



NATIONAL OPEN UNIVERSITY OF NIGERIA

COURSE CODE :NSS 305

COURSE TITLE: EPIDEMIOLOGY IN NURSING



NSS 305
EPIDEMIOLOGY IN NURSING

Course Writers	Professor D.B. Parakoyi Department of Community Health and Epidemiology University of Ilorin Ilorin
	Kayode S. Olubiyi National Open University of Nigeria
Programme Leader	Prof. Afolabi Adebajo National Open University of Nigeria
Course Coordinator	Kayode S. Olubiyi National Open University of Nigeria



NATIONAL OPEN UNIVERSITY OF NIGERIA

National Open University of Nigeria
Headquarters
14/16 Ahmadu Bello Way
Victoria Island
Lagos

Abuja Office
NOUN Building
No. 5, Dar es Salaam Street
Off Aminu Kano Crescent
Wuse II, Abuja
Nigeria.

e-mail: centralinfo@nou.edu.ng

URL: www.nou.edu.ng

Published by
National Open University of Nigeria

Printed 2009

ISBN: 978-058-822-1

All Rights Reserved

CONTENTS	PAGE
Introduction.....	1
What you will learn in this course.....	2
Course Aim.....	2
Course Objectives.....	2
Working through this course.....	3
Course Materials.....	3
Study Units.....	3
Recommended Texts.....	4
Assignment File.....	4
Presentation Schedule.....	4
Assessment.....	5
Tutor Marked Assignment	5
Final Examination and Grading.....	5
Course Marking Scheme.....	5
Course Overview.....	6
How to Get the Most Out of this Course.....	6
Facilitators/Tutors and Tutorials	7

Introduction

Epidemiology is the study of the distribution, determinants of diseases and injuries in human population. It is a scientific research discipline concerned with observing, measuring and analyzing health-related occurrences in human populations. Epidemiological studies can be applied to all diseases, conditions and health-related events.

Historically, the impact of epidemiology on the health of the nation has been long-standing and far-reaching. Its origins can loosely be traced to the time of Hippocrates (460-377 BC) who, as a physician, attempted to investigate the occurrence of disease on a rational basis (Valanis, 1992).

Epidemiological research is of immense value in determining the health of populations. Epidemiology is traditionally seen as a discipline associated with medicine and public health. Many other health-related disciplines are now seen to be using and adapting it for their own purposes and reaping its benefits. Nursing has yet to adopt epidemiology's knowledge base in its own educational and practice arenas

The questions that we will be answering in this course include:

- To what degree are epidemiological perspectives currently used in nursing?
- What dilemmas does it pose for nurses?
- How can nursing move forward in establishing itself as a contributor in this area of study?

NSS 305: Epidemiology in Nursing is a two credit course for students in the Bachelor of Nursing Science programme.

The course is broken to 3 modules with 11 study units. It will introduce the students to Epidemiology in nursing. At the end of the course, the learner is expected to demonstrate clear understanding of epidemiology in relation to disease causation and the expected role of the nurse in the overall attainment of health.

This course guide provides you with what to expect in the course, how to work through the course material as a distance learner saddled with the responsibility of studying on your own and your overall responsibilities and expectations. Tutorial sessions are also linked up with the course to provide the needed support you require.

What You Will Learn in This Course

Today, Nigeria has a growing population of 140 million people. There is still a great imbalance in the provision of medical care facilities and it has become a great challenge to provide same for the larger population.

The overall aim of this course NSS 305: Epidemiology in nursing therefore is to help you see the relevance of epidemiology in the understanding of disease causation and determinant factors.

Course Aim

This course aims at providing learners with in-depth understanding of epidemiology and its place in nursing practice so as to be better equipped to contribute to meaningful health living for all.

Course Objectives

To achieve the aims set out above, the course sets the overall objective. In addition, each unit has specific objectives stated at the beginning of a unit. Learners are advised to read them carefully before going through the unit. You will have to refer to them during the course of your study to monitor your progress. You are encouraged to always refer to the Unit objectives after completing a unit. This is the way you can be certain that you have done what is required of you in the unit.

The wider objectives of the course are set below. By meeting these objectives, you should have achieved the aims of the course as a whole.

On successful completion of the course, you should be able to:

- Highlight the principles of epidemiology
- Describe epidemiology types of epidemiological studies
- Know the basic measurements in epidemiology
- Describe the strategies of epidemiology
- Discuss the epidemiology of communicable and non-communicable diseases
- Determine the relationship between epidemics and surveillance
- Describe the signs and symptoms as well as management of HIV/AIDS
- Discuss the epidemiology of HIV/AIDS
- Understand the associated consequences of Sexually Transmitted Infections

Working through This Course

To complete this course, you are required to study through the units, the recommended textbooks and other relevant materials. Each unit contains some self assessment exercises and tutor marked assignments and at some point in this course, you are required to submit the tutor marked assignments. This will be followed by an end of term examination.

Course Materials

The following are the components of this course:

1. The course guide
2. Study Units
3. Textbooks
4. Assignment file
5. Presentation schedule

Study Units

This course is made up 11 study units in 3 modules. These are:

Module 1 Introduction to Epidemiology

- | | |
|--------|------------------------------------|
| Unit 1 | Introduction to Epidemiology |
| Unit 2 | Types of Epidemiological Studies |
| Unit 3 | Basic Measurements in Epidemiology |

Module2 Epidemiology and Communicable/Non Communicable Diseases

- | | |
|--------|---------------------------------------|
| Unit 1 | Strategies of epidemiology |
| Unit 2 | Epidemics |
| Unit 3 | Epidemiology of Communicable Diseases |

Module 3 Sexually Transmitted infections and HIV/AIDS

- | | |
|--------|---|
| Unit 1 | Sexually Transmitted Infection |
| Unit 2 | Human Immuno-Deficiency Virus/Acquired Immune Deficiency Syndrome |
| Unit 3 | Demographic Incidence and Prevalence of HIV/AIDS |
| Unit 4 | Testing for HIV |
| Unit 5 | Prevention, treatment and control of the HIV/AIDS |

Textbooks and References

- Alakija, W. (2000). *Essentials of Community Health Primary Health Care and Health Management*: Medisuccess Publication
- Last J (1994). The uses of Epidemiology. In Ashton J (Ed). *The Epidemiological Imagination*. Buckingham: Open University Press.
- Lucas and Guiles (2003). *Short Textbook of Public Health Medicine for the Tropics*, 4th Edition. London: Oxford University Press.
- Lucas and Guiles (1989). *A Short Textbook of Preventive Medicine for the Tropics*, 2nd Edition. ELBS.
- Mulhall A (2000). The Case for a More Epidemiologically Informed Nursing Profession. *Nursing Times Research*. 5, 1, 65-73.
- Mulhall A (1996). *Epidemiology, Nursing and Healthcare: A New Perspective*. London: Macmillan.
- Park K. (2000). *Park's Textbook of Preventive and Social Medicine*. M/s Banarsidas: Bhanot Publishers, India
- Self-Study Manual (1) on Principles of Epidemiology Course 3030-G, Public Health Practice Program Office. Atlanta, Georgia 30333.
- Valanis B (1992). *Epidemiology in Nursing and Health Care*. Second Edition. Connecticut: Appleton & Lange.

Assignment File

The assignment file will contain the Tutor Marked Assignment (TMA) which will constitute part of the continuous assessment (CA) of the course. There are 15 assignments in this course with each unit having an activity/exercise for you to do to facilitate your learning as an individual.

Presentation Schedule

This presentation schedule in this course provides important dates for completion of each tutor marked assignment. Please try to meet the deadlines.

Assessment

There are two aspects to the assessment of the course. These are the Tutor marked assignment and written examination. In tackling the assignments, you are expected to apply information, knowledge and strategies gathered during the course. The assignments must be turned in to your tutor for formal assessment in accordance with the stated presentation schedules. The works you submit to your tutor for assessment will count for 30% of your total course work.

At the end of the course you will need to sit for a final written examination of three hours' duration. This examination will also count for 70% of your total course mark.

Tutor-Marked Assignment

There are Tutor-marked assignments in each of the units of this course. You are advised in your own interest to attempt and go through all the assignments at your own pleasure. You will be able to complete the assignments from the information and materials contained in your reading and study units. Those to be submitted for evaluation will be communicated to you through the Study Centre. There are other self-directed activities contained in the instructional material to facilitate your studies. Try to attempt all. Feel free to consult any of the references to provide you with broader view and a deeper understanding of the course.

Final Examination and Grading

The final examination of NSS 305 will be of 2 hours duration and have a value of 70% of the total course grade. The examination will consist of questions which have bearings with the attempted self assessment exercises and tutor marked assignments that you have previously encountered. Furthermore, all areas of the course will be evaluated. Make sure you give enough time to revise the entire course.

Course Marking Scheme

The following table includes the course marking scheme

Table 1

Assessment	Marks
Assignment 1 – 15	15 assignments for the best 4 Total = 10% x 4 = 40%
Final examination	60% of overall course marks
Total	100% of course marks

Course Overview

This table indicates the units, the number of weeks required to complete the assignments.

Unit	Title of Work	Week of Activity	Assessment
Course Guide		Week 1	
Module 1 Introduction to Epidemiology			
1	Introduction to Epidemiology	Week 2	
2	Types of Epidemiological Studies	Week 3	
3	Basic Measurement in Disease Frequency	Week 4	
Module 2 Epidemiology and Communicable/Non-Communicable Diseases			
1	Strategies of Epidemiology	Week 5	
2	Epidemics	Week 6	
3	Epidemiology of Communicable and Non-Communicable Diseases	Week 7	
Module 3 Sexually Transmitted Infections and HIV/AIDS			
1	Sexually Transmitted Infections	Week 8	
2	Sexually Transmitted Infections and Consequences	Week 9	
3	Human Immuno-Deficiency Virus/ Acquired Immune Deficiency Syndrome	Week 10	
4	Demographic Incidence and Prevalence of HIV/AIDS	Week 11	
5	Prevention, Control and Treatment of HIV/AIDS	Week 12	

How to Get the Most Out of the Course

In distance learning, the study units replace the university lecture. This is one of the greatest advantages of distance learning. You can read and work through specially designed study materials at your own pace and at time and place that suit you best. Think of it as reading the lecture notes instead of listening to a lecturer. In the same way that a lecturer might set you some reading task, the study units tell you when to read your other material. Just as a lecturer might give you an in-class exercise, your study units provide exercise for you to do at appropriate points.

The following are Practical Strategies for Working through the Course:

- Read the course guide thoroughly.
- Organize a study schedule.
- Stick to your own created study schedule.
- Read the introduction and objectives very well.
- Assemble your study materials.
- Work through the unit.
- Keep in mind that you will learn a lot by doing all your assignments carefully.
- Review the stated objectives.
- Don't proceed to the next unit until you are sure you have understood the previous unit.
- Keep to your schedules of studying and assignments.
- Review the course and prepare yourself for the final examination.

Facilitators/Tutors and Tutorials

There are 8 hours of effective tutorial provided in support of this course. Details will be communicated to you together with the name and phone number of your facilitator through the study centre. You must ensure that you submit your assignment as and at when due.

Do not hesitate to contact your tutor or study centre on phone or email in case of any of the following circumstances:

- You do not understand any part of the study units or the assigned reading
- You have difficulty with the self test or exercises.
- You have questions or problems with an assignment, tutors comments or grading of an assignment.

You are encouraged to attend the tutorials to allow for face to face contact with your tutor and ask questions which you needed answers immediately. It is also an opportunity to discuss any grey area with your tutor. You can equally prepare questions to the tutorial class for meaningful interactions. You are sure to gain a lot from actively participating in the discussion.

Best of Luck.



Course Code	NSS 305
Course Title	Epidemiology in Nursing
Course Writers	Professor D.B. Parakoyi Department of Community Health and Epidemiology University of Ilorin Ilorin Kayode S. Olubiyi National Open University of Nigeria
Programme Leader	Prof. Afolabi Adebajo National Open University of Nigeria
Course Coordinator	Kayode S. Olubiyi National Open University of Nigeria



NATIONAL OPEN UNIVERSITY OF NIGERIA

National Open University of Nigeria
Headquarters
14/16 Ahmadu Bello Way
Victoria Island
Lagos

Abuja Office
NOUN Building
No. 5, Dar es Salaam Street
Off Aminu Kano Crescent
Wuse II, Abuja
Nigeria.

e-mail: centralinfo@nou.edu.ng

URL: www.nou.edu.ng

Published by
National Open University of Nigeria

Printed 2009

ISBN: 978-058-822-1

All Rights Reserved

CONTENTS	PAGE
Module 1	1
Unit 1 Introduction to Epidemiology	1
Unit 2 Types of Epidemiological Studies	6
Unit 3 Basic Measurement in Disease Frequency.....	11
Module 2	18
Unit 1 Strategies of Epidemiology	18
Unit 2 Epidemics	26
Unit 3 Epidemiology of Communicable and Non-Communicable Diseases	33
Module 3	43
Unit 1 Sexually Transmitted Infections	43
Unit 2 Human Immuno-Virus/Acquired Immune Deficiency Syndrome.....	49
Unit 3 Demographic Incidence and Prevalence of HIV/AIDS	58
Unit 4 Testing for HIV and Results	67
Unit 5 Prevention, Treatment and Control of the HIV/AIDS	72
Appendices	78

MODULE 1

Unit 1	Introduction to Epidemiology
Unit 2	Types of Epidemiological Studies
Unit 3	Basic Measurement in Disease Frequency

UNIT 1 INTRODUCTION TO EPIDEMIOLOGY**CONTENTS**

1.0	Introduction
2.0	Objectives
3.0	Main Content
3.1	Definition of Epidemiology
3.2	Significance of Epidemiology
3.3	Uses of Epidemiology
4.0	Conclusion
5.0	Summary
6.0	Tutor-Marked Assignment
7.0	References/Further Readings

1.0INTRODUCTION

Welcome to NSS 305: Epidemiology in Nursing. Having successfully gone through NSS 214: Introduction to Statistics, a sure foundation has been laid to prepare you for epidemiological studies. Most epidemiological research informs the planning and implementation of health-related policy and this policy has a fundamental impact on the way that the nursing profession delivers its care. Many nurses are unaware of the impact that epidemiology has on their working practice; this unit therefore hopes to unfold the concept of epidemiology and its place in nursing for effective health service delivery.

2.0OBJECTIVES

At the end of this unit, you should be able to:

- define epidemiology
- describe the uses of epidemiology
- determine its relevance to nursing practice.

3.0 MAIN CONTENT

3.1 Definition of Epidemiology

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 (J.M. Last, 1988). Epidemiology was coined from a Greek word meaning the science of people. Historically, the impact of epidemiology on the health of the nation has been long-standing and far-reaching. Its origins can loosely be traced to the time of Hippocrates (460-377 BC) who, as a physician, attempted to investigate the occurrence of disease on a rational basis. In Britain, its formative roots can be traced back to isolated studies of specific diseases in the early 19th century. These investigations culminated in the celebrated study by John Snow (referred to as the Father of Epidemiology) who, around the 1850s, observed patterns of incidence of a cholera outbreak in central London. As a result of his recording of the incidence of cholera and mortality in the area, Snow was able to isolate the cause of the cholera epidemic and attribute it to a communal water-pump in Broad Street, Soho. After removing the pump handle, Snow observed that new cases of cholera in the area ceased and the epidemic declined.

Although dismissed by most scientists of the time, this finding and others related to disease and the environment had a profound effect on the formation of the public health movement and the early Public Health Acts of 1848 and 1875.

Originally, the term epidemiology meant the study of epidemics, but the techniques have long been improved upon. It is an applied discipline and a basic science of preventive and social medicine (not theoretically) and methods are essentially observational. Thus the modern definition of epidemiology accommodates three important elements namely: inclusion of all diseases, populations, and ecological approach. Please note the three components (**3Ds**) common to the definition of epidemiology: **disease frequency**, **distribution and determinants**. In addition, the following terms are used to describe the extent of the occurrence of disease: endemic, epidemic and pandemic.

The major questions that are usually asked in epidemiology are: who are the group of person (s) affected by the disease, where has the incidence occurred? and when (time) did it occur?

