased risk of breast cancer.
- **Having never been pregnant.** Women who have never been pregnant have a greater risk of breast cancer than do women who have had one or more pregnancies.
- **Postmenopausal hormone therapy.** Women who take hormone therapy medications that combine estrogen and progesterone to treat the signs and symptoms of menopause have an increased risk of breast cancer. The risk of breast cancer decreases when women stop taking these medications.
- **Drinking alcohol.** Drinking alcohol increases the risk of breast cancer.

3.4 Signs and Symptoms

Signs and symptoms of breast cancer may include:

- A breast lump or thickening that feels different from the surrounding tissue
- Change in the size, shape or appearance of a breast
- Changes to the skin over the breast, such as dimpling
- A newly inverted nipple
- Peeling, scaling, crusting or flaking of the pigmented area of skin surrounding the nipple (areola) or breast skin
- Redness or pitting of the skin over your breast, like the skin of an orange
- a lump in the breast or armpit,
- bloody nipple discharge,
- inverted nipple,
- orange-peel texture or dimpling of the breast's skin (peau d'orange),
- breast pain or sore nipple,
- swollen lymph nodes in the neck or armpit, and
- a change in the size or shape of the breast or nipple.

- Breast cancer can also be symptom free, which makes following national screening
- Breast cancer is diagnosed during a physical exam, by a self-exam of the breasts, mammography, ultrasound testing, and biopsyst

3.5 Control and Prevention of Breast Cancer

Treatment of breast cancer depends on the type of cancer and its stage (0-IV) and may involve surgery, radiation, or chemotherapy. Breast cancer risk reduction for women with an average risk; making changes in your daily life may help reduce your risk of breast cancer. Try to:

- **Ask your doctor about breast cancer screening.** Discuss with your doctor when to begin breast cancer screening exams and tests, such as clinical breast exams and mammograms.
- Talk to your doctor about the benefits and risks of screening. Together, you can decide what breast cancer screening strategies are right for you.
- **Become familiar with your breasts through breast self-exam for breast awareness.** Women may choose to become familiar with their breasts by occasionally inspecting their breasts during a breast self-exam for breast awareness. If there is a new change, lumps or other unusual signs in your breasts, talk to your doctor promptly.
- Breast awareness can't prevent breast cancer, but it may help you to better understand the normal changes that your breasts undergo and identify any unusual signs and symptoms.
- **Drink alcohol in moderation, if at all.** Limit the amount of alcohol you drink to no more than one drink a day, if you choose to drink.
- **Exercise most days of the week.** Aim for at least 30 minutes of exercise on most days of the week. If you haven't been active lately, ask your doctor whether it's OK and start slowly.
- **Limit postmenopausal hormone therapy.** Combination hormone therapy may increase the risk of breast cancer. Talk with your doctor about the benefits and risks of hormone therapy.
- Some women experience bothersome signs and symptoms during menopause and, for these women, the increased risk of breast cancer may be acceptable in order to relieve menopause signs and symptoms.
- To reduce the risk of breast cancer, use the lowest dose of hormone therapy possible for the shortest amount of time.

- **Maintain a healthy weight.** If your weight is healthy, work to maintain that weight. If you need to lose weight, ask your doctor about healthy strategies to accomplish this. Reduce the number of calories you eat each day and slowly increase the amount of exercise.
- **Choose a healthy diet.** Women who eat a Mediterranean diet supplemented with extra-virgin olive oil and mixed nuts may have a reduced risk of breast cancer.
- The Mediterranean diet focuses mostly on plant-based foods, such as fruits and vegetables, whole grains, legumes, and nuts. People who follow the Mediterranean diet choose healthy fats, such as olive oil, over butter and fish instead of red meat.

Breast cancer risk reduction for women with a high risk

If your doctor has assessed your family history and determined that you have other factors, such as a precancerous breast condition, that increase your risk of breast cancer, you may discuss options to reduce your risk, such as:

- **Preventive medications (chemoprevention).** Estrogen-blocking medications, such as selective estrogen receptor modulators and aromatase inhibitors, reduce the risk of breast cancer in women with a high risk of the disease.
- These medications carry a risk of side effects, so doctors reserve these medications for women who have a very high risk of breast cancer. Discuss the benefits and risks with your doctor.
- **Preventive surgery.** Women with a very high risk of breast cancer may choose to have their healthy breasts surgically removed (prophylactic mastectomy). They may also choose to have their healthy ovaries removed (prophylactic oophorectomy) to reduce the risk of both breast cancer and ovarian cancer.

SELF-ASSESSMENT EXERCISE

What is Breast cancer?

4.0 CONCLUSION

Having successfully discuss and completed this unit it is assume that you have fully understood the epidemiology of Breast cancer diseases.

5.0 SUMMARY

In this unit, you have learnt the epidemiology of Breast cancer r as a Non-communicable diseases, in public health

6.0 TUTOR-MARKED ASSIGNMENT

1. Describe the signs and symptoms of Breast cancer.
2. Describe the prevention and control measures for Breast cancer?

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MODULE 3 INTRODUCTION TO PUBLIC HEALTH

UNIT 1 INTRODUCTION TO PUBLIC HEALTH

CONTENTS

1.0 INTRODUCTION

Public health is defined as the science of protecting the safety and improving the health of communities through education, policy making and research for disease and injury prevention. **Public health** is the art and science of preventing disease, prolonging life, and promoting physical and mental health, sanitation, personal hygiene, control of infectious diseases, and organization of health services. Public health is the science of protecting and improving the health of people and their communities or public health is concerned with protecting the health of entire populations which can be as small as a local neighbourhood, or as big as an entire country or region of the world. According to the American Public Health Association, “Public Health is the practice of preventing disease and promoting good health within groups of people, from small communities to entire countries.”

According to the World Health Organization (WHO), “Public health refers to all organized measures whether public or private to prevent diseases, promote health, and prolongs life among the population as a whole aim to provide conditions in which people can be healthy and focus on entire populations, not on individual patients or diseases.”

2.0 OBJECTIVES

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

- explain Public Health
- state the objectives of public health
- state the Purpose of Public Health
- state the historical background of public health
- describe the major disciplines in public health
- state the contemporary development of public health.

3.0 MAIN CONTENT

3.1 Explain the Word Public Health

Public health is defined as the science of protecting the safety and improving the health of communities through education, policy making and research for disease and injury prevention. **Public health** is the art and science of preventing disease, prolonging life, and promoting physical promoting good health within groups of people, from small communities to entire countries.”and mental health, sanitation, personal hygiene, control of infectious diseases, and organization of health services. Public health is the science of protecting and improving the health of people and their communities or public health is concerned with protecting the health of entire populations which can be as small as a local neighbourhood, or as big as an entire country or region of the world. According to the American Public Health h, “Public Health is the practice of preventing disease and

According to the World Health Organisation (WHO), “Public health refers to all organised measures whether public or private to prevent diseases, promote health, and prolongs life among the population as a whole aim to provide conditions in which people can be healthy and focus on entire populations, not on individual patients or diseases.”

Public health is the science and art of preventing disease, prolonging life and promoting physical health and efficiency through organised community efforts for the sanitation of the environment, the control of

community infections, the education of the individual in principles of personal hygiene, the organisation of medical and nursing service for the early diagnosis and preventive treatment of disease, and the development of social machinery which will ensure to every individual in the community a standard of living adequate for the maintenance of health'. (Winslow, 1920)

3.1.1 The Objectives of Public Health

- To identify the etiology or the cause a disease and the risk factors that is, factors that increase a person's risk for a disease.
- To determine the extent of disease found in the community
- To study the natural history and prognosis of diseases

3.2 Purpose of Public Health

As a Public Health Professional, you will be trained to perform one or more of these essential services:

- Surveillance, analysis and evaluation of population's health status
- Monitor health status to identify population or community health problems
- Diagnose and investigate health problems and health hazards in the community
- Monitor environmental and health status to identify and solve community environmental health problems
- Diagnose and investigate environmental health problems and health hazards in the community
- Act as quickly as possible with efficacy in solving and improving these problems
- Monitor the health status of a community to identify potential problems
- Inform, educate, and empower people about health issues, particularly the underserved and those at risk
- Mobilize community partnerships to identify and solve health problems
- Develop policies and plans that support individual and community health efforts
- Enforce laws and regulations that protect health and ensure safety
- Link people to needed personal health services and ensure the provision of health care when otherwise unavailable
- Ensure a competent public health and personal health care workforce
- Evaluate effectiveness, accessibility, and quality of personal and population-based health services

- Promote the health of the population through educating in health from the different health, education and mass media facilities
- Disease Prevention:
- ✓ Primary Prevention: to intervene before a disease appears
- ✓ Secondary Prevention: to intervene in pre-symptomatic phases
- ✓ Tertiary Prevention: to intervene when the individual is already ill. Try to mitigate the effects of disease
- to determine, describe, and report on the natural course of disease, disability, injury, and death
- to aid in the planning and development of health services and programs
- to provide administrative and planning data
- to study the cause (or etiology) of disease(s), or conditions, disorders, disabilities, etc.
- to determine the primary agent responsible or ascertain causative factors
- to determine the characteristics of the agent or causative factors
- to determine the mode of transmission
- to determine contributing factors
- to identify and determine geographic patterns to provide a basis for developing disease control and prevention measures for groups at risk
- this translates into developing measures to prevent or control disease
- Research new insights and innovative solutions to health problems

3.3 A Brief Historical Background of Public Health

After much campaigning by the Health of Towns Association, and another severe outbreak of cholera which became a major threat to health in 1848, the government was forced to act, and the Public Health Act of 1848 was passed. The Act as it was passed was not perfect but was an important step forward. An understanding of the rich and diverse history of public health cannot only support contemporary innovation but can help reduce the risk of public health practice being too narrowly focused on specific influences on the health of individuals rather than maintaining an overview of the full range of factors at work

During the past 150 years, two factors have shaped the modern public health system: first, the growth of scientific knowledge about sources and means of controlling disease; second, the growth of public acceptance of disease control as both a possibility and a public responsibility. In earlier centuries, when little was known about the causes of disease, society tended to regard illness with a degree of

resignation, and few public actions were taken. As understanding of sources of contagion and means of controlling disease became more refined, more effective interventions against health threats were developed. Public organizations and agencies were formed to employ newly discovered interventions against health threats. As scientific knowledge grew, public authorities expanded to take on new tasks, including sanitation, immunization, regulation, health education, and personal health care. (Chave, 1984; Fee, 1987)

The link between science, the development of interventions, and organization of public authorities to employ interventions was increased public understanding of and social commitment to enhancing health. The growth of a public system for protecting health depended both on scientific discovery and social action. Understanding of disease made public measures to alleviate pain and suffering possible, and social values about the worthiness of this goal made public measures feasible. The history of the public health system is a history of bringing knowledge and values together in the public arena to shape an approach to health problems.

Before The Eighteenth Century

Throughout recorded history, epidemics such as plague, cholera, and smallpox evoked sporadic public efforts to protect citizens in the face of a dread disease. Although epidemic disease was often considered a sign of poor moral and spiritual condition, to be mediated through prayer and piety, some public effort was made to contain the epidemic spread of specific disease through isolation of the i The Eighteenth Century

The Eighteenth Century

By the eighteenth century, isolation of the ill and quarantine of the exposed became common measures for containing specified contagious diseases. Several American port cities adopted rules for trade quarantine and isolation of the sick. In 1701 Massachusetts passed laws for isolation of smallpox patients and for ship quarantine as needed. After 1721, inoculation with material from smallpox scabs was also accepted as an effective means of containing this disease once the threat of an epidemic was declared. By the end of the eighteenth century, several cities, including Boston, Philadelphia, New York, and Baltimore, had established permanent councils to enforce quarantine and isolation rules

The Nineteenth Century: The Great Sanitary Awakening

The nineteenth century marked a great advance in public health. "The great sanitary awakening" (Winslow, 1923) the identification of filth as both a cause of disease and a vehicle of transmission and the ensuing embrace of cleanliness was a central component of nineteenth-century social reforms. Sanitation changed the way society thought about health.

Illness came to be seen as an indicator of poor social and environmental conditions, as well as poor moral and spiritual conditions. Cleanliness was embraced as a path both to physical and moral health. Cleanliness, piety, and isolation were seen to be compatible and mutually reinforcing measures to help the public resist disease. Sanitation also changed the way society thought about public responsibility for citizen's health. Protecting health became a social responsibility. Disease control continued to focus on epidemics, but the manner of controlling turned from quarantine and isolation of the individual to cleaning up and improving the common environment. And disease control shifted from reacting to intermittent outbreaks to continuing measures for prevention. With sanitation, public health became a societal goal and protecting health became a public activity.

Late Nineteenth Century: Enter Bacteriology

Another major set of developments in public health took place at the close of the nineteenth century. Rapid advances in scientific knowledge about causes and prevention of numerous diseases brought about tremendous changes in public health. Many major contagious diseases were brought under control through science applied to public health. Louis Pasteur, a French chemist, proved in 1877 that anthrax was caused by bacteria. By 1884, he had developed artificial immunization against the disease. During the following few years, discoveries of bacteriologic agents of disease were made in European and American laboratories for such contagious diseases as tuberculosis, diphtheria, typhoid, and yellow fever (Winslow, 1923).

The identification of bacteria and the development of interventions such as immunization and water purification techniques provided a means of controlling the spread of disease and even of preventing disease. The germ theory of disease provided a sound scientific basis for public health. Public health measures continued to be focused predominantly on specific contagious diseases, but the means of controlling these diseases changed dramatically. Laboratory research identified exact causes and specific strategies for preventing specific diseases. For the first time, it was known that diseases had single, specific causes. Science revealed that both the environment and people could be the agents of disease. During this period public agencies that had been developed to conduct and enforce sanitary measures refined their activities and expanded into laboratory science and epidemiology. Public responsibility for health came to include both environmental sanitation and individual health.

Early Twentieth Century: The Move Toward Personal Care

In the early twentieth century, the role of the state and local public health departments expanded greatly. Although disease control was based on bacteriology, it became increasingly clear that individual persons were more often the source of disease transmission than things. Identification and treatment of individual cases of disease were the next natural steps. Several states established disease registries. In 1907, Massachusetts passed a law requiring reporting of individual cases of 16 different diseases. Required reporting implied an obligation to treat. For example, reporting of cancer was later added to the list, and a cancer treatment program began in 1927. It also became clear that providing immunizations and treating infectious diseases did not solve all health problems. Despite remarkable success in lowering death rates from typhoid, diphtheria, and other contagious diseases, considerable disability continued to exist in the population. There were still numerous diseases, such as tuberculosis, for which infectious agents were not clearly identified. It also became clear that diseases, even those for which treatment was available, still predominantly affected the urban poor. By 1915, there were more than 500 tuberculosis clinics and 538 baby clinics in America, predominantly run by city health departments. These clinics concentrated on providing medical care and health education. (Starr, 1982)

3.4 Mid-Twentieth Century: Further Expansion of the Governmental Role in Personal Health

From the 1930s through the 1970s, local, state, and federal responsibilities in health continued to increase. The federal role in health also became more prominent. A strong federal government and a strong government role in ensuring social welfare were publicly supported social values of this era. The federal government and state and local health agencies took on greater roles in providing and planning health services, in health promotion and health education, and in financing health services. The agencies also continued and increased activities in environmental sanitation, epidemiology, and health statistics.

