

COMMUNITY HEALTH III

DIPLOMA IN CLINICAL MEDICINE & SURGERY

KMTC

2ND YEARS [YEAR 2 SEMESTER 2]

MODULE 37: COMMUNITY HEALTH III

Code: CHE 223; Hours - 30; Credits - 3

Pre-requisite(s): successfully covered and passed all units in CHE 113 and CHE 213 (Community Health I & II), Research and statistics

Module Competence

- ▶ This Module is designed to enable the learner acquire knowledge and applications of epidemiological approaches in the management, prevention and control of communicable and non-communicable diseases.

Module Outcomes

- By the end of this module the learner should: -
1. Apply epidemiological data and concepts in investigation and control measures of disease determinants in a community
 2. Apply the principles of epidemiology in prevention, control and management of communicable diseases in the community.
 3. Apply the principles of epidemiology in prevention, control and management of non-communicable diseases in the community.
 4. Carry out community diagnosis

Module Units

Module Name

Hours

Theory

Practical

1. Principles of epidemiology	6	0
2. Community Diagnosis	4	0
3. Communicable diseases	12	0
4. Non communicable diseases	8	0

Module Content

1. **Principles of epidemiology:** Definitions of terms, purpose of epidemiology, differences between epidemiological and clinical focus, sources of epidemiological information, mortality and morbidity statistics, epidemiological concepts, epidemiological studies.
2. **Communicable diseases:** Definition, standard case definition, classification, principles in management, prevention and control, notification and reporting of emerging and re-emerging infections, infestations, specific communicable diseases.

Module Content - Continued

- 3. Non-communicable diseases (NCDs):** Definition, classification, causes, direct and risk factors, types of risk factors, modifiable risk factors, shared risk factors, metabolic risk factors, social determinants of health, urbanization and its impact on NCDs, tobacco, alcohol, obesogenic environment, childhood obesity, the nutrition transition, food marketing and advertisements, physical inactivity, mental health and other NCDs, finances, the role of youth as a vulnerable group with an operational role, principles of management, prevention, control, notification, specific non-communicable diseases.
- 4. Community Diagnosis:** Concepts of community diagnosis, community needs assessment / diagnosis, importance of community diagnosis. Steps in community diagnosis.

Reference

1. DiClemente, R.J., Crosby R.A. and Kegler, M.C. (eds). (2002). Emerging Theories in Health Promotion Practice and Research: Strategies for Improving Public Health. San Francisco: Jossey-Bass, John Wiley & Sons.
2. Green, L. W., and Ottoson, J. M. (1998). Community and Population Health, 8th ed. St. Louis New York and Toronto: WCBMcGraw-Hill.
3. Taylor, R. & Taylor, B. (1994). AUPHA Manual of Health Services Management. Massachusetts: Jones and Burtlett Publishers
4. Bowden, J. C. and Manning, V. (2006). Health Promotion in Midwifery: Principles and Practice, New York: Hodder Amold

Reference - Continued

5. Elwes, I., (ed.) (2005). Key Topic in Public Health: Essential Briefings on Prevention and Health Promotion. Edinburgh: Elsevier
6. Naidoo, J. and Wills, J. (2009). Foundations of Health Promotion. Oxford: Saunders.
7. Hawker, J., Begg, N., Blair, I., Reintjes, R. and Weinberg, J (2005). Communicable Disease Control Handbook. Massachusetts: Blackwell Publishing.
8. Heymann, D. (Ed) (2004). Control of Communicable Diseases Manual. Washington, DC: American Public Health Association.
9. Nordberg, E. and Kingondu, T. (2007) Communicable Diseases, 4th ed. Nairobi: AMREF

Mode of Learning

1. Interactive Lectures
2. Participatory learning
3. Group Discussions
4. Assignments
5. ELearning Session

Content Delivery:

Week	Dates		Unit
	From	To	
Week 1:			Principles of epidemiology, introduction, definitions, purpose of epidemiology, epidemiological focus, clinical focus
Week 2:			Objective of epidemiology, uses of epidemiology
Week 3			Sources of epidemiological data
Week 4			Mortality and morbidity statistics, epidemiological concept
Week 5:			Epidemiological studies
Week 6:			Communicable diseases, definition, standard case definition, classification,
Week 7:			Principles of management, management and control of an epidemic, specific communicable diseases-faeco-oral route diseases
Week 8:			Emerging and re-emerging disease
Week 9:			cats
Week 10:			specific communicable diseases-airborne diseases
Week 11			Water-related diseases
Week 12:			Non-communicable diseases, Definitions, classification, causes, direct and risk factors,
Week 13:			types of risk factors, modifiable risk factors, shared risk factors, metabolic risk factors, Social determinants of Health, Urbanization and its impact on NCDs, tobacco, alcohol, obesogenic environment, childhood obesity, the nutrition transition,
Week 14:			Food marketing and advertisements, Physical inactivity, Mental Health and other NCDs, Finances, The role of youth as a vulnerable group with an operational role, principles of management, prevention, control,
Week 15:			Specific non-communicable diseases.
Week 16:			Specific non-communicable diseases.
Week 17:			Study week
Week 18:			End of Semester Examinations

Introduction:

Epidemiology

- ❑ The word epidemiology comes from the Greek words **epi**, meaning on or upon, **demos**, meaning people, and **logos**, meaning the study of.
- ❑ In other words, the word epidemiology has its roots in the study of what befalls a population.
- ❑ **Epidemiology is:** the branch of medicine that studies the patterns of disease occurrence in human population and the factors that influence these patterns.

OR

- ❑ The study of distribution and determinants of disease in human population

OR

- ❑ The study of distribution and determinants of health and disease states in human populations

OR

- ❑ The study of the factors that influence the occurrence and distribution of disease among the human population
- ❑ It studies the **disease distribution** and **determinants** in the populations.
- ❑ Epidemiology tend to use the 5 W's in characterizing epidemiologic events: diagnosis or health event (**what**), person (**who**), place (**where**), time (**when**), and causes, risk factors, and modes of transmission (**why/how**).
- ❑ It is also important to note that although epidemiology is a discipline, it has an Historical Evolution. Epidemiology's roots are nearly 2500 years old.
- ❑ **Disease** is the inability of the individual to function, physically, mentally and socially at a level that is both individually satisfying and appropriate to the stage of growth and development of the individual. (Hardley,1974).

Definitions:

- ❑ **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
- ❑ Major components of the definition
 - Key terms in this definition reflect some of the important principles of epidemiology.
- ❑ **Study:** Epidemiology is a scientific discipline with sound methods of scientific inquiry at its foundation. Epidemiology is data-driven and relies on a systematic and unbiased approach to the collection, analysis, and interpretation of data.

- **Distribution:** Epidemiology is concerned with the **frequency** and **pattern** of health events in a population:
 - **Frequency** refers not only to the number of health events such as the number of cases of meningitis or diabetes in a population, but also to the relationship of that number to the size of the population. The resulting rate allows epidemiologists to compare disease occurrence across different populations.
 - **Pattern** refers to the occurrence of health-related events by time, place, and person.
- **Determinants:** **Epidemiology** is also used to search for determinants, which are the causes and other factors that influence the occurrence of disease and other health-related events.

- ❑ **Health-related states or events:** Health related conditions (states or events) are conditions which directly or indirectly affect or influence health. These may be injuries, births, health related behaviors like smoking, unemployment, poverty etc. Epidemiology is concerned not only with disease but also with other health related conditions because every thing around us and what we do also affects our health.
- ❑ **Specified populations:** The main focus of epidemiology is on the effect of disease on the population rather than individuals. For example malaria affects many people in Place A but lung cancer is rare. If an individual develops lung cancer, it is more likely that he/she will die.
- ❑ Epidemiology is concerned about the collective health of the people in a community or population.

- **Application:** Epidemiology is not just “the study of” health in a population; it also involves applying the knowledge gained by the studies to community-based practice. Epidemiology involves application of the studies to the promotion of health and to the prevention and control of health problems. This means the whole aim in studying the frequency, distribution, and determinants of disease is to identify effective disease prevention and control strategies.