SELF ASSESSMENT EXERCISE 1

Highlight the three important component of epidemiology

1. _____
2. _____
3. _____

3.2 Significance of Epidemiology

The following reasons have been adduced for studying these three ‘**ds**’: **disease frequency, distribution and determinants of diseases** in human population:

- For planning and evaluation of health care
- For identification of the determinants of diseases
- For evaluation of method of controlling disease
- For observation of the natural history of a disease – making up of diagnosis and prognosis
- For classification of a disease.

SELF ASSESSMENT EXERCISE 2

Using at least 3 out of the reasons in 3.2 above, discuss among yourselves how these are applied in your environment.

3.3 Uses of Epidemiology

Please recall from the activity above that the study of disease distribution and causation is central to epidemiology. The broad grouping of the uses occurs in the following areas namely:

1. Understanding the causation of the disease and the development of hypothesis and their testing
2. Understanding of geographical or local patterns of the diseases.
3. Administration (i.e.) the planning of health activities and direction of programme to relevant sub-group identified to be at risk

However, epidemiology is used for the following:

- To analyze the respective role of agent, host and the environment in the development and the natural history of disease.
- To analyze the occurrence and distribution of disease according to characteristics such as age, sex, race, occupation and heredity.
- To study, outline and define problems of health and disease by the analysis of incidence, prevalence and mortality.

- To help the to complete the clinical features and natural history of diseases by group analysis
- To estimate an individual's risk of developing a disease and his survival chances.
- To search for factors related to health and disease through the observation of group custom and habits.
- For planning and allocation of resources
- To evaluate the need for and the effectiveness of health service through field studies.

4.0 CONCLUSION

The scope of epidemiology, its range of designs and impact on healthcare formation and reformation has been immense. Many healthcare - related strategies and policies that have influenced the practice of nurses over the past century or so have been established as a consequence of epidemiological study. Its uses also have contributed to increasing knowledge on health care. The fact that epidemiology is seen to be more holistic, less structured, focusing not just on individuals, but on communities, and looks towards preventive strategies, instead of curative ones, makes it an ideal strategy for nursing to incorporate into its professional practice.

5.0 SUMMARY

This unit has touched on epidemiology, rationale for studying the **3 ds** namely: the disease frequency, distribution and determinants as well as the uses for the overall improvement of our health care.

ANSWER TO SELF ASSESSMENT EXERCISE 2

- Disease frequency
- Distribution and
- Determinants of diseases

6.0 TUTOR-MARKED ASSIGNMENT

Discuss five (5) importance of epidemiology

7.0 REFERENCES/FURTHER READINGS

K. Park (2000). Park's Textbook of Preventive and Social Medicine: M/s Banarsidas: India Bhanot Publishers.

Last J (1994). The Uses of Epidemiology. In Ashton J (Ed) *The Epidemiological Imagination*. Buckingham: Open University Press.

Lucas and Guiles (2003). Short textbook of Public Health Medicine for the Tropics: 4th Edition. London: Oxford University Press.

UNIT 2 TYPES OF EPIDEMIOLOGICAL STUDIES

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Types of Epidemiological Studies
 - 3.2 Observational Studies
 - 3.2.1 Descriptive Studies
 - 3.2.2 Analytical Studies
 - 3.3 Experimental Studies
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment
- 7.0 References/Further Readings

1.0 INTRODUCTION

The epidemiologist is concerned with studying disease occurrence in people and the numerous factors which people are often exposed to that played a significant role in disease occurrence. Thus, the epidemiologist employs carefully designed strategies to determine this. This unit aims at exposing you to different methods of epidemiological studies. In all, it is crucial that you have a clear definition of the case under review and of the person involved. Failure to obtain the required information will make the interpretation of data difficult

2.0 OBJECTIVES

At the end of this unit, you are expected to be able to:

- highlight the methods of epidemiology
- describe the importance of these methods.

3.0 MAIN CONTENT

3.1 Types of Epidemiological Studies

Epidemiological studies comprises of the following:

1. Descriptive Epidemiology

- a. Cross Sectional Study (Prevalence rates) with individuals as unit
- b. Longitudinal (Incidence rates)

2. Analytical Epidemiology

- a. Case-control (Case-reference) with individuals as unit of study
- b. Cohort (absolute, relative, attributable risk or follow-up with individuals as unit of study)

3. Experimental/Interventional studies

- a. randomized controlled trials/or Clinical trials with patients as unit of study
- b. Field trials or community intervention studies with healthy people as unit of study
- c. Community trials with communities as unit of study.

3.2 Observational Studies

This is made up of the **descriptive and analytical studies**

3.2.1 Descriptive Studies

This is the study of the amount and distribution of a disease within a population by persons, place and time. The three broad questions necessary to describe the occurrence of a disease fully relate to are:

Person - who is getting the disease (person distribution)? i.e. male or female, the age range, ethnicity, marital status, social economic factors, social class, education, occupation, income level, family variables such as size, type, birth order, maternal age, parental deprivation and personal habits.

Place - where is it occurring (place distribution)? This will answer for region, state, district, LGA, local community, towns, village and wards either in the city or rural areas. Boundaries are also considered with precise location.

Time – when is the disease occurring (time distribution)? This includes the year, season, day of the week, month and the time of the day. Certain diseases are common during the year for example measles in dry season.

The procedures in descriptive studies are:

- Defining the population to be studied
- Defining the disease under study
- Describing the disease by: time, place and person
- Measurement of disease
- Comparing with known indices
- Formulation of an aetiological hypothesis

The description of diseases is usually done based on some characteristics which are shown in the table below:

Table 1: Characteristics Frequently Examined

Time	Place	Person	
Year, season	Climatic zones	Age	Birth order
Month, week	Country, region	Sex	Family Size
Day, hour of onset	Urban/rural, Local community	Marital status	Height. Weight
Duration	Towns, Cities and Institutions	Occupation, Social status, Education	Blood pressure, Blood cholesterol and personal habits

3.2.2 Analytical Studies

This is the second major type of epidemiological studies. While descriptive studies looks at the entire population, analytic studies only look at the individuals so affected within the population. The focus is not to formulate but to test hypothesis. However, even though individuals are evaluated in analytical studies, the inference is made in respect of the population so selected.

Analytic studies comprises of two distinct types of observational studies, these are: **retrospective or case study and prospective or cohort study**. From here, we can determine whether or not a statistical association exists between a disease and a suspected factor and if it does, what is the strength of association. In prospective or cohort studies, a group of persons are exposed to causative factors while others are not. A follow-up is made in the nearest future to check the proportion of effects on the exposed and the non-exposed and comparism is then made.

SELF ASSESSMENT EXERCISE

What are the advantages and disadvantages of Cohort Studies?

Advantages

Disadvantages

3.3 The Experimental/Interventional Studies

This is a study in which one group deliberately subjected to an experience, is compared with a control group which has not had a similar experience. The use of experiments in this study is done with ethical considerations. It usually involves selection of an individual or communities. The principle of conducting experimental trials is that under the control of the investigator, some system are subjected to manipulation, creating an *independent variable* whose effect is then determined by the measurement of subsequent events or outcome. This is known as *dependent variable*.

4.0 CONCLUSION

All the epidemiological studies complement one another. An observational study allows nature to take its course. The investigator measures but do not intervene. Descriptive study is limited to describing disease occurrence in a population. Analytical goes on to examine the relationship between health status and variables. Experimental or interventional studies involve an active attempt to change disease determinant or the progress of a disease. It is clearly acknowledged that epidemiology is a major tool in the formulation and implementation of national, regional and local health policy, providing evidence on which policies can be based.

5.0 SUMMARY

This unit has touched on the various types of epidemiological studies with particular reference to their importance.

ANSWER TO SELF ASSESSMENT EXERCISE

Advantages

- a. Accurate information
- b. Can be used to measure the direct estimate

Disadvantages

- a. Laborious
- b. time consuming
- c. Expensive
- d. Difficulty in data collection

6.0 TUTOR-MARKED ASSIGNMENT

Describe the Cohort and observational studies. What are the advantages and disadvantages of Cohort studies?

7.0 REFERENCES/FURTHER READINGS

Alakija, W. (2000). Essentials of Community Health Primary Health Care and Health Management. Medisuccess Publication

Lucas and Guiles (2003): Short Textbook of Public Health Medicine for the Tropics 4th Edition. London: Oxford University Press.

Lucas and Guiles (1989). A Short Textbook of Preventive Medicine for the Tropics, 2nd Edition. ELBS.

UNIT 3 BASIC MEASUREMENT IN DISEASE FREQUENCY

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Definition of Rate
 - 3.2 Incidence Rates (IR)
 - 3.3 Prevalence Rate (PR)
 - 3.4 Other Rates
 - 3.5 Statistics
 - 3.5.1 Types of Statistics
 - 3.5.2 Uses of Statistics
 - 3.6 Data Collection
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment
- 7.0 References/Further Readings

1.0 INTRODUCTION

The basic tool of epidemiology is the rate which relates to the number of cases of the population at risk. In NSS 214: Introduction to Biostatistics, you must have been introduced to different rates used in statistics. The place of statistics which seeks to source, process and analyze data for decision making cannot be overemphasized. In this unit, we shall be examining in details the various data and their clinical importance. Please follow up the discussions in this unit, with a view to understand and see the importance of these basic measurements in disease frequency.

2.0 OBJECTIVES

At the end of this study, you are expected to be able to:

- identify the basic measurements in disease frequency
- explain the difference between each of them
- interpret the measurements for your clients care.
- describe health statistics
- distinguish between data and information
- highlight the sources of data
- describe the uses of data in nursing practice.

3.0 MAIN CONTENT

The various basic measurements used in disease frequency are referred to as rates. These are incidence and prevalence rates. The mode, median and mean has been extensively discussed in NSS 214.

3.1 Definition of Rate

In defining a rate, it is important to know the number of people (denominator) affected in the entire population (numerator) to be multiplied by 100. Rates help to determine spread. In order to compare populations of different sizes easily, the rate is usually expressed as the number of events in an arbitrary total such as 1000 or 100,000.

In general, the rate is equal to the number of cases over the number of population in a given unit of time:

$$: \frac{\text{Number of cases or events}}{\text{Population in the same area}} \times 100$$

3.2 Incidence Rates (IR)

This is the measure of the frequency of cases of disease in a particular population, the times of onset of which occurred during a specified period of time. Incidence rates are calculated for narrowly defined populations (in terms of age, sex, etc.) during intervals of time as in epidemics are often called attack rates. Attack rates are usually expressed as a percent. A secondary attack rate is a measure of the frequency of new cases of a disease among close contacts of known cases. Secondary attack rates are usually calculated for household contacts.

$$\text{IR} = \frac{\text{Number of new cases}}{\text{Population at risk}} \times \text{a given interval of time}$$

3.3 Prevalence Rate (PR)

Prevalence rate is defined as the proportion of the population affected by a disease at a particular time. It therefore measures the number of people in a population who have the disease at a given time.

$$\text{PR} = \frac{\text{Number of existing cases Old + New}}{\text{Total population at risk}} \times \text{a given point in time}$$

It is clearly evident that a relationship exists between prevalence, incidence and the duration of the disease. Prevalence is important in

determining the work load and in planning for facilities for example the number of hospital bed required. The relationship changes if the incidence rate is rapidly changing, as in acute epidemic if the average duration of illness changes in response to treatment.

SELF ASSESSMENT EXERCISE 1

Highlight the major differences between incidence and prevalence.

3.4 Other Rates to be Noted include

- **Crude rate** – is a rate expressed in terms of the total population. In other words, the denominator of crude rate is the total population of the area being studied. There are three (3) crude rates commonly used. These are: crude birth rate, crude death rate and rate of natural population increase.

- A. Crude Birth Rate (CBR) – this is the number of life births to resident in an area in a calendar year divided by the average population in that population multiplied by 1000

$$= \frac{\text{Total number of births in a year}}{\text{Mid year population}} \times 1000$$

- B. The Crude Death Rate (CDR) - The total number of death in a year divided by the mid- year population in the area multiplied by 1000.

$$= \frac{\text{Total number of deaths in a year}}{\text{Mid-year population}} \times 1000$$

- C. Rate of Natural Population Increase (RNPI) – this is the difference between Crude Birth Rate and Crude Death Rate.

$$= \text{CBR} - \text{CDR} = \text{RNPI}$$

- **Specific Rates** – this is a rate expressed in terms of a sub-group of a population (i.e.) the denominator is not the total population but a selected portion of it. The sub-population may be defined in terms of age or other demographic characteristics like sex, race or as a combination. Examples are those of age, sex and cause specifics, case fatality, and standardized rate.

Age Specific Death Rate

$$= \frac{\text{Number of deaths in the aged(1-5) group}}{\text{Total number of aged 1-5 in a year}} \times 1000$$

Sex Specific Rate

$$\text{MMR} = \frac{\text{Number of deaths in women age group 15-44 yrs in a year}}{\text{Number of women aged 15-44yrs in the population in a year}} \times 1000$$

where MMR = Maternal Mortality Rate

3.5 Statistics

It is a process of collecting, processing, analyzing and reporting of data required for planning and operating health services. Data can be collected through primary or secondary source. The main objective is to provide reliable, relevant, adequate, timely and unambiguous information for health planners who will in turn interpret it for health providers to implement.

The health of a community is assessed by data usage which serves as indicators of the health status. The main sets of statistics are: morbidity, mortality and service utilization statistics.

3.5.1 Types of Statistics

There are three (3) main types of statistics. These are vital, health and morbidity statistics.

Vital statistics are statistics that records vital events such as births, death, marriages, annulment and divorce obtained at registration centres at Local, State and at Federal levels. The data are used to generate information for whole groups or entire population.

Health Statistics are a combination of vital statistics and other data pertinent to health. In the operation of health services, data can be derived from resources and institutional records. This is can be further explained as being derived from

- Notification of diseases which is routinely done. Diseases may be infectious and non-infectious.
- Institutions which includes hospitals, health centres, dispensaries and private hospitals
- Special programme like school health services, maternal and child health, disease control programme such as Tuberculosis, Leprosy, etc
- Epidemiological survey which includes the whole population or sample in case of an epidemic

Morbidity Statistics

This includes data on occurrence and severity of sickness in a community obtained from medical health service points.

Statistics from Other Sectors

There are other sectors apart from health where data can be collected to assist in planning for health care of the people. These include: education, public works such as housing, water supply and sanitation, agriculture in regards to food production and distribution as well as economic planning and development which provides the poverty and economic indicator.

3.5.2 Uses of statistics

Statistics is used for the following among others:

- To measure the health status of the people and quantify their health problems
- For health comparisons at local, national and international levels
- For planning, administration and effective management of health services and programme
- For assessment of health services in relation to the set goals
- For assessing the attitudes and degree of consumers satisfaction to health care
- For health research

3.6 Data Collection

There is a basic source of data which is of primary importance in epidemiology. It is called CENSUS. It is so because it provides the denominator for the calculation of rate. Census is a periodic count or enumeration of a population. It is usually done every ten (10) years. Census is massive undertaking to contact every member of the population in a given time and collect a variety of information. It is used to derive population pyramid. A population pyramid is the age and sex structure of the population displayed in the form of histogram showing the percentage distribution of each sex at 5 yearly intervals. The primary function of census is to provide information such as total count of population and breakdown into groups and subgroups such as age and sex distribution.

The data to be collected will include age, sex, colour, marital status, relationships to head of households, occupation, housing, address, name, educational level, parity, employment status, income, etc

Methods and Sources of Data Collection

We shall now consider various methods of data collection. These include:

- use of questionnaire in households
- physical examination
- special investigation
- sample registration form a population or group
- sources related to utilization services
- data collected from routine medical examination
- census
- registration of vital events
- notification of disease
- hospital records
- data from environment
- population surveys
- epidemiological surveillance

SELF ASSESSMENT EXERCISE 2

Enumeration is a key word in census. What is enumeration?
Mention the two (2) methods of enumeration

4.0 CONCLUSION

You have been exposed to epidemiological studies. It is hoped that you understood it so well to be able to interpret and apply it in your client management at all levels of health care. The place of data in patients' management is of overall importance. In medical practice, a lack of reliable data in developing countries is an important barrier to effective management of health and other social services. It is therefore obligatory that a viable and functional method of data collection which will assist health planners and managers be put in place to allow for effective implementation and evaluation of health care services.