By the 1970s, the financial impact of the expansion in public health activities of the 1930s through the 1960s, including new public roles in the financing of medical care, began to be apparent. Per capita health expenditures increased from $198 in 1965 to $334 in 1970. During the same period, the public sector share of this sum rose from 25 percent to 37 percent. (Anderson, 1985). The Health Maintenance Act of 1973, promoting health maintenance organizations as a less costly means of health care, and the National Health Planning and Resources Development Act of 1974, setting up a certification system for new

health services, are examples of this effort. (Turner, 1977) In the current decade, efforts toward cost containment continue.

SELF-ASSESSMENT EXERCISE
What is public health?

4.0 CONCLUSION

Having successfully discuss and completed this unit it is assume that you have fully understood the introduction to public health, objectives of public health, the purpose of public health and the brief history of public health.

5.0 SUMMARY

In this unit, you have learnt the introduction to public health, objectives of public health, the purpose of public health and the brief history of public health.

6.0 TUTOR-MARKED ASSIGNMENT

1. State the objectives of public health.
2. Outline the purpose of public health.
3. Briefly describe the history of public health.

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UNIT 2 TRADITIONAL HEALTH CARE PRACTICES

CONTENTS

1.0 INTRODUCTION

Traditional medicine refers to health practices, approaches, knowledge and beliefs incorporating plant, animal and mineral based medicines, spiritual therapies, manual techniques and exercises, applied singularly or in combination to treat, diagnose and prevent illnesses or maintain well-being. Traditional medicine (TM) may be defined as "the sum total of knowledge, skills and practices based on the theories, beliefs and experiences indigenous to different cultures that are used to maintain health, as well as to prevent, diagnose, improve or treat physical and mental illnesses"

2.0 OBJECTIVES

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

- explain ttraditional medicine
- state the objectives of traditional medicine
- mention the forms of traditional medicine
- outline the functions of traditional medicine
- state the contemporary development of public health.

3.0 MAIN CONTENT

3.1 Explain Traditional Health Care Practices

Traditional medicine has a long history. It is the sum total of the knowledge, skill, and practices based on the theories, beliefs, and experiences indigenous to different cultures, whether explicable or not, used in the maintenance of health as well as in the prevention, diagnosis, improvement or treatment of physical and mental illness.

Traditional medicine, as defined by the World Health Organization, as the sum total of the knowledge, skills, and practices based on the theories, beliefs, and experiences indigenous to different cultures, whether explicable or not, used in the maintenance of health as well as in the prevention, diagnosis, improvement, or treatment of physical and mental illness. Some traditional medicine systems are supported by huge volumes of literature and records of the theoretical concepts and practical skills; others pass down from generation to generation through verbal teaching. To date, in some parts of the world, the majority of the population continue to rely on their own traditional medicine to meet their primary health care needs. When adopted outside of its traditional culture, traditional medicine is often referred to as "complementary and alternative medicine."

The terms "complementary medicine" or "alternative medicine" refer to a broad set of health care practices that are not part of that country's own tradition or conventional medicine and are not fully integrated into the dominant health-care system. They are used interchangeably with traditional medicine in some countries

Herbal medicines include herbs, herbal materials, herbal preparations and finished herbal products, that contain as active ingredients parts of plants, or other plant materials, or combinations. Among others, the most widely used traditional medicine systems today include those of China, India, and Africa.

3.2 Forms of Traditional Healthcare Delivery Practices

Traditional medicine refers to health practices, approaches, knowledge and beliefs incorporating plants, certain animals and mineral-based medicines, spiritual therapies, manual techniques and exercises, applied singularly or in combination to treat, diagnose and prevent illnesses or maintain well-being. The World Health Organization (WHO) defines traditional medicine as the "sum total of the knowledge, skill, and practices based on the theories, beliefs, and experiences indigenous to different cultures, whether explicable or not, used in the maintenance of health, as well as in the prevention, diagnosis, improvement. The basic forms of traditional healthcare delivery practices are:

3.2.1 Traditional medicine (TM)

Traditional medicine has a long history. It is the sum total of the knowledge, skill, and practices based on the theories, beliefs, and experiences indigenous to different cultures, whether explicable or not, used in the maintenance of health as well as in the prevention, diagnosis,

improvement or treatment of physical and mental illness. (http://www.who.int/medicines/ areas/traditional/definitions/en/).

3.2.2 Complementary and alternative medicine (CM):

The terms “complementary medicine” or “alternative medicine” refer to a broad set of health care practices that are not part of that country’s own
tradition or conventional medicine and are not fully integrated into the dominant health-care system. They are used interchangeably with traditional
medicine in some countries. (http://www.who.int/medicines/areas/traditional/definitions/en/).

3.2.3 Herbal Medicines

By definition, ‘traditional’ use of herbal medicines implies substantial historical use, and this is certainly true for many products that are available as traditional herbal medicines. In many developing countries, a large proportion of the population relies on traditional practitioners and their armamentarium of medicinal plants in order to meet health care needs. Although modern medicine may exist side-by-side with such traditional practice, herbal medicines have often maintained their popularity for historical and cultural reasons. Such products have become more widely available commercially, especially in developed countries. In this modern setting, ingredients are sometimes marketed for uses that were never contemplated in the traditional healing systems from which they emerged. An example is the use of ephedra (Ma huang) for weight loss or athletic performance enhancement (Shaw, 1998). While in some countries, herbal medicines are subject to rigorous manufacturing standards, this is not so everywhere. In Germany, for example, where herbal products are sold as ‘phytomedicines’, they are subject to the same criteria for efficacy, safety and quality as are other drug products. In the USA, by contrast, most herbal products in the market place are marketed and regulated as dietary supplements, a product category that does not require pre-approval of products on the basis of any of these criteria.

The role of herbal medicines in traditional healing

The pharmacological treatment of disease began long ago with the use of herbs (Schulz *et al*., 2001). Methods of folk healing throughout the world commonly used herbs as part of their tradition.

3.3 Function of Traditional Healthcare Delivery Practices

Traditional medicine has remained the most affordable and easily accessible source of treatment in primary health care system of poor communities where alternative therapy is the major means of medical treatment in such communities.

- Using therapies to help you feel better.
- Reducing symptoms or side effects.
- Feeling more in control
- Natural and healing therapies
- Comfort from touch, talk and time
- Staying positive
- Boosting your immune system
- Looking for a cure.

SELF-ASSESSMENT EXERCISE
What is traditional health care practice?

4.0 CONCLUSION

Having successfully discuss and completed this unit it is assume that you have fully understood the traditional health care practices, objectives of traditional health care practices, the purpose of traditional health care practices and the function of traditional healthcare delivery practices in public health.

5.0 SUMMARY

In this unit, you have learnt the traditional health care practices, objectives of traditional health care practices, the purpose of traditional health care practices and the function of traditional healthcare practices in public health.

6.0 TUTOR-MARKED ASSIGNMENT

1. State the objectives of traditional health care practice.
2. Outline the function of traditional healthcare practices in public health.

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UNIT 3 FAMILY HEALTH EDUCATION

1.0 INTRODUCTION

Family Health Education (FHE) is based on providing Family with the knowledge, attitudes and skills needed to enable young parents also to acquire the knowledge attitudes and skills needed to practice better self-care as well as better care of their family members. The process of enabling healthy practices or behaviour is the foundation of health education. This unit will provide family members with an overview of basic health education theory and practice. Family Health Education trainees will examine the key practices and behaviours that are the goals of the Family Spirit program and link these with health outcomes in both parents and children. Family Health Education trainees will also be encouraged to think about their local cultural, social and economic environment and identify factors that may influence the behaviours of the young parents who will be their clients.

2.0 OBJECTIVES

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

- define family health
- explain family health education
- state the objectives of family health education
- explain the important of family health education
- describe the role of family health education.

3.0 MAIN CONTENT

3.1 Concept of Family Health Education

3.3.1 Define Family Health

A family is a basic unit of the society that is responsible for supporting, caring for and preparing children for adulthood. It is made up of people

related by blood, marriage or law. There are several characteristics that define a group of people as a family. Firstly for a family to be formed there must be a marriage between a woman and a man (traditional, religious or court marriage), Children might be brought into the relationship either by mating between the couples or by adoption, the family must have a common habitation together. Some examples of families are:

- Blood-related family: Parents and their children.
- Family-related by marriage- Husband and wife plus their relatives.
- Family-related by law-Husband and wife plus adopted child or foster children.

The family is a very important unit of society which contributes to development of society and for the wellbeing of members of the family. The family starts through a contract between consenting adults who agree to live as husband and wife. In society, there are some variations in the marital contract. The primary aim of the family is to help propagate the species through the matrimonial functions of the couples. To perform this function effectively there is the need to understand the facilities one is equipped with to perform these functions and how they work. This is most time learnt from the family as well as taught to school age.

Family health is more than the sum of the personal health of individuals including father who form the family since it also takes in to consideration-interaction in terms of health (physical and psychological) between members of the family-relationships between the family and its social environmental stages. Family health is a state in which the family is a resource for the day-to-day living and health of its members. A family provides its individual members with key resources for healthful living, including food, clothing, shelter, a sense of self-worth, and access to medical care. Further, family health is a socioeconomic process whereby the health of family members is mentioned. As the basic socioeconomic unit of most societies, the family is the interface between societal and individual health, and the economic interface between the family and society determines what resources are available for a family's health. For example, in some families the father is the primary income earner, yet his skills are marketable only in remote, resource-based communities.In such families, members may have adequate financial resources for healthful living because of the father's stable employment, though their shared geographic location has the potential to negatively impact access to fresh foods, recreation facilities, and quality health care. Here, the community plays a primary role in

mitigating the effects of geographic location. In healthy communities, many families will benefit from resources available in the community and, in turn, will produce members who contribute in kind, with family dynamics mediating this reciprocal process.

While a family may have adequate resources to support its members' health-related decisions, family dynamics influence if, how, when, and by whom resources are accessed. For example, while the family may have adequate financial resources to support the regular physical activity of all members, female family members may be less apt to participate in such activities because of family expectations regarding traditional feminine behavior, such as caregiving and household management. Further, it is in families that individuals learn about, and are exposed to, behaviors and patterns of living that may be key to their own health. Such learned patterns may include diet, exercise patterns, orientation to social support, religious practices, substance use or abuse, and domestic violence. And, it is in families that individuals share a genetic makeup that may influence their individual and collective health-related decisions, such as those related to genetic.

3.3.2 Definitions of Health Education

Health Education is a planned process of learning experiences that enable people to make voluntary adaptations in their behaviour in order to improve and maintain their health. Health education has been defined by Green *et al.* (1981) as any combination of planned learning activities that enable (empower) people to voluntarily behave in ways that promote health, prevent disease and recover from illness

Health education has been defined by Green *et al.* (1981) as any combination of planned learning activities that enable (empower) people to voluntarily behave in ways that promote health, prevent disease and recover from illness. WHO and the International Union for Health Education (1991) defined it similarly as the combination of planned social action and learning experiences designed to enable people gain control over the determinants of health and health behaviors. Brieger (1996) also defined health education as any combination of learning activities that promote voluntary adaptation in health and related behaviors.

The four Key words 1) planned, 2) learning 3) voluntary and 4)behave in these definitions require further attention:

"Planned" implies that health education is a systematic goal-oriented and strategic activity. One does not simply do health education in a spur of the moment.

"Learning," not teaching, is the emphasis of health education. Learning strategies in health education include social support and modeling, skills and resource development, and the acquisition of knowledge and clarification of values.

"Voluntarily" means that health education is achieved through choice not by force. Erben (1983) described health education as a vehicle to progress, but it cannot force progress. Full and active involvement of individuals, communities, and organizations is required in defining needs, setting priorities, planning, implementing and evaluating programs

"Behave" denotes that health education is action oriented; the result of learning through health education can be seen in the behavior of the individuals, families, communities and organization, and needs to take account of the fact that delayed effect may be involved as an outcome of health education learning (Head, 1987; Brieger, 1996). Using family with health education it becomes family health education.

Family Health Education is the professional practice of equipping and empowering family members to develop knowledge and skills that enhance well-being and strengthen interpersonal relationships through an educational, preventive, and strengths-based approach. The skills and knowledge needed for healthy family functioning are widely known:

- strong communication skills
- knowledge of typical human development
- good decision-making skills, positive self-esteem
- healthy interpersonal relationships

3.4 Objectives of Family Health Education

The major objectives include:

- gaining insight into one's self and others;
- acquiring knowledge about human development and behavior in the family setting over the life course;
- understanding marital and family patterns and processes;
- acquiring interpersonal skills for present and future family roles;
- impart correct factual knowledge, skills, abilities and understanding regarding sex and reproduction to the individuals according to their age.

- To develop wholesome positive attitude towards sexual behaviour compatible with the demand of their society.
- To help individuals and families learn what is known about human growth, development, and behaviour in the family setting throughout the life cycle.
- To impart training for home making and for successful participation in family life.
- To guide individuals and families in improving their interpersonal relationships through enhanced communication and furthering their maximum development and improve their quality of life

3.5 The Important of Family Health Education

It helps the young generation to deal with physical, emotional and social changes which takes place in the process of growing up. It helps in establishing and maintaining healthy relationship among family members.

- Feed and educate girls as equally as boys
- Avoid early marriage arrangements and encourage delay of pregnancy once married
- Give equal decision-making power to girls and women for family resources and decisions about reproduction and family size
- Put aside money for emergencies
- Collaborate with neighbors and community when access to health services is needed.

3.6 The Role of Family Health Education

The family plays a central role in developing and maintaining attitudes, values, and behaviours related to health promotion of its members. Further, the family is responsible for providing basic resources that support the promotion of health in its members. The goal of Family health Education is to teach these skill and knowledge areas to family members across the lifespan, and foster positive individual and family development so that families can function optimally.

Family health Educators have knowledge based in the discipline of Family Science, and they are employed in a variety of settings and roles. They consider societal issues economics, education, work-family issues, parenting, sexuality, gender, and more within the context of the family. They believe that societal problems like substance abuse, domestic violence, unemployment, debt, and child abuse can be more

effectively addressed from a perspective that considers individuals and families as part of larger systems. Family Health Educators empower families themselves to apply knowledge about healthy family functioning to prevent or minimise problems.

SELF-ASSESSMENT EXERCISE
What is family health?

4.0 CONCLUSION

Having successfully discuss and completed this unit it is assume that you have fully understood the concepts of family, family health, family health education, objectives of family health education, important of family health education and the roles family health education.

5.0 SUMMARY

In this unit, you have learnt the concepts of family, family health, family health education, objectives of family health education, important of family health education and the roles family health education.

6.0 TUTOR-MARKED ASSIGNMENT

2 what is family health education?
2. State the objectives of family health education
3. Outline the roles of family health education.

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UNIT 4 OCCUPATIONAL HEALTH AND SAFETY

CONTENT

1.0 INTRODUCTION

Occupational health is an area of work in public health to promote and maintain highest degree of physical, mental and social well-being of workers in all occupations. Occupational health and safety is the field of public health that studies trends in illnesses and injuries in the worker population and proposes and implements strategies and regulations to prevent them. Its scope is broad, encompassing a wide variety of disciplines from toxicology and epidemiology to ergonomics and violence prevention.