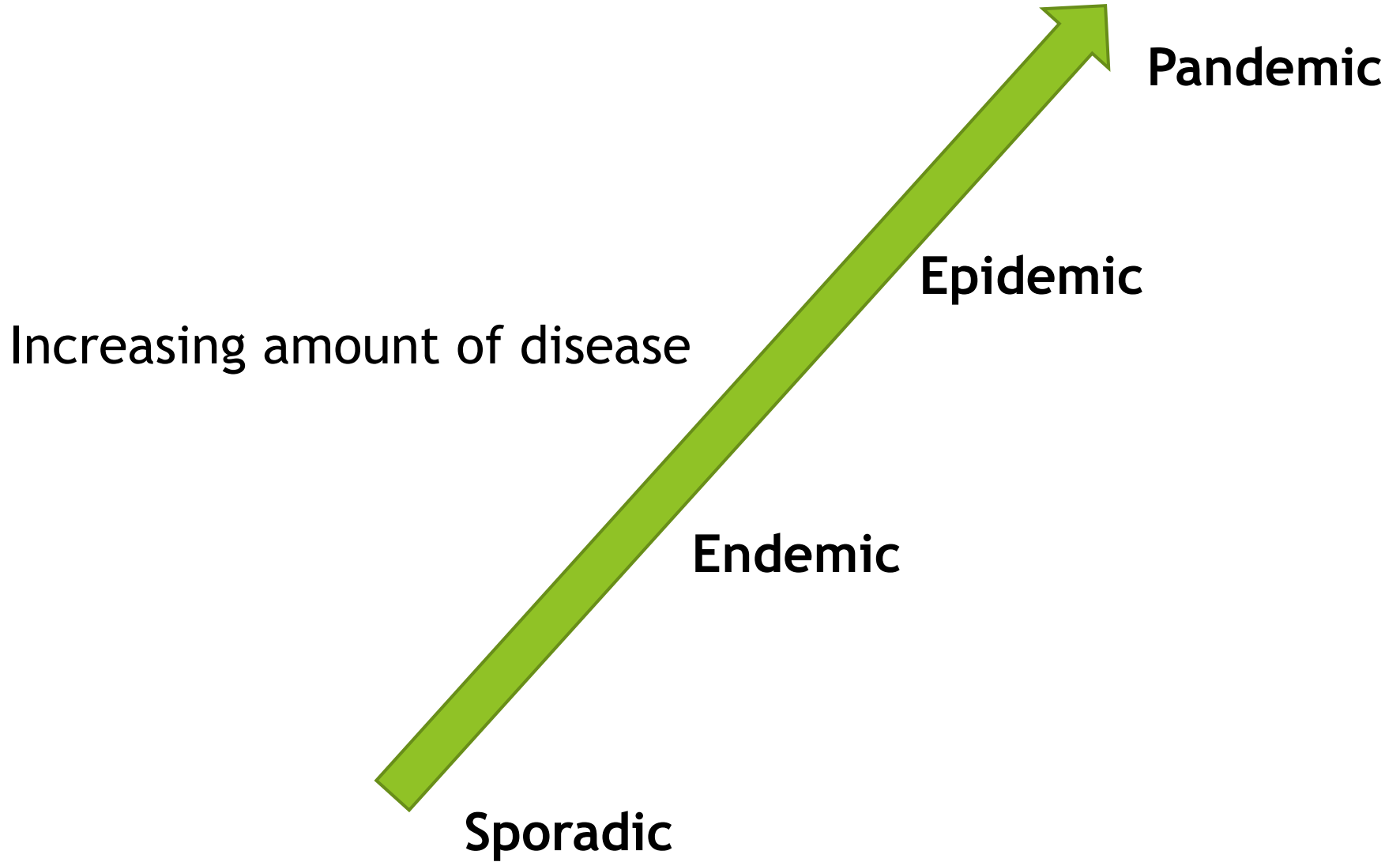
Summary

- Epidemiology is the study (scientific, systematic, data-driven) of the distribution (frequency, pattern) and determinants (causes, risk factors) of health-related states and events (not just diseases) in specified populations (patient is community, individuals viewed collectively), and the application of (since epidemiology is a discipline within public health) this study to the control of health problems.

Basic Epidemiology Terms - Disease Frequency

- ❑ **Endemic** - disease or condition present among a population at all times
- ❑ **Outbreak** - (localized epidemic) - more cases of a particular disease than expected in a given area or among a specialized group of people over a particular period of time.
- ❑ **Epidemic** - large numbers of people over a wide geographic area affected.
- ❑ **Pandemic** - An epidemic occurring over a very wide area (several countries or continents) and usually affecting a large proportion of the population.
- ❑ **Sporadic** - a disease that occurs infrequently and irregularly

Level of Disease



Endemic vs Epidemic vs Pandemic



ENDEMIC



EPIDEMIC



PANDEMIC



Knowledge Check

Match each term with the correct example.

A. endemic

B. pandemic

C. epidemic

- _____ 1. Malaria is present in Africa at all times because of the presence of infected mosquitoes. Malaria is _____ in Africa.
- _____ 2. The Ebola virus in parts of Africa is in excess of what is expected for this region. This virus is a/an _____.
- _____ 3. HIV/AIDS is one of the worst global diseases in history. It is a/an _____.

- ❑ **Cluster** - an aggregation of cases over a particular period esp. cancer & birth defects closely grouped in time and space regardless of whether the number is more than the expected number. (often the expected number of cases is not known.)
- ❑ **Risk** - The probability that an individual will be affected by, or die from, an illness or injury within a stated time or age span.
- ❑ **Rate** - number of cases occurring during a specific period; always dependent on the size of the population during that period.
- ❑ **Ratio** - value obtained by dividing one quantity by another - a ratio often compares two rates.
- ❑ **Proportion** - the comparison of a part to the whole as the number of cases divided by the total population - does not have a time dimension, It can be expressed as a decimal, a fraction, or a percentage.



Knowledge Check

Choose the correct answer.

- A. distribution B. cluster C. determinant

In March 1981, an outbreak of measles occurred among employees at Factory X in Fort Worth, Texas.

This group of cases in this specific time and place can be described as a _____.

Uses (Purposes) of epidemiology

- ❑ Description of health status of a population
 - To describe the distribution and extent of a disease problem in human population. Assessing the community's health. To make a community diagnosis.
- ❑ Evaluation of program or treatment
 - To provide the data essential to the planning, implementation and evaluation of services for the prevention, control and treatment of disease and to set up priorities among these services. Making individual decisions
- ❑ Assessing causation
 - To identify aetiological factors in the pathogenesis of disease.
Searching for causes
- ❑ Outbreak investigation
- ❑ Surveillance
- ❑ Interpreting public health literature
- ❑ Screening
- ❑ Natural history studies
 - Contributes to understanding of the clinical picture and natural history of disease. Complete the clinical picture

Objectives (aims) of epidemiology

Epidemiology helps to

- ❑ Determine the magnitude and trends
 - To know the magnitude of the problem
 - To know the distribution of the disease in the community
- ❑ Identify the aetiology or cause of disease
 - To identify the etiological and risk factors in the development of disease
- ❑ Determine the mode of transmission
- ❑ Identify risk factors or susceptibility
- ❑ Determine the role of the environment
- ❑ Evaluate the impact of the control measures
 - To plan for the implementation of prevention and control measures
 - To evaluate the control measures
- ❑ To promote the health and well-being of the people
- ❑ To eliminate or eradicate the disease

Core Epidemiologic Functions

In the mid-1980s, five major tasks of epidemiology in public health practice were identified:

1. Public Health Surveillance
 - ❑ is the ongoing, systematic collection, analysis, interpretation, and dissemination of health data to help guide public health decision making and action.
2. Field Investigation
 - ❑ Investigations often lead to the identification of additional unreported or unrecognized ill persons who might otherwise continue to spread infection to others.
3. Analytic Studies
 - ❑ Rigorous methods are needed to evaluate credibility of hypotheses.
4. Evaluation
 - ❑ Is the process of determining, as systematically and objectively as possible, the relevance, effectiveness, efficiency, and impact of activities with respect to established goals
5. Linkages. Epidemiologists rarely act in isolation.
6. Policy Development (A Sixth Task, Was Recently Added)
 - ❑ Regularly provide input, testimony, and recommendations regarding disease control strategies, reportable disease regulations, and health-care policy.

Epidemiological focus verses and clinical focus

- ❑ One defining differences is the primary unit of concern. The primary unit of concern in epidemiology is the group, while the primary unit of concern in clinical is the individual.
- ❑ One major difference between the clinician's and the epidemiologist's perspective is the focus on individual patients versus the population at large.
- ❑ Epidemiology focus on the distribution and determinants of disease. Epidemiology may also be considered the method of public health—a scientific approach to studying disease and health problems. The primary unit of concern in epidemiology is the group.
- ❑ Clinical Approach - primary role is diagnosis and treatment of illness in individuals

Clinic vs. Epidemiology

S/No.	Clinician	Epidemiologist
1	Person (Individuals)	Population
2	Medical history, physical examination	Surveillance descriptive epidemiology
3	Differential diagnosis	Comparison
4	Diagnostic test	Analytical epidemiology
5	Treatment	Intervention (prevention / control)

Sources of Epidemiological Information

- ❑ There are different sources of data (health information) on health and health related conditions in the community. Each source has advantages and limitations. The information obtained from these sources is used for health planning, programming and evaluation of health services.
- ❑ Major sources are the following:
 1. Census
 2. Vital statistics
 3. Health Service Records
 4. Health Surveys

1. Census

- ❑ Census is defined as a periodic count or enumeration of a population.
- ❑ It is a process of collecting, compiling and publishing demographic, economic and social data pertaining at a specified time to all persons in a country.
- ❑ Census data are necessary for accurate description of population's health status and are principal source of denominator for rates of disease & death.
- ❑ It provides information on: (1) Size and composition of a population (2) The trends anticipated in the future.
- ❑ Examples of data found in census: Age, sex and size of the population; Mortality, fertility; Language, ethnicity; Housing.

- ❑ From these data different health indices could be calculated. Crude birth rate, crude death rate, age specific mortality rate and sex specific mortality rate are some of the examples of the indicators that could be calculated.

Advantages of census

- ❑ It is the most accurate count of a country's population on which official planning can be based upon.
- ❑ It captures a wide spectrum of a country's population data and characteristics.
- ❑ It has a wider coverage of a country's population as well as other variables such as housing, income, sanitation etc.

Limitation / Disadvantages of census

- ❑ Conducting nationwide census is very expensive and it generates a large amount of data which takes a very long time to compile and analyze.
- ❑ It is carried in intervals of many years. Therefore it can't assess yearly changes.

2. Vital statistics (Registration of vital events)

- ❑ This is a system by which all births and deaths occurring nationwide are registered, reported and compiled centrally. Certificate is issued for each birth and death. It is the source of information for the calculation of birth and death rates.
- ❑ Registration of vital events keeps continuous check on demographic changes. Complete and accurate registration is a reliable source of health data
- ❑ Vital events include legal registration, statistical recording and reporting of the occurrence of and the collection, compilation, presentation, analysis and distribution of statistics pertaining to vital events such as live births, deaths, foetal deaths, marriages, divorces, adoptions, separations

The main characteristics of vital statistics are:

- ❑ Comprehensive - all births and deaths should be registered.
- ❑ Compulsory by law - should be enforced by law.
- ❑ Compiled centrally so that it can serve as a source of information.
- ❑ Continuous - it should be an ongoing process.

3. Health Service Records (Hospital records)

- ❑ Data constitute a basic and primary source of information about disease prevalence
- ❑ All health institutions report their activities to the Ministry of Health through the various health facilities. The Ministry compiles, analyzes and publishes it in the health service directory. It is therefore the major source of health information.