5.0 SUMMARY

This unit has considered the various basic measurements in epidemiology. Rate which is the basic tool for epidemiological studies was examined with particularly reference to incidence, prevalence and specific rates. This unit also discussed the place of statistics, its uses, sources, types and methods of data collection. It is hoped that you will find it very useful as you explore other variables for effective health care of your patients and clients.

ANSWER TO SELF ASSESSMENT EXERCISE 1

1. Differences between Incidence and Prevalence rates

Incidence Rates	Prevalence Rate
It shows the risk of acquiring a disease	It is the rate which shows the burden risk of disease or characteristics at a given point (point prevalence) or time (period prevalence)
Goes usually with the same population at least twice to detect new cases	A single cross sectional study at a point in time to show both new and old cases.
Deals only with new cases	Deals with new and old cases
Aetiological factor or method of diagnosis provide changes in incidence of a disease	Changes do arise from low incidence, and increase duration or both
Incidence of disease of insidious onset is very difficult to determine. Takes a long period.	Almost equivalent to incidence multiplied by average duration of disease.
Useful in planning future health needs	Useful as administrative tool
Can be measured by cohort study	Can be measured by cross sectional study

ANSWER TO SELF ASSESSMENT EXERCISE 2

- a. Enumeration is the procedure employed in census to allow for accurate head count one by one.
- b. 2 methods are: defacto and dejure.

6.0 TUTOR-MARKED ASSIGNMENT

Highlight the major differences between incidence and prevalence.

7.0 REFERENCES/FURTHER READINGS

Alakija, W. (2000). Essentials of Community Health Primary Health Care and Health Management. Medisuccess Publication.

Lucas and Guiles (2003). Short Textbook of Public Health Medicine for the Tropics 4th Edition. London. Oxford University Press.

Lucas and Guiles (1989). A Short Textbook of Preventive Medicine for the Tropics, 2nd Edition. ELBS.

MODULE 2

Unit 1	Strategies of Epidemiology
Unit 2	Epidemics
Unit 3	Epidemiology of Communicable and Non-Communicable Diseases

UNIT 1 STRATEGIES OF EPIDEMIOLOGY

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Chain of Epidemiology
 - 3.2 Disease Causation
 - 3.3 Factors Precipitating Causation
 - 3.4 Interrelated Factors
 - 3.5 Levels of Prevention
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment
- 7.0 References/Further Readings

1.0 INTRODUCTION

Your understanding of epidemiology with the 3D's summarized (i.e.) distribution, determinant and deterrent of disease the distribution requires some strategies which provide a search for causal association between disease and other biological processes and specific biological experiences. This unit will expose you to those strategies.

2.0 OBJECTIVES

At the end of this unit, the learner will be able to:

- identify the main strategies for epidemiological studies
- interpret its usefulness in disease management
- apply them in the overall health care of the patient/client.

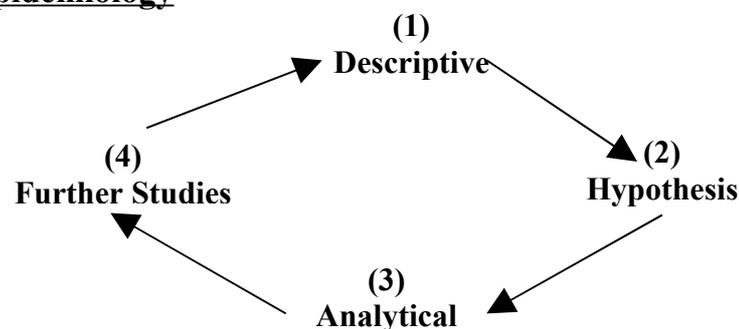
3.0 MAIN CONTENT

3.1 Chain of Epidemiology

The following chain exist in the study of epidemiology: These are:

- Descriptive studies: in which there is data aggregation and analysis
- Hypothesis - that is based on the result of your analysis in the descriptive studies, you can build a model and formulate an hypothesis
- Analytical study – the hypothesis generated in phase II is tested and this can be either observational or experimental. Result obtained here may suggest further studies or new hypothesis is formulated.

Chain of Epidemiology



3.2 Disease Causation

In disease causation, ecological factors are important. You may ask what is ecology? Ecology is the study of relationship of organisms including humans to each other as well as other aspects of the environment. This has given rise to the concept of the multiple causation of disease that is multi-factoral aetiology of disease.

There are other factors necessary for the development of disease namely:

- a. level of immunity
- b. the environmental conditions
- c. the agents – factors which must be present for the particular disease to occur (i.e.) a sinequanon = without which nothing will happen.

3.3 Factors that Influence Development of the Disease

There are factors that precipitate the cause of diseases. These are the Host factor (HF) and the Environmental Factor (EF).

1. **Host Factor:** these are intrinsic factors, genetic (inborn) in a person. It can be
 - **Specific** (i.e.) not inborn but acquired by immunization and natural infection
 - **Personality** – people working hard, ambitious with strong drive
 - **Social Class Membership** – peer grouping, organization.

SELF ASSESSMENT EXERCISE 1

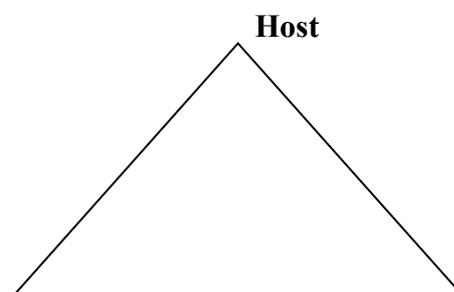
Do all smokers develop lung cancer? What about those exposed to radiation who do not develop Leukemia?

2. **Environmental Factors:** these are sub-divided into three namely: biological, physical and social factors.
 - **Biological factors:** these cause diseases that easily pass from one person to another through direct (person-to-person) transmission or indirect (vehicle, fomites, vectors) transmission.
 - **Physical factors:** it includes heat, light, air, water, radiation, chemical agent, atmospheric pressure, etc.
 - **Social factor:** this is defined as the overall economic and political organization of a society and the institutions by which individual are integrated into the society at various ages of their lives. Social environment is man- made environment which includes what he has created to make life worth living e.g. housing. It also includes the people's customs, levels of integration of the community, levels and systems of medicare, the degree of enforcement of health law and code.

3.4 Interrelated Factors

Our state of health depends on a balance of forces in a dynamic equilibrium. If the equilibrium is precarious, then the disease occurs easily. If the equilibrium is stable then the disease does not occur very easily. See this ecological model showing the state of equilibrium in disease state.

A. Ecological model (Epidemic triangle)

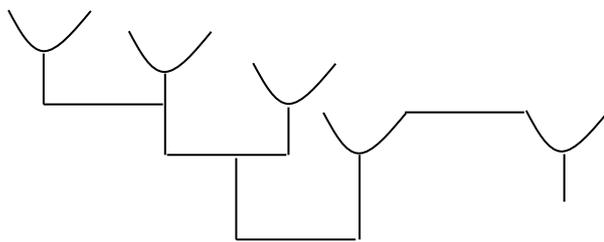


Agent

Environment

B. Web of Causation

Diseases do not just happen but effects depend on single isolated cases which develop as a result of chain of position in which each link is the result of a complex genealogy of antecedence.

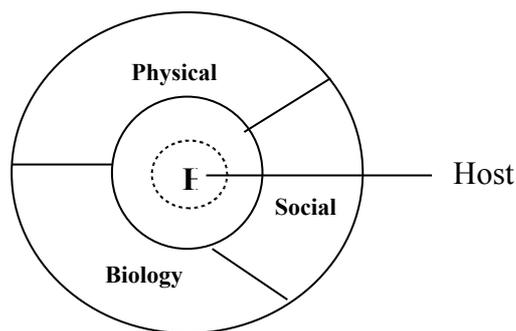


Webs

If the link in the chain is broken any where, the disease may not occur.

C. The Wheel model

Wheel model tends to emphasize that the contributions of the different components are not equal in any specific disease.



It is worthy of note that the host has the genetic core and this determines prognosis/severity. You may not know the agent of a disease before its modification. Killing of mosquitoes may reduce the malaria episodes. Counselling is used in Sickle Cell Disease (SCD) to reduce genetic core. This is a way of manipulation. Manipulation sometimes leads to another problem e.g. use of insecticide in killing mosquito. An impact assessment is therefore necessary in carrying out a manipulation.

SELF ASSESSMENT EXERCISE 2

Highlight the disease precipitating factors

3.5 Levels of Prevention

Control is assumed as the ultimate aim of epidemiology but now prevention seems taking the lead. In a narrow common usage prevention means the inhibition of the development of a disease before it occurs but in the broader sense. Prevention also includes all measures which interrupt or slow the progression of disease and the resulting disability. Prevention in epidemiology is divided into four main stages.

Stage 1 Primary Prevention

Primary prevention has two components: general health promotion (GHP) and specific measure (SM).

GHP includes health education, environmental sanitation and good housing SM includes chemoprophylaxis, immunization and good nutrition.

This is the prevention stage which reduces exposure of an individual or you alter the susceptibility of either being affected by the disease or not.

Stage 2 Secondary Prevention

The second stage is the stage of early diagnosis and treatment. Any measure that will interfere with the progression of the disease. The measures that constitute early detection are: screening, case finding, mass X-ray to determine lung diseases and smear to detect cancer of cervix in a woman.

Stage 3 Tertiary Prevention

The third stage of prevention is rehabilitation. This is the alleviation of disabilities from the disease and attempt to restore effective functioning. Rehabilitation can be divided into three (3) forms;

- a. **Medical Rehabilitation:** this is the process of medical care aimed at developing functional and psychological liabilities of the individual. Compensatory mechanism is put in place so as to enable the victim to attain self dependence and live a full life.
- b. **Social Rehabilitation:** a part of rehabilitation that aims at the integration of a disabled person into society by helping him to adjust to the demand of the family, community and occupation while reducing any economic and social burden that may impede the social rehabilitation process. It is important in diseases with stigma such as leprosy, pulmonary tuberculosis and mental illness. Counseling, social evaluation, individual and community counseling, provision of services including psychiatric services, recreation facilities are components of social rehabilitation.
- c. **Vocational Rehabilitation:** this includes provision of those vocational services, vocational guidance, training, selective placements which are designed to enable a disabled person to retain a suitable employment. He may require counseling, vocational training, vocational evaluation, proper placement or being looked after by others.

Stage 4 Surveillance

This is the exercise of continuous scrutiny of and watchfulness over the distribution and spread of infection and the related factors with sufficient accuracy and completeness to provide the basis for effective control. This idea has three main features namely:

- systematic collection of all related data
- orderly collation and evaluation of each data
- prompt dissemination of results for action to relevant authority

The following are examples of sources of epidemiological data in the surveillance of disease: registration of deaths, notification of disease and reporting of epidemics, laboratory investigations, data from routine screening e.g. blood donors, investigation of individual cases and epidemics, epidemiological surveys, data from clinics, distribution of the animal reservoir and the vector production and distribution and care of vaccines, serum and drugs, demographic and environmental data and non-medical statistics.

Objectives of Surveillance

There are two main objectives in surveillance. These are:

- the recognition of acute problems so that immediate action is taken. For example the recognition of an outbreak of cholera in any area so as to “curb”/limit its spread to that area only.
- to provide broad assessment of specific problems in order to discern long-term trends and epidemiological patterns. This is useful as basis for planning, implementation and assessment for programme of control and prioritization of public health programme.

4.0 CONCLUSION

You have been enlightened on the strategies which provide a search for causal association between disease and other biological /specific biological experiences. Host and environmental factors played a key role in disease causation with an unparallel interrelation of the factors. The levels of prevention are well laid out to assist you in providing the needed support to facilitate recovery.

5.0 SUMMARY

This unit has discussed on the following: chain of epidemiology, disease causation, factors precipitating disease causation, interrelated factors and levels of prevention.

ANSWER TO SELF ASSESSMENT EXERCISE 2

- Host
- Environment
- Agent

6.0 TUTOR-MARKED ASSIGNMENT

Describe the four (4) levels of prevention of illness.

7.0 REFERENCES/FURTHER READINGS

Alakija, W. (2000).Essentials of Community Health Primary Health Care and Health Management. Medisuccess Publication.

Lucas and Guiles (2003). Short textbook of Public Health Medicine for the Tropics, 4th Edition. London: Oxford University Press.

Lucas and Guiles (1989). A Short Textbook of Preventive Medicine for the Tropics 2nd Edition. ELBS.

UNIT 2 EPIDEMICS

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Definition and Terms used in Epidemics

- 3.2 Propagation of Epidemics
- 3.3 Types of Spread
- 3.4 Investigation of Epidemics
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment
- 7.0 References/Further Readings

1.0 INTRODUCTION

In this unit we shall be discussing epidemics and its related concepts. While epidemics expresses the occurrence of a particular group of illness far beyond expected nature, surveillance observes the continuous scrutiny of and watchfulness over the distribution and spread of infection to provide the basis for effective control. It is hoped that you will find it very enriching.

2.0 OBJECTIVES

At the end of this unit, the learner is expected to:

- define epidemics
- explain various terms related to epidemics
- understand the sequence of events associated with epidemics
- know how to investigate epidemic cases.

3.0 MAIN CONTENT

3.1 Definition and Terms used in Epidemics

Epidemics can be defined as the occurrence in a community or region or a member of a defined population of a group of illnesses of a similar nature in excess of a normal expectancy in that population.

In **epidemics**, any kind of disease or injury may be involved and there are no universally applicable number of cases and no clear geographical extent e.g. food poisoning. However, it can affect a large population.

A disease can be said to be **endemic** in contrast to epidemics. This is a constant presence of a disease or an infective agent within a given geographical area. It is the usual prevalence of a given disease within an area.

Endemic: This is the constant presence or the usual prevalence of a disease or infectious agent in human populations within a given geographic area.

Hyperendemic is a term that expresses a persistent intense transmission of the disease e.g. malaria

Epizootic and Enzootic are expressions that are equivalent of epidemic and endemic as it applies to animals e.g. epizootic of yellow fever in Monkey which precedes that of yellow fever in man. It is the incidence of disease in animal.

Herd Immunity: this is the resistance of a group to the introduction and spread of an infectious agent. Such resistance is based on the immunity of a high proportion of individual members of the group and on the uniform distribution of the immunes within the group.

Propagated-Source Epidemic: An epidemic in which infections are transmitted from person to person or animal to animal in such a fashion that cases identified cannot be attributed to agents transmitted from a single source.

Epidemiologist: An epidemiologist is a person who applies epidemiologic principles and methods to the prevention and control of disease.

3.2 Propagation of Epidemics

Epidemics only affect a susceptible number of populations. There is an incubation period before manifestation of symptoms; however, susceptible may develop inapparent infection. The infectious agent may leave the host during the communicable period which varies in timing, and duration with each disease. The following are the sequence of events:

- introduction of the agent
- attack on susceptible
- acquisition of immunity
- reduction in the number of susceptible
- decline of the epidemic

Introduction of the agent susceptible → attack on susceptible → acquisition of immunity → decline number of

DECLINE ←

* *The Epidemic Cycle*

However it is worth noting that the cycle described above can be influenced by any of these factors namely: immunity decline, migration and birth/death.