2.0 OBJECTIVES

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

- define occupational health
- briefly explain the history of occupational health
- state the objectives of occupational health
- explain the components of occupational health
- describe the ways of promoting occupational health and safety.

3.0 MAIN CONTENT

3.1 Concept of Occupational Health

The field of occupational health and safety (OHS) has become a topic of increasing importance over the last 30 years. The establishment of the Occupational Safety and Health Administration (OSHA) in 1970 reflected the recognition that safety in the workplace is a basic expectation for all employees. Originally addressing concerns in industry and hazards associated with mechanical injury, the field of occupational health and safety has expanded to almost every workplace

environment, from the office to the airplane, as well as to the laboratory and the vivarium. Every organisation uses a variety of tools to achieve institutional goals, including business plans, strategic plans, and long-range development plans. The goals of an organization's OHSP are:

- to identify hazards in the workplace and determine the risk associated with them,
- to design the facility and management program to reduce risks associated with the hazards,
- to communicate hazard identification, risk assessment, and appropriate safety measures to all employees. An OHSP integrates the efforts of management, administration, employees, and health care professionals in an active, evolving program that promotes a culture of safety in the workplace.

3.2 A Brief History of Occupational Health and Safety

Today, employers know that occupational safety is a workplace hero. But once upon a time, that wasn't the case. Prior to 1970, the regulation of workplace health and safety was a very different landscape. Back then, it fell under the purview of the Department of Labor but did not have a central focus, which meant that workers were the ones to suffer the consequences. How did workplace safety become what it is today? Here is a brief history of occupational health and safety to better understand how we have achieved the safe workplaces we have.

The Occupational Safety and Health Act

In the United States, occupational health and safety truly begin in 1970, with the passing of the Occupational Safety and Health (OSH) Act. The goal of this law was simple: to improve safety and guarantee safer working conditions for all workers, regardless of their job or industry. As such, the law addressed issues related to known health and safety hazards, such as unsanitary conditions, cold and heat stress, and environmental toxins. The Act also established the Occupational Safety and Health Administration (OSHA) to pass health and safety standards, as well as the National Institute for Occupational Safety and Health (NIOSH) to act as a research body on OSHA's behalf under the umbrella of the Centers for Disease Control.

On April 28, 1971, OSHA was officially established as the federal body responsible for worker health and safety. The first year of OSHA's existence was a busy one, as the agency quickly began establishing safety standards and industry regulations. The first standards were issued five months after OSHA's establishment. These standards are the ones that all current standards are built on. They established baseline

health and safety regulations for businesses to follow, guiding employer responsibilities and reporting protocols.

One year later, in 1972, OSHA established the OSHA Training Institute. The Institute is alive and well today, responsible for the training and education of state and federal compliance officers, private sector safety managers, state consultants, and non-OSHA personnel. In those days, OSHA had 10 regional offices, 49 area offices, and two maritime offices in major cities across the country. These offices would begin OSHA's ongoing work: educating employers on their safety responsibilities.

Objectives of Occupational Health

1. The promotion and maintenance of the highest degree of physical, mental and social wellbeing of workers in all occupation
2. The prevention of among workers of departure from health caused by their working condition
3. The protection of all workers in their employment from risk resulting from factors adverse to health
4. The planning and maintenance of workers in an occupational environment adapted to physiological equipment
5. the improvement of working conditions and the working environment to become conducive to safety and health;
6. the development of work organization and working cultures that should reflect essential value systems adopted by the undertaking concerned, and include effective managerial systems, personnel policy, principles for participation, and voluntary quality-related management practices to improve occupational safety and health.

The Components of Occupational Health

- occupational hygiene
- environmental medicine or inspection
- toxicology
- occupational medicine
- ergonomic or human factor engineering
- occupation psychology

Occupational Hygiene

Occupational Hygiene is the discipline of anticipating, recognizing, evaluating and controlling health hazards in the working environment with the objective of protecting worker health and well-being and safeguarding the community at large. Occupational hygiene is the practice of safeguarding against existing or potential risks in the workplace to protect the health and safety of employees and the surrounding environment. It is a process of preempting, identifying,

assessing, and managing factors that can cause illness, poor health, or considerable physical discomfort to an employee. Occupational hygiene is important in many industries such as manufacturing, mining, hospitals, farms and petrochemical plants. There are several factors that occupational hygiene is concerned with. It encompasses air quality, radiation, occupational disease, biological hazards, temperature, ergonomics, noise, exposure to and disposal of hazardous materials. Occupational hygiene is implemented by occupational hygienists who conduct assessments of all work areas, equipment, job roles, and job activities. Any issues that are identified are then evaluated and measures are put in place to mitigate and manage them so that the health and safety of employees and the community is protected.

Environmental Medicine or Inspection

Environmental Health and Safety (EHS) performs periodic health and safety-related inspections to identify work practices, procedures or conditions that do not comply with state or federal regulations or other authorities When issues are identified, they are reported to the Principal Investigator, Supervisor and/or departmental executive. Identified issues are to be corrected within the timeframe provided in the EHS report. If corrections are not made, the report will be reissued to the next executive level. Hazards that are immediately dangerous to life or health must be corrected immediately, either by fixing the hazardous condition or by removing the equipment or operation from service.

Toxicology

Toxicology is a field of science that helps us understand the harmful effects that chemicals, substances, or situations, can have on people, animals, and the environment. Toxicology is the scientific study of adverse effects that occur in living organisms due to chemicals. It involves observing and reporting symptoms that arise following exposure to toxic substances Toxicologists will investigate the mechanisms by which these substances exert toxicity, as well as how to detect the presence of these substances in various sample types. Additionally, toxicology also involves assessing how to effectively treat animals and/or individuals who have been exposed to certain toxicants. The substances that are assessed by toxicologists includes environmental agents and chemical compounds found in nature, as well as pharmaceutical compounds that are synthesized for medical use by humans. These substances may produce toxic effects in living organisms, of which can include, but are not limited to, disturbances in growth patterns, discomfort, disease and even death. The word “toxicity” describes the degree to which a substance is poisonous or can cause injury. The toxicity depends on a variety of factors: dose, duration

and route of exposure and structure of the chemical itself, and individual human factors.

Importance of dose

What is a dose?

The dose is the actual amount of a chemical that enters the body. The dose received may be due to either acute (short) or chronic (long-term) exposure. An acute exposure occurs over a very short period of time, usually 24 hours. Chronic exposures occur over long periods of time such as weeks, months, or years. The amount of exposure and the type of toxin will determine the toxic effect.

What is dose-response?

Dose-response is a relationship between exposure and health effect that can be established by measuring the response relative to an increasing dose. This relationship is important in determining the toxicity of a particular substance (2). It relies on the concept that a dose, or a time of exposure (to a chemical, drug, or toxic substance), will cause an effect (response) on the exposed organism. Usually, the larger or more intense the dose, the greater the response, or the effect. This is the meaning behind the statement "the dose makes the poison."

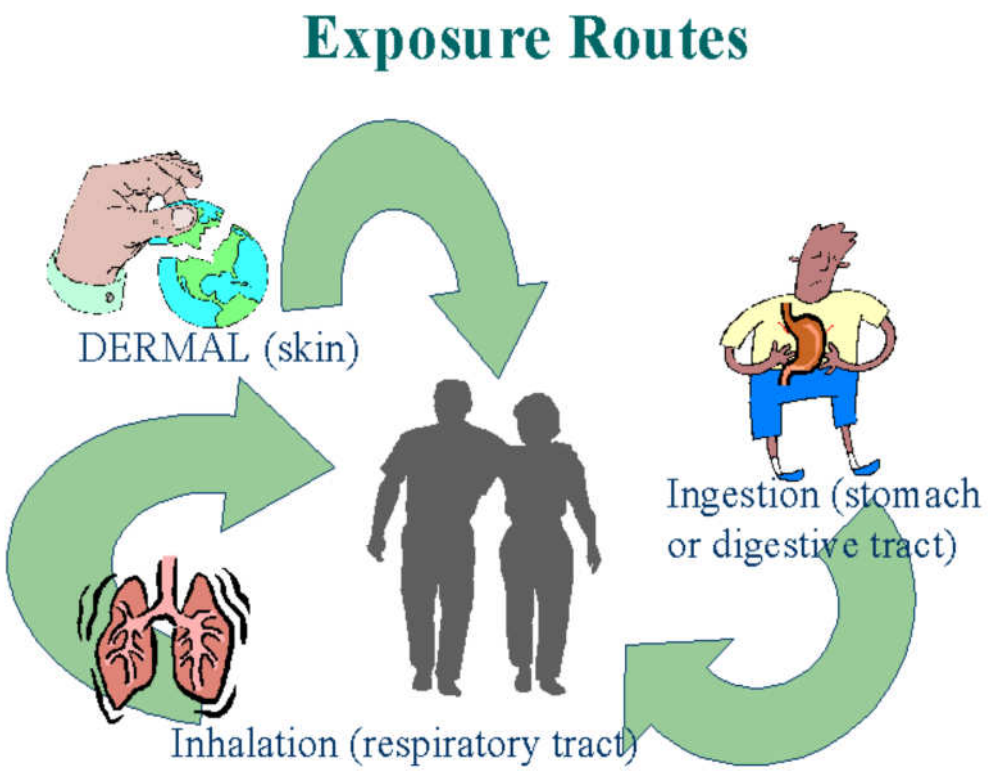

Figure 1

3.4 Occupational Medicine-

Occupational medicine also known as “occupational health” is focused on the treatment of work-related injuries and illnesses**.** Physicians trained in occupational medicine diagnose and treat work-related injuries much more effectively than most primary care physicians. The main focus in occupational health is on three different objectives:

1. the maintenance and promotion of workers' health and working capacity;
2. the improvement of working environment and work to become conducive to safety and health and
3. development of work organizations and working cultures in a ...

Ergonomic or Human Factor Engineering

Human-factors engineering, also called ergonomics or human engineering, science dealing with the application of information on physical and psychological characteristics to the design of devices and systems for human use. Human factors and ergonomics (commonly referred to as human factors) is the application of psychological and physiological principles to the engineering and design of products, processes, and systems. The goal of human factors is to reduce human error, increase productivity, and enhance safety and comfort with a specific focus on the interaction between the human and the thing of interest. The field is a combination of numerous disciplines, such as psychology, sociology, engineering, biomechanics, industrial design, physiology, anthropometry, interaction design, visual design, user experience, and user interface design. Ergonomics (or human factors) is the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance. Ergonomists contribute to the design and evaluation of tasks, jobs, products, environments and systems in order to make them compatible with the needs, abilities and limitations of people.

Occupational Psychology is the study of human behaviour in the workplace. It is an applied discipline within the field of psychology. We also refer to it as **Industrial and Organizational Psychology, Organizational Psychology,** and **Work and Organizational Psychology**

3.5 The Ways of Promoting Occupational Health and Safety

Workplace safety is an important part of any job and requires that everyone in the company adhere to the safety guidelines and policies in

place. Carefully following appropriate safety guidelines can go a long way toward preventing workplace injuries. Here are some ways you can work to stay safe on the job.

1. **Be Aware**

   Always be alert to what's happening in your surroundings; remember that your safety is your responsibility. Understand the particular hazards related to your job or workplace, and keep clear of potentially hazardous areas or situations. Be awake and attentive on the job, and be particularly aware of machinery. Avoid going to work under the influence of alcohol or drugs, which can compromise your concentration, coordination, judgment, motor control and alertness.

2. **Maintain Correct Posture**

   Use correct posture to protect your back while at work. If you sit at a desk, keep your shoulders and hips in line and avoid hunching over. Use correct form when lifting objects and avoid twisting and stooping. The following tips provide information about lifting correctly:

   - ✓ Use both hands to lift or carry a heavy object.
   - ✓ Adopt a proper lifting stance by putting the strain on your legs, keeping your back straight and not bending at the waist.
   - ✓ Wear a back brace for heavy work.
   - ✓ Test the weight before picking up the item.
   - ✓ Lift items smoothly and slowly.
   - ✓ Move your feet instead of your back when traveling or turning with a heavy object.
   - ✓ Hold the load close to your body.
   - ✓ Ask for help to move loads that are too heavy for you.

3. **Take Breaks Regularly**

   Feeling tired and burned out makes you less likely to be aware of your surroundings and is a common cause of workplace injuries. Regular breaks help you stay fresh and alert on the job. It is particularly important to take short breaks when you have a task that requires repetitive movements over a long period of time.

4. **Use Equipment Properly**

   Always take the proper precautions when operating machinery or using tools. Taking shortcuts is a leading cause of workplace injuries. Use the appropriate tool for the job, and use it in the right way. When using tools and machinery, put safety first with the following:

   - ✓ Only use machinery you are trained and authorized to use.
   - ✓ Keep tools clean and in good working order.

- ✓ Organize tools and always return them to their proper place.
- ✓ Make sure the machine operator sees you, don't approach from a blind spot or from behind.
- ✓ Only perform tasks you have been properly trained to perform.
- ✓ Never leave machinery unattended while it is running.
- ✓ Always obey operating instructions.
- ✓ Never remove or tamper with safety guards.
- ✓ If something seems wrong, immediately stop the machine and get assistance.
- ✓ Communicate with those around you.
- ✓ Never walk in front of heavy equipment.
- ✓ Read and follow all labels and instructions.
- ✓ Don't tamper with hazardous items, including cords, switches and electric controls.
- ✓ Wear appropriate and compact clothing; loose, billowing clothing and accessories can easily get caught in moving parts.
- ✓ Never place fingers or other objects into moving machinery.
- ✓ Turn off equipment before moving, cleaning, adjusting, oiling or un-jamming.

5. **Locate Emergency Exits**

Always know where emergency exits are located and keep the path to them clear. You should also have clear access to emergency shutoffs on machinery.

6. **Report Safety Concerns**

If you notice a potential safety hazard or risk, report it to your supervisor immediately so that they can address the situation. Keep communication lines open and work as a team to create a safe working environment.

7. **Practice Effective Housekeeping**

Maintain a clean and organized workplace environment. Make housekeeping an ongoing project that everyone is involved in and keep these in mind:

- ✓ Prevent trips, slips and falls by keeping all floors clean and dry.
- ✓ Eliminate fire hazards by removing combustible materials and storing flammable materials away from sources of ignition.
- ✓ Control dust accumulation.
- ✓ Avoid tracking materials and cross contamination by keeping mats clean and having separate cleaning protocols for different areas.

- ✓ Use appropriate procedures to prevent falling objects.
- ✓ Keep the workplace clutter free.
- ✓ Store all materials and equipment properly.
- ✓ Regularly inspect tools and personal protective equipment to make sure they are in good working order.

8. **Make Use of Mechanical Aids**

   Take the extra time to obtain a wheelbarrow, crank, conveyor belt, forklift or other mechanical aid to assist you in lifting heavy objects. Attempting to lift something that is too heavy can cause injuries that could have been avoided.