- ❑ Provide information on geographic sources of patients, age and sex distribution of disease and duration of hospital stay, distribution of diagnosis, association between different diseases, period between disease and hospital admission, distribution of patient according to different social and biological characteristics and cost of care.
- ❑ Considered A poor guide to the estimation of disease frequency

Advantages:

- ❑ Easily obtainable
- ❑ Available at low cost
- ❑ Continuous system of reporting
- ❑ Causes of illness and death available

Limitations of health service records:

- ❑ Lack of completeness - health service coverage is low.
- ❑ Lack of representativeness - a small proportion of diseased population seeks medical advice. Those patients who remained at home are not reported.
- ❑ Lack of denominator - catchment area is not known in the majority of cases.
- ❑ Lack of uniformity in quality.
- ❑ Diagnosis varies across the level of health institutions.
- ❑ Lack of compliance with reporting.
- ❑ Irregularity and incompleteness of published compilations.

4. Health Surveys

- ❑ Health surveys are studies conducted on a representative sample population to obtain more comprehensive data for monitoring the health status of a population.
- ❑ There are two types of health surveys:
 1. Surveys of specific diseases: These are studies conducted on each specific disease. Examples are: EPI target diseases, Diarrheal Diseases, HIV/AIDS, Trachoma, Tuberculosis / Leprosy
 2. Surveys of general health status: These are studies on general health status of the population. They are based on interview, physical examination and laboratory tests. They are expensive. These **Population surveys** are for evaluating health status of a population - community diagnosis and for investigation of factors affecting health and disease-environment, occupation

- ❑ Helpful for studying the natural history of disease , obtaining new information about disease aetiology and risk factors

Advantages of surveys based on interview:

- ❑ They are more representative of the health condition of the community.
- ❑ The denominator is known.
- ❑ Data are more uniform in quality.

Limitations:

- ❑ Data accuracy is dependent on the memory and cooperation of the interviewee.
- ❑ Surveys are expensive.

Other Sources of Epidemiological Information

5. Notification (Notification of Infectious Diseases)

- ❑ A notification is the reporting of certain diseases or other health-related conditions by a specific group, as specified by law, regulation, or agreement.
- ❑ There are some internationally notifiable diseases. WHO member states report on Plague, Cholera, and Yellow fever. Moreover, every country has its own list of notifiable diseases. A few others such as Lassa fever, SARS, H1N1 influenza , etc. are placed under international surveillance.
- ❑ Provides valuable information about fluctuation of disease frequency and early warning about new occurrences or outbreaks of disease
- ❑ The major problems related to this source (health service records) are low compliance and delays in reporting.

6) Epidemiological surveillance

- ❑ Particular diseases are endemic, targeted for control, elimination and eradication.
- ❑ Surveillance systems are set up to report on occurrence of new cases and efforts to control the diseases

7) Active epidemiological surveillance

- ❑ In-depth search for cases of a few selected diseases likely to cause epidemics e.g. sentinel surveillance for EPI diseases

8) Computerized bibliographic database

- ❑ DHS - Demographic Health Survey; DOLPHIN- Data online for Population, Health and Nutrition, GIDEON - Global Infectious Disease and Epidemiology Network

9) Reanalysis or Secondary Use of Data

- ❑ Surveillance for a health problem can use data originally collected for other purposes – a practice known as the reanalysis or secondary use of data. This approach is efficient but can suffer from a lack of timeliness, or it can lack sufficient detail to address the problem under surveillance.

10) Record linkage

- ❑ It is used to describe the process of bringing together records relating to one individual, the records originating in different times and places.

11) Registries (e.g. - Disease registers)

- ❑ Maintaining registries is a method for documenting or tracking events or persons over time
- ❑ Certain registries are required by law (e.g., registries of vital events).
- ❑ Registries are more specific because they are intended to be a permanent record of persons or events.
- ❑ Morbidity registers are a valuable source of information as to duration of illness, case fatality and survival
- ❑ Registers allow follow up of patients and provide continuous account of frequency of disease in the absence of population base, useful information may be obtained from registers on natural course of disease.
- ❑ It can provide data on morbidity from the particular diseases, treatment given and disease -specific mortality

Methods of data collection

- ❑ Data collection is the process of gathering and measuring information on variables of interest, in an established systematic fashion that enables one to answer stated research questions, test hypotheses, and evaluate outcomes.
- ❑ The main methods of collecting information are:
 1. Observation
 2. Interview and questionnaires
 3. Documentary sources - Clinical records and other personal records, death certificates, publications etc.
- ❑ Data collected for health-related purposes typically come from three sources, individual persons, the environment, and health-care providers and facilities. Moreover, data collected for non health-related purposes (e.g., taxes, sales, financial, legal or administrative data) might also be used for surveillance of health-related problems.

□ Below is a Summary of health and non-health-related sources of data with examples that can be used for surveillance of specific health problems.

Data Sources and Collection Methods

Source	Method	Example
Individual persons	<ul style="list-style-type: none"> • Questionnaire • Survey 	<ul style="list-style-type: none"> • Foodborne illness outbreak • CDC's National Health and Nutrition Examination Survey • Health data on U.S. residents
Environment	<ul style="list-style-type: none"> • Samples from the environment (river water, soil) • Sensors for environmental changes 	<ul style="list-style-type: none"> • Collection of water from area streams — check for chemical pollutants • Air-quality ratings
Health care providers	<ul style="list-style-type: none"> • Notifications to health department if cases of certain diseases are observed 	<ul style="list-style-type: none"> • Report cases of meningitis to health department
Nonhealth-related sources (financial, legal)	<ul style="list-style-type: none"> • Sales records • Court records 	<ul style="list-style-type: none"> • Cigarette sales • Intoxicated driver arrests

MORTALITY AND MORBIDITY STATISTICS

- ❑ Epidemiology is mainly a quantitative science. Measures of disease frequency are the basic tools of the epidemiological approach. Health status of a community is assessed by the collection, compilation, analysis and interpretation of data on illness (**morbidity**), death (**mortality**), disability and utilization of health services.
- ❑ The most basic measure of disease frequency is a simple **count** of affected individuals. Such information is useful for public health planners and administrators for proper allocation of health care resources in a particular community.
- ❑ However, to investigate distributions and determinants of disease, it is also necessary to know the size of the source population from which affected individuals were counted

- One of the central concerns of epidemiology is to find appropriate denominators in order to describe and compare groups in a meaningful and useful way. Such measures allow direct comparisons of disease frequencies in two or more groups of individuals.
- **The Basic Epidemiologic Methods used are:-**
 - ◆ Count cases (events)
 - ◆ Define involved population
 - ◆ Determine rates/proportions
 - ◆ Compare rates
 - ◆ Make inferences
- **Epidemiology involves “3 Steps”**
 - ◆ Counting number of events or conditions in populations or subgroups of persons. (C)

◆ Dividing the number of events by the number of persons in the population to make rates. (D)

◆ Comparing rates from different populations to make inferences about the cause for the observed differences in rates. (C)

□ This 3 steps leads us in to understanding measurement of disease occurrence.

MEASUREMENT OF DISEASE OCCURRENCE

□ Measurement is fundamental to Epidemiologic practice

□ Epidemiological studies are designed to Identify disease determinants, describe and compare disease trends and evaluate public health interventions aimed at controlling health problems

- ❑ **Measures of disease occurrence** are used when we are interested only in quantifying an event (the outcome), and our analysis does not extend further to take into account exposures. When we want to relate the effect of a certain exposure to an outcome, we will then need to use what we call measures of effects.
- ❑ Different measures may be used to describe how often disease (or another health event) occurs in a population.
- ❑ Incidence expresses the development of new cases and is mostly used against the background of prevention, to assess disease etiology or to determine the risk factors of disease

- Measures of disease frequency: Discussion
 - Counts
 - Rate
 - Proportion
 - Ratio

COUNTS

- Number of cases
- On its own offers little information
- Counting number of events or conditions in populations or subgroups of persons
- The first step in descriptive epidemiology
- How many persons experienced a particular condition?
- Count = 'numerator'

RATE

- ❑ The division of 2 numbers
- ❑ Time included in the denominator
- ❑ Speed of occurrence of an event over time
- ❑ Rate may be expressed in any power of 10: - 100, 1000, 10000, 100 000...
- ❑ Dividing the number of events by the number of persons in the population to make rates.
- ❑ The second step in descriptive epidemiology.
 - What group of persons experienced the event?
 - Population group = denominator.
 - Use events and population to make: proportions, rates, odds.
- ❑ Rates help us compare health problems among different populations that include two or more groups who differ by a selected characteristic

Rate Formula

- To calculate a rate, we first need to determine the frequency of disease, which includes
 - The number of cases of the illness or condition
 - The size of the population at risk
 - The period during which we are calculating the rate

$$\text{Rate (\%)} = \frac{\text{number of cases}}{\text{population at risk}} \times 100$$

- Rate = $\frac{\text{Number of events in a specified period}}{\text{Population at risk of the events in a specified period}} \times K$

K = any power of 10: e.g. 100, 1,000, 10,000 etc.

- ❑ Rate is the most important epidemiological tool used for measuring diseases. Rate is a special form of proportion that includes time.
- ❑ It is the measure that most clearly expresses probability or risk of disease in a defined population over a specified period of time, hence, it is considered to be a **basic measure of disease occurrence**. Accurate count of all events of interest that occur in a defined population during a specified period is essential for the calculation of rate.

Example of rate:

- ❑ The number of newly diagnosed pneumonia cases in 1999 per 1000 under five children.