3.3 Types of Spread

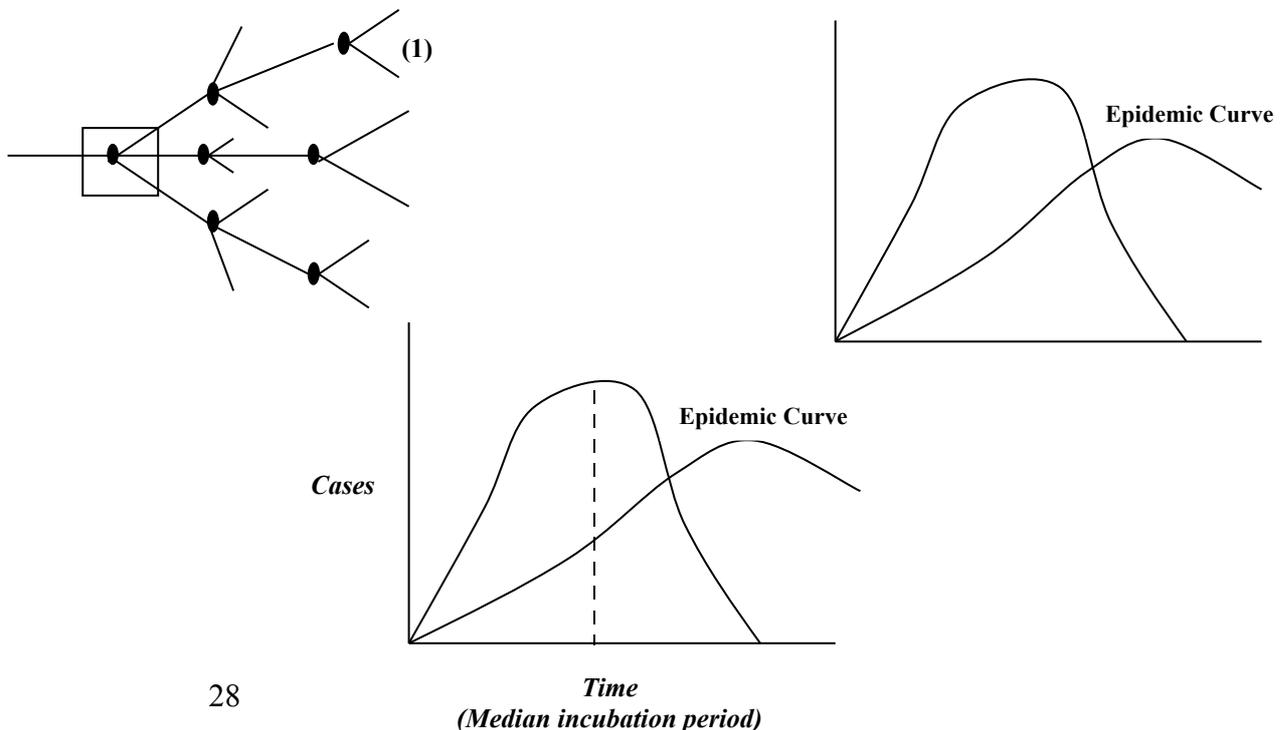
There are two major types of spread in any epidemic. These are common vehicle epidemic and latent case. We shall consider each of the spread turn by turn.

3.3.1 The Common Vehicle Epidemic

This is also called the point source. Transmission here may be through water, food, air or by inoculation. When the epidemic results from a single exposure of the population it is called a point source epidemic. Sometimes there may be repeated multiple exposure or a continued exposure over a period of time e.g. a contaminated well (point source). It is a point source at the closing up and if from the closing up there is continuous drinking from the source (contaminated well), then it becomes a multiple source.

Characteristics of Common Vehicle Epidemics

- explosive in onset
- limited in time, place and person (i.e.) there is geographical limitation
- serial transfer or propagation : this usually involves a transfer from host to host. The spread can be by contact, direct or indirect between the infected and susceptible.
- Route is respiratory, oral-fecal or genital



The Index Case

This is the first among a number of similar cases which are epidemiologically related. Index cases are often identified as a source of contamination or infection. Typically, a common vehicle epidemic shows a rapid rise and a fall within one incubation period whereas in propagated epidemic new cases continue to develop beyond one incubation period.

Please note the followings

- that a typical point source epidemic may be affected by the development of secondary source. For example, water that is infected gives diarrhea.
- by the continuous contamination of the source, it ceases to give the picture of point source but multiple sources.
- a disease that has a long incubation period will give the type of a long epidemic curve with serial transfer.
- on the other hand, a propagated epidemic may look highly infectious with short incubation period.
- geographical mapping can be done to determine the geographical location of the victims and a spread can occur from centre to sub-boundary regions. The geographical marking and epidemic curve can help determine the type of epidemic and the source.

SELF ASSESSMENT EXERCISE

Clearly differentiate between index case and common vehicle onset

3.4 Investigation of Epidemic

Having being exposed to some details of epidemics, it must be stated clearly that there are due processes for investigating epidemics and these must be done systematically. They include the following:

1. Verification of the diagnosis: this includes what type of disease is been viewed, full history, laboratory investigation, post mortem

examination may be required but often a clinical assessment is all that is needed.

2. Confirmation of the existence of an epidemic. This is done by:
 - looking at the previous clinical records and data, questioning the local people in order to obtain approximate estimate of the previous incidence of the disease in the area.
 - Do a mapping. An epidemic curve to see the number rising, a map to show that cases are spreading.
3. The identification of the affected persons and their characteristics: who is affected? in terms of age, sex, name, occupation, etc. Obtain their recent movement, time of onset of their symptoms, find out whether they were previously immunized, and find out their contacts within the incubation period of the disease so that you will be able to follow the contact. Here also, you will endeavor to look for additional cases that may be concealed and not typical in nature. Identify a common experience shared by all of those affected e.g. do they all go to the same venue when they ate the food (ceremonies)? Was the water contaminated from source or a sick person visited the family of recent? All of these provides for epidemiological description of those affected.
4. Conduct further laboratory and immunological investigation of the population. Carriers are deduced e.g. cholera, cerebro-spinal meningitis to identify the type of organism and therapy sensitivity.
5. Study the environmental conditions at the time of the outbreak and compare with the previous condition. Find out if there is any change in water source, weather, food, housing conditions, population of human beings and any environmental change for epidemic invasion.
6. Formulate an hypothesis. Here you will want to find out how it started, its source, method of transmission, reservoir, etc.
7. Management of the cases affected. This is done in any of the following:
 - Treatment of cases by health personnel
 - Rehabilitation facilities. Measures are taken to prevent spread and control of epidemics. These will include chemotherapies, immunization, isolation of infected individuals, and imposition of quarantine so as to reduce movement from one point to the other as well as education of the community to obtain cooperation. Permanent control measures are also put in place which includes any of the following: personal hygiene, health education, water supply,

vector control, food hygiene legislation, continuous vaccination programme.

- Report writing. This is usually from a layman, health planners and a scientific report.
- Continued surveillance of the population for early detection to reduce the spread.

4.0 CONCLUSION

An epidemic is an unusual occurrence in a community of disease or specific health related behaviour that is in excess of expected occurrence. The techniques and methods of surveillance can be applied not only to communicable diseases but also non-communicable disease such as environmental hazards, cancer and other degenerative diseases as well as and social problems such as drug addiction.

5.0 SUMMARY

This unit has considered the subject epidemics. We examined the various components of epidemics, propagation, spread, characteristics and methods of investigating epidemics.

ANSWER TO SELF ASSESSMENT EXERCISE

In common vehicle onset is explosive; limited in time, place and person (i.e.) there is geographical limitation, serial transfer or propagation and usually involves a transfer from host to host. In Index case the spread can be by contact, direct or indirect between the infected and susceptible, route is respiratory, oral-fecal or genital, transmission here may be through water, food, air or by inoculation.

6.0 TUTOR-MARKED ASSIGNMENT

Clearly differentiate between index case and common vehicle onset.

7.0 REFERENCES/FURTHER READINGS

- Mulhall A (1996). *Epidemiology, Nursing and Healthcare: A New Perspective*. London: Macmillan.
- Park K. (2000). *Park's Textbook of Preventive and Social Medicine: M/ s Banarsidas*: Bhanot Publishers, India
- Valanis B (1992). *Epidemiology in Nursing and Health Care*. Second Edition. Connecticut: Appleton & Lange.

WHO (2000). Communicable Diseases 2000. WHO/CDS/2000.1.WHO, Geneva.

UNIT 3 EPIDEMIOLOGY OF COMMUNICABLE AND NON-COMMUNICABLE DISEASES

CONTENTS

1.0 Introduction

2.0 Objectives

3.0 Main Content

 3.1 Definition

 3.2 Agents Causing Diseases

 3.2.1 Agents and Disease Caused

	3.2.2	Infectious Agents
	3.2.3	Reservoir
	3.3	Concepts in Communicable Disease
	3.4	The General Methods of the Control
	3.5	Overview of Non-Communicable Diseases
	3.6	The Risk Factors of Non-Communicable Diseases
	3.7	Problems of Investigating Non-Communicable Diseases
4.0		Conclusion
5.0		Summary
6.0		Tutor-Marked Assignment
7.0		References/Further Readings

1.0 INTRODUCTION

The epidemiology of communicable disease is an important aspect of this course. You will remember by hindsight the place of who, what, where, and when in the understanding of epidemiology. To this end, therefore, the relationship of epidemiology, communicable and non-communicable disease will form the basis of our discussion in this unit.

2.0 OBJECTIVES

At the end of this unit, the learner is expected to be able to:

- define communicable and non-communicable diseases
- identify various agents causing diseases
- describe infectious agents
- enumerate the concepts that applied to communicable and non – communicable disease
- discuss the general methods of control of communicable and non-communicable diseases disease
- enumerate problems of investigating non-communicable disease
- discuss the significant changes in the health and disease pattern.

3.0 MAIN CONTENT

3.1 Definition

A communicable disease is an illness that occurs due to a specific causative agent or its toxic products which arises through transmission of that agent or its products from a reservoir to a susceptible hosts either directly as from an infected person or animal or indirectly through an intermediate plant or animal host, vector or the inanimate environment.

3.2 Agents Causing Diseases

We shall now consider some of the key points in the definition above

3.2.1 Agents and Disease Caused

Agents	Disease Caused
Viruses	Measles, small pox,
Rickettsiae	Typhus organism and tapeworm
Bacteria	Spirochetes – Syphilis
Fungi	Candidiasis, Tinea Capitis, Histoplasmosis
Protozoa	Malaria, Trypanosomiasis, Amoebiasis
Helminthes	Nematodes: roundworms, guineaworms, onchocerciasis: Trematodes and Cestodes: Schizomiasis, Paragomiasis, Flat worms, Tapeworms, Tinea Sadinasa
Anthropds	Gigar

3.2.2 Infectious Agent

Infectious agent is any organism or agent that is capable of producing infection or infectious diseases. Infection is the successful invasion of the body by micro organisms. You have discussed this extensively in NSS 314: Applied Sciences for Nurses. Please note that infection is not the same as infectious disease and contamination because infection can be apparent or manifest.

SELF ASSESSMENT EXERCISE 1

Differentiate between infection and contamination

3.2.3 Reservoir

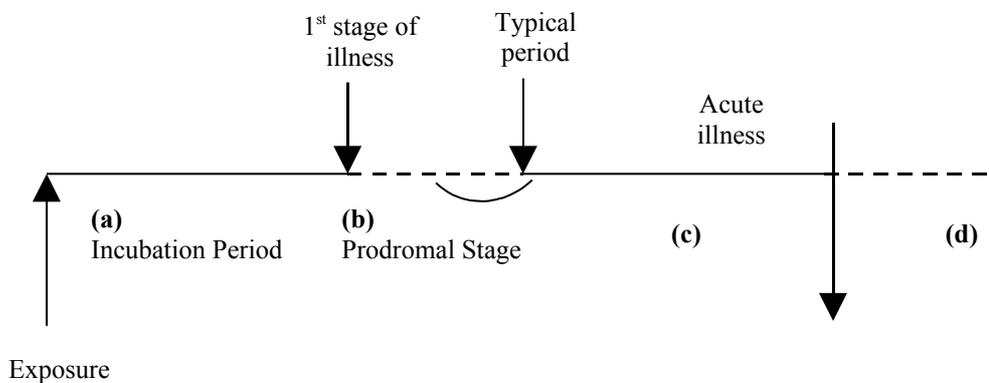
A reservoir is any human being/animal/arthropod/plants/soil or inanimate matter in which an infectious agent normally lives and multiply and on which it depends primarily for survival and reproduces itself in such manner that is can be transmitted to a successive host. Man is the only reservoir of infection of many diseases: (man to man). Occasionally an animal may serve as the reservoir and this is called **Zoonosis**.

A zoonosis is an infectious disease transmissible under natural conditions from vertebrate animal to man. For example rabies, trypanosomiasis, yellow fever (jungle type), anthrax, Lassa fever from rat and tape worm.

3.3 Concepts in Communicable Disease

The following concepts are very important in understanding communicable disease

- **Incubation Period:** this is the period between the exposure to an infectious agent and the appearance of the first signs and symptoms of disease.



It is worthy of note here that the (d) point is the variable. Here the patient can go into convalescence, chronic illness or death can occur.

- **Characteristics that Influence Diseases/Illness Formation**

There are characteristics that influence disease/illness formation in the body. These are:

- Infectivity
- Pathogenicity
- Virulence
- Antigenic power

SELF ASSESSMENT EXERCISE 2

What is the meaning of the following terms?

Infectivity _____
 Pathogenicity _____
 Virulence _____
 Antigenic Power _____

- **Resistance**

This is the sum total of body mechanism that provides a barrier to the progress of invasion or multiplication of infectious agents and damage their toxic products. This is made possible through immunity.

- **Carrier**

A carrier is someone who though has disease causing organism in his body but do not show any sign of infection. The carrier has the ability to harbour and disseminate the parasite without showing any clinical evidence of infection. There are times when even carriers of a disease are more than those showing the signs of the disease. They often become chronic carriers but this does not last long. Some of the disease known to have carriers include: cholera, salmonella typhi, poliomyelitis and diphtheria.

Types of Carrier

1. Incubatory carrier is one that is transferred during incubation period
2. Convalescent carrier is one that is transferred during recovery period
3. Intermittent carrier is one that is on and off
4. Chronic carrier is one in which the individual keeps carrying the disease on for a long time
5. Healthy carrier is someone who does not show the manifestation at any time but keeps on transmitting it to people.

- **Immunity**

This is the resistance usually associated with possession of antibodies having specific actions on the micro-organism concerned with a particular infectious disease or its toxin. An individual is considered immune when he possesses specific protective antibodies or cellular immunity as a result of previous infection or immunization or by previous experience.

Immunity can be natural or acquired. Natural is inherent in the individual or specie and it is independent of previous infection. Acquired also can be active and passive. Active acquired immunity can be natural or induced, while passive acquired may be natural/transplacental or passive induced.

Active Immunity: this is the immunity an individual develops as a result of infection or specific immunization and usually associated with antibodies or cells having a specific action on the disease or toxin. This can be acquired through any of the following:

- After infection e.g. measles

- After in apparent infection e.g. poliomyelitis
- After immunization with an antigen which may be killed vaccine.

Passive Immunity: this is the transference of antibodies produced in one body to another to induce protection against disease. This is useful for individual who cannot form antibodies or for the normal host who takes time to develop antibodies after active immunization. Here the body depends solely on ready-made antibodies. This can be derived from any of the following:

- when an antibody is administered
- transfer of maternal antibodies across the placenta
- transfer of lymphocytes to induce passive cellular immunity.

Herd Immunity: this is the level of resistance of a community or group of people to a particular disease. It provides an immunological barrier to the spread of disease in the human herd.

- **Vaccine:** this is an immuno-biological substance designed to produce specific protection against a given disease. It stimulates the production of protective antibody and other immune mechanisms. It may be prepared from live modified mechanism or inactivated or killed organisms.