9. **Reduce Workplace Stress**

   Stress can contribute to difficulty concentrating and depression, which make it hard to be alert at work. There are many causes of stress at work including conflicts with others, heavy workloads, long hours and job insecurity. If you are experiencing workplace stress, talk to your supervisor about ways to address your concerns.

10. **Use Appropriate Safety Equipment**

    It is important to use the proper safety equipment for a task to help protect yourself from injury:

    - ✓ Wear appropriate clothing and shoes for your job.
    - ✓ Know the location of fire extinguishers and first aid kits.
    - ✓ Use a hard hat if there is a risk of falling objects.
    - ✓ Wear gloves when handling toxic substances or sharp objects.
    - ✓ Wear goggles when there is a hazard to your eyes.
    - ✓ Use safety harnesses if there is a danger of falling.
    - ✓ Wear non-skid shoes when working on slippery surfaces or lifting heavy objects.
    - ✓ Wear a breathing mask.
    - ✓ Use all protective equipment intended for your task including seat belts, protective headgear or clothing and safety glasses.

Creating an environment that is safe is the responsibility of everyone; do your part by following safety guidelines and policies. If you are injured on the job, notify your supervisor immediately and get assistance. Avoid taking risks when it comes to safety, be aware and do your part to maintain a safe workplace environment. If you have been injured on the job, call to schedule an appointment to see how a team of specialists can help to get you feeling better and back to work!

SELF-ASSESSMENT EXERCISE

State ways of promoting occupational health and safety.

4.0 CONCLUSION

Having successfully discuss and completed this unit it is assume that you have fully understood the concepts of occupational health, history of occupational health, the objectives of occupational health, the components of occupational health and the ways of promoting occupational health and safety.

5.0 SUMMARY

In this unit, you have learnt the concepts of occupational health, history of occupational health, the objectives of occupational health, the components of occupational health and the ways of promoting occupational health and safety.

6.0 TUTOR-MARKED ASSIGNMENT

1. What is occupational health?
2 Briefly describe the history of occupational health.
3 State the objectives of occupational health.
4 Outline the components of occupational health.

7.0 REFERENCES / FURTHER READING

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American Conference of Government Industrial Hygienists (ACGIH) 1330 Kemper Meadow Drive, Suite 6000 Cincinnati, OH 45240513-742-2020 Web site: https://www.acgih.org

Agency for Toxic Substances and Disease Registry (ATSDR) 1600 Clifton Road, NE Atlanta, Georgia 30333 1-888-42-ATSDR or 1-888-422-8737 Web site: https://www.atsdr.cdc.gov

Association of Occupational and Environmental Clinics (AOEC) 1010 Vermont Avenue, NW, Suite 513 Washington, DC 20005 (202) 347-4976 Centers for Disease Control and Prevention (CDC)

1600 Clifton Rd. Atlanta, GA 303331-800-311-3455 Web site: https://www.cdc.gov

UNIT 5 HEALTH CARE SERVICE IN NIGERIA

CONTENTS

1.0 INTRODUCTION

The Federal Government's role is mostly limited to coordinating the affairs of the University Teaching Hospitals, Federal Medical Centres (tertiary healthcare) while the State Government manages the various general hospitals (secondary healthcare) and the Local Government focus on dispensaries (Primary Health Care)._Nigeria has one of the largest stocks of human resources for health (HRH) in Africa but, like the other 57 HRH crisis countries, has densities of nurses, midwives and doctors that are still too low to effectively deliver essential health services (1.95 per 1,000). In recent years migration to foreign countries has declined and the primary challenge for Nigeria is inadequate production and inequitable distribution of health workers. The health workforce is concentrated in urban tertiary health care services delivery in the southern part of the country, particularly in Lagos (HRH Country Profile: Nigeria, WHO GHWA, 2008). This inequity has been attributed to:

- lack of public and private sector coordination;
- favouring indigenous hires;
- commercial pressures in the private sector that lead to poor quality work;
- work environments that contribute to low motivation, less-than-optimal productivity, high attrition especially from rural areas; and
- lack of planning based on staffing projection needs resulting in an overproduction of some categories of health workers and a lack of others (Federal Republic of Nigeria HRH Strategic Plan 2008-2012).

These challenges are further compounded by the fact that the federal government accepts and regulates 3 systems of health care delivery: orthodox, alternative, and traditional. The absence of a common HRH and data collection system leads to a lack of coordination in collecting

HRH information, which means various stakeholders get fragmented information.

Current strategies to manage HRH maldistribution and attrition include:

- use of telemedicine;
- financing/aid arrangements with other countries where significant populations of Nigerian health workers live plus efforts to enable easier transition to Nigeria; and
- actively managing brain drain.

One successful approach is the Midwifery Service Scheme (2009). It mobilises unemployed and retired but able midwives and newly qualified graduates from Nigerian Schools of Midwifery to rural communities for 1 year of community service.

2.0 OBJECTIVES

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

- explain health care system in Nigeria
- briefly outline components of health care system in Nigeria
- state the objectives of health care system in Nigeria
- state the health system challenges in Nigeria.

3.0 MAIN CONTENT

3.1 Health Care System in Nigeria

According to the World Health Organization (WHO), universal health coverage (UHC) is a means of ensuring that all people and communities can use the promotive, preventive, curative, rehabilitative and palliative health services they need, of sufficient quality to be effective, whilst also ensuring that the use of these services does not expose the user to financial hardship. UHC is an integral part of the WHO Constitution agreed in 1948, which declared health a fundamental human right, and of the 'health for all' agenda set out in the Alma-Ata Declaration in 1978. UHC is specifically referred to in Sustainable Development Goal 3 (SDG3)3 and, by ensuring the health of populations, it also makes a fundamental contribution to the achievement of other SDGs. The goal of universal health coverage (UHC) is to ensure that all people have access to essential health services without enduring financial hardship. Globally, it is enshrined within Sustainable Development Goal 3 (SDG3) as an objective to be achieved by 2030.

The Federal Government's role is mostly limited to coordinating the affairs of the University Teaching Hospitals, Federal Medical Centres (tertiary healthcare) while the State Government manages the various

general hospitals (secondary healthcare) and the Local Government focus on dispensaries (Primary Health Care).

3.2 Components of Health Care System in Nigeria

Types of health care system in Nigeria are primary, secondary and tertiary healthcare system. This structure also reflects the three tiers of government in Nigeria, namely Local, State and Federal government.

3.2.1 Primary Health Care System

In the simplest of terms Nigerian health services are organized along three tiers of Governments as follows: Primary healthcare at the Health Centers at local government, ward and community level. Simply put, primary health care shall provide general health service of preventive, promotive, curative and rehabilitative nature for the population as on the entry point of the health care system. Primary health care ensures people receive quality comprehensive care ranging from promotion and prevention to treatment, rehabilitation and palliative care as close as feasible to people's everyday environment.

Primary health care is the first level of contact of individuals, the family and community with the national health system bringing health care as close as possible to where people live and work, and constitutes the first element of a continuing health care process. Much has been spent and continues to be spent on PHC. Yet, our health statistics have plummeted over the last three decades. For example Maternal Mortality rate (MMR) despite our excellent obstetricians, skilled birth attendants and community health workers, Nigeria is amongst the world’s worst. A pregnant woman developing complications at the PHC level will be sent to a SHC facility. There, bleeding, infection and anaesthesia-related problems remain the biggest killers. Many believe we should not just pour funds into PHC (prenatal care, health education etc) and ignore the perioperative inadequacies at SHC facilities.

3.2.2 Secondary Health Care System

Secondary healthcare General and state hospitals.

Problems in Secondary Healthcare Services

- Structures Most of the buildings are dilapidated, Uneven distribution of facilities Inadequate maintenance culture.

- Equipment- There is acute shortage of basic equipment; Most of the equipment are obsolete; and not procured according to needs and technical specifications and Poor maintenance culture.
- Drugs & Supplies - unavailability of adequate essential drugs & consumables; Inadequate funds; Fake and sub-standard drugs; Poor management of the DRF system
- Human Resources - shortage of skilled staff, lack of continuing education (capacity building), poor motivation/incentives and wrong distribution
- Basic Amenities (Utilities) - Basic amenities are lacking in most of the facilities, especially in the rural areas.
- Funding - Poor funding of SHC, The untimely & irregular release of funds makes planning difficult and Non-implementation of Budget
- Management, Lack of managerial skills for Health Professionals; Limited available Health Human Resource is ineffective and inefficient for service delivery, Culture of corruption and selfinterest in management.
- Health Management Information System, Poor data collection; Inadequate planning. Where data is available it is not used in planning & decision making at the Hospitals and Lack of reliable data returns from facilities to SMOH.
- Community Participation And Ownership: Lack of involvement of host communities in the establishment and running of facilities, Lack of awareness, commitment, enlightenment and knowledge on the part of the Communities and those involved in the management of facilities.
- Private Sector Participation: Inadequate involvement of private sector participation in SHC delivery.
- Referral System: Poor & uncoordinated referral system , Lack of feedback mechanism in the referral system.

3.2.3 Tertiary Health Care System Federal Teaching and Specialist Hospitals

Specialized care that offers a service to those referred from secondary care for diagnosis or treatment, and which is not available in primary or secondary care.Tertiary Health care refers to a third level of health system, in which specialized consultative care is provided usually on referral from primary and secondary medical care.

3.4 The Objectives of Health Care System in Nigeria

- To ensure health care services to all particularly to the disadvantaged groups like scheduled tribes, scheduled castes & back ward classes.
- To ensure adequate, qualitative, preventive & curative health care to people of the State.
- To ensure health care services to all particularly to the disadvantaged groups like scheduled tribes, scheduled castes & back ward classes.
- To provide affordable quality healthcare to the people of the State, not only through the allopathic systems of medicine but also through the homeopathic & ayurvedic systems.
- To ensure greater access to primary health care by bringing medical institutions as close to the people as possible or through mobile medical health units, particularly, in the underserved & backward districts.
- To improve health care in the KBK districts of the State
- To eliminate diseases like polio & leprosy from the state & prevent as well as control other communicable diseases
- To reduce maternal, infant & neo-natal mortality rates
- To guarantee to the people of Orissa free treatment(including free medicines) for certain major communicable diseases
- To improve hospital services at the primary, secondary & tertiary levels in terms of infrastructure, drugs & personnel
- To impart training to doctors, nurses & other paramedical staff to upgrade their skills & knowledge to improve quality health care in the state and improve medical education in the State.

3.5 The Health Care System Challenges in Nigeria

An average of 20,000 Nigerians travel to India each year for medical assistance due to the absence of a solid healthcare system at home. Nigeria is responsible for high amount under-five child deaths. UNICEF said in a recent report that “preventable or treatable infectious diseases such as malaria, pneumonia, diarrhea, measles and HIV/AIDS account for more than 70% of the estimated one million under-five deaths in Nigeria.” Another report by the WHO says that nearly ten percent of newborn deaths in the world last year occurred in Nigeria. Furthermore, five countries accounted for half of all newborn deaths, with Nigeria third on the list. These are India (24%), Pakistan (10%), Nigeria (9%), the Democratic Republic of the Congo (4%) and Ethiopia (3%). Most newborn deaths occurred in two regions: Southern Asia (39%) and sub-Saharan Africa (38%).

There is a toxic mix of problems including inaccessibility of quality health care, poor hygiene, corruption, and malnutrition, lack of access to safe drinking water, poor health infrastructure, fake drugs, insufficient financial investment, and lack of sufficient health personnel. Government's performance in the health sector has been abysmal. Investment in infrastructure has been poor, and meager remuneration for health workers has created a massive brain drain to the US and Europe. The annual budget of the government for the health sector is 4.17% of the total national budget, which is equivalent to only $5 per person per year!

Hardly a year passes without a major national strike by nurses, doctors, or health consultants. The major reasons for these strikes are poor salaries and lack of government investment in the health sector. Unfortunately, many Nigerians cannot afford private hospitals; they are simply too expensive. Since financing is a major problem for patients, one would think that management of the National Health Scheme (NHS) through the Health Maintenance Organizations (HMOs) would help people secure better quality health care. But corruption has crushed this opportunity and made quality medical care inaccessible for people who contributed to the system.

The health sector like other key sectors in the country has failed largely due to inept leadership. It is such a shame that despite the huge talents of Nigerians, which are on display in health sectors all over the world, our own health system is failing. Donor countries and multilateral organizations are aware of these challenges, but there's little they can do to improve the situation. It is believe that Nigeria's policymakers and health professionals including the Nigerian diaspora need to come together and create a long-term blueprint for the sector. This should include a strategy for success in the next 25-35 years with timelines and key performance indicators. Creating this blueprint, and then making it a reality, is the only way to make meaningful improvements in the health of Nigerians.

SELF-ASSESSMENT EXERCISE
Explain health care system in Nigeria.

4.0 CONCLUSION

Having successfully discuss and completed this unit it is assume that you have fully understood the health care system in Nigeria, components of health care system in Nigeria, objectives of health care system in Nigeria and health care system challenges in Nigeria.

5.0 SUMMARY

In this unit, you have learnt the health care system, components of health care system, objectives of health care system and health care system challenges in Nigeria.

6.0 TUTOR-MARKED ASSIGNMENT

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1. Briefly outline components of health care system in Nigeria.
2. State the objectives of health care system in Nigeria.
3. State the health care system challenges in Nigeria.

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UNIT 6 CHILD HEALTH SERVICE

CONTENTS

1.0 INTRODUCTION

Child Health care is defined as the medical services that are provided by the medical health professionals to the children having disease or infection. These services are funded by different health organizations. These medical professionals are specialized and experienced in treating pediatric patients. Child Health Information Services (CHIS) are local active clinical care records of all the children in an area, ideally containing information about an individual child's public health interventions, particularly screening, immunizations and outcomes of the 0 to 5 healthy child programme. The goal of the Child Health is to end preventable child deaths and promote the healthy growth and development of all children in the first decade of their life.

2.0 OBJECTIVES

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

- explain child health services
- state the objectives of child health services
- enumerate components of child health services
- promote children’s health.

3.0 MAIN CONTENT

3.1 Child Health Service

Child health is a state of physical, mental, intellectual, social and emotional well-being and not merely the absence of disease or infirmity. Healthy children live in families, environments, and communities that provide them with the opportunity to reach their fullest developmental potential.

Child Health care is defined as the medical services that are provided by the medical health professionals to the children having disease or infection. The true measure of a nation's standing is how well it attends to its children their health and safety, their material security, their education and socialization, and their sense of being loved, valued, and included in the families and societies into which they are born.

America's children are its greatest resource, and measures of child health are important indicators of the overall health and future prospects of the nation as a whole (CDC, 1991; Klein and Hawk, 1992; Nersesian, 1988; Reidpath and Allotey, 2003). Ensuring the health, safety, and well-being of children at each critical stage of development is a responsibility shared among individuals and families and across institutions and governmental jurisdictions. The vast number of public health initiatives, individual actions, community activities, advocacy campaigns, child- and adolescent-targeted programs and research, and policies and legislation focused on children would suggest the nation's desire to distinguish children's health as one of the highest national priorities.

3.2 Objectives of Child Health Services

As services are provisions made for the public to use as much as they need in order to benefit from them, the purpose of child health care in health facilities is to promote the health of children, provide support in maintaining and improving children's health through counseling, medical examination, treatment and prevention. Child Health care is defined as the medical services that are provided by the medical health professionals to the children having disease or infection. These services are funded by different health organizations. These medical professionals are specialized and experienced in treating pediatric patients.