PROPORTION

- ❑ The division of 2 numbers (related)
- ❑ Numerator always included in the denominator
- ❑ Quantities have to be of same nature
- ❑ Proportion always ranges between 0 and 1
- ❑ Percentage = proportion x 100
- ❑ A proportion quantifies occurrences in relation to the populations in which these occurrences take place. It is a specific type of ratio in which the numerator is included in the denominator and the result is expressed as a percentage.
- ❑ Example: The proportion of all births that was male

Method for calculating a proportion

$$\frac{\text{Male births}}{\text{Male + Female births}} \times 100$$

$$\frac{\text{Number of persons or events with a particular characteristic}}{\text{Total number of persons or events, of which the numerator is a subset}} \times 10^n$$

For a proportion, 10^n is usually 100 (or $n = 2$) and is often expressed as a percentage.

RATIO

- ❑ The division of two numbers (unrelated)
- ❑ Numerator not included in the denominator
- ❑ Allows comparison of quantities of different nature
- ❑ A ratio quantifies the magnitude of one occurrence or condition to another. It expresses the relationship between two numbers in the form of $x:y$ or x/y X k
- ❑ Example:
 - The ratio of males to females (M:F) in Kenya.
 - The ratio of male malaria patients to female malaria patients
- ❑ This makes Epidemiology: Step 3 -Comparing
- ❑ Comparing rates from different populations to make inferences

- ❑ Comparison of rates to make rate ratios or rate differences.
- ❑ Comparison of odds to make odds ratios.
- ❑ Use ratios or differences to identify risk factors.
- ❑ Use statistical tests to determine reliability of ratios or differences.
- ❑ Analytic epidemiology
 - Cohort (exposed vs. non-exposed)
 - Case-control (sick vs. healthy)

Method for calculating a ratio

$$\frac{\text{Number or rate of events, items, persons, etc. in one group}}{\text{Number or rate of events, items, persons, etc. in another group}}$$

- ❑ After the numerator is divided by the denominator, the result is often expressed as the result “to one” or written as the result “:1.”

MEASUREMENT OF MORBIDITY (DISEASE OCCURRENCE)

- ❑ Is the measurement of the amount of disease in a given population. It is measured in terms of incidence and prevalence rates.
- ❑ Morbidity rates are rates used to quantify the occurrence of disease. Measures of morbidity include incidence, prevalence (period prevalence and point prevalence rates).
- ❑ Morbidity has been defined as any departure, subjective or objective, from a state of physiological or psychological well-being. In practice, morbidity encompasses disease, injury, and disability.

INCIDENCE RATES

- ❑ Number of new cases of a disease occurring in a specified time period divided by the number of individuals at risk of developing the disease during the same time

- **Incidence of a disease** is defined as the number of new cases of a disease that occur during a specified period of time in a population at risk for developing the disease

$$\text{Incidence} = \frac{\text{Number of New cases in a specified period}}{\text{Population at risk during the period}} \times 1000$$

$$\text{Incidence rate} = \frac{\text{Number of new cases of a disease over a period of time}}{\text{Total Population during the given period of time}} \times K$$

- The critical element in the definition of incidence is **new cases** of disease. Because incidence is a measure of new events (i.e. transition from a non-diseased to a diseased state), incidence is a measure of risk.
- Incidence refers to the occurrence of new cases of disease or injury in a population over a specified period of time.

- ❑ The appropriate denominator for incidence rate is population at risk but knowing the **population at risk** is difficult at this level. Hence, total population can be used as a denominator.
- ❑ Another important issue in incidence is the issue of **time**. For incidence to be a measure of risk we must specify a period of time and we must know that all of the individuals in the group represented by the denominator have been followed up for that entire period.
- ❑ The choice of time period is arbitrary: We could calculate incidence rate in one week, one month, one year, 5 years, and so on.
- ❑ Incidence rates can be used to make statements about the risk of disease. If the incidence rate of a certain disease is high in one area, then the risk of acquiring that disease by other healthy individuals will be high.

- Example. In Ginbot 1995 there were 50 new cases of relapsing fever in “Kebele X”. The average total population of “Kebele X” was 5000. Calculate the incidence rate of relapsing fever in “Kebele X” in Ginbot 1995.

Answer:

- Incidence rate = $\frac{50}{5,000} \times 1000 = 10$ new cases per 1000 population
- That means out of every 1000 people living in “Kebele X”, 10 of them acquired relapsing fever in Ginbot 1995.

Uses incidence rate

- Incidence rate is important as a fundamental tool for etiologic studies of diseases since it is a direct measure of risk. If the incidence rate is significantly higher in one area, then the cause of that disease can be systematically searched.

- ❑ Two types of incidence are commonly used – **incidence proportion** and **incidence rate**.
- ❑ Incidence proportion is the proportion of an initially disease-free population that develops disease, becomes injured, or dies during a specified (usually limited) period of time.

Method for calculating incidence proportion (risk)

$$\frac{\text{Number of new cases of disease or injury during specified period}}{\text{Size of population at start of period}}$$

- ❑ **Incidence rate or person-time rate** is a measure of incidence that incorporates time directly into the denominator. A person-time rate is generally calculated from a long-term cohort follow-up study, wherein enrollees are followed over time and the occurrence of new cases of disease is documented.

Method for calculating incidence rate

$$\frac{\text{Number of new cases of disease or injury during specified period}}{\text{Time each person was observed, totaled for all persons}}$$

- Another commonly used measure of morbidity is **attack rate**. Attack rate is a type of incidence rate which is mainly used during epidemics.

$$\text{Attack rate} = \frac{\text{No. of new cases of a specific disease reported during an epidemic}}{\text{Total population at risk during the same time}} \times k$$

- On Tir 7, 1995, 100 people were invited by Ato Alemitegnaw for dinner. All of them ate the food that was served for dinner. The next day (Tir 8, 1995) 90 of the 100 people who ate that food developed diarrhea. Calculate the attack rate of diarrhea which occurred on Tir 8, 1995.

$$\text{Attack rate} = \frac{90}{100} \times 100 = 90 \text{ cases of diarrhea per 100 people}$$

- That means out of 100 people who ate the food served by Ato Alemitegnaw, 90 of them developed diarrhea on Tir 8, 1995.

PREVALENCE

- ❑ Total number of affected individuals in a population at a specified time period divided by the number of individuals in the population at the time
- ❑ This is the proportion of a defined group having a disease at a given point in time
- ❑ It is the number of affected persons present in the population at a specific time divided by the number of persons in the population at that time
- ❑ Chronic diseases have high prevalence rates
- ❑ Low prevalence rate of a disease indicates that the disease is fatal or gets cured easily

$$\text{Prevalence} = \frac{\text{No of cases of a disease in the population in a specified period} \times 1000}{\text{Number of persons in the population at that specified time}}$$

- ❑ Prevalence rate measures the number of people in a population who have a disease at a given time. It includes both new and old cases.
- ❑ The major type of prevalence is point prevalence rate.
- ❑ **Point Prevalence rate:** measures the proportion of a population with a certain condition at a given point in time. Point prevalence rate can be determined by conducting cross-sectional study.

$$\text{Point Prevalence rate} = \frac{\text{All persons with a specific Condition at one point in time}}{\text{Total population}} \times K$$

- ❑ Example: One health extension worker conducted a survey in one of the nearby elementary schools on Hidar 10, 1996 to know the prevalence of trachoma in that school. The total number of students in that school was 200.

- ❑ The health extension worker examined all the 200 students for trachoma. Hundred students were found to have trachoma. Calculate the point prevalence rate of trachoma for that school.
- ❑ Point prevalence rate
= $\frac{100}{200} \times 100 = 50$ trachoma patients per 100 students
on Hidar 10, 1996
- ❑ That means 50 % of the students in that elementary school were affected by trachoma on Hidar 10, 1996.
- ❑ **Period prevalence** refers to prevalence measured over an interval of time. It is the proportion of persons with a particular disease or attribute at any time during the interval.

Uses of prevalence rate

1. Planning health facilities and human resource
2. Monitoring chronic disease control programs like tuberculosis control program

Method for calculating prevalence of disease

$$\frac{\text{All new and pre-existing cases during a given time period}}{\text{Population during the same time period}} \times 10^n$$

Method for calculating prevalence of an attribute

$$\frac{\text{Persons having a particular attribute during a given time period}}{\text{Population during the same time period}} \times 10^n$$

- The value of 10^n is usually 1 or 100 for common attributes. The value of 10^n might be 1,000, 100,000, or even 1,000,000 for rare attributes and for most diseases.

□ Frequently Used Measures of Morbidity

Table 3.3 Frequently Used Measures of Morbidity

Measure	Numerator	Denominator
Incidence proportion (or attack rate or risk)	Number of new cases of disease during specified time interval	Population at start of time interval
Secondary attack rate	Number of new cases among contacts	Total number of contacts
Incidence rate (or person-time rate)	Number of new cases of disease during specified time interval	Summed person-years of observation or average population during time interval
Point prevalence	Number of current cases (new and preexisting) at a specified point in time	Population at the same specified point in time
Period prevalence	Number of current cases (new and preexisting) over a specified period of time	Average or mid-interval population

MEASUREMENT OF MORTALITY

- ❑ This is the measure of the amount death in a community
- ❑ Mortality rates and ratios measure the occurrence of deaths in a population using different ways.
- ❑ Rates whose denominators are the total population are commonly calculated using either the mid - interval population or the average population. This is done because population size fluctuates over time due to births, deaths and migration.

$$\text{Average Population: } \frac{\text{Population count at the beginning} + \text{population count at the end of the time interval considered}}{2}$$

- ❑ A mortality rate is a measure of the frequency of occurrence of death in a defined population during a specified interval.