3.4 The General Methods for the Control of Communicable Disease

Preventive measures	Control of patient, contact and environment	Epidemic measures	International measures
(a) Vaccination against epidemic (b) Chlorination of water supplies (c) Pasteurization of milk	(a) Measures designed to prevent spread of infection matters to person and to the environment	Measures to limit spread of communicable disease which has developed widely in a group or	(a) control of international travelers, immigrant, goods, animal products and the means of transport of the

<p>(d) Control of rodent arthropod, animal (e) Immunization (f) Public health education (g) Improvement of environmental sanitation and personal; hygiene (h) Chemoprophylaxis e.g. malaria, filariasis, meningococcal meningitis, bacillary dysentery.</p>	<p>(b) Keeping contacts under surveillance during incubation periods (c) Keeping records under control until found to be free of infectious agents (d) reporting to local authority (e) Isolation (f) Concurrent disinfection (g) Quarantine i.e. limitation of improvement of person exposed to infection (h) Immunization of contact (i) Investigation of contact (j) Specific treatment</p>	<p>community within an area, state or nation: (a) Notification of occurrence to the appropriate health authority (b) Mass immunization (c) Health education (d) Source and contact investigation</p>	<p>above (b) Intergovernmental arrangement, national laws (c) Monitoring immunization posts especially at the boarders and ports.</p>
---	--	--	---

Adapted from “Essentials of Community Health, PHC and Health Management

3.5 Overview of the Non-Communicable Diseases

Non – communicable disease is an illness that occurs due to a specific causative agent or its toxic products but not transferable from persons to persons. It may be acute or chronic. Our discussion here will cover the chronic diseases. This will include all ailments or deviation from normal which have one or the following characteristics:

- Permanent disability
- leaves residual disability
- caused by non-reversible pathological change
- it requires the special training of the patient for rehabilitation

- it may be expected to require a long period of supervision, observation and care.

With the control of communicable disease in some part of the world, a change occurs in the demographic picture leading to an older population. This is why chronic disease has become the commonest cause of morbidity and mortality. Non-communicable diseases include cardiovascular, renal, nervous and mental diseases, musculo-skeletal conditions such as arthritis and allied diseases, chronic non-specific respiratory diseases (e.g. chronic bronchitis, emphysema, and asthma), permanent results of accidents, senility, blindness, cancer, diabetes, and obesity and various other metabolic and degenerative diseases and chronic results of communicable diseases. Disorders of unknown cause and progressive cause and often labeled “degenerative”.

3.6 The Risk Factors of Non-Communicable Diseases

There are six (6) major key sets of risk factors that are responsible for major distribution of non-communicable disease in relation to its morbidity and premature mortality. These are:

- use of cigarette and other forms of smoking
- alcohol abuse
- failure or inability to obtain preventive health services e.g. hypertension control, cancer detection and management of diabetes
- life-style changes e.g. dietary patterns, physical activity
- environmental risk factors e.g. occupational hazards, air and water pollution and possession of destructive weapons
- stress factors

3.7 Problems of Investigating Non-Communicable Disease

There are some problems in the understanding of the natural history of chronic/non-communicable disease investigation which invariably results in difficulties in causal investigation and research.

1. Absence of a known agent. The absence of a known agent makes both diagnosis and prevention difficult. An example of this is cancer.
2. The multifactorial nature of the aetiology because most chronic diseases are caused by multiple factors. There is rarely a simple one-to-one cause-effect relationship and in the absence of a

known agent, the term “risk factor/s is used to describe certain factors in relation to a person’s background or lifestyle. Occasionally it can result from cumulative effects of multiple factors and may be addictive or synergistic.

3. Long latent period (incubation period) between the first exposure to suspected cause and the eventual development of disease which is often difficult to determine. It is assumed that what is happening now to someone may result from the effect of past happenings.
4. Indefinite onset so that the incidence rate is difficult to calculate. Most chronic disease is slow in onset and development and the distinction between diseased and non-diseased states may be difficult to establish. An example of this is cancer which by the time the patient seeks medical attention, the damage would have been irreversible or difficult to treat.
5. The differential effect of the factors on the incidence and the cause of the disease.

SELF ASSESSMENT EXERCISE 3

What are the risk factors for hypertension?

4.0 CONCLUSION

The prevalence of chronic disease reveals an upward trend all over the world and for obvious reasons; this trend is likely going to increase. Some of the adduced reasons are: that life expectancy is increasing with a greater number of people living to older ages and are at risk of chronic diseases of various kinds relative to ageing, changing life-style and behavioural patterns that are favourable to onset of chronic diseases and modern medical care has enabled chronic disease sufferers to survive. However, the impact of the disease on the lives of the people is serious when measured in terms of loss of life, disability, family stress, poverty and its resultant effect on the nations economy.

5.0 SUMMARY

We have discussed this unit covering the definition, agents causing disease. Infectious agents, reservoir, concepts worthy of note in the discussion of communicable disease and the general methods of the

control. Here we also examined the chronic non-communicable diseases which are assuming higher increase among young and adult population in both developed and developing countries with attending changing patterns in health and disease.

ANSWER TO SELF ASSESSMENT EXERCISE 1

Infection is the successive invasion of micro organisms in the body.

Contamination is the presence of living infectious agents on exterior surfaces of the body or upon articles or apparel or solid articles.

ANSWER TO SELF ASSESSMENT EXERCISE 2

Infectivity means ability of the micro organism to colonize an individual

Pathogenicity means ability to cause adverse effect

Virulence means causing severe measure

Antigenic is the ability to elicit antigenic response from the host

ANSWER TO SELF ASSESSMENT EXERCISE 3

Non-modifiable risk factors: age and genetic factors

Modifiable factors: obesity, salt intake, saturated fats, alcohol, physical activity, environmental stress

Other factors: secondary hypertension resulting from the use of oral contraceptives, noise, vibration and temperature.

6.0 TUTOR-MARKED ASSIGNMENT

1. Differentiate between infection and contamination.
2. What are the risk factors for hypertension?

7.0 REFERENCES/FURTHER READINGS

Alakija, W. (2000). Essentials of Community Health Primary Health Care and Health Management. Medisuccess Publication.

Last J (1994): The uses of Epidemiology. In Ashton J (Ed). *The Epidemiological Imagination*. Buckingham: Open University Press.

Lucas and Guiles (2003). Short textbook of Public Health Medicine for the Tropics, 4th Edition. London: Oxford University Press.

Lucas and Guiles (1989). A Short Textbook of Preventive Medicine for the Tropics, 2nd Edition. ELBS.

MODULE 3

- Unit 1 Sexually Transmitted Infection
- Unit 2 Human Immuno-Virus/Acquired Immune Deficiency Syndrome
- Unit 3 Demographic Incidence and Prevalence of HIV/AIDS
- Unit 4 Testing for HIV and Results
- Unit 5 Prevention, Treatment and Control of the HIV/AIDS

UNIT 1 SEXUALLY TRANSMITTED INFECTIONS

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 What are Sexually Transmitted Infections?
 - 3.2 Types of Sexually Transmitted Infections
 - 3.3 Consequences of Sexually Transmitted Infections
 - 3.3.1 Health Consequences
 - 3.3.2 Social consequences
 - 3.3.3 Economic Consequences
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment
- 7.0 References/Further Readings

1.0 INTRODUCTION

Communicable diseases are sometimes classified by way of transmission. The same applies in case of sexually transmitted infections. Even when Sexually Transmitted Infections are predominantly transmitted through sex, you should note that there are situations where sex is not directly involved. For example, the unborn baby can contract gonorrhoea from the womb. The issue of HIV is another example. Aside from sex, you must have learnt that HIV can be transmitted through other means like the exchange of blood and other bodily fluids (through the sharing of infected body-piercing instruments; transfusion with infected blood and blood products e.t.c) and also from mother to child. This can occur during pregnancy, during birth or through breast-feeding if the mother is infected with HIV. In this unit, you will learn more about Sexually Transmitted Infections.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- define Sexually Transmitted Infections
- give examples of some common Sexually Transmitted Infections
- list the characteristics of at least two Sexually Transmitted Infections.

3.0 MAIN CONTENT

3.1 What are Sexually Transmitted Infections?

Sexually Transmitted Infections are bacterial, viral, and parasitic infections, transmitted through sexual contacts. They usually affect the genital areas. They may also cause serious disease complications to the body.

Sexually transmitted infections were, over the years, known by some other names. They used to be called venereal diseases (VD). This name was purportedly derived from the Roman goddess of love. Later, the name changed to sexually transmitted diseases (STDs).

In recent times, the name Sexually Transmitted Infections is used. This is because it has been found that not all infections will get to the stage of disease. An example is the HIV infection. The fact that someone is infected with HIV does not mean he would eventually contract AIDS. But that is if he/she manages the condition very well through adequate diets, rest and medication.

3.2 Types of Sexually Transmitted Infections

There are many organisms transmitted through sex and that can lead to diseases. You will learn about three of them in this unit.

1. Gonorrhoea

This is caused by a bacterium called *Neisseria gonorrhoea*. It is transmitted through intercourse and by oral-genital and anal-genital contact. There is need for warmth and moisture provided by the mucus membranes of the vagina, mouth, or anus for the *Neisseria gonorrhoea* to survive. Because of this, it is not too likely for you to contract gonorrhoea by sharing someone else's towel or from sitting on a public toilet seat, unless the bacterium had just been deposited there. Even then, the place should be warm and moist.

2. Syphilis

The organism that causes syphilis is called *Treponema pallidum*. It is a corkscrew-like organism, which resembles bacteria.

Like the gonorrhoea bacterium, the organism causing syphilis can survive only in the warmth and moisture by the mucous membranes of the human body. The organism dies quickly outside the body. For this reason, syphilis may not be contracted from a toilet seat. Syphilis can be detected through a simple blood test.

3. Genital Herpes

There are two types of herpes simplex viruses. Type 1 result in cold sores in the mouth, while Type Two causes genital herpes. In about two to 10 days after the virus has entered the body, some symptoms begin to appear. The symptoms include sores and swollen glands (around the groin). The person will also experience flu-like symptoms (fever, muscle aches and a sick feeling). Also, pain in the genital area during urination or intercourse may occur. There may also be fatigue, swelling of the legs and watery eyes. The treatment of syphilis is handled medically.

SELF ASSESSMENT EXERCISE 1

List 3 types of Sexually Transmitted Infections and organisms responsible for them

- 1a----- 1b-----
- 2a----- 2b-----
- 3a----- 3b-----

3.3 Sexually Transmitted Infections and Consequences

Case Study: Awaiting Result

Miss X, a young school leaver, contracted gonorrhoea while awaiting her school certificate examination result. Instead of going to the hospital, she discussed the problem with her friends, who gave her some drugs to use. Because her condition was not improving, she borrowed some money and decided to go to a hospital far away from her home. In the hospital, treatment was commenced. On her third appointment in the hospital, she met a nurse who was from the same town with her. This made her to abandon her treatment.

SELF ASSESSMENT EXERCISE 2

1. What made Miss X to abandon her treatment?
2. Explain the possible effect of the lady’s half-treated gonorrhoea?
3. What do you think should be done to prevent this type of action among young girls?

3.3.1 Health Consequences

Sexually transmitted infections can have a lot of implications on the reproductive health of an individual. Especially in women, the

consequences can be very serious. This is why STIs should be properly treated.

In women, pelvic inflammatory disease (PID) can come with the following associated complications:

- Infertility, ectopic pregnancy leading to maternal mortality; chronic pelvic pain, and increased possibility of subsequent pelvic infections.
- Adverse pregnancy and neonatal outcomes have also been identified as a consequence of STIs. In pregnant women, the organism responsible for syphilis, *Treponema pallidum* can cross the placenta barrier and infect the foetus. The same is possible with gonorrhoea and *chlamydia trachomatis*.

3.3.2 Social Consequences

In a country or an area where much value is attached to children, the social consequences of STI can be serious for a woman. Imagine a situation where improperly managed STI leads to infertility. A lot of sad things can happen to the woman:

- She will be stigmatized;
- She can be abandoned or rejected by her husband;

Even when there is no problem of infertility, when there is STI, there may be conflicts arising between the couples. The friends and family members who provide support may start accusing the woman. There is mistrust. This may lead to both psychological and emotional problems for the couple.

3.3.3 Economic Consequences

STIs are not without some economic consequences. Handling the situation involves both direct and indirect costs. The direct costs are costs incurred in the process of treatment. Diagnosis, screening and treatment can be very expensive. Because of the expensive screening cost, some communities have resorted to the use of syndrome management or presumptive therapy without laboratory screening. Some costs cannot be measured in Naira and Kobo, but that does not mean that they do not exist. Some of the indirect costs associated with STIs

include: loss of productive life, the cost in infant morbidity, debility and mortality, increase in the economic burden placed on a society.

4.0 CONCLUSION

Sexually Transmitted Infections can be prevented and can also be treated. If they are not treated properly, they can have serious implications for the sexual health of an individual. There is the need to acknowledge that other STIs such as gonorrhoea, syphilis, Pelvic Inflammatory Disease, etc should be given attention like HIV. When these infections are not properly treated, they can cause a lot of harm.

5.0 SUMMARY

In this unit, you have learnt that Sexually Transmitted Infections are infections one can get through sexual intercourse. But you also know that one can get Sexually Transmitted Infections through other means apart from sex.

In the past, venereal diseases (VD) and sexually transmitted diseases (STDs) were used to describe this class of infections. Examples of Sexually Transmitted Infections are gonorrhoea, syphilis and genital herpes. You have learnt in this unit the various consequences of sexually transmitted infections. You are already aware that the consequences of STIs go beyond physical pain or discomfort. There are also cordial and economic consequences, all of which can have adverse effects on the well being of the individual.

ANSWER TO SELF ASSESSMENT EXERCISE 1

Gonorrhoea: This is caused by a bacterium called *Neisseria gonorrhoea*.

Syphilis: The organism that causes syphilis is called *Treponema Pallidum*. It is a corkscrew-like organism, which resembles bacteria.

Genital Herpes. There are two types of herpes simplex viruses. Type One results in cold sores in the mouth. Type Two causes genital herpes.

6.0 TUTOR-MARKED ASSIGNMENT

1. Explain sexually transmitted infections with two examples.
2. Explain the health implications of STIs.
3. Differentiate between direct and indirect cost of STIs.

7.0 REFERENCES/FURTHER READINGS

Greenberg *et al* (1997). *Wellness: Creating a Life of Health and Fitness*, pp. 119-125. London: Allyn & Bacon.

Dullabetta *et al* (eds). *Control of Sexually Transmitted Disease*. U.S.A:
AIDSCAP.

UNIT 2 HUMAN IMMUNO-VIRUS/ACQUIRED IMMUNE DEFICIENCY SYNDROME

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 HIV/AIDS
 - 3.2 Different Types of HIV
 - 3.3 The Structure of HIV

- 3.4 Replication in HIV
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment
- 7.0 References/Further Readings

1.0 INTRODUCTION

HIV is Human Immuno-deficiency virus (HIV) and AIDS is Acquired immune Deficiency Syndrome. As a syndrome AIDS is a group of signs and symptoms resulting from the attack of the HIV on the body's Immune system.

It is the worst epidemic so far and it affects every part of the globe. Its effect is estimated to be that of four world wars put together and it still defies cure. Available drugs do not cure but prevent multiplication of the virus.

2.0 OBJECTIVES

At the end of this unit the learner should be able to:

- define HIV/AIDS
- describe the symptoms of HIV/AIDS
- explain the different types of HIV
- differentiate the different types of HIV on the basis of cytopathy and virulence.
- describe the structure of HIV
- explain the different genes and their functions in the HIV genome
- explain all the processes involved in the replication of HIV.

3.0 MAIN CONTENT

3.1 HIV/AIDS

The Human Immuno-Deficiency Virus (HIV) is a retro virus so called because this single stranded RNA (ssRNA) virus contains a polygene that codes for a reverse transcriptase. The HIV is causative agent of the Acquired Immune Deficiency (AIDS) which is a pandemic that have spread to the whole world. In 1981, the Communicable Diseases Centre, Atlanta USA noted an increase in requests to use pentamidine for Pneumocystis carinii infection in previously well individuals who also suffered severe infections by other normally harmless microorganisms.

These included *Candida albicans* oesophagitis, mucocutaneous herpes simplex, toxoplasma CNS infection or pneumonia and cryptosporidial enteritis; and Kaposi's sarcoma was often present. Such patients had evidence of impaired immune function as shown by skin test anergies and depletion of CD4 positive T-helper lymphocytes. This immunodeficiency syndrome appearing in an individual without a known cause, such as treatment with immunosuppressive drugs was referred to as "Acquired Immune Deficiency Syndrome" (AIDS).

Signs and symptoms of acute HIV infection usually occur within days to weeks after initial exposure and last from a few days to more than 10 weeks (usually less than 14 days). Unfortunately, the syndrome is often undiagnosed or misdiagnosed because HIV antibodies are not usually detected during this early phase of infection.