- To provide immunization services in public and private health facilities
- To carried out growth monitoring and screening services in public and private health facilities.
- To ensure effective curative health services in these health facilities for children;
- To ensure reliable emergency health services in these health facilities for children;
- To ensure the provision of nutritional services in these health facilities for children;

- To ensure consistency of the health education components in these health facilities for children;
- To employ and engage competen staff who are responsible for the provision of childhealth care in these health facilities;
- To provide solution for administrative problems that affect child health care services in public and private health facilities.
- Use administrative strategies for improving child health care services in public and private health facilities.

Components of Child Health Services

The components of child health services are

1) Family planning and reproductive health services,
2) Maternal, newborn, and child health services;
3) Health communications;
4) Health commodities and supplies;aand
5) Health systems strengthening

Promotion of Children's Health

Improving healthy food options and nutrition education in school; improving physical education and physical activity opportunities in school; preventing use of all tobacco products. Helping children and adolescents manage their chronic health conditions in school. Establishing healthy behaviours to prevent chronic disease is easier and more effective during childhood and adolescence than trying to change unhealthy behaviors during adulthood. CDC's National Center for Chronic Disease Prevention and Health Promotion works with parents, early care and education (ECE) facilities, schools, health systems, and communities to keep children healthy by:

- Reducing obesity risk for children in ECE facilities.
- Improving healthy food options and nutrition education in school.
- Improving physical education and physical activity opportunities in school.
- Preventing use of all tobacco products.
- Helping children and adolescents manage their chronic health conditions in school.
- Promoting the use of dental sealants to prevent cavities
- Promoting adequate sleep

SELF-ASSESSMENT EXERCISE

Define child health.

4.0 CONCLUSION

Having successfully discuss and completed this unit it is assume that you have fully understood the child health services, objectives of child health services, components of child health services and promotion of children's health in Nigeria.

5.0 SUMMARY

In this unit, you have learnt the child health services, objectives of child health services, components of child health services and promotion of children's health in Nigeria.

6.0 TUTOR-MARKED ASSIGNMENT

1. Explain child health services.
3. State the objectives of child health services.
4. Enumerate the components of child health services.
5. describe the promotion of children's health.

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UNIT 7 MATERNAL HEALTH

CONTENTS

1.0 INTRODUCTION

Maternal health refers to the health of women during pregnancy, childbirth and the postnatal period. Each stage should be a positive experience, ensuring women and their babies reach their full potential for health and well-being.

2.0 OBJECTIVES

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

- explain maternal health
- state the objectives of maternal health
- enumerate components of maternal health
- state the current strategies to increase access to maternal health
- determine maternal mortality
- promote maternal health
- prevention of maternal mortality.

3.0 MAIN CONTENT

3.1 Maternal Health

Maternal health refers to the health of women during pregnancy, childbirth and the postnatal period. Each stage should be a positive experience, ensuring women and their babies reach their full potential for health and well-being. Although important progress has been made in the last two decades, about 295 000 women died during and following pregnancy and childbirth in 2017. This number is unacceptably high. The most common direct causes of maternal injury and death are excessive blood loss, infection, high blood pressure, unsafe abortion, and obstructed labour, as well as indirect causes such as

anemia, malaria, and heart disease. Most maternal deaths are preventable with timely management by a skilled health professional working in a supportive environment. Ending preventable maternal death must remain at the top of the global agenda. At the same time, simply surviving pregnancy and childbirth can never be the marker of successful maternal health care. It is critical to expand efforts reducing maternal injury and disability to promote health and well-being. Every pregnancy and birth is unique. Addressing inequalities that affect health outcomes, especially sexual and reproductive health and rights and gender, is fundamental to ensuring all women have access to respectful and high-quality maternity care.

Objectives of Maternal Health

The specific objectives of MCH Care focuses on the reduction of maternal, perinatal, infant and childhood mortality and morbidity and the promotion of reproductive health and the physical and psychosocial development of the child and adolescent within the family.

Components of Maternal Health

- Prevention and management of unwanted pregnancy.
- Maternal care that includes antenatal, delivery and postpartum services.
- Child survival services for newborns and infants.
- Management of Reproductive Tract Infection (TRIs) and Sexually Transmitted Infections (STIs).

Barriers to Effective Maternal Health

We distinguished five groups of access domains related to availability, adequacy, affordability, acceptability and approachability of maternal care. We used these domains to examine the views of maternal care stakeholders and to identify key barriers to accessing adequate maternal care. Barriers to accessing maternal health services can take a variety of forms, such as:

- Geographic, including long travel distances, lack of transportation from remote areas, and difficult terrain
- Financial, whereby care may not be affordable, notably surgical care
- Social, for example community preferences, cultural norms and traditional attitudes that restrict women’s movement
- Individual, including lack of knowledge about the benefits of care, lack of information on services, pregnancy complications and childbirth, an experience of poor quality care or uneventful past deliveries
- Nature of labour, in that it can start at an unpredictable time and women may have difficulty moving.

Maternal Mortality

- Every year globally approximately 536,000 girls and women die from pregnancy-related cause's one girl or woman dies every minute.
- A recent Lancet study, using a revised maternal mortality methodology, estimates this number to be significantly lower 343,000 in 2008.
- Over 99 per cent of maternal deaths occur in developing countries, with nearly half of these taking places in Sub-Saharan Africa.
- Women living in Sub-Saharan Africa have a higher risk of dying while giving birth than women in any other region of the world.
- For women aged 15 to 19 in Africa, giving birth is the leading cause of death.
- Globally, up to 20 million girls and women a year suffer from maternal morbidities surviving childbirth, but enduring chronic ill-health.
- Progress is slower in some regions than others: while every North African country has reduced maternal mortality by at least 5.5 per cent per year since 1990, only one Sub-Saharan African country (Rwanda) has achieved an average yearly reduction of more than 4 per cent.
- The rate of maternal mortality varies significantly across the world, and globally is the most inequitably distributed health indicator. One thousand women die per 100,000 live births in Sub-Saharan Africa, compared to 24 deaths per 100,000 live births in European countries.11
- For every maternal death, there are approximately 20 other women who suffer pregnancy-related disability. That is equivalent to an estimated 10 million women each year who survive pregnancy, yet experience some type of severe negative health consequence.
- A woman's lifetime risk of maternal death is 1 in 7,300 in developed countries versus 1 in 75 in developing countries. In Sub-Saharan Africa, a woman's lifetime risk of maternal death is a staggering 1 in 22.
- Maternal deaths are caused by a wide range of complications in pregnancy, childbirth or the postpartum period. Most of these complications develop because of the pregnancy itself, and some occur where pregnancy has aggravated an existing disease.
- The four major killers are: severe bleeding (mostly bleeding postpartum), infections (also mostly soon after delivery), hypertensive disorders in pregnancy (eclampsia) and obstructed labour. Complications after unsafe abortion cause 13 per cent of

maternal deaths. Globally, about 80 per cent of maternal deaths are due to these direct causes.

- Among the indirect causes of maternal death (20 per cent) are diseases that complicate or are aggravated by pregnancy, such as malaria, anaemia and HIV. Women also die because of poor health at conception and a lack of adequate care needed for the healthy outcome of the pregnancy for themselves and their babies.

Current Strategies to Increase Access to Maternal Health

Current strategies to increase access to these services include:

- Maternity waiting homes and ambulance services
- Reducing or removing user fees, cash transfers
- Birth preparedness and complication readiness
- Information, Education, and Communication (ICE) campaigns
- Respectful care
- Participatory learning and action cycles with women's groups.

Promotion of Maternal Health

- Advocate for policies that promote improved maternal health and safe motherhood
- Raise awareness and build commitment to maternal health among leaders and decision makers
- Address barriers to access posed by gender and poverty
- Expand access to family planning
- Foster the integration of maternal health and family planning and reproductive health
- Introduce social accountability mechanisms to enable communities to hold governments and providers accountable for the quality and availability of maternal health services
- Promote the provision of respectful maternity care
- Improve the status and working conditions of midwives
- Promoting Respectful Maternity Care that is to promote respectful maternity care for all women during pregnancy, childbirth, and in the time after birth.
- Advocating to Improve Midwives' Status and Working Conditions that is advocacy campaigns to demonstrate the value of and increase support for midwives.
- Identifies and analyzes whether systematic attention to gender factors during the planning and process of scaling up family planning and maternal, neonatal, and child health programs would in fact achieve better programmatic outcomes (e.g., wider availability of health services and health interventions institutionalized and sustained) and health outcomes (e.g.,

increased contraceptive prevalence rate and decreased maternal mortality rate) among their clients.

- Reducing Maternal Mortality through Improved Family Planning that is identify barriers that prevent women's access to these services and work with partners to develop guidelines to help service providers effectively deliver crucial family planning services that help protect the lives of women and infants.

Prevention of Maternal Morbidity and Mortality

Use of family planning services not only prevents unintended pregnancy, it can also protect the lives of many women who face increased health risks when giving birth at a young age. Health Promotion and Prevention programs help integrate family planning and reproductive health services into existing health programs that focus on reducing maternal deaths during childbirth. We identify barriers that prevent women's access to these services and work with partners to develop guidelines to help service providers effectively deliver crucial family planning services that help protect the lives of women and infants.

SELF-ASSESSMENT EXERCISE

Define maternal health

4.0 CONCLUSION

Having successfully discuss and completed this unit it is assume that you have fully understood maternal health, objectives of maternal health, components of maternal health, the current strategies to increase access to maternal health, maternal mortality, promotion of maternal health and prevention of maternal mortality.

5.0 SUMMARY

In this unit, you have learnt the concept of maternal health, objectives of maternal health, components of maternal health, the current strategies to increase access to maternal health, maternal mortality, and promotion of maternal health and prevention of maternal mortality.

6.0 TUTOR-MARKED ASSIGNMENT

1. State the objectives of maternal health.
2. Enumerate the components of maternal health.
3 Describe the current strategies to increase access to maternal health.

4. Describe the promotion of maternal health and prevention of maternal mortality.

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UNIT 8 ADOLESCENCE HEALTH

CONTENTS

1.0 INTRODUCTION

Adolescence is a critical growth period in which youth develop essential skills that prepare them for adulthood. Prevention and intervention programs are designed to meet the needs of adolescents who require additional support and promote healthy behaviours and outcomes. To ensure the success of these efforts, it is essential that they include reliably identifiable techniques, strategies, or practices that have been proven effective. Promoting Positive Adolescent Health Behaviours and outcomes: Thriving in the 21st Century identifies key program factors that can improve health outcomes related to adolescent behaviour and provides evidence-based recommendations toward effective implementation of federal programming initiatives.

2.0 OBJECTIVES

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

- explain the word adolescent
- describe the characteristics of adolescents
- state the objectives of adolescents' health
- explain the health problems of adolescents
- describe the ways of promoting adolescents health
- explain the preventive measures for adolescents' health problems.

3.0 MAIN CONTENT

3.1 Concept of Adolescent

Adolescence is the period of transition between childhood and adulthood. Children who are entering adolescence are going through many changes. This unit offers advice for adolescents and parents to

negotiate these changes. Adolescence is the period of transition between childhood and adulthood. Children who are entering adolescence are going through many changes physical, intellectual, personality and social developmental. Adolescence begins at puberty, which now occurs earlier, on average, than in the past. The end of adolescence is tied to social and emotional factors and can be somewhat ambiguous.

The Characteristics of Adolescents

Physical changes of adolescence

There are three main physical changes that come with adolescence:

- The growth spurt an early sign of maturation;
- Primary sex characteristics changes in the organs directly related to reproduction;
- Secondary sex characteristics (bodily signs of sexual maturity that do not directly involve reproductive organs

Intellectual changes of adolescence

Adolescent thinking is on a higher level than that of children. Children are only able to think logically about the concrete, the here and now. Adolescents move beyond these limits and can think in terms of what *might* be true, rather than just what they see is true. They are able to deal with abstractions, test hypotheses and see infinite possibilities. Yet adolescents still often display egocentric behaviours and attitudes.

Social and emotional changes of adolescence

Adolescents are also developing socially and emotionally during this time. The most important task of adolescence is the search for identity. This is often a lifelong voyage, launched in adolescence. Along with the search for identity comes the struggle for independence.

What adolescents should do during this time

- Avoid looking at your parents as the enemy. Chances are that they love you and have your best interests in mind, even if you don't necessarily agree with their way of showing that.
- Try to understand that your parents are human beings, with their own insecurities, needs and feelings.
- Listen to your parents with an open mind, and try to see situations from their point of view.
- Share your feelings with your parents so that they can understand you better.
- Live up to your responsibilities at home and in school so that your parents will be more inclined to grant you the kind of independence you want and need.

- Bolster your criticisms of family, school and government with suggestions for practical improvements.
- Be as courteous and considerate to your own parents as you would be to the parents of your friends.

How parents should support healthy adolescent development

While adolescence can be a trying period for both youth and their parents, the home does not have to become a battleground if both parents and young people make special efforts to understand one another. The following guidelines may help parents:

- Give your children your undivided attention when they want to talk. Don't read, watch television or busy yourself with other tasks.
- Listen calmly and concentrate on hearing and understanding your children's point of view.
- Speak to your children as courteously and pleasantly as you would to a stranger. Your tone of voice can set the tone of a conversation.
- Understand your children's feelings, even if you don't always approve of their behaviour. Try not to make judgments. Keep the door open on any subject. Be an "open/approachable" pa ent.
- Avoid humiliating your children and laughing at what may seem to you to be naive or foolish questions and statements.
- Encourage your children to "test" new ideas in conversation by not judging their ideas and opinions, but instead by listening and then offering your own views as plainly and honestly as possible. Love and mutual respect can coexist with differing points of view.
- Help your children build self-confidence by encouraging their participation in activities of their choice not yours.
- Make an effort to commend your children frequently and appropriately. Too often, we take the good things for granted and focus on the bad, but everyone needs to be appreciated.
- Encourage your children to participate in family decision-making and to work out family concerns together with you. Understand that your children need to challenge your opinions and your ways of doing things to achieve the separation from you that's essential for their own adult identity.

3.2 The Objectives of Adolescents' Health

The 21 Critical Health Objectives represent the most serious health and safety issues facing adolescents and young adults (aged 10 to 24 years): mortality, unintentional injury, violence, substance abuse and mental

health, reproductive health, and the prevention of chronic diseases during adulthood. Around the world, UNICEF partners with adolescents to improve the policies, programmes and services that affect their health and well-being. They work with Governments in health and other areas like education; nutrition; gender; child protection; HIV and AIDS; and water,sanitation and hygiene to increase investments and help countries develop comprehensive plans that address the needs of all adolescents, especially the most marginalized. Our efforts:

- **Fight** communicable diseases, like malaria and diarrhoeal diseases.**Support HIV and AIDS prevention programmes** tailored to local needs.
- **Strengthen gender-responsive health services** through programmes that promote gender equality, reduce stigma and discrimination, and provide adolescents with the information they need to make decisions that affect their own health, including their sexual and reproductive health.
- **Meet the menstrual health and hygiene needs of adolescent girls**, including by preventing and responding to early and unintended pregnancy, conducting evidence-based advocacy to address stigma and providing menstrual hygiene supplies and facilities especially in emergency settings.
- **Promote mental well-being and address mental health conditions** through global advocacy, awareness-raising, and evidence-building to support the implementation and scale-up of effective interventions.
- **Promote good nutrition,** including by providing counseling and other services that support healthy eating and physical activity.
- Prevent and respond to non-communicable diseases by promoting healthy behaviours, the prevention of substance use, increased physical activity, and youth-led policy action. We also help reduce the risk of cervical cancer through Human Papillomavirus (HPV) vaccines.
- Prevent and respond to violence at home, in school and throughout communities, and protect adolescents from unintended injuries.