- The formula for the mortality of a defined population, over a specified period of time, is:

$$\frac{\text{Deaths occurring during a given time period}}{\text{Size of the population among which the deaths occurred}} \times 10^n$$

- Below are given some formulas for the commonly used mortality rates and ratios.
- Mortality rates include crude death rate (CDR), case specific death rate (CSDR), crude fatality rate (CFR), infant mortality rate (IMR) and maternal mortality rate (MMR)

Crude Death Rate (CDR)

- CDR is the total number of deaths to residents in a specified geographic area (country, state, county, etc.) divided by the total population for the same geographic area (for a Specified time period, usually a calendar year) and multiplied by 1000

- ❑ The Crude Death Rate measures the proportion of the population dying every year, or the number of deaths in the community, per 1000 population. It reflects the risk of death in that community or country.
- ❑ CDR

$$\text{CDR} = \frac{\text{No. of deaths within a year}}{\text{Total mid-year population}} \times 1,000$$

$$\text{CDR} = \frac{\text{Total no. of deaths reported during a given time interval}}{\text{Estimated mid interval population}} \times 1000$$

Case Specific Death rate (CSDR)

- ❑ Measures the number of deaths attributed to a specific cause in a year divided by the total population that year

$$\text{Cause specific death rate} = \frac{\text{Number of death due to a particular cause (defined place and time period)}}{\text{Mid-period population (same place and time period)}} \times 1,000$$

Crude Fatality rate (CFR)

- ❑ Measures the proportion of episodes of illness that result in death
- ❑ Number of people who die from a disease out of those who had the disease within a given period of time divided by the number of cases of that disease in a given period

Sex- specific mortality rate

$$\text{Sex- specific mortality rate} = \frac{\text{No. of deaths in a specific sex during a given time}}{\text{Estimated mid interval population of same sex}} \times 1000$$

- Example: The average total population of “Kebele Y” in 1996 was 6000 (3500 female & 2500 male). In the same year 300 people died (100 female & 200 male). Calculate the mortality rate (Crude death rate) for females.
- CDR for females = $\frac{100}{3500} \times 1000 = 29$ per 1000 female population
- That means out of 1000 female population living in “Kebele Y”, 29 females died in 1996.

Proportionate mortality ratio

$$\text{Proportionate mortality ratio} = \frac{\text{No. of deaths from a specific cause during a given time}}{\text{Total no. of deaths from all causes in the same time}} \times 100$$

- The proportionate mortality ratio asks the question: What proportion of deaths are due to a certain cause? For example when we say the proportionate mortality ratio for HIV/AIDS is 30 %, this means out of 100 total (of all) deaths 30 of them died from HIV/AIDS.

Case Fatality Rate (CFR)

$$\text{Case Fatality Rate (CFR)} = \frac{\text{No. of deaths from a specific disease during a given time}}{\text{No. of cases of that disease during the same time}} \times 100$$

- ❑ Case fatality rate represents the probability of death among diagnosed cases or the killing power of a disease.
- ❑ Example: In 1996 there were 1000 tuberculosis patients in one region. Out of the 1000 patients 100 died in the same year. Calculate the case fatality rate of tuberculosis.
- ❑ $CFR = \frac{100}{1000} \times 100 = 10 \%$
- ❑ That means 10% of tuberculosis patients will die once they develop the disease

Neonatal Mortality Rate

Neonatal Mortality Rate = No. of deaths under 28 days of age reported

$$\frac{\text{during a given time}}{\text{No. of live births reported during the same time}} \times 1000$$

Under- five mortality rate

Under- five mortality rate = No. of deaths of 0-4 years of age

$$\frac{\text{during a given time}}{\text{Average (mid-year) population of the same age at the same time}} \times 1000$$

Maternal Mortality rate (MMR)

- Number of women who die as a result of child bearing in a given year per 1000 live births

$$\frac{\text{No. of deaths from (pregnancy, labour, etc)}}{\text{No. of live births during that year}} \times 1000$$

Maternal Mortality Rate = No. of pregnancy associated deaths of

$$\frac{\text{mothers in a given time}}{\text{No. of live births in the same time}} \times 100,000$$

Causes of maternal morbidity and mortality

- The major direct causes of maternal morbidity and mortality include hemorrhage, infection, high blood pressure (eclampsia), unsafe abortion, prolonged and obstructed Labour.
- Indirect causes including HIV/AIDS, malaria and TB, heart disease, anemia

Factors Contributing To Maternal Mortality

1. Difficulty of predicting and/or preventing obstetric complications
2. Lack of access to good quality maternal health services
3. Poor health before and during pregnancy
4. Women's low social and economic status
5. Biological factors e.g. age, parity

Frequently Used Measures of Mortality

Table 3.4 Frequently Used Measures of Mortality

Measure	Numerator	Denominator	10 ⁿ
Crude death rate	Total number of deaths during a given time interval	Mid-interval population	1,000 or 100,000
Cause-specific death rate	Number of deaths assigned to a specific cause during a given time interval	Mid-interval population	100,000
Proportionate mortality	Number of deaths assigned to a specific cause during a given time interval	Total number of deaths from all causes during the same time interval	100 or 1,000
Death-to-case ratio	Number of deaths assigned to a specific cause during a given time interval	Number of new cases of same disease reported during the same time interval	100
Neonatal mortality rate	Number of deaths among children < 28 days of age during a given time interval	Number of live births during the same time interval	1,000
Postneonatal mortality rate	Number of deaths among children 28–364 days of age during a given time interval	Number of live births during the same time interval	1,000
Infant mortality rate	Number of deaths among children < 1 year of age during a given time interval	Number of live births during the same time interval	1,000
Maternal mortality rate	Number of deaths assigned to pregnancy-related causes during a given time interval	Number of live births during the same time interval	100,000

MEASUREMENT OF FERTILITY

Crude Birth rate (CBR)

- Number of live births in a year divided by the total population in a year

$$\text{CBR} = \frac{\text{Number of live births in a year}}{\text{Total population that year}} \times 1000$$

General Fertility rate (GFR)

- Measure of fertility

$$\text{GFR} = \frac{\text{Number of live births in a year}}{\text{Number of women of child bearing age that year}} \times 1000$$

RISK OF A DISEASE

- ❑ Risk is the probability that an individual with some characteristics (e.g. age, race, gender, etc.) will experience a health status change over a specified follow-up time (risk period)
- ❑ Estimated by observing events among a population during a specified time
- ❑ Measures of risk in epidemiology include **absolute risk**, **relative risk** and **attributable risk**

Absolute Risk

- ❑ This is the incidence or prevalence of a disease in a population
- ❑ Indicates the magnitude of the risk in a group of people with a certain disease

$$\text{Ratio of risk (or of the incidence rate)} = \frac{\text{Disease risk in exposed}}{\text{Disease risk in non-exposed}}$$

$$\text{Difference in risks (incidence rate)} = \text{Disease risk (exposed)} - \text{Disease risk (non-exposed)}$$

Relative Risk (RR) or Odds Risk (OR)

- RR is the ratio of incidence of disease in exposed individuals to the incidence of disease in non-exposed

$$\text{Relative Risk (RR)} = \frac{\text{Risk in exposed}}{\text{Risk in non-exposed}}$$

$$\text{Incidence in exposed} = a/(a + b)$$

$$\text{Incidence in non-exposed} = c/(c + d)$$

$$\text{RR} = \frac{\text{Incidence in exposed}}{\text{Incidence in non-exposed}} = \frac{a/(a + b)}{c/(c + d)}$$

Interpretation

- $RR = 1$ - Risk in exposed equal risk in non-exposed (No association)
- $RR > 1$ - Risk in exposed greater than risk in non-exposed (positive association, possibly causal)
- $RR < 1$ - Risk in exposed less than risk in non-exposed (Negative association, possibly protective)

□ Example

Test Results	True Diagnosis		Total
	Disease	No Disease	
Positive	a (TP) 132	b (FP) 985	a + b (TP + FP) 1117
Negative	c (FN) 47	d (TN) 62,295	c + d (FN + TN) 62,342
Total	a + c (TP + FN)	b + d (FP+TN)	a + b + c + d (TP + FP + FN + TN)

$$RR = \frac{\text{Incidence in exposed}}{\text{Incidence in non-exposed}} = \frac{a/(a + b)}{c/(c + d)}$$

$$RR = \frac{132/1117}{47/62,342}$$

$$= \frac{0.118}{0.00075}$$

$$= 157 \text{ (Risk in exposed } > \text{ risk in non-exposed)}$$

OR is the ratio of the odds that cases were exposed to the odds that controls were exposed (from a case control/retrospective study), is an estimate of the RR

Attributable Risk (AR) / Attributable Fraction (AF)

- AR is the amount of disease incidence that can be attributed to a specific exposure
- AF is the proportion of disease incidence that can be attributed to a specific exposure (among those who were exposed)

EPIDEMIOLOGICAL CONCEPTS

It is concerned with the systematized study of:

- ❑ Whole population in their living and working environment
- ❑ Factors that determine a state of health and disease
- ❑ Patterns of health and those of illness
- ❑ Mass phenomena and effect of diseases or conditions of groups or individuals, as small as family or as large as a whole community, nation, or groups of nations
- ❑ Distribution and causes of human health problems
- ❑ Multiple factors of causation
- ❑ Measures of causation and prevention

EPIDEMIOLOGICAL TYPES

TYPES OF EPIDEMIOLOGY

- ❑ Epidemiology is divided into two components: descriptive and analytic epidemiology
- ❑ Descriptive epidemiology focuses on identifying and reporting both the pattern and frequency of health events in a population
- ❑ Analytic epidemiology focuses on the search for the determinants of health outcomes.
- ❑ The intention in carrying out epidemiological investigation of a disease may either be to describe its patterns of occurrence in a population, or to analyze the influences which determine that one person is infected while another is not.