AIDS is a severe, life threatening syndrome which represents the late clinical state of infection with HIV. Invasion and destruction of helper T – cells lead to suppression of the patients immune system. The immune system of the HIV infected person is unable to produce antibodies in response to T – cell dependent antigens. Secondary infections cause by viruses, protozoa, bacteria and or fungi become systemic and caused death of the patients. AIDS patients die as a result of overwhelming infections caused by a variety of opportunistic pathogens. Previously considered to be a universally fatal disease, certain combinations of drugs referred to as cocktail are used in extending life of AIDS patients.

Different Types of Human Retroviruses

HIV is classified as a retrovirus because it contains' reverse transcriptase. It is a D type virus in the Lentivirus family. Retroviruses are ribonucleic acid (RNA) viruses and in order to replicate they must make a deoxyribonucleic acid (DNA) copy of their RNA. It is the DNA genes that allow the virus to replicate.

Like all viruses, HIV can replicate only inside cells, commandeering the cell machinery to replicate (reproduce). However, only HIV and other retroviruses, once inside the cell, use the enzyme called reverse transcriptase to convert their RNA into DNA which can be incorporated into the host cells' gene.

Infections of cultured T – cells with HIV usually result in cell death. The major antigenic types (HIV–1 and HIV–2) have been identified and are readily distinguished by differences in antibody reactivity to the envelope glycoproteins. The two HIV types share approximately 40% genetic identity. There is some disagreement about whether or not they

are pathogens. Both apparently cause AIDS, but some researchers think that HIV-2 is less virulent in causing diseases.

Different isolates of HIV-1 and HIV-2 exhibit considerable genomic variation and antigenic heterogeneity. This type of variation is observed in HIV isolates obtained from individuals over the course of their infection. HIV strains often display differences in replicative capacity and cytopathic effect /cytopathicity.

In 1983, the causative virus of AIDS, HIV was isolated from blood lymphocytes and recognized as belonging to the Lentivirus (slow viruses) group of retroviruses related to similar agents in monkey and to similar virus in sheep and goats.

Table 1: Human Retroviruses

Virus	Characteristics
HTLV1	endemic in W. Indies and SW Japan transmission via blood human milk, can cause adult T-Cell leukaemia and HTLV 1 associated myelopathy and tropical spastic paraparesis,
HTLV2	Uncommon, sporadic, occurrence, transmission via blood can cause hairy T. Cell leukaemia
HIV 1, HIV2	Transmission via blood, sexual intercourses responsible for ARC, AIDS, AIDS dementia etc. HIV 2 is West Africans in origin. closely related but antigenically distinct
Human foamy virus	Causes foamy vacuolation in infected cells, little is known of its occurrence or pathogenic potential.
Human placental virus(es)	Detected in placental tissues by electron microscopy and by the presence of reverse transcriptase
Human genome viruses	Nucleic acid sequence representing endogenous retroviruses are common in the vertebrate genome, often in well defined genetic loci, acquired during evolutionary history, not expressed as infectious virus; function unknown, perhaps should be regarded as mere parasitic DNA.

The human placental and genome viruses are not known to be infectious agents.

An increasing number of different strains of both HIV – 1 and HIV – 2 are being identified by molecular virology and by phenotyping in cell culture. Highly cytopathic and infectious strains of HIV – 1 have been identified in parts of Central Africa. Increases in virulence appear to be due to minor differences in the molecular structure of the virus. Some strains of HIV – 2 appear to cause few symptoms in those known to have been infected for many years.

The molecular biological evidence through nucleic acid sequencing indicates that both HIV – 1 and the closely related HIV – 2, seen in West African probably arose from closely related primate viruses. HIV – 1 may have been present in humans in Central African for many years but in the late 1970s it began to spread rapidly possibly with change of properties, as a result of increased transmission following major socio – economic upheavals and migration of people from Central to East Africa such as female prostitutes and mobile male soldiers.

3.3 The Structure of HIV

The general structure of HIV is similar to that of Human T– cell Leukemia viruses (HTLV), the virus consists of an external lipid bilayer glycoprotein envelope (including envelopes proteins gp 120 and gp 41), an internal protein core (proteins p15, p17 and p24) a viral RNA complexed with reverse transcriptase. The HIV genome is approximately 10 kilobases which is larger than the HTLV. In addition to the structural gag, pol and env genes and regulatory lat (analogous to HTLV rex) genes (nef, rif, vpu and vpr). HIV -2 does not have sequences for vpu but does encode a novel gene, vpx that is also found in the simian Immunodeficiency virus.

A complete HIV particle consists of an envelope, a coat or capsid shell and core. The envelope is the membrane that surrounds the virus. It is a lipid (fat bilayer), which is derived from the host proteins. Embedded in the envelope is the viral encoded glycoprotein (gp), gp41, bound to this is the outer glycoprotein knob gp120 molecules bind to specific molecules on the surface of the host cell called cluster designation 4 (CD4) receptors. The capsid is the protein coat that surrounds the core (viral genome) of the virus. It is made up of protein (P) p17 and p18 which the icosahedral symmetry. The viral core is the elongated inner mass of the virus which contains two identical single strands of viral RNA, structural protein, the enzyme reverse transcriptase and other enzymes. The main core protein is P25. Serological diagnosis of HIV is based on P24, P26 specific detection of antibodies to HIV and envelope proteins.

SELF ASSESSMENT EXERCISE

- i. List the different types of HIV

- ii. What are the Lentiviruses?
- iii. The enzyme used in classifying HIV is

3.4 Replication in HIV

Viral replications are regulated by the products of the genes. The replication cycle is often halted after integration of the provirus, so that the infection remains latent in the cell. The *lat* and *ref* genes, for instance function as transactivating factors and can increase production of viral RNAs and proteins when latently infected cells are stimulated to differentiate (e.g. T-helper cell by antigen) or stimulated by infection with certain other viruses (e.g. HSV, cytomegalovirus)

The life cycle of HIV involves 8 steps namely:

- Attachment / Entry
- Reverse transcription and DNA synthesis
- Transport to the nucleus
- Integration
- Viral transcription
- Viral protein synthesis
- Assembly of virus
- Release of virus

1. Entry of HIV into Cells

Infection typically begins when an HIV particle, which contains two copies of the HIV RNA, encounters a cell with a surface molecule called cluster designation 4(CD4). Cells carrying this molecule are known as CD4 positive cells.

One of the more of the virus gp120 molecules bind tightly to CD4 molecules (s) on the cells surface. The binding of gp 120 to CD4 results in conformational change in the gp 120 molecule allowing it to bind to a second molecule on the cell surface known as co-receptor. The envelope of the virus and the cell membrane then fuse, leading to the entry of the virus into the cell. The gp41 of the envelope is critical to the fusion process. Drugs that block either the binding or the fusion process are being developed and tested in clinical trials.

Studies have identified multiple co-receptors for different types of HIV strains; these co-receptors are promising targets for new anti – HIV drugs, some of which are now being tested in pre-clinical and clinical studies. In the early stage of HIV diseases, most people harbour viruses that use, in addition to CD4, a receptor called CCR5 to enter their target cells. With disease progression, the spectrum of co-receptor usage expands in approximately 50 percent of patients to include other receptors, notably a molecule called CXCR4. Virus that utilizes CCR5 is called R5 HIV and virus that utilizes CXCR4 is called X4 HIV.

Although CD4+ T – cells appear to be the main target of HIV, other immune system cells with and without CD4 molecules on their surfaces are infected as well. Among these are long – lived cells called monocytes and macrophages, which apparently can harbour large quantities of the virus without being killed, thus acting as reservoirs of HIV. CD 4 T – cells also serve as important reservoir of HIV. : a small proportion of these cells harbours HIV in a stable, inactive form. Normal immune processes may activate these cells resulting in the production of new HIV virions. Cell to cell spread of HIV also can occur through the CD 4 – mediated fusion of an infected cell with an uninfected cell.

2. Reverse Transcription

In the cytoplasm of the cell HIV reverse transcriptase converts viral RNA into DNA, the nucleic acid form in which the cell carries the genes.

Nine of the 15 antiviral drugs approved in the United States of America for treatment of people with HIV infection, AZT, ddC, ddI, d4T, 3TC nevirapine, delavirdine abacavir, and efavireng- work by interfering with this stage of the viral cycle.

3. Integration

The newly made HIV DNA moves to the cell's nucleus, where it is spliced into the host's DNA with the help of HIV integrase. HIV DNA that enters the DNA of the cell is called a "provirus" integrase is an important stage for the development of new drugs.

4. Viral Transcription

For a provirus to produce new viruses, RNA copies must be made that can be read by the host cell's protein making machinery. These copies are called messenger RNA (mRNA) and production of mRNA is called transcription, a process that involves the host cell's own enzymes. Viral genes in concert with the cellular machinery control this process, the *lat* gene for example encodes a protein that accelerates transcription. Genomic RNA is also transcribed for later incorporation in the budding virion. Cytokines proteins involved in the normal regulation of the immune response may also regulate transcription. Molecules such as tumour necrosis factor (TNF) – alpha and interleukin6 (IL – 6), secreted in elevated levels by the cells of HIV – infected people may help to activate HIV proviruses. Other infections, by organisms such as *Mycobacterium tuberculosis*, may also enhance transcription by inducing the secretion of cytokines.

5. Translation

After HIV mRNA is processed in the cell's nucleus, it is transported to the cytoplasm. HIV proteins are critical to this process. For example, a protein encoded by the rev gene allows mRNA encoding HIV, structural proteins to be transferred from the nucleus to the cytoplasm. Without the rev protein, structural proteins are not made. In the cytoplasm, the virus co-opts the cell's protein making machinery including structures called ribosome – to make long chains of viral proteins and enzymes using HIV mRNA as a template. This process is called translation.

6. Assembly and Budding

Newly made HIV co-reproteins, enzymes and genomic RNA gather just inside the cell's membrane while the viral envelope proteins aggregate within the membrane. An immature viral particle forms and buds off from the cells, acquiring an envelope that includes both cellular and HIV proteins from the cells membrane.

During this part of the viral life cycle, the core of the virus is immature and the virus is not yet infectious. The long chains of the proteins and enzymes that make up the immature viral core are now cleaved into smaller pieces by a viral enzyme called protease. This step results in infectious viral particles. Drugs called inhibitors interfere with this step of the viral life cycle. Six of such drugs are saquinavir, ritonavir, indinavir, amprenavir, nelfinavir and lopinavir –have been approved for marketing in the United States of America.

4.0 CONCLUSION

In this unit, we presented a definition of HIV/AIDS. Specifically, we saw that HIV is Human Immuno-deficiency virus (HIV) and AIDS is Acquired immune Deficiency Syndrome. As a syndrome AIDS is a group of signs and symptoms resulting from the attack of the HIV on the body's Immune system. Hope you enjoyed your studies.

5.0 SUMMARY

We have seen that HIV, the aetiology of AIDS which is pandemic is retrovirus of the Lentivirus family. HIV/AIDS is associated with opportunistic infections such as Pneumocystic carinii infections, Candida albicans oesophagitis, toxoplasma CNS infection etc. HIV infected patients had evidence of impaired immunity as shown by skin test allergies and depletion of CD4 positive T-helper lymphocytes. There are two types of HIV i.e. HIV 1 and HIV 2 on the basis of antibody reactivity to the envelope glycoproteins both share 70%

genetic identity. The general structure of HIV I is similar to that of HTLV. The viral replication is regulated by the product of genes. Eight steps are involved in HIV replication which includes attachment/entry, reverse transportation and synthesis, transportation to the nucleus, integration, viral transcription, protein synthesis assembly and release of viruses. Careful and in-depth examination of patients is required so as not to miss out something vital in clinically diagnosing HIV.

6.0 TUTOR-MARKED ASSIGNMENT

- i. What do you understand by HIV and AIDS?
.....
.....
- ii. List six infectious agents associated with AIDS.
.....
.....
- iii. What effect has HIV on the T – cell?

ANSWER TO SELF ASSESSMENT EXERCISE

- i. Different types of HIV are...HIV 1 and HIV 2
- ii. Lentiviruses are (slow viruses) group of retroviruses related to similar agents in monkey and to similar virus in sheep and goats
- iii. The enzyme used in classifying HIV is...reverse transcriptase

7.0 REFERENCES/FURTHER READINGS

Baron S. (1996). Medical Microbiology 4th Edition, pp. 761-776: The University of Texas Medical Branch at Galveston.

Burton R.W. Engelkirk P.G., (2000). Microbiology for the Health Sciences, 6th edition. pp. 309 – 412 Lippincott Williams & Wilkins.

Moro, D.D., Opere, B.O. and Famurewa, O (2004). HIV Infection among Pregnant Women in Osogbo, Osun State, Nigeria Nig. J. Res.Rev. Sci. 3:234 – 239.

UNIT 3 DEMOGRAPHIC INCIDENCE AND PREVALENCE OF HIV/AIDS

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content

- 3.1 HIV/AIDS Global Demographic View
- 3.2 The UN's View of HIV/AIDS Pandemic
- 3.3 HIV/AIDS Epidemic in Nigeria
- 3.4 HIV Sentinel Surveillance in Nigeria
- 3.5 Epidemiology of HIV/AIDS in Nigeria
 - 3.5.1 HIV Prevalence by State
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment
- 7.0 References/Further Readings

1.0 INTRODUCTION

This aspect of your study deals with demography which is the statistical study of human population. This course unit essentially will relate HIV/AIDS prevalence and incidence to the epidemiology of the disease. That is, the study of HIV/AIDS in terms of its distribution pattern or spread and the number of new cases around.

2.0 OBJECTIVES

By the end of this unit you should be able to.

- understand the factors that encourage the spread of AIDS in Africa
- appreciation of the spread of HIV/AIDS globally and locally
- know HIV surveillance epidemiology in terms of modes or routes of transmission
- identify some high risk culture – related practices/ factors that increase HIV/AIDS spread.

3.0 MAIN CONTENT

3.1 HIV/AIDS Global Demographic View

The disease spreads through infected blood production and drug abuse, but overwhelmingly by sexual contact, predominantly between men and women. Women are more vulnerable to infection due to physiological and social reasons, and sex workers are far more likely than the population at large to be infected. But the sexual behaviour of men is largely responsible for spreading the disease. The study of HIV/AIDS general distribution pattern or spread as well as the total number of new cases is shown in the alarming figures enumerated below according to a report by the World Health Organization (WHO)

1. North America _____ 1.2 Million

2.	Caribbean	_____	300, 000
3.	Western Europe	_____	220,000
4.	Eastern Europe & Central Asia	_____	1.6 Million
5.	East Asia	_____	870,000
6.	South & South East Asia	_____	74, Million
7.	Oceania	_____	74,000
8.	Sub-Sahara Africa	_____	25.8 Million
9.	North Africa & Middle East	_____	510,000
10	Latin America	_____	<u>1.8 Million</u>
			<u>39.774 Million</u>

SELF ASSESSMENT EXERCISE 1

Highlight the possible reasons for the difference in the total population of HIV positive people in North America and Sub-Saharan Africa.

3.2 The United Nations’ View of HIV/AIDS Pandemic

The United Nations has called AIDS the most devastating disease mankind has ever faced. AIDS is a worldwide catastrophe and the biggest plague in human history. The latest statistics tell us that around 40 Million people worldwide are HIV- positive. In sub-Saharan Africa, we have 70% of that 40 Million people. Experts estimate that 600,000 people, especially babies become infected each year.

All the wars in the twentieth century resulted in 33 million deaths. But in just about 25 years of AIDS, already about 25 million people or more have died, 8,000 people die every day from HIV/AIDS in sub-Saharan Africa, from Nigeria to Cape Town, 6,000 people die daily from AIDS.

The continent of America and the world were shocked when on September 11 of the year 2001, the world trade centre collapsed through terrorist’s attacks, but in Africa, the world trade centre collapses twice a day, in terms of the number of victims that die from AIDS in Africa.