Health Problems of Adolescents

Although adolescence and young adulthood are generally healthy times of life, some important health and social problems either start or peak during these years. Examples include:

- Mental disorders
- Substance use
- Smoking/nicotine use

- Nutrition and weight conditions
- Sexually transmitted infections, including human immunodeficiency virus (HIV)
- Teen and unintended pregnancies
- Homelessness
- Academic problems and dropping out of school
- Homicide
- Suicide
- Motor vehicle collisions

Because they are in developmental transition, adolescents and young adults (AYAs) are particularly sensitive to influences from their social environments. Their families, peer groups, schools, and neighborhoods can either support or threaten young people's health and well-being. Societal policies and cues, such as structural racism and media messages, can do the same. Older adolescents and young adults, including those with chronic health conditions, may face challenges as they transition from the child to the adult health care system, such as changes in their insurance coverage and legal status and decreased attention to their developmental and behavioUral needs. Bolstering the positive development of young people facilitates their adoption of healthy behaviours and helps ensure a healthy and productive adult population.to mention the ways for solving the health problems of adolescents.

Ways of Promoting Adolescents Health

Improving physical education and physical activity opportunities in school; preventing use of all tobacco products; helping children and adolescents manage their chronic health conditions in school and promoting the use of dental sealants to prevent cavities.There are many examples of effective policies and programs that address adolescents' health issues:

- Access to health care
- School-based health care services
- State graduated driver licensing programs
- Prevention of alcohol, marijuana, and tobacco use
- Violence prevention
- Delinquency prevention
- Mental health and substance use interventions
- Teen pregnancy prevention
- HIV prevention

The leading causes of illness and death among adolescents are largely preventable, and health outcomes are frequently both behaviorally

mediated and linked to multiple social factors. This is shown by the following empirical examples:

Family

- Adolescents who have good communication and are bonded with a caring adult are less likely to engage in risky behaviors.
- Parents who supervise and are involved with their adolescents' activities are promoting a safe environment for them to explore opportunities.
- The children of families living in poverty are more likely to have health conditions and poorer health status, as well as lower access to and use of health care services.

School

- Student health and academic achievement are linked. Healthy students are more effective learners.
- Academic success and achievement strongly predicts overall adult health outcomes. Proficient academic skills are associated with lower rates of risky behaviors and higher rates of healthy behaviors.
- High school graduation leads to lower rates of health problems and risk for incarceration, as well as enhanced financial stability and socio-emotional well-being during adulthood.
- The school social environment affects student attendance, academic achievement, engagement with learning, likelihood of graduation, social relationships, behavior, and mentalhealth.

Neighborhoods

- Adolescents growing up in distressed neighborhoods with high rates of poverty are at risk for exposure to violence and a variety of negative outcomes, including poor physical and mental health, delinquency, and risky sexual behavior.

Media Exposure

- Adolescents exposed to media portrayals of violence, smoking, and drinking are at risk for adopting these behaviours
- Although social media use offers important benefits to adolescentss, such as health promotion, communication, education, and entertainment, it also increases risks for exposure to cyberbullying, engagement in "sexting," and depression.

Preventive Measures for Adolescents' Health Problems

- expanding private and public insurance coverage, including allowing states to expand which will improve access to services for vulnerable populations, such as adolescents with chronic conditions.

- Increasing access to preventive services in private plans, by requiring plans to cover, without cost-sharing, the preventive services recommended the Women's Preventive Health Service Guidelines, and the immunizations recommended by the CDC.
- Improving access to preventive services in publically funded programs, by increasing payments for Medicaid providers, increasing federal payments for states that cover preventive services in their Medicaid programs without cost-sharing, and ensuring that plans in state exchanges offer the equivalent of the benefits and cost-sharing available in the Children's Health Insurance Program (CHIP) for those children and adolescents who may lose eligibility for that program.
- Supporting clinical training in areas such as primary care and interdisciplinary care, which could improve clinicians' skills in delivering preventive services and specialty services.
- Supporting innovative models of service delivery, such as integrating physical and mental health services, improving coordination of specialty services, and the expansion of school-based health centers and the medical home.

SELF-ASSESSMENT EXERCISE
Explain the word adolescent

4.0 CONCLUSIONS

Having successfully discuss and completed this unit it is assume that you have fully understood concept of adolescence health, the characteristics of adolescents, the objectives of adolescents' health, the health problems of adolescents, the ways of promoting adolescents health and the preventive measures for adolescents' health problems.

5.0 SUMMARY

In this unit, you have learnt the concept of adolescence health, the characteristics of adolescents, the objectives of adolescents' health, the health problems of adolescents, the ways of promoting adolescents' health and the preventive measures for adolescents' health problems

6.0 TUTOR-MARKED ASSIGNMENT

1. Describe the characteristics of adolescents
2. State the objectives of adolescents' health
3. Explain the health problems of adolescents
4. Describe the ways of promoting adolescents health

5. Explain the preventive measures for adolescents' health problems

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UNIT 9 ADULT HEALTH (AGED)

CONTENTS

1.0 INTRODUCTION

People worldwide are living longer. Today, for the first time in history, most people can expect to live into their sixties and beyond. By 2050, the world's population aged 60 years and older is expected to total 2 billion, up from 900 million in 2015. Today, 125 million people are aged 80 years or older. By 2050, there will be almost this many (120 million) living in China alone, and 434 million people in this age group worldwide. By 2050, 80% of all older people will live in low and middle income countries.

The pace of population ageing around the world is also increasing dramatically. France had almost 150 years to adapt to a change from 10% to 20% in the proportion of the population that was older than 60 years. However, places such as Brazil, China and India will have slightly more than 20 years to make the same adaptation. While this shift in distribution of a country's population towards older ages known as population ageing started in high income countries for example in Japan 30% of the population are already over 60 years old, it is now low and middle income countries that are experiencing the greatest change. By the middle of the century many countries for example Chile, China, the Islamic Republic of Iran and the Russian Federation will have a similar proportion of older people to Japan. A longer life brings with it opportunities, not only for older people and their families, but also for societies as a whole. Additional years provide the chance to pursue new activities such as further education, a new career or pursuing a long neglected passion. Older people also contribute in many ways to their families and communities. Yet the extent of these opportunities and contributions depends heavily on one factor, health.

2.0 OBJECTIVES

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

- explain the word adult
- state the objectives of adult' health
- explain the health problems of an adult/aged
- describe the ways of promoting adult's health
- explain the preventive measures for adult's health problems.

3.0 MAIN CONTENT

3.1 Concept of an Adult and Adult Health

An adult is a living organism that has reached sexual maturity and is able to reproduce **or** a person or animal that has grown to full size and strength.

The Objectives of Adult' Health
The objective is to keep people active and caring for themselves independently. This would minimize the duration, although not necessarily the intensity, of the medical care they require. But it clearly reduces suffering and limits the feelings of decline for the elders and their caretakers and family. The goal of health promotion programs for older people is not to prolong life indefinitely, but rather to put as much life as possible into the years that remain for each person.

The Health Problems of An Adult/Aged
The health problems of adult are forgetfulness or dementia, arthritis, high blood pressure, diabetes, cancer, falls, loss of vision, urinary tract problem, constipation among others.

The Ways of Promoting Adult's Health
There are many different published exercise prescriptions, but most share the following points:

- exercise regularly, preferably four or more times per week,
- do it with enough zest to make you breathe faster and your heart beat faster,
- continue to exercise for 20 to 30 minutes,
- slow down if you are breathing too fast to carry on a conversation, if you gasp for breath, or if you feel any pressure, heaviness, or pain in your chest, shoulder, neck, or left arm.

Environmental Protections; Since falls and other injuries become more common again in later years, elders and others should be protected by providing the following:

- provide plenty of light where there are steps or slopes,
- install handrails on stairs if there are none,

- apply adhesive strips or a rough surface in bathtubs and showers,
- install strong bars to hold onto in the bathroom,
- use floor coatings that do not get slippery when wet,
- lay down rugs that do not slide,
- exercise regularly to improve leg strength and balance.

Preventive Measures for Adult' Health Problems

Having had longer education as a youth. The effects of longer education persist for more than 50 years in an increased level of mental processing skills, logical thinking, and fund of knowledge as one enters older age; and in a slower decline in mental performance skills during later years.

- Continuing to engage in "cognitive exercise" by tackling complex tasks at the high end of one's capabilities.
- Maintaining a sense of self-efficacy: the belief, faith, and action that "I can do what is necessary or expected" never giving up without a good try.
- Engaging in regular physical activity that makes one breathe harder and one's heart beat faster.
- Maintaining good lung function through physical exercise. Healthy breathing capacity helps fill blood hemoglobin with oxygen, thus keeping brain cells functioning well.
- Maintaining regular interaction with others. The daily exchange of information and feelings keeps one's sense of reality accurately tuned, exercises social and language skills, modulates the excitatory and inhibitory functions, and probably does much more.

Promoting Health of Older Adults

National Center for Chronic Disease Prevention and Health Promotion funds partners to improve the health of older adults by:

- Helping those with dementia remains active, independent, and involved in their community as long as possible.
- Providing resources to help caregivers stay healthy and deliver quality care to their care recipients.
- Increasing early assessment and diagnosis, risk reduction, and prevention and management of chronic diseases for people with or at risk for Alzheimer's disease and other dementias.
- Increasing the use of other clinical preventive services like blood pressure checks, cancer screenings, and blood sugar testing.
- Increasing the number of people who speak to a health care provider about their worsening memory.
- Providing CDC-recognized lifestyle change programs to Medicare beneficiaries through the National Diabetes Prevention Program (National DPP) to reduce the risk of type 2 diabetes.

- Promoting physical activity programs to reduce the risk of dementia, arthritis pain, and falls.
- Promoting Programs to Reduce Arthritis Pain and Prevent Falls

SELF-ASSESSMENT EXERCISE
What is adult health?

4.0 CONCLUSION

Having successfully discuss and completed this unit it is assume that you have fully understood concept of adult health, the objectives of adult' health, the health problems of an adult/aged, the ways of promoting adult's health and the preventive measures for adult's health problems.

5.0 SUMMARY

In this unit, you have learnt the concept of adult health, the objectives of adult' health, the health problems of an adult, the ways of promoting adult's health and the preventive measures for adult's health problems

6.0 TUTOR-MARKED ASSIGNMENT

1. state the objectives of adult health
2. explain the health problems of an adult
3. describe the ways of promoting adult health
4. enumerate the preventive measures for adult health problems

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UNIT 10 PRIMARY HEALTH CARE

CONTENTS

1.0 INTRODUCTION

Primary healthcare is a term used to describe the first contact a person has with the health system when they have a health problem or issue that is not an emergency. It is the part of the health system that people use most and may be provided, for example, by a general practitioner (GP), physiotherapist or pharmacist; primary healthcare refers to a broad range of health services provided by medical professionals in the community; primary healthcare is the provision of health services, including diagnosis and treatment of a health condition, and support in managing long-term healthcare, including chronic conditions like diabetes or primary healthcare includes seeing health professionals to help you maintain good health, with regular health checks, health advice when you have concerns, and support for ongoing care.

2.0 OBJECTIVES

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

- explain the word primary health care
- describe the principle of primary health care
- state the components of primary health care
- mention the primary health care services
- state the problems of primary health care implementation in Nigeria.

3.0 MAIN CONTENT

3.1 Concept of Primary Health Care

Primary health care is an integral part of the country's health system. It is the first level of contact of individuals, the family and the community

with the national health system bringing health care as close as possible to where people live and work**.** Primary health care is the essential care based on practical, scientifically sound and socially acceptable method and technology made universally accessible to individuals and families in the community through their full participation and at a cost they and the country can afford to maintain in the spirit of self-reliance and self-determination (Alma Ata, 1978).

The Principle of Primary Health Care

The basic principles of primary health care include:

1. Community participation
2. Intersectional collaboration
3. Integration of health care programmes
4. Equity
5. Self-reliance.

Community participation
Is the whole mark of primary health care, without which it will not succeed. Community participation is a process by which individuals and family assume responsibility for their own health and those of the community and develop the capacity to contribute to their/and the community development. Participation can be in the area of identification of needs during implementation. The community needs to participate at village, ward, district or local government level. Participation is easier at the ward or village level because the issue of heterogeneity is eliminated.

Advantages of Community Participation
- It addresses the felt health needs of the people
- It ensures social responsibility among the community
- It ensures sustainability
- It ensures cost sharing
- It ensures enhancement of knowledge
- It encourages intersectoral collaboration

This is the coordination of health activities with other sectors; such sectors include education, finance, agriculture, information etc. There is a working relationship of these bodies and the health ministry.

Advantages
- Overall human development
- It ensures economic development
- It ensures affordability

Integraton of Health Services
This is defined as coordination of various primary health care components into a whole programme and made available at all times including referrals.

Advantages
- It ensures efficient use of all resources and removes areas of wastage.
- It ensures sustainability of programme
- It ensures bye pass phenomenon
- It reduces opportunity cost
- It grantees clients confidentiality

Equity
The health care resources available in a given community should not be in the handle of a few. And resources should be accessible and affordable to all. Addressing the issue of equity in Nigeria, it is divided in 3 components:
1. Decentralization of health services into Federal, State, Local Government-to-ward levels.
2. The essential drug services and the national drug formulae, making drugs available at all levels and at low cost.
3. National health insurance scheme where people contribute to the health services of those who don't have or cannot afford.

Self-Reliance
This involves the use of technological methods and scientifically sound and maintain by the community .It can be in terms of human resources, money or materials. Human resources in Nigeria-medical officer of health, community health officer, nurses, midwives, community health extension work, community health aid among others. Money; is to ensure that there is financial backing; Material can be in form of physical facilities, drugs or other biological.

Advantages of Self-reliance
1. Affordability
2. Sustainability
3. Acceptability
4. Authenticity

The Components of Primary Health Car
There are 8 components or elements of Primary Health Care.
1. **Immunization**-An increasing number of infectious diseases can be prevented by vaccinations example-measles, Meningitis, Pertusis, tuberculosis, yellow fever among others

2. **Maternal and child care-**Pregnant women and women of child bearing age (15-49 years) are the target group for special care. Children under 5yrs of age are also vulnerable to childhood killer disease. Maternal and child health clinics are established in Nigeria to take care of these groups.
3. **Essential drugs-**The most vital drugs should be available and affordable at all levels.
4. **Food and Nutrition-**The family's food should be adequate, affordable and balanced in nutrients.
5. **Education-**The community should be informed of health problem and methods of prevention and control.
6. **Illness and injury-**Adequate provision of curative services for common ailments and injuries should be made available in the community.
7. **Water and sanitation-**Potable water supply and the clean disposal of wastes are vital for health.
8. **Vector and reservoirs-**Endemic infection diseases can be regulated through the control or eradication of vectors and animal reservoir.