Descriptive and Analytic Epidemiology

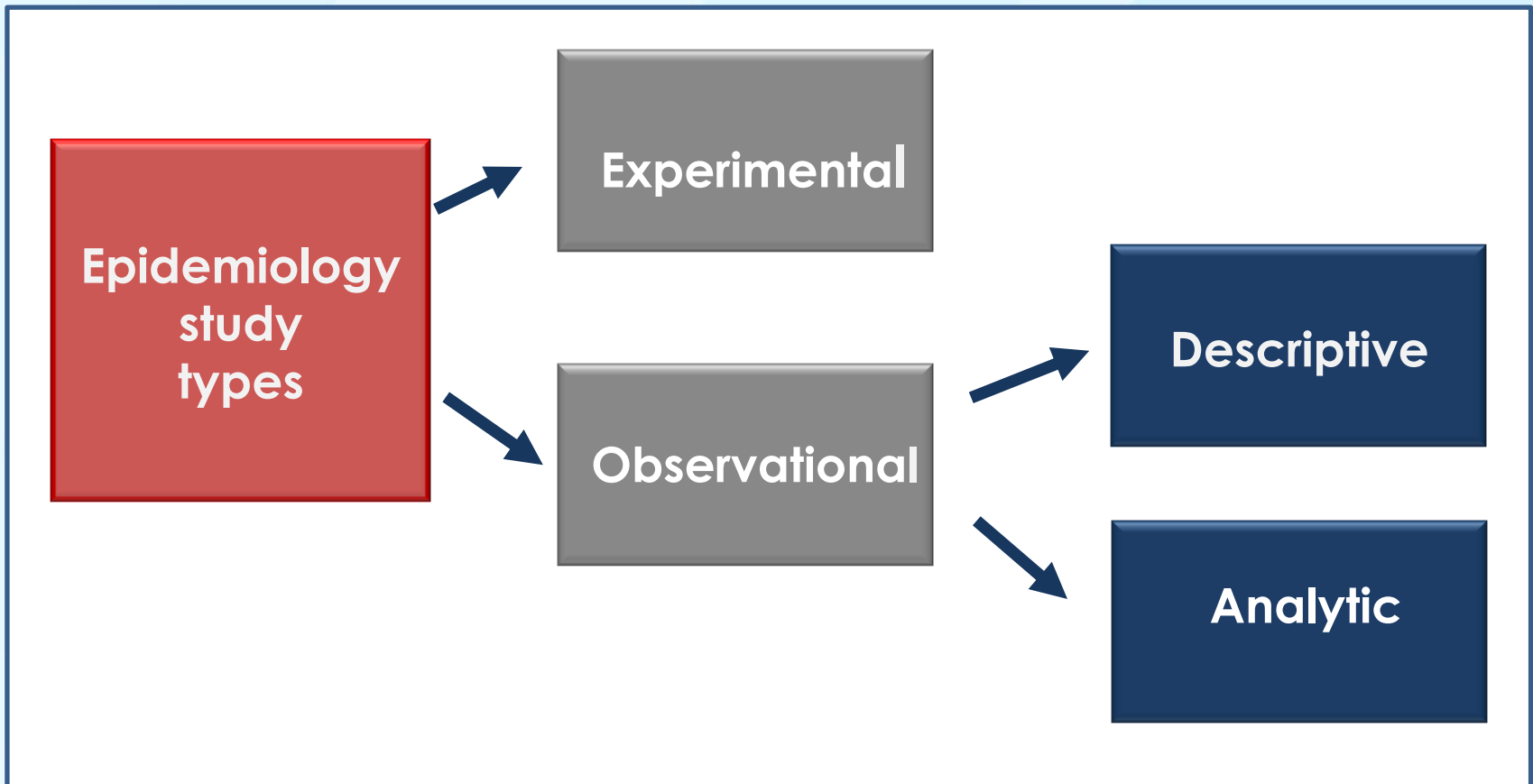
Descriptive epidemiology	Analytic epidemiology
When was the population affected?	How was the population affected?
Where was the population affected?	Why was the population affected?
Who was affected?	

EPIDEMIOLOGICAL STUDIES

Types of Epidemiological Studies

- ❑ Epidemiological studies can be classified as either observational or experimental.
- ❑ **Observational studies:** the investigator measures but does not intervene. They include studies that can be called descriptive or analytical:
- ❑ A descriptive study is limited to a description of the occurrence of a disease in a population and is often the first step in an epidemiological investigation.
- ❑ An analytical study goes further by analysing relationships between health status and other variables.
- ❑ **Experimental or intervention studies** involve an active attempt to change a disease determinant - such as an exposure or a behaviour - or the progress of a disease through treatment, and are similar in design to experiments in other sciences.

Epidemiology Study Types



Epidemiologic Study Designs

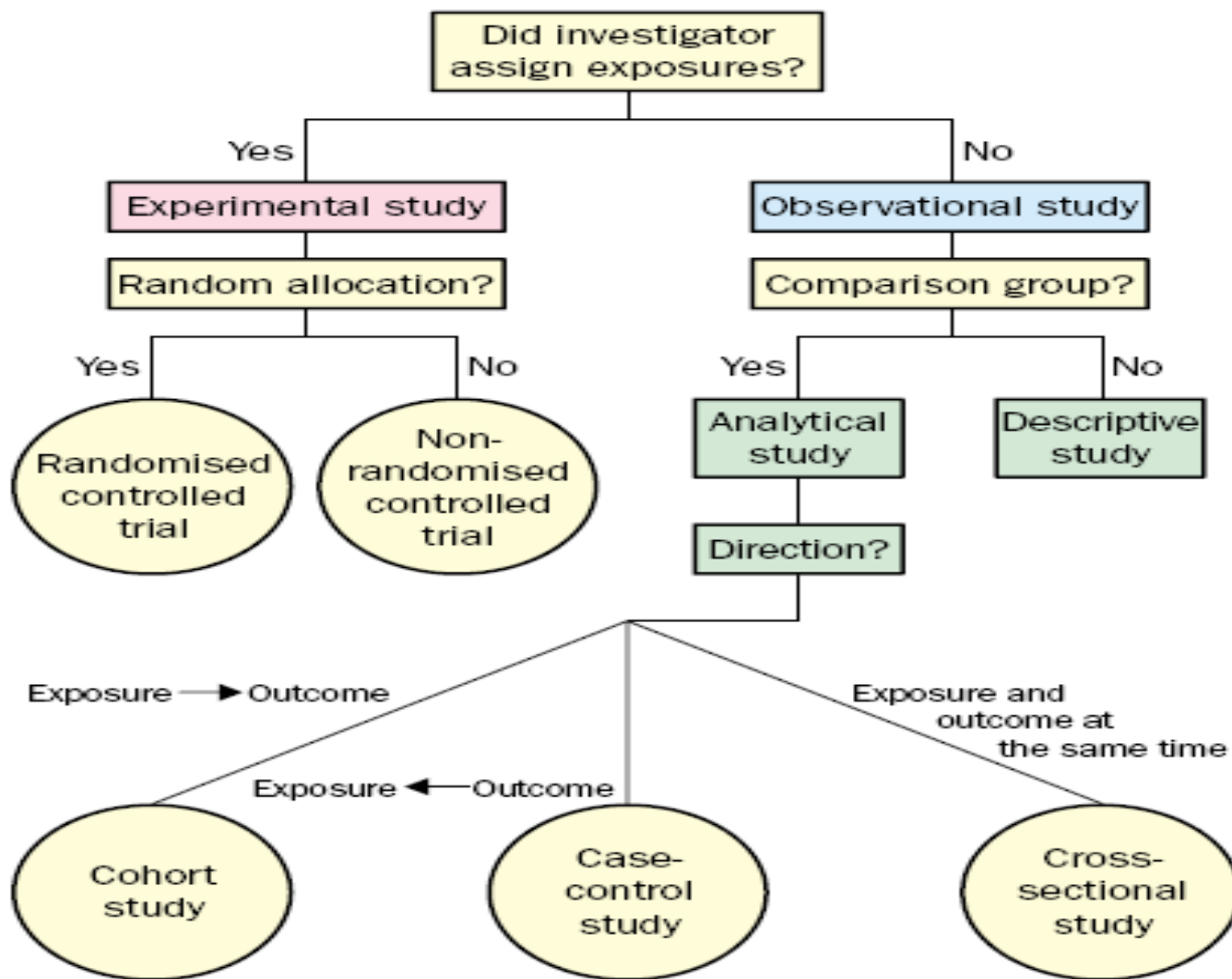
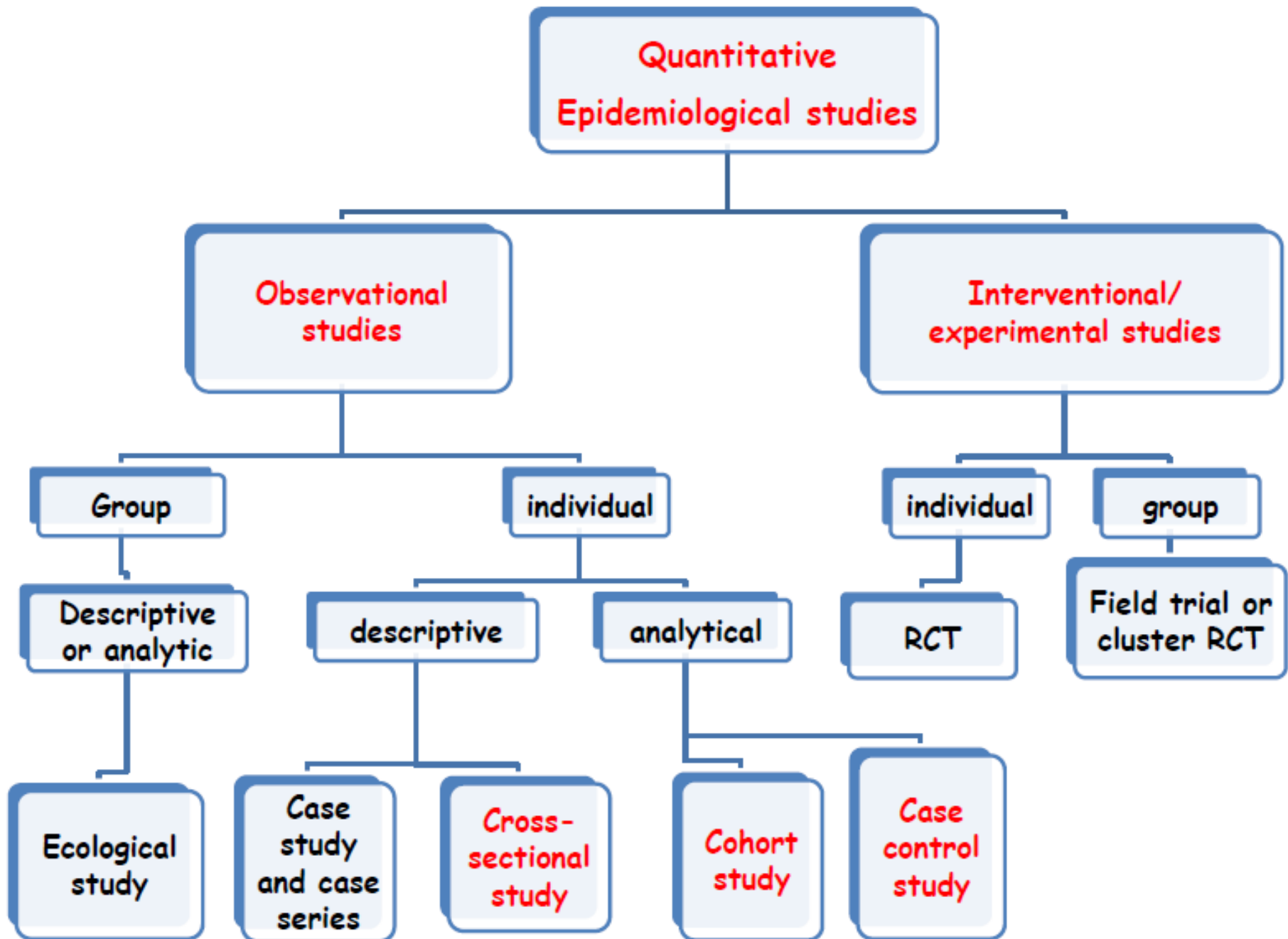