3.3 Epidemic of HIV in Nigeria

The spread of this virus in Nigeria is believed to have started in the 1980s with the first AIDS case reported in 1986. Nigeria is currently experiencing a generalized HIV prevalence persistently above 1% in pregnant women attending antenatal clinics since 1999. In 2003, it was estimated that 3.2 – 3.8 Million persons were living with HIV/AIDS in Nigeria.

It is believed that statistics on HIV/AIDS in Nigeria is not a true picture of what is on ground but it is estimated that there could be 1 to 2 Million people in Lagos alone who are HIV positive. The city of Lagos is also estimated to have the largest number of HIV positive victims than many cities in the world. It is said that, in Lagos, commercial hawking of one's body is a big factor in HIV/AIDS spread. According to the Federal Ministry of Health, the official HIV/AIDS prevalence rate in Nigeria between 2000 to 2005 is around 5.8%, and more recently, the 2007 health statistics indicates 4.4%, hopefully a steady and promising decline.

3.4 HIV Sentinel Surveillance

The virus sentinel surveillance was established to monitor trend in the HIV epidemic and assess the impact of the response. The survey was conducted from August 29 to November 26, 2005 to determine HIV prevalence among pregnant women attending antenatal clinics and also acquire data for estimating and projecting HIV Figures and trends in the general population.

The 2005 sentinel survey involved 36,931 pregnant women attending antenatal clinics in 160 sites (86 urban and 74 rural) in 36 states and the management Team was set up by the Federal Ministry of Health under the chairmanship of the Director of Public Health. The National Action Committee on AIDS (NACA), UN agencies, bilateral agencies and other stakeholders participated as members of the committee.

3.5 Epidemiology of HIV/AIDS in Nigeria

The prevalence of HIV among antenatal clinic clients after the 2005 sentinel survey was found to be 4.4% it was 1.9% in 1991, 4.5% in 1996, and 5.8% in 2001. HIV epidemic in Nigeria has since extended beyond the high risk groups to the general population. Some parts of the country are worst affected than others but no state community is unaffected. All the states of Nigeria have a generalized epidemic (>1% among pregnant women) The epidemic in the country can be described as heterogeneous with various communities in different stages, some declining while others are still rising.

From the result of the 2003 survey, it was estimated that 3.5 million people were living with HIV/AIDS in the country. The report also showed that HIV was more prevalent in the 20-29 years age group in the urban areas and amongst persons with only primary and secondary school education. AIDS cases are becoming more visible in communities. Although AIDS case reporting has been characterized by

under – recognition, under – reporting and delayed reporting, the number of reported cases has been on the increase especially since 1996.

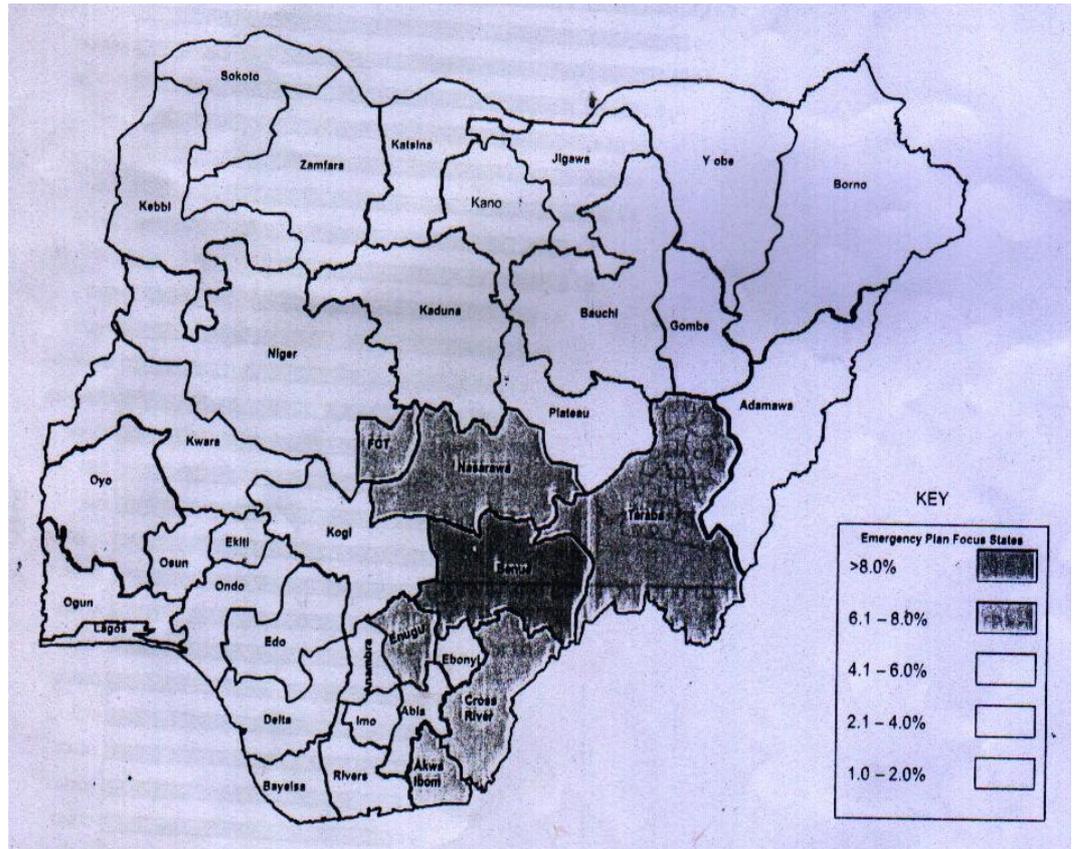
HIV prevalent rate among commercial sex workers in Nigeria has remained high and on the increase from 17.5% in 1991. Through 22.5% in 1993, to 35.6% in 1995. This group constitutes an important reservoir of HIV infection for transmission to the general population through sexual networking. Also the growth in prevalence among tuberculosis patents has remained relatively high 2.8% in 1991, 7.9% in 1993 13% in 1995 and 17% in 2000 (refer to figures 1 to 3 and tables 1 to 4).

3.5.1 HIV Prevalence by State

States in the North West and South West presents Lower HIV prevalence. High HIV prevalence is concentrated in Benue and adjoining State (see Figure 1).

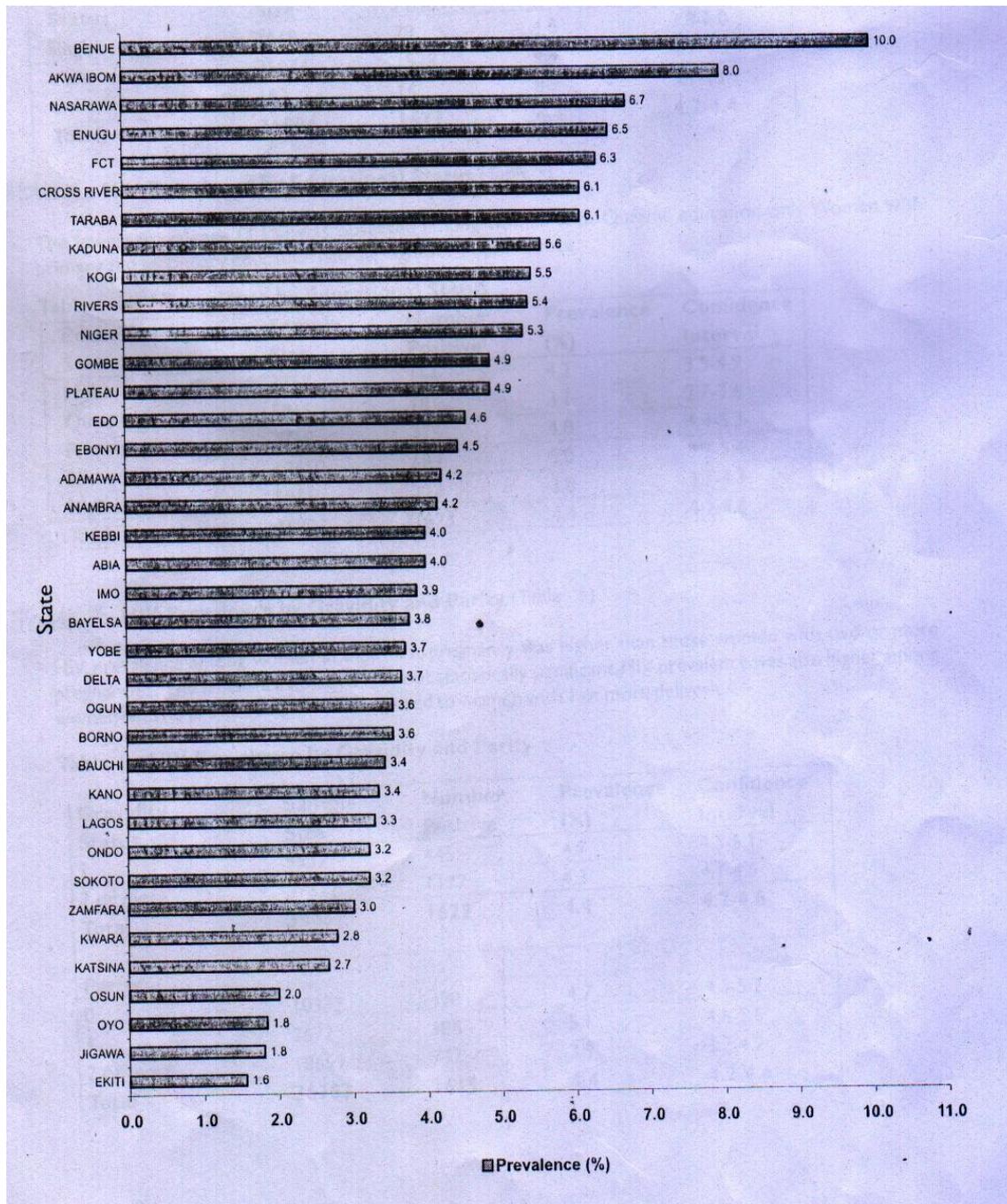
Figure 1: Geographical Distribution of HIV Prevalence by State (HSS 2005)

HIV Prevalence by State (Nigeria 2005)



The state HIV prevalence range from 1.6% (Ekiti) to 10.0% (Benue) and the median prevalence was 4.0% (Abia)

Figure 2: HIV Prevalence by State, (HSS 2005)



2005 HIV SENTINEL SURVEY.

3.4.3 HIV Prevalence by Marital Status (Table)

***HIV Prevalence was Lowest among Married Women**

Table 1: HIV Prevalence by Marital Status (HSS 2005)

Marital Status	Sample Size	Number Positive	Prevalence (%)	Confidence Interval
Single	1648	78	4.8	3.8-6.0
Married	35074	1528	4.4	4.1-4.6
Other	182	16	8.8	5.1-13.9
Total	36904	1623	4.4	4.2-4.4

Table 2: HIV Prevalence by Educational Status

Educational Status	Sample Size	Number Positive	Prevalence (%)	Confidence Interval
None	3757	156	4.2	3.5-4.9
Quranic Only	5816	181	3.1	2.7-3.6
Primary	7768	375	4.8	4.4-5.3
Secondary	13650	689	5.0	4.7-5.4
Higher	5911	222	3.8	3.3-4.3
Total	36902	1623	4.4	4.2-4.6

Table 3: HIV Prevalence by Gravidity and Parity (Table)

HIV prevalence among those in their first pregnancy was higher than those women with two or more pregnancies. The difference however was not statistically significant. HIV prevalence was also higher among women with no previous deliveries compared to women with one or more deliveries.

Table HIV Prevalence by Gravity and Parity

Marital Status	Sample Size	Number Positive	Prevalence (%)	Confidence Interval
1	9532	445	4.7	4.3-5.1
2 or more	27317	1177	4.3	4.1-4.6
Total	36851	1622	4.4	4.2-4.6
Parity				
0	10332	490	4.7	4.3-5.2
1	7672	388	5.1	4.6-5.6
2 or more	18699	737	3.9	3.7-4.2
Total	36703	1615	4.4	4.2-4.6

3.4.4 Trend Analysis

Figure 3: National HIV Prevalence Trend, 1991 – 2005, (HSS 2005)

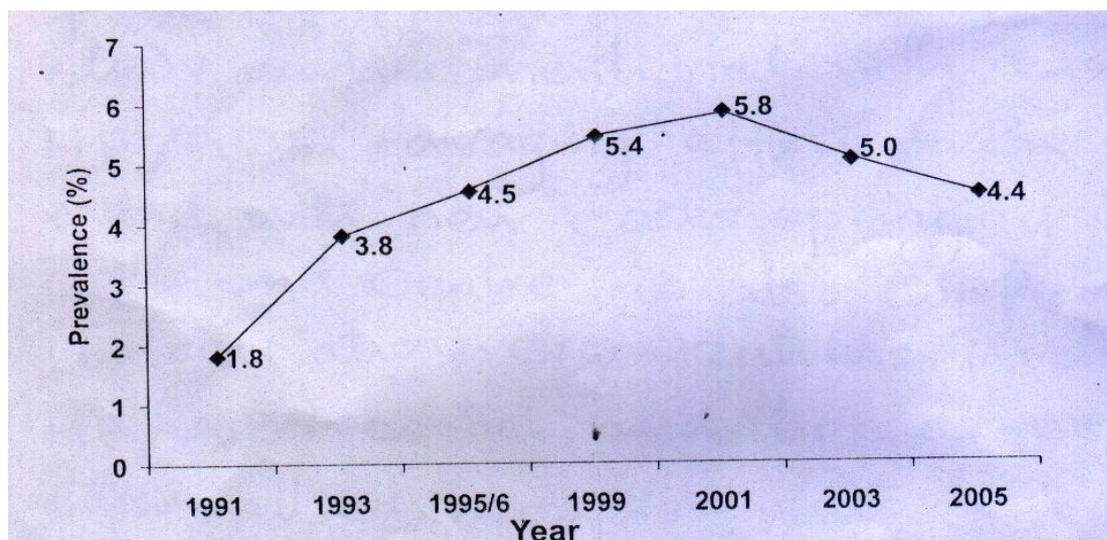


Figure 4 shows the trend of HIV prevalence in Nigeria between 1991 and 2005, as reported from the HIV sentinel sero-surveillance cycle. There was a steady increase in HIV prevalence from 1.8% in 1991 to 5.8% in 2001 before a drop to 5.0% in 2003. The result for 2005 showed a further drop to 4.4%.

Table 4: HIV Prevalence Trends by State from 1991 – 2005, (HSS 2005)

State	1991/92	1993/94	1995/96	1999	2001	2003	2005
Adamawa	0.3	1.3	5.3	5.0	4.5	7.6	4.2
Anambra	0.4	2.4	5.3	6.0	6.5	3.8	4.2
Benue	1.6	4.7	2.3	16.8	13.5	9.3	10.0
Borno	4.4	6.4	1.0	4.5	4.5	3.2	3.6
Cross River	0.0	4.1	1.4	5.8	8.0	12.0	6.1
Delta*	0.8	5.1	2.3	4.2	5.8	5.0	3.7
Edo	0.0	1.8	3.0	5.9	5.7	4.3	4.6
Enugu	1.3	3.7	10.2	4.7	5.2	4.9	6.5
Kaduna	0.9	4.6	7.5	11.6	5.6	6.0	5.6
Kano	0.0	0.4	2.5	4.3	3.8	4.1	3.4
Kwara	0.4	2.4	1.7	3.2	4.3	2.7	2.8
Lagos	1.9	6.8	-	6.7	3.5	4.7	3.3
Osun*	0.0	1.4	1.6	3.7	4.3	1.2	2.0
Oyo*	0.1	0.2	0.4	3.5	4.2	3.9	1.8
Plateau*	6.2	8.2	11.0	6.1	8.5	6.3	4.9
Sokoto	1.8	1.6	-	2.7	2.8	4.5	3.2
Abia	ND	ND	ND	3.0	3.3	3.7	4.0
Akwa Ibom	ND	ND	ND	12.5	10.7	7.2	8.0
Bauchi	NN	ND	ND	3.0	6.8	4.8	3.4
Bayelsa	ND	ND	ND	4.3	7.2	4.0	3.8

4.0 CONCLUSION

It is clear from the WHO report of demographic incidence and prevalent study earlier mentioned with regards to HIV/AIDS ravaging effect on the whole world with new cases springing up left, right and centre. All hands must be on deck in the fight to control the scourge that has been on the increase ever since its emergence.