Primary Healthcare Services

Services delivered by primary healthcare providers include:

- diagnosis, treatment and care of people with health problems
- promoting good health
- preventing health problems
- early intervention
- managing ongoing and long-term conditions.

Problems of Implementation of Primary Health Care at the Lga's in Nigeria

To achieve primary health care in Nigeria, Nigeria was divided into wards of 10.000 people. This ward is the same as political ward that makes up district and then local government. However problems experienced during implementation of primary health care in Nigeria include the following:

1. Shortage of funds
2. Lack of materials and equipment
3. Shortage of appropriate stuff
4. Lack of commitment which can be at the individual or government level.
5. Lack of incentive
6. Lack of information
7. Inadequate community participation
8. Inadequate intersectoral collaboration

9. Rapid turnover of policy makers
10. Lack of manpower training and development
11. Inadequate utilization of services
12. In appropriate staff recruitment
13. Ill defined responsilities that is poor job description
14. Ill defined authority.

SELF-ASSESSMENT EXERCISE
What is primary health care?

4.0 CONCLUSION

Having successfully discuss and completed this unit it is assume that you have fully understood concept of primary health care, the principle of primary health care, the components of primary health care, the primary health care services and the problems of primary health care implementation in Nigeria.

5.0 SUMMARY

In this unit, you have learnt the concept of primary health care, the principle of primary health care, the components of primary health care, the primary health care services and the problems of primary health care implementation in Nigeria.

7.0 TUTOR-MARKED ASSIGNMENT

1 Describe the principle of primary health care
2. State the 8 components of primary health care
3. Mention the primary health care services known to you
4 Enumerate the problems of primary health care implementation in Nigeria.

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UNIT 11 MENTAL HEALTH

CONTENTS

1.0 INTRODUCTION

Mental health refers to cognitive, behavioral, and emotional well-being. It is all about how people think, feel, and behave. People sometimes use the term “mental health” to mean the absence of a mental disorder. “Mental health is a state of well-being in which an individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively, and is able to make a contribution to his or her community**.** The WHO stress that mental health is “more than just the absence of mental disorders or disabilities.” Peak mental health is about not only avoiding active conditions but also looking after ongoing wellness and happiness. They also emphasize that preserving and restoring mental health is crucial on an individual basis, as well as throughout different communities and societies the world over.

2.0 OBJECTIVES

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

- explain the word mental health
- describe the characteristics of a mentally healthy person
- state the ways of promoting mental health.

3.0 MAIN CONTENT

3.1 Concept of Primary Health Care

Mental Health is one of the three important aspects of health (others being physical and social) incorporated in the WHO definition of health. Just as physical health is subject to a lot of variations and fluctuations, so also is mental health. Mental health is generally equated with happiness, satisfaction and normal behaviour. It shows in one’s ways of thinking, adjustment in life, relationship with others and effective

functioning in the different roles of daily life. Mental health means a harmonious working of the mind, which result in a well adjusted personality that can:

- Adjust to one's environment pleasantly without being disturbed.
- Fully utilise one's talents in creative work and help others to do the same.
- Realise one's own limitations and also those of others.
- Be realistic in outlook, confidence of one's own capacity and be able to find meaning in life.
- Enjoy one's work and marital and other social relationships, and
- Provide love and affection.

The Characteristics of a Mentally Healthy Person

The characteristics of a mentally healthy person according to Da'am (2010) are that the person feels comfortable about himself/herself and enjoys his/her capabilities, putting his best effort into what he/she is doing, gets satisfaction from simple everyday things, has tolerant and easy-going attitude and can laugh at himself and regularly experience a sense of fulfillment in life. Kjas (1999) opined that mentally healthy person thinks, feels and acts positively when faced with life's situations, the person provides love and affection for others, the person faces problems and tries to solve them intelligently.

Mentally healthy person enjoys positive quality of life; functions very well at home, in school and in his/her community; he is well adjusted to his/her environment pleasantly without being disturbed or he/she gets along well with others; he/she realizes his/her limitation and also those of others.

Mentally healthy person enjoys his/her work, marital and other social relationships; he/she feels reasonably secure, adequate and self respect, he/she feels right towards others, able to cope with the problems and tragedies that occur in life, he/she is free from internal conflicts and not at 'war' with himself or herself and others and is the person who initiates, develops and sustains mutually satisfying personal relationships.

The Ways of Promoting Mental Health

WHO (2005) defined mental health promotion as the process of enabling people to increase control over, and thereby improving their health. It further stated that mental health promotion for students requires coordination, collaboration and integration strategies and action. The aims of mental health promotion are:

1. to reduce differences in current health status and ensure equal opportunities and resources to enable people to achieve their fullest health potential;
2. to make conditions that have an impact on health such as political, economic, social, cultural, behavioural and biological factors favourable through advocacy for health;
3. to coordinate action by all concern including government, non-governmental, communities and individuals for mental health promotion strategies through lectures, students hand books and leaflets on dangers of alcohol consumption, drug abuse and addiction, cigarette smoking among others;
4. to provide counseling services in schools and work places to counsel people properly for normal life
5. to train more health professionals on mental health and mental illness issues to enable them handle cases expertly
6. to establish clubs and associations associated with healthy lifestyles such as sports clubs, entertainment clubs, religious and cultural societies to inject into their members positive mental health;
7. to train school, colleges and university staff members on recognition of mental health problems in students for early referral to health facility for expert management
8. to provide healthy working places to promote mental health of the students and staff
9. to provide peer support programme of training in recognizing and responding to mental health problems of students to promote mental health
10. make early identification and referral of mentally ill persons/students to health facilities for expert management
11. provide early intervention and treatment for students with mental illness in schools to promote their health.

SELF-ASSESSMENT EXERCISE
What is mental health?

4.0 CONCLUSION

Having successfully discuss and completed this unit it is assume that you have fully understood concept of mental health, the characteristics of a mentally healthy person and the ways of promoting mental health

5.0 SUMMARY

In this unit, you have learnt the concept of mental health, the characteristics of a mentally healthy person and the ways of promoting mental health.

6.0 TUTOR-MARKED ASSIGNMENT

1 Describe the characteristics of a mentally healthy person.
2. State the ways of promoting mental health.

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UNIT 12 MENTA ILLNESS

CONTENTS

1.0 INTRODUCTION

Mental illness refers to a wide range of disorders that affect mood, thinking and behaviour. Mental illness can affect anyone regardless of age, gender, social standing, religion or race/ethnicity. People with mental illness often experience distress and problems functioning at work, home and in social situations. Mental illness includes many different conditions that range from mild to moderate to severe. People who don't have a mental illness might still be impacted by the mental illness of a friend or family member. Mental illnesses are common in America, and approximately one in five adults' lives with a mental illness (43.8 million in 2015.)

Mental ill-health is defined as "a clinically recognizable set of symptoms or behaviour associated in most cases, with considerable stress and substantial interference with personal function". A mental illness is a health problem that significantly affects how a person feels, thinks, behaves, and interacts with other people. It is diagnosed according to standardized criteria. The term mental disorder is also used to refer to these health problems. A mental health problem also interferes with how a person thinks, feels, and behaves, but to a lesser extent than a mental illness. Mental health problems are more common and include the mental ill health that can be experienced temporarily as a reaction to the stresses of life. Mental health problems are less severe than mental illnesses, but may develop into a mental illness if they are not effectively dealt with. Mental illnesses cause a great deal of suffering to those experiencing them, as well as their families and friends. Furthermore, these problems appear to be increasing.

2.0 OBJECTIVES

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

- explain the word mental illness
- describe the Causes of Mental Illness
- enumerate the types of mental illnesses
- mention the early signs and symptoms of mental illness
- state the control and prevention of mental illness.

3.0 MAIN CONTENT

3.1 Concept of Mental Illness

Mental ill-health is defined as "a clinically recognizable set of symptoms or behaviour associated in most cases, with considerable stress and substantial interference with personal function". A mental illness is a health problem that significantly affects how a person feels, thinks, behaves, and interacts with other people. It is diagnosed according to standardized criteria. The term mental disorder is also used to refer to these health problems. A mental health problem also interferes with how a person thinks, feels, and behaves, but to a lesser extent than a mental illness. Mental health problems are more common and include the mental ill health that can be experienced temporarily as a reaction to the stresses of life. Mental health problems are less severe than mental illnesses, but may develop into a mental illness if they are not effectively dealt with. Mental illnesses cause a great deal of suffering to those experiencing them, as well as their families and friends. Furthermore, these problems appear to be increasing.

The Causes of Mental Illness
Mental illness is not something the person can "overcome with willpower," and can be caused by biological factors such as genes or brain chemistry, trauma and abuse of drugs/alcohol, and family history of mental illness.

The Types of Mental Illnesses
There is no physical test or scan that reliably indicates whether a person has developed a mental illness. However, people should look out for the following as possible signs of a mental health disorder:

- withdrawing from friends, family, and colleagues
- avoiding activities that they would normally enjoy
- sleeping too much or too little
- eating too much or too little
- feeling hopeless
- having consistently low energy

- using mood-altering substances, including alcohol and nicotine, more frequently
- displaying negative emotions
- being confused
- being unable to complete daily tasks, such as getting to work or cooking a meal
- having persistent thoughts or memories that reappear regularly
- thinking of causing physical harm to themselves or others
- hearing voices
- experiencing delusions
- Anger
- Anxiety and panic attacks
- Bipolar disorder
- Body dysmorphic disorder (BDD)
- Borderline personality disorder (BPD)
- Depression
- Dissociation and dissociative disorders
- Drugs - recreational drugs & alcohol
- Eating problems
- Hearing voicesLoneliness
- Obsessive-compulsive disorder (OCD)
- Panic attacks
- Paranoia
- Personality disorders
- Phobias
- Postnatal depression & perinatal mental health
- Post-traumatic stress disorder (PTSD)
- Premenstrual dysphoric disorder (PMDD)
- Psychosis
- Schizoaffective disorder
- Schizophrenia
- Sleep problems
- Stress

The Early Signs and Symptoms of Mental Illness

There is no physical test or scan that reliably indicates whether a person has developed a mental illness. However, people should look out for the following as possible signs of a mental health disorder:

- withdrawing from friends, family, and colleagues
- avoiding activities that they would normally enjoy
- sleeping too much or too little
- eating too much or too little
- feeling hopeless
- having consistently low energy

- using mood-altering substances, including alcohol and nicotine, more frequently
- displaying negative emotions
- being confused
- being unable to complete daily tasks, such as getting to work or cooking a meal
- having persistent thoughts or memories that reappear regularly
- thinking of causing physical harm to themselves or others
- hearing voices
- experiencing delusions

Control and Prevention of Mental Illness

- Talk about mental illness openly with everyone you meet - it is surprising how many people are affected by mental illness, particularly the highly prevalent disorders of depression and anxiety.
- Educate the community to overcome negative stereotypes based on misconceptions.
- Promote mental health and healthy attitudes through childhood and adult life.
- Support the development of resilience: learn ways to deal with stress in relationships, situations, and events.
- Assist friends and family with a mental illness to obtain care and treatment as early as possible.
- Ensure high quality support and treatment services are provided to people with mental illness to promote recovery.
- Actively support the families and carers of people who have mental illness, who also experience the confusion, distress, and stigma that can accompany mental illness.
- Address discrimination in every area of life, including employment, education, and the provision of goods, services, and facilities.
- Encourage research into mental illness to assist understanding of how these illnesses affect people and can be prevented and/ or effectively treated.

SELF-ASSESSMENT EXERCISE

What is mental illness?

4.0 CONCLUSION

Having successfully discuss and completed this unit it is assume that you have fully understood concept of mental illness, Causes of Mental Illnes, the various types of mental illnesse, the early signs and symptoms of mental illness and the control and prevention of mental illness.

5.0 SUMMARY

In this unit, you have learnt the concept of mental illness, Causes of Mental Illness, the various types of mental illnesses, the early signs and symptoms of mental illness and the control and prevention of mental illness.

6.0 TUTOR-MARKED ASSIGNMENT

1. Describe the causes of mental illness.
2. enumerate ten types of mental illnesses.
3. State the ways of control and preventing mental illness.

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UNIT 13 DISPOSAL OF COMMUNITY SOLID WASTE

CONTENTS

1.0 INTRODUCTION

The community participation in waste management provides background information on the facilities and systems used in waste collection and disposal, storage and transport facilities and on waste disposal methods. Local conditions of city management and settlement development determine the relevant options; the final choice of community involvement depends on community specific factors.

Waste management systems which include community participation and do not require high technology and inappropriate machinery might prove to be sustainable at the community level, since income generating waste management systems can be maintained by low income communities. This show the possible scope of community participation in solid waste management.

2.0 OBJECTIVES

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

- explain the word solid waste
- explain solid waste disposal
- describe the sources of solid waste
- describe the methods of solid waste disposal
- describe SOLID WASTE MANAGEMENT
- state the objectives of waste management
- mention the six functional elements of the waste management system
- state the health risk post by solid waste
- state the advantages of solid waste management

3.0 MAIN CONTENT

3.1 Concept of Solid Waste

Solid waste refers to the range of garbage materials arising from animal and human activities that are discarded as unwanted and useless. Solid waste is generated from industrial, residential, and commercial activities in a given area, and may be handled in a variety of ways. Waste disposal is often seen as simply removing waste from human settlements. Nowadays, waste is also seen as a resource that should benefit the community: resource recovery (reuse or recycling) is a basic element in waste management. This factor plays an important role in the planning of waste disposal systems. Community participation in waste disposal can be a catalyst in community development work, because it gives residents a feeling of selfesteem. It can lead to the possibility of income generation through recycling which will also reduce the quantities of material that have to be transported for disposal.

3.2 Solid Waste Disposal

Solid waste refers to the range of garbage materials arising from animal and human activities that are discarded as unwanted and useless. Solid waste is generated from industrial, residential, and commercial activities in a given area, and may be handled in a variety of ways. As such, landfills are typically classified as sanitary, municipal, construction and demolition, or industrial waste sites. Waste can be categorized based on material, such as plastic, paper, glass, metal, and organic waste. Categorization may also be based on hazard potential, including radioactive, flammable, infectious, toxic, or non-toxic wastes. Categories may also pertain to the origin of the waste, whether industrial, domestic, commercial, institutional, or construction and demolition.

Waste poses a threat to public health and the environment if it is not stored, collected, and disposed of properly. The perception of waste as an unwanted material with no intrinsic value has dominated attitudes towards disposal. **Waste disposal is** the collection, processing, and recycling or deposition of the waste materials of human society. Waste is classified by source and composition. Broadly speaking, waste materials are either liquid or solid in form, and their components may be either hazardous or inert in their effects on health and the environment. The term *waste* is typically applied to solid waste, sewage (wastewater), hazardous waste, and electronic waste.