Table 3.1. Types of epidemiological study

Type of study	Alternative name	Unit of study
<i>Observational studies</i>		
Descriptive studies		
Analytical studies		
Ecological	Correlational	Populations
Cross-sectional	Prevalence	Individuals
Case-control	Case-reference	Individuals
Cohort	Follow-up	Individuals
<i>Experimental studies</i>		
<i>Intervention studies</i>		
Randomized controlled trials	Clinical trials	Individuals
Cluster randomized controlled trials		Groups
Field trials		
Community trials	Community intervention studies	Healthy people Communities



Classification of Study Designs

Observational studies

1. Descriptive or case-series
2. Retrospective (case-control)
3. Cross-sectional (prevalence), surveys
4. Prospective (cohort)
5. Retrospective cohort

Experimental studies

1. Controlled trials
 - a) Parallel designs
 - b) Sequential designs
 - c) External controls
2. Studies with no controls

Epidemiological Studies

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graph TD; A[Epidemiological Studies] --> B[Descriptive studies<br/>• Case report/series]; A --> C["Analytic" studies]; C --> D[Observational studies<br/>• Cross-sectional<br/>• Observational cohort<br/>• Case-control]; C --> E[Experimental studies<br/>• e.g., randomized trial<br/>(experimental cohort)];
```

Descriptive studies
• Case report/series

“Analytic” studies

Observational studies
• Cross-sectional
• Observational cohort
• Case-control

Experimental studies
• e.g., randomized trial
(experimental cohort)

Hierarchy of Epidemiologic Study Design

Case reports

Generate hypotheses

Case series

Ecologic studies

Cross-sectional studies

Case-control studies

Cohort studies

Randomized controlled trials

Establish causality



- ❑ A study design is a specific plan or protocol for conducting the study, which allows the investigator to translate the conceptual hypothesis into an operational one.
- ❑ Observational/Analytical studies look towards finding out the causes of observed rates.
- ❑ Called "observational" since the epidemiologist does not intervene in the assignment of exposure.
- ❑ Descriptive studies describe the events and rates of disease. Tend to be the first sets of studies done.
- ❑ Experimental studies are formal research experiments. The classic example is the randomized control trial where one group is randomly assigned a treatment and a control group gets the placebo or "usual" treatment.

Descriptive studies:

- ❑ The major purpose of descriptive research is description of the state of affairs as it exists.
- ❑ This is the first phase of epidemiological studies in which the distribution of diseases is described in terms of the three major variables: person, place and time
- ❑ Descriptive studies yield information which is of immediate relevance to planning of medical services, disease classification and natural history of the disease.
- ❑ Descriptive studies are important in hypothesis generation which can be tested by analytical studies
- ❑ Descriptive study will usually comprise observations made at a point in time, so-called cross-sectional studies

Cross-sectional study design

- ❑ Is also referred to as a prevalence studies
- ❑ The feature of this study design is that it includes only a single period of observation.
- ❑ This obtains measurement of disease and exposure at individual level (individual is the unit of analysis in this study design).
- ❑ Cross-sectional studies are mainly descriptive in nature i.e. their primary usefulness is to provide quantitative estimates of the magnitude of the problem.
- ❑ Mainly uses primary data and tends to be expensive.
- ❑ Examples of studies that use this study design: surveys

2. Analytical Studies

- ❑ Are carried out to test hypothesis about factors that determine that one person is affected by a disease while another is not.
- ❑ Analytic studies aim at determining causal association between a risk factor and a disease or health status of interest and they tend to be longitudinal in nature.
- ❑ They are designed to show whether a particular events (such as consumption of certain foods), or states (such as overcrowded houses), acts as ‘causes’ whose ‘effect’ is the resulting disease.
- ❑ The study designs that have been used to suggest that a particular event or state is causally associated with and may be a determinant of a disorder include:

1. Case-control study design
 2. Cohort study design
 3. Ecological study design
- ❑ Analytical studies tend to be longitudinal
 - ❑ Longitudinal Study Designs: These are studies in which observations are repeated in the same community over a prolonged period. Examples include:

a) Ecological Study Design

- ❑ Is a study design in which the unit of analysis is a group of people.
- ❑ It involves the assessment of exposure rates and disease rates in a group of people or a population; usually more than 10 groups or populations to allow for comparison.

- ❑ The important characteristic of this study design is that the level of exposure for each individual in the population/unit being studied is unknown.
- ❑ Ecological studies mainly use secondary data that have been collected by the government, some other agencies or investigators. In terms of cost and duration, they are more advantageous.

b) Cohort study Design

- ❑ Is also known as prospective study
- ❑ It is an analytic study design since it tends to determine the causal association of a disease and a risk factor.
- ❑ Cohort studies usually have 2 groups i.e. the exposed and non-exposed. The exposed group is the study population and the non-exposed group is the control group to allow for comparison.

- ❑ The unit of analysis/observation in this study design is the individual.
- ❑ They involve the use of primary data but secondary data may also be used.

c) Case -Control Study Design

- ❑ A case-control study design considers 2 groups i.e. case (people with the disease) and the controls (comparable group but are free from the disease).
- ❑ This study design seeks to identify possible causes of the disease by finding out how the two groups differ.
- ❑ This is because disease does not occur randomly; the case group must have been exposed to some factor either voluntary or involuntary that contributed to the causation of disease.

- ❑ In case control study design, one starts from effect to cause i.e. start with the people with disease and determine the past exposure to a risk factor.
- ❑ In the recent years, case-control study design has proven to be useful and efficient for evaluation vaccine effectiveness, treatment effectiveness, evaluation of screening programs and outbreak investigation.

Experimental studies

- ❑ In this design, subjects are randomly assigned to an experimental group which receives the treatment or to a control group which receives standard of care or placebo or no treatment.
- ❑ Assuming the two groups were initially equivalent, the researcher can compare their performance.

❑ The study designs used in experimental studies include:

1. Randomized Clinical Trial

2. Community Trial

a) Clinical trials

❑ Is a planned experiment designed to assess the efficacy of a treatment in man by comparing the outcomes in a group of patients treated with the test treatment and those patients in the control treatment.

❑ Once the eligible participants have agreed to participate, they are then randomly assigned to one of the study groups (test treatment group and control treatment group).

❑ They are then observed over the same period of time.

- ❑ This Study Design has been used in testing drug or vaccine efficacy/effectiveness and effectiveness of a prevention program.

b) Community trials

- ❑ Although clinical trials play an important part in efforts to improve health and delivery of medical care, they are limited in terms of scope of their potential impact.
- ❑ They also require greatest control over the study subjects hence are not typically employed to evaluate the potential efficacy of large scale public health interventions. Community trials are therefore used in such cases.
- ❑ The word community is used but is not literary referring to community but also mean a single unit e.g. a school, a country, a state or even a district.

- ❑ Like clinical trials, community trials start by determining eligible communities and their willingness to participate.
- ❑ To evaluate the impact of the intervention or treatment, it is desirable to have a baseline measure of the problem to be addressed in the intervention community and control community.
- ❑ The communities are then randomized to receive or not receive the intervention. The two groups i.e. control and treatment communities are followed for a period of time and the outcome of interest measured.

CASE SERIES

- ❑ It is a sequence of case reports with common elements e.g. similar clinical features and suspected common exposures
- ❑ Can form useful early evidence for associations between exposures and diseases
- ❑ May also refer to qualitative study of the experience of a single patient, small group of patients with a similar diagnosis, or to a statistical technique comparing periods during which pts are exposed to some factor with the potential to produce illness with periods when they are unexposed.
- ❑ It does not have control subjects

CASE CONTROL STUDIES

Advantages:

- ❑ Quick and cheap
- ❑ Only feasible method for very rare disorders or those with long lag between exposure and outcome
- ❑ Fewer subjects needed than cross-sectional studies.

Disadvantages

- ❑ Reliance on recall or records to determine exposure status
- ❑ Confounders (a variable that can cause or prevent outcome of interest and is associated with the factor under investigation)
- ❑ Selection of control groups is difficult
- ❑ Potential bias (deviation of results from the truth) eg recall bias (Cases are more likely to remember exposure than controls), selection bias.

COHORT STUDIES

Advantages of cohort studies

- ❑ Ethically safe
- ❑ Subjects can be matched
- ❑ Can establish timing and directionality of events
- ❑ Eligibility criteria and outcome assessments can be standardised
- ❑ Administratively easier and cheaper than randomized controlled trial.

Disadvantages of cohort studies

- ❑ Controls may be difficult to identify
- ❑ Exposure may be linked to a hidden confounder
- ❑ Blinding is difficult
- ❑ Randomisation not present
- ❑ For rare disease, large sample sizes or long follow-up necessary.

CROSS-SECTIONAL STUDIES

Advantages:

- ❑ Cheap and simple;
- ❑ Ethically safe.

Disadvantages:

- ❑ Establishes association at most, not causality;
- ❑ Recall bias susceptibility;
- ❑ Confounders may be unequally distributed

Types of Clinical trials

- ❑ Trials may be open, blind or double-blind.
- ❑ Blind trials: (i) Single-blind trial; (ii) Double-blind trial; (iii) Triple-blind trial

COMMUNICABLE DISEASES

Introduction:

- ❑ **A communicable disease** is one due to a specific agent or its product which arises through the transmission of that agent or its product from a reservoir to a susceptible host, either through the agent of an intermediate host, vector or inanimate environment.
- ❑ A disease that is passed from one person to another person is called a communicable or transmissible disease. Transmissible diseases include: measles, HIV infection, tuberculosis, chickenpox, gonorrhoea, scabies, malaria, cholera, and roundworms among others.
- ❑ They are among the major cause of illnesses in Kenya and the entire Africa.
- ❑ These diseases affect people of all ages but more so children due to an increased intensity of exposure and a poorly developed immunity.

- ❑ Communicable diseases means illnesses due to infectious agents or their toxic products, which may be transmitted from a reservoir to a susceptible host either directly as from an infected person or animal or indirectly through the agency of an intermediate plant or animal host, vector, or the inanimate environment.
- ❑ **Agent** originally referred to an infectious microorganism or pathogen: a virus, bacterium, parasite, fungi or other microbe. They are agents of disease.
- ❑ Generally, the agent must be present for disease to occur; however, presence of that agent alone is not always sufficient to cause disease.
- ❑ Disease agent means a pathogen: organism that is detrimental to susceptible host.
- ❑ The agents that cause disease fall into five groups: viruses, bacteria, fungi, protozoa, and helminths (worms).

- ❑ **Infectious agents** are organisms that are capable of producing infection or infectious disease. They include bacteria, fungi, viruses, and parasites.
- ❑ **Susceptible host:** Individuals who are likely to develop a communicable disease after exposure to the infectious agents.
- ❑ After an infectious agent gets inside the body it has to multiply in order to cause the disease. In some hosts, infection leads to the disease developing, but in others it does not.
- ❑ Factors that increase the susceptibility of a host to the development of a communicable disease are called **risk factors**.
- ❑ Some risk factors arise from outside the individual - for example, poor personal hygiene, or poor control of reservoirs of infection in the environment. Other factors are inside the individual example low level of immunity

- ❑ **SUSCEPTIBLE PERSON (HOST):** A susceptible or non-immune person is one who has little resistance against a particular organism and who, if exposed to this organism, is likely to contract disease.
- ❑ **Intermediate host:** an organism that supports the immature or non-reproductive forms of a parasite.
- ❑ **Intermediate host:** a host which is normally used by a parasite in the course of its life cycle and in which it may multiply asexually but not sexually.
- ❑ **Intermediate host** is the host harboring a parasite that primarily grows but not to the point of reaching (sexual) maturity
- ❑ Thus, the intermediate host serves only as a site wherein the parasite spends a particular developmental stage of its life cycle (i.e. larval stage).

- ❑ Example: **tapeworm** using a pig as intermediate hosts. When the pig ingests its egg, the egg hatches and the larva moves from the intestine to the muscle to form a cyst.
- ❑ The two intermediate hosts on which the **human liver fluke** depends on to complete its life cycle are terrestrial snail and ant.
- ❑ The intermediate hosts of *Schistosoma* spp. are various species of freshwater snails.
- ❑ **Inanimate environment:** showing no sign of life; lifeless. dead or inert: not in a physically live state.
- ❑ Example: The inanimate environment in healthcare facilities generally refers to environmental surfaces (including floors, walls, medical equipment and instruments, furniture, and other parts of the physical infrastructure), air, and water.

- ❑ **Vector:** an insect or animal that carries a disease from one animal or plant to another.
- ❑ A vector is a living organism that transmits an infectious agent from an infected animal to a human or another animal. Vectors are frequently arthropods, such as mosquitoes, ticks, flies, fleas and lice.
- ❑ **The reservoir** of an infectious agent is the habitat in which the agent normally lives, grows, and multiplies. Reservoirs include humans, animals, and the environment. The reservoir may or may not be the source from which an agent is transferred to a host. For example, the reservoir of *Clostridium botulinum* is soil, but the source of most botulism infections is improperly canned food containing *C. botulinum* spores.
- ❑ Reservoir is usually a living host of a certain species, such as an animal or a plant, inside of which a pathogen survives, often (though not always) without causing disease for the reservoir itself.

- ❑ Human reservoirs. Many common infectious diseases have human reservoirs. Diseases that are transmitted from person to person without intermediaries include the sexually transmitted diseases, measles, mumps, streptococcal infection, and many respiratory pathogens. Because humans were the only reservoir for the smallpox virus, naturally occurring smallpox was eradicated after the last human case was identified and isolated.
- ❑ Animal reservoirs: Many of these diseases are transmitted from animal to animal, with humans as incidental hosts. Term used 'zoonosis'
- ❑ Incidental host (a.k.a. dead-end host) a host that shelters an organism but is unable to transmit the organism to a different host.

- ❑ Environmental reservoirs. Plants, soil, and water in the environment are also reservoirs for some infectious agents. Many fungal agents, such as those that cause histoplasmosis, live and multiply in the soil. Outbreaks of Legionnaires disease are often traced to water supplies in cooling towers and evaporative condensers, reservoirs for the causative organism *Legionella pneumophila*.
- ❑ **Example toxic products of infectious agents:** Bacterial toxins are virulence factors that manipulate host cell functions and take over the control of vital processes of living organisms to favor microbial infection. Some toxins directly target innate immune cells.

Characteristics of communicable diseases

1. They are common
 2. Some of them cause death (untreated complicated malaria) and disability (poliomyelitis)
 3. Some of them cause epidemics (sudden outbreak of Cholera)
 4. Most of them are preventable when using fairly simple interventions. (Hand washing protects on from diahorreal disease)
 5. Many of them affect infants and children(helminthic and airborne diseases)
- **N/B:** the above explains why communicable diseases are among the most important diseases in this country.

Classification of communicable diseases

There are various ways of classifying communicable diseases:

- ❑ **Contact (contagious) diseases** - parasitic and fungal skin infections, trachoma and acute bacterial conjunctivitis.
- ❑ **Sexually transmitted diseases and HIV/AIDS**
- ❑ **Vector borne diseases** - malaria, relapsing fever, Bancroftian filariasis, onchocerciasis, yellow fever, trypanosomiasis, plague, schistosomiasis, and drancunculosis
- ❑ **Diseases caused by Fecal-oral contamination** - acute gastroenteritis, Trachoma, polio, bacillary dysentery, campylobacter jejuni, giardiasis, amoebiasis, cholera. Enteric fevers, food poisoning and viral hepatitis, Acute Bacterial Conjunctivitis

- ❑ **Helminthic diseases** - ascariasis, enterobiasis, truchuriasis, strongyloidiasas, taeniasis, hydatidosis
- ❑ **Air borne diseases** such as acute respiratory infections, meningitis tuberculosis and leprosy.
- ❑ **Zoonotic diseases** (diseases of contact with animals or animal products. Anthrax brucellosis, hydatidosis, tetanus.

PATTERNS OF COMMUNICABLE DISEASES IN THE COMMUNITY

Introduction:

- ❑ **Pattern** refers to the occurrence of health-related events by time, place, and person.
- ❑ Linking occurrence of disease and the Level of Disease
- ❑ We need to understand the linkages between the occurrence of communicable diseases and the level of disease in a specified population
- ❑ Explore the balance existence and shift in reference to disease occurrence due to the level of interaction of agent, the host and the environment.
- ❑ Determine the level of diseases in the specified population (sporadic, endemic, epidemic and pandemic) due to the interaction of agent, host and environment

PATTERNS OF COMMUNICABLE DISEASES IN THE COMMUNITY

- ❑ Different diseases are common in different places and at different times.
- ❑ To understand why this happens, you need to consider (a) the disease causative organisms (**the agents**); (b) the people they infect (**the hosts**); and (c) the surroundings in which they live (**the environment**) that make it favourable or unfavourable for the transmission of the agent.
- ❑ A delicate **balance** exists between the agent, the host and the environment and it can change in different ways.
- ❑ For instance, **the agent** needs a suitable environment in which to grow and multiply and thus be able to spread and infect other hosts. If the environment does not support the agent it dies or transforms to a dormant state.
- ❑ The **host** (person) is also affected by the environment. For example, a person may live in a hot, wet climate where there are many mosquitoes.

- ❑ However they can change this environment by draining swamps, clearing the vegetation and adding competing hosts such as animals.
- ❑ If the balance is shifted **against the agent**, the disease will be controlled and the number of cases will go down.
- ❑ When the balance between the agent, the host and the environment is fairly constant, you tend to see approximately the same number of cases of the disease every month. When this happens the disease is said to be **endemic**.
- ❑ When the balance is shifted in **favour of the agent** (organism), for example, when many nonimmune children have been born in an area since the last measles epidemic, a large number of cases of measles may occur in a short time. This is called an **epidemic**. Epidemic diseases occur during certain periods or seasons and cause sudden deaths and much suffering in