5.0 SUMMARY

In this unit we understood that the latest statistics tell us that there are about 40 Million HIV positive people globally. 70% of the 40 Million sero-positive people are said to be in sub-Saharan Africa alone 600,000 people mainly babies become infected with HIV every year. In just about 25 years of AIDS 25 Million people or more have died of it in the world. 8000 people die everyday of AIDS in sub-Sahara Africa alone and the 2003 sentinel survey estimated that about 5.0 Million people are living with HIV/AIDS in Nigeria.

6.0 TUTOR-MARKED ASSIGNMENT

Describe the global demographic view of HIV/AIDS and the nursing intervention.

7.0 REFERENCES/FURTHER READINGS

Adeyi .O. Kanki, P.I; Odutolu, O and Idoko, J. A (2006), *Aids in Nigeria: A Nation on the Threshold*. U.S.A: Harvard University Press.

Technical Report (2005). National HIV/Syphilis Sero-Prevalence Sentinel Survey among Women attending by Dept of Public Health, National AIDS/STI Control Programme.

FMOH (1992). *Care of a Person with AIDS in the Community*. Lagos: Federal Ministry of Health and Social Services.

UNIT 4 TESTING FOR HIV AND RESULTS

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 The HIV test
 - 3.2 Testing Infants for HIV
 - 3.3 Possible HIV Test Results
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment
- 7.0 References/Further Readings

1.0 INTRODUCTION

In this unit, we will look at various ways of examining HIV, testing infants for HIV, possible HIV test results, and the window period.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- describe HIV testing
- describe testing infants for HIV
- identify possible HIV test results.

3.0 MAIN CONTENT

3.1 The HIV Test

The HIV test is a test that tells if a person is HIV positive or negative by using a simple blood test or at times making use of saliva or urine. Several methods have been developed to detect the infection. Most HIV test that are readily available and affordable do not actually test for the HIV virus but rather for the antibodies produced by the body in reaction to the HIV infection. It is important to note that even though HIV antibodies can be detected in the mouth and in urine, the virus cannot be transmitted from one person to another through saliva or urine. This is because there is not enough of the virus in saliva or urine to infect people this way. HIV needs to be present in very large quantities in order for a person to be infected. The only body fluids that contain enough HIV to be infectious are blood, semen, vaginal fluids and breast milk. There are tests which can detect the virus but they are very expensive to carry out and require rigorous procedure to carry it out.

It is important to remember that the HIV test can only detect if a person has contracted the virus or not:

- If a person has AIDS (only a doctor can make this diagnosis)
- How the person became infected with HIV
- How long the person has been living with HIV
- Who infected the person

HIV test can be carried out in any reputable Medical institution/facility and various approved and regulated Non Governmental Organisations and Laboratories across the country. When the HIV test is carried out typically it is followed by another HIV test which is called a confirmatory test, which is done to confirm the result of the first test. A confirmatory test is carried out only for positive HIV results and it is carried out shortly after the first test so as make sure that the positive result is a truly positive result.

3.2 Testing Infants for HIV

Children born to HIV positive mothers can be prevented from contacting the virus from their mothers with proper medical attention, care and treatment. Unfortunately it is difficult to ascertain if a child is positive or not soon after it is born, this because children carry their mothers antibodies for several months after birth as a form of protection against infection. Since most available HIV test seek to detect HIV antibodies then the children would test positive because they are carrying their mothers HIV antibodies. Babies born to HIV positive mothers can test positive for antibodies acquired from their mothers for as long as 15 months after birth for this reason, identifying infected and uninfected infants can only be possible after 18 months. HIV-antibody test results will only show us infants who have been exposed to the virus via their mothers. As mentioned previously, in environments where the HIV test which can detect the virus itself as opposed to the HIV antibody produced by the mothers body is available, the children can accurately be tested HIV negative or positive.

SELF ASSESSMENT EXERCISE

When the HIV test is carried out typically it is followed by another HIV test which is called _____

3.3 Possible HIV Test Results

A. Negative Result

An HIV negative result can mean one of the following things.....

The person has not been infected with the HIV virus and the HIV antibodies have not been found in the individual's blood.

That person has been infected with HIV in the last 3-6 months, and the body has not yet developed antibodies for the HIV test to detect the infection. It is recommended that everybody who is HIV negative should be asked to carry out another HIV test within 3-6 months of the first test during which time they should avoid putting themselves and others at risk contracting the HIV infection. This period is called the window period.

In cases where an individual has developed AIDS and is very ill, the person's HIV test may read HIV negative this usually happens close to the death of the person.

The Window Period

This refers to the period between when a person is first infected with HIV and the development of HIV antibodies in the person's body. If an individual gets tested for HIV during this period it will read negative. This is what is called a false negative because the individual is actually positive but the test cannot detect it yet because the body has not produced enough antibodies for the test to detect. During this period though the person has tested negative the person is actually HIV positive and can infect other people. In other words, a person is actually infected with HIV but the test will show up negative.

Depending on the test used, it can take anywhere from three weeks to 6 months for the antibodies to show up in the blood. Almost all people (99%) develop antibodies within 3 months, however. Some testing sites now have more sophisticated tests that are able to "shorten" the window period. In other words, they can detect antibodies within a much shorter period of time -- approximately 25 days after infection.

If this new test is not available, a person who has received a negative test result and has recently engaged in risky behaviour should be tested again 3-6 months after the last time they participated in a risky activity (For example, if s/he had unprotected sex one month ago, s/he should be tested again in 2-5 months).

B. Indeterminate Result

This means that it is not possible to tell if the person has been infected with HIV based on the test results. In other words, the test results are inconclusive meaning it does not indicate either a negative or a positive. This does not occur very often, but it can happen to people with any of the following conditions:

- multiple pregnancies or miscarriages
- multiple blood transfusions
- received an organ transplant
- Suffer from other autoimmune diseases, such as lupus or Grave's Disease
- kidney disease or are receiving dialysis treatment
- liver disorders
- some type of cancer.
- in the process of Sero-Conversion from negative to positive (window period)
- Cross reactivity due to prior inoculating, e.g. anti viral vaccine
- Prior medical conditions, e.g. auto immune disorders and severe Kidney diseases
- People who receive indeterminate results should also be re-tested again in six months if they have engaged in HIV risk behaviours.

C. Positive Result

A positive result means that the HIV antibodies have been detected in the person's blood and that the person has been infected with HIV and can infect others through exposing them to infectious body fluids (blood, semen, vaginal fluids or breast milk). All positive results are confirmed with another test called a confirmatory test. Therefore, it is unlikely that a positive result will be false.

D. False Positive Result

There are sometimes a positive result will be obtained when there are no HIV antibodies in the blood. These can be due to a number of reasons such as:

Technical errors: Technical errors which may be made by the laboratory scientist.

Serological cross-reactivity, repeated freezing and thawing of the HIV test reagent.

Stickiness of stored sera in malaria

E. False Negative Result

This situation occurs when the blood tested gives a negative result for HIV antibodies while it should have tested positive as the person is infected. The reason for this is the Window period, that is the person must have been newly infected or the test maybe defective

4.0 CONCLUSION

In this unit, we summarized that HIV test is a test that tells if a person is HIV positive or negative by using a simple blood test or at times making use of saliva or urine. We also illustrated that children born to HIV positive mothers can be prevented from contacting the virus from their mothers with proper medical attention, care and treatment. A review of possible HIV test also includes: negative result, indeterminate result, positive result, false positive result and false negative result.

5.0 SUMMARY

This unit provided a broad view of HIV testing and possible HIV results. Let us attempt the questions below.

6.0 TUTOR-MARKED ASSIGNMENT

Describe the Indeterminate and False HIV test results.

7.0 REFERENCES/FURTHER READINGS

Anne-Marie B. and Chris Y. (2002). *Understanding Health*. SAGE.

Allot, M and Robb, M. (1997). *Understanding Health and Social Care*. SAGE.

D'Cruz P. (2004). *Family Care in HIV*. SAGE.

McKee N. Bertrand and Becker-Benton A. (2004). *Strategic Communications in the HIV/AIDS Epidemic*. SAGE.

UNIT 5 PREVENTION, TREATMENT AND CONTROL OF THE HIV/AIDS

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Rationale for Combination Therapy
 - 3.2 Combination Therapy
 - 3.3 Other Pharmaceutical Care Services
 - 3.4 Preventive Measures for Target Group
 - 3.5 Preventive Measures for Medical Personnel
 - 3.6 Preventive Measures for the General Public
 - 3.7 Care for those Already Infected with HIV/AIDS
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment
- 7.0 References/Further Readings

1.0 INTRODUCTION

This unit is the second part and complementary to the first one on HIV/AIDS treatment, leading to the advent of combination therapy. Combination therapy as the name implies comes as a follow up to antiretroviral therapy because of certain problems due to the use of antiretroviral drugs, chief among which are toxicity and resistance. The virus is also capable of constant mutation thus the need for combination therapy.

2.0 OBJECTIVES

At the end of this unit, you are expected to:

- know what combination therapy is all about in HIV/AIDS treatment
- understand the rationale for combination therapy
- familiarize with other pharmaceutical care services
- appreciate the different preventive measures for target groups.

3.0 MAIN CONTENT

3.1 Rationale for Combination Therapy

- A) Combination therapy is useful in increasing efficacy through addition and/or synergistic antiviral activity.
- B) To reduce the toxic effects associated with each drug used at higher doses.

- C) To delay the emergence of drug resistance and/or broaden coverage against pre-existing drug resistant virus.
- D) To target virus in different cellular reservoirs and/or different tissue reservoirs and direct treatment towards cells at different stages of activation

3.2 Combination Therapy

- 1) Retrovir (AZT)/ Epivir (3TC) combination. It gives pronounced and prolonged fall in HIV RNA Load. It also gives marked and sustained increase in CD4 cell counts.

Dosage:

Retrovir	200mg	t.i.d
Epivir	150mg	b.i.d

- 2) AZT/3TC/indinavir combination

SELF ASSESSMENT EXERCISE

Review the rationales for combination therapy

- i. _____
- ii. _____
- iii. _____
- iv. _____

3.3 Other Pharmaceutical Care Services

- 1) Drug information for AIDS patients: Information on new drugs and therapies. Medical literature, newsletters, computer bulletin etc must be available to all concerned.
- 2) Protection of patients: It is the ethical and legal responsibility of the pharmacist and others involved in AIDS patient' care, to protect their confidentiality
- 3) Counseling of HIV patients: Counsel patients from time on the use of medical devices and appliances.

Example:

- i) Use of condoms, made of latex as more effective barrier to virus than lambkin or natural membrane that is porous.
- ii) Adding the use of spermicide to a condom may provide additional protection
- iii) It is safer to use condom with lubricant
- iv) Community services

All health providers involved in the care of HIV/AIDS patients should provide needed information to the patients and others in the community, including those who do not have AIDS.

Lastly, due to many problems of treatment especially toxicity, there is therefore need to emphasize prevention which is often said to be safer and cheaper than cure.

3.4 Preventive Measures for Target Group

These are measures that essentially apply to risk groups such as long distance truck drivers, prostitutes, youths, intravenous drug users, market women and medical personnel.

- 1) Maintain regular and faithful sex partners. Do not share partners or engage in group sex.
- 2) Avoid patronizing commercial sex workers. The highest percentage of HIV/AIDS cases has been reported with this group.
- 3) Always use condom if you must have casual sex but do not rely on it. The tensile strength of some of these condoms is inadequate because of our tropical environmental condition. A sizeable number of them tear during use. More-over the pore sizes are much larger than the largest viral particle; hence do not offer absolute protection against HIV infection.
- 4) Do not share injection needles or other surgical appliances. Insist on fresh ones.
- 5) Do not patronize unqualified medical personnel for injection, tattooing, circumcision and scarification. If you must do any of the above, provide your own blades or surgical equipment.
- 6) Request and insist that your traditional medical practitioners use fresh blades or other incision instruments when any cut, or incision or scarification is to be done.
- 7) Insist that your barber disinfect his barbing instruments before he applies them on you.
- 8) Do not donate blood if you have engaged in risky behaviours.

3.5 Preventive Measures for Medical Personnel

- Assume that all blood, blood products and other body products and other body fluids are infectious and adopt measures to prevent direct contact with them.
- Sterilize all re-useable needles and syringes, surgical and skin piercing instruments after use
- Screen all blood for HIV before transfusion. It is worthwhile to maintain this standard in all situations so as to ensure safety

- Wash your hands with soap and disinfect after any accidental exposure to blood, semen, vaginal secretions and body fluids
- Wear hand gloves during vaginal examinations, blood, dental procedures etc
- Decontaminate all re-usable instruments immediately after use, then disinfect or sterilize them.
- In case of accidental cuts, or needle stabs, wash the area thoroughly with soap and disinfect with suitable and effective agents.
- Spills of body fluids and blood should be well cleaned using suitable disinfectants such as preparations containing chorine
- Wash your hands with soap and water after working with a patient and before you start with another patient.
- Avoid blood transfusion to patients except in critical cases and where there are no alternatives/options

3.6 Preventive Measures for the General Public

General preventive and control measures are needed for the general public and the main interest here are to:

- prevent HIV infection
- prevent and control cross-infection
- reduce the personal and social impact of HIV and care for those already infected
- preventive measures for the general populace are designed to prevent the spread due to ignorance

3.7 Care for Those Already Infected with HIV/AIDS

1) Information, Education and Awareness Creation

The above three are the key to AIDS prevention. It is only through enlightenment information that people can voluntarily and individually decide to change some of their risk behaviours. It should be remembered that such behaviours are private and often known to the individual alone.

The media must be fully involved in the dissemination of information to the general public and not AIDS victims alone.

SELF ASSESSMENT EXERCISE

Enumerate the HIV/AIDS preventive measures for the general public

- i. _____ ii. _____
 iii. _____ iv. _____

2) Health and Social Services for Patients

Information and education programmes alone do not sustain prevention. A supportive social environment and health services must be put in place especially for those already infected.

The HIV infected individual needs counseling so also their sexual partner and family. A supportive social environment such as tolerance, avoidance of discrimination towards the infected individual at the workplace and at home, helps to protect and give assurance to the victim. There is no health rationale for the isolation of HIV/AIDS patients. What the HIV patients need is empathy, understanding and not pity. Actually, existing prejudices serve to scare people from volunteering for HIV screening. Certain health and social services such as counseling of I.V drug users, provision of free sterile needles and syringes to I.V drug users during the period of counseling and drug withdrawal, supply of drugs free or at subsidized rates to strengthen people's capacity to make long term behaviour changes are helpful.

Treatment with drugs is a very crucial and integral part of HIV/AIDS control and in line with the National Drug Policy launched in 1990 It is absolutely necessary to make available at all times, drugs which are very effective, affordable, safe, and of good quality in all sectors of health care through the rational use of drugs.

4.0 CONCLUSION

There is thus need for behavioural change as high rates of sexual contact with multiple partners is also incriminated in AIDS spread. There is therefore greater need for awareness creation and effective mobilization of human, material, medicinal and financial resources towards effective control of the AIDS scourge.

5.0 SUMMARY

Due to the adverse effects of the ART drugs, particularly toxicity, combination therapy is preferable and in vogue. There are other care services for treatment of HIV/AIDS victims and these include counseling, drug information and community services. There are also

preventive measures in place which include those targeted at specific groups such as the commercial sex workers (CSW), medical personnel, HIV/AIDS patients and the general public.

6.0 TUTOR-MARKED ASSIGNMENT

Highlight the adverse effects of antiretroviral drugs.

7.0 REFERENCES/FURTHER READINGS

FMOH (1992). *Care of a Person with AIDS in the Community*. Lagos: Nigeria Federal Ministry of Health and Social Services

TDR News (2007). “*Enhancing Drug Discovery for Neglected Tropical Diseases*”. Geneva: WHO.

UNAIDS (2001). *Sources and Prices of Selected Drugs and Diagnostics for People Living with HIV/AIDS*. Geneva: WHO.