The Sources of Solid Waste

The sources of solid waste are from:

- Household
- Market square/commercial
- Industrial/factories
- Agricultural
- Mining

The Methods of Solid Waste Disposal

Once a community has a shared understanding of the problems caused by waste, it can take steps to solve these problems, starting with projects that best meet the community's needs and abilities. A complete community solid waste program would include all of these steps:

- **Reduce** the amount of waste generated, especially toxic products and products that cannot be recycled.
- **Separate wastes** where they are made to make them easier and safer to handle. Consider people's needs and abilities, and begin with what you can achieve together in the short term.
- **Compost** food scraps and other organic wastes.
- **Reuse** materials whenever possible.
- **Recycle** materials and organize for government and industry to develop community recycling programs.
- **Collect, transport, and store** wastes safely. Respect and pay fair wages to the people who do this work.
- **Safely dispose** of all wastes that cannot be reused or recycled.

Solid waste management?

Solid waste management is defined as the discipline associated with control of generation, storage, collection, transport or transfer, processing and disposal of solid waste materials in a way that best addresses the range of public health, conservation, economic, aesthetic, engineering, and other environmental considerations. In its scope, solid waste management includes planning, administrative, financial, engineering, and legal functions. Solutions might include complex inter-disciplinary relations among fields such as public health, city and regional planning, political science, geography, sociology, economics, communication and conservation, demography, engineering, and material sciences.

Solid waste management practices can differ for residential and industrial producers, for urban and rural areas, and for developed and developing nations. The administration of non-hazardous waste in metropolitan areas is the job of local government authorities. On the other hand, the management of hazardous waste materials is typically

the responsibility of those who generate it, as subject to local, national, and even international authorities.

Objectives of Waste Management

The primary goal of solid waste management is reducing and eliminating adverse impacts of waste materials on human health and the environment to support economic development and superior quality of life. This is to be done in the most efficient manner possible, to keep costs low and prevent waste buildup.

The Six Functional Elements of the Waste Management System

The six functional components of the waste management system, are:

1. **Waste generation**: This encompasses any activities involved in identifying materials that are no longer usable and are either gathered for systematic disposal or thrown away.
2. **Onsite handling, storage, and processing**: This relates to activities at the point of waste generation, which facilitate easier collection. For example, waste bins are placed at sites that generate sufficient waste.
3. **Waste collection:** A crucial phase of waste management, this includes activities such as placing waste collection bins, collecting waste from those bins, and accumulating trash in the location where the collection vehicles are emptied. Although the collection phase involves transportation, this is typically not the main stage of waste transportation.
4. **Waste transfer and transport:** These are the activities involved in moving waste from the local waste collection locations to the regional waste disposal site in large waste transport vehicles.
5. **Waste processing and recovery**: This refers to the facilities, equipment, and techniques employed to recover reusable or recyclable materials from the waste stream and to improve the effectiveness of other functional elements of waste management.
6. **Disposal**: The final stage of waste management. It involves the activities aimed at the systematic disposal of waste materials in locations such as landfills or waste-to-energy facilities.

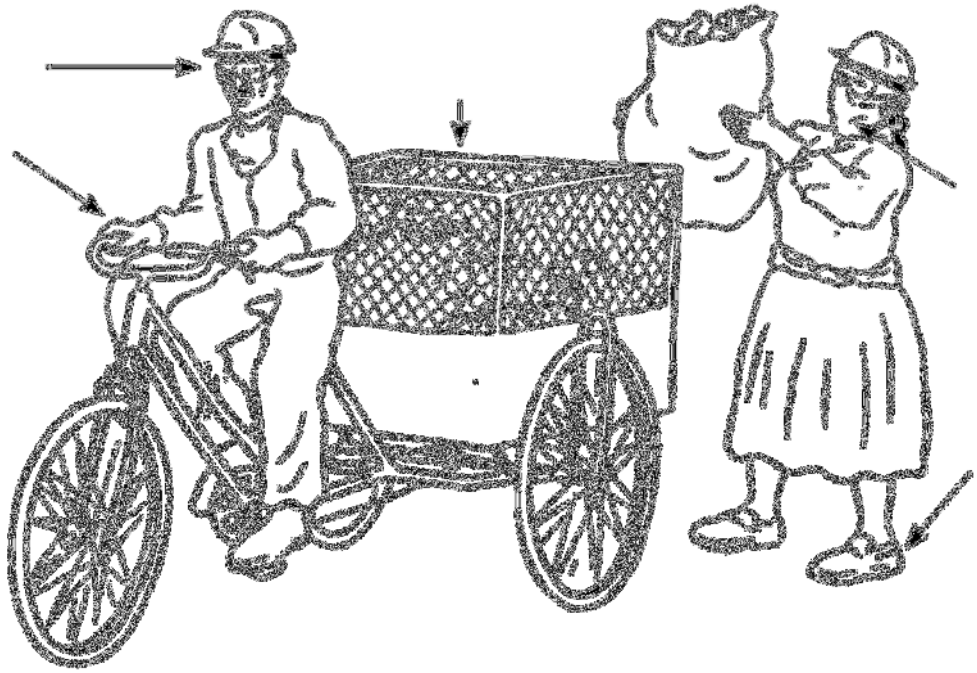

Figure: Waste collection and transportation

Health Risk Post by Solid Waste

1. Waste are dumped into the drainages that block the free flow of runoff water and this practice gives rise to flooding and the communities are adversely affected.
2. some people dumped their waste to the road side, thereby reducing the width of the road and esthetics of the cities especially in Nigeria.
3. heaps of refuse littering the entire landscape, road sides, parks, gardens, commercial centres and other land use heaps of refuse littering the entire landscape, road sides, parks, gardens, commercial centres and other land use
4. A wide range of toxic substances are released into the environment from waste disposal sites, for example; methane, carbon dioxide, benzene and cadmium. Many of these pollutants have been shown to be toxic for human health.
5. Highly hazardous compounds resulting from industrial activities (e.g. nuclear discharges, Asbestos, Lead) associated with cancer and congenital malformations as well as influencing the likelihood of developing, brain cancer, bladder and lung cancer
6. Contamination of sources of surface and underground water supply.
7. It leads to air and soil pollution

The Advantages of Solid Waste Management

1. Promotion of clean environment
2. Protection of surfaces and underground sources of water supply

3. Control of vectors of public health important such as mosquitoes and house flies
4. Protection and prevention of food contamination
5. Promotion of community health

SELF-ASSESSMENT EXERCISE
What is solid waste?

4.0 CONCLUSION

Having successfully discuss and completed this unit it is assume that you have fully understood concept of solid waste disposal, the sources of solid waste, the methods of solid waste management, the objectives of solid waste management, the six functional elements of solid waste management system, **the health risk post by poor solid waste management and** the advantages of solid waste management.

5.0 SUMMARY

In this unit, you have learnt the concept of solid waste disposal, the sources of solid waste, the methods of solid waste management, the objectives of solid waste management, the six functional elements of solid waste management system, **the health risk post by poor solid waste management and** the advantages of proper solid waste management.

6.0 TUTOR-MARKED ASSIGNMENT

1. Describe solid waste disposal.
2. State the sources of solid waste.
3. Describe the six functional elements of solid waste management system..
4. Explain the health risk posed by poor solid waste management.
5. State the advantages of proper solid waste management.

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UNIT 14 PUBLIC HEALTH SURVEILLANCE

CONTENTS

1.0 INTRODUCTION

Surveillance is the continued watchfulness over the distribution and trends of incidence of a disease through the systematic collection, consolidation, and evaluation of morbidity and mortality reports and other relevant data. Public health surveillance provides and interprets data to facilitate the prevention and control of diseases. Surveillance is the ongoing systematic collection, analysis, and interpretation of outcome specific data for use in planning, implementing and evaluating public health policies and practices. A communicable disease surveillance system serves two key functions; early warning of potential threats to public health and programme monitoring functions which may be disease specific or multi-disease in nature.

2.0 OBJECTIVES

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

- explain the word surveillance
- describe public health surveillance
- state goal of public health surveillance
- state the objectives of public health surveillance
- identify Health Problems for Surveillance
- select Health Problem for Surveillance
- collect Data for public health Surveillance
- analyse and interpreting Data in public health.

3.0 MAIN CONTENT

3.1 Concept of Surveillance

Surveillance is the continued watchfulness over the distribution and trends of incidence of a disease through the systematic collection,

consolidation, and evaluation of morbidity and mortality reports and other relevant data. Public health surveillance provides and interprets data to facilitate the prevention and control of diseases. Surveillance is the ongoing systematic collection, analysis, and interpretation of outcome specific data for use in planning, implementing and evaluating public health policies and practices. A communicable disease surveillance system serves two key functions; early warning of potential threats to public health and programme monitoring functions which may be disease specific or multi-disease in nature.

Explain Public Health Surveillance

Disease surveillance is the systematic collection, analysis, and dissemination of morbidity and mortality data for the purpose of taking action to improve health outcomes. The early warning functions of surveillance are fundamental for national, regional and global health security. Recent outbreaks such as the severe acute respiratory syndrome (SARS), Covid-19 and Avian influenza, are potential threats from biological agents, which demonstrate the importance of effective national surveillance and response systems. The International Health Regulations (IHR) 2005 underscore the commitment to the goal of global security and request all Member States to establish and implement effective surveillance and response systems to detect and contain public health threats of national and international importance.

Goal of Public Health Surveillance

The programme monitoring function of surveillance of communicable diseases encompasses a variety of goals such as eradication or elimination of guinea worm, measles, and poliomyelitis among others. Surveillance systems also serve to monitor trends of endemic diseases, progress towards disease control objectives, and to provide information that may be used to evaluate the impact of disease prevention and control programmes.

Objectives of Public Health Surveillance

All Member States should enhance their national surveillance systems for communicable diseases in order to meet the various objectives. A structured approach to strengthen national communicable disease surveillance systems include:

- Assessment of communicable disease risks identifying major public health threats.
- Prioritisation of public health threats to ensure that surveillance is limited to the important public health events.
- Assessment of existing systems to review strengths, weaknesses, and opportunities for strengthening the systems.

- Development of a strategic plan of action based on the findings of the assessment.
- Implementation of activities planned to strengthen the systems.
- Monitoring progress in implementation of planned activities, the evolution and performance of the surveillance system.
- Evaluating outcomes and overall impact of the surveillance system.

Identify Health Problems for Surveillance

There are multiple health problems that confront the populations of the world. Certain problems present an immediate threat to health; whereas others are persistent, long-term problems with relatively stable incidence and prevalence among the populations they affect. Example malaria, tuberculosis, HIV/AIDS and Corona among others. Health problems also vary for different populations and settings, and an immediate threat among one population might be a chronic problem among another. For example, an outbreak of malaria in developed country like America would be an immediate threat, but malaria in African countries is a chronic problem.

Select Health Problem for Public Health Surveillance

Conducting surveillance for a health problem consumes time and resources, taking care in selecting health problems for surveillance are critical. Selection of health problem may be based on criteria developed for prioritizing diseases in some countries, review of available morbidity and mortality data, knowledge of diseases and their geographical and temporal patterns, as well as the impressions of people about the health problem. Criteria for selecting and prioritizing health problems for surveillance include the following:

- incidence, prevalence,
- severity, sequela, disabilities,
- mortality caused by the problem
- socioeconomic impact,
- communicability,
- potential for an outbreak,
- public perception and concern, and
- International requirements.

Collect Data for Public Health Surveillance

After the problem for surveillance has been identified and defined, and the needs and scope determined, available reports and other relevant data should be located that can be used to conduct surveillance. These reports and data are gathered for different purposes from multiple sources by using selected methods. Data might be collected initially to serve health-related purposes. Examples data from death certificates

regarding the cause and circumstances of death and collecting data from national health surveys regarding health-related behaviours; examples cigarette and alcohol sales and administrative data generated from the reimbursement of health-care providers.

Before describing available local and national data resources for surveillance, understanding the principal sources and methods of obtaining data about health problems is helpful. An understanding of the natural history of a disease is critical to conducting surveillance for that disease because someone may be either the patient or a healthcare provider who must recognize, or diagnose the disease and create a record of its existence for it to be identified and counted for surveillance. For diseases that cause severe illness or death, example lung cancer or rabies, the likelihood that the disease will be diagnosed and recorded by a healthcare provider is high. For diseases that produce limited or no symptoms in the majority of those affected, the likelihood that the disease will be recognized is low. Certain diseases fall between these extremes. The characteristics and natural history of a disease determine how best to conduct surveillance for that disease.

Sources and Methods for Gathering Data: Data collected for health-related purposes typically come from three sources, individual persons, the environment, and health-care providers and facilities. Moreover, data collected for non-health–related purposes example taxes, sales, or administrative data might also be used for surveillance of health-related problems. This is because a researcher might wish to calculate rates of disease, information about the size of the population under surveillance and its geographic distribution are helpful. That is onIndividual persons from Health-care providers, facilities, and records, environmental conditions such as Air, Water, or Animal vectors through monitoring and registries among others.

Analyse and Interpreting Data on Public Health Surveillance

After morbidity, mortality, and other relevant data about a health problem have been gathered and compiled, the data should now be analyzed by time, place, and person. Different types of data are used for surveillance, and different types of analyses are needed for each. For instance data on individual cases of disease are analyzed differently while data aggregated from multiple records; such as data received as text must be sorted out, categorized, and coded for statistical analysis; and data from surveys might need to be weighted to produce valid estimates for sampled populations.

For analysis of majority of surveillance data, descriptive statistics or methods are usually appropriate. The frequencies counts or rates of the

health problem using simple tables and graphs are the most common method of analysing data for surveillance. Rates are useful and frequently preferred for comparing occurrence of disease for different geographical areas or periods because they take into account the size of the population from which the cases arose. One critical step before calculating a rate is con.

Disseminate Data for Public Health Surveillance

Data dissemination is the process of communicating information through defined channels and media in order to reach various target groups example national policymakers, researchers, health professionals, or consumers" or it the process of communicating information through defined channels and media in order to reach various target groups like national policymakers, researchers, health professionals, or consumers."

Purpose of Data Dissemination

- Elicit immediate action
- Promote behaviour change
- Share new information or insights
- Solicit support or participation
- Educate about recent findings or accomplishments
- Document magnitude of health problem
- Justify program activities
- Prepare for an upcoming intervention or program

Key Components of Disseminating Data

- Establish communications message
- Define the audience
- Select the communication channel
- Market the message
- Evaluate the impact

Common Methods of Data Dissemination Include

- Publishing program or policy briefs.
- Publishing project findings in national journals and state-wide publications.
- Presenting at national conferences and meetings of professional associations.
- Presenting program results to local community groups and other local stakeholders.

SELF-ASSESSMENT EXERCISE

What is surveillance?

4.0 CONCLUSION

Having successfully discussed and completed this unit, it is assume that you have fully understood the concept of surveillance, purpose of public health surveillance, identification of health problems for surveillance; collecting data for surveillance, analyze, interpreting and disseminate data for health promotion.

5.0 SUMMARY

In this unit, you have learnt the concept of surveillance, purpose of public health surveillance, identification of health problems for surveillance; collecting data for surveillance, analyze, interpreting and disseminate data for health promotion.

6.0 TUTOR-MARKED ASSIGNMENT

1. Explain public health surveillance.
2. Mention the methods for disseminating data.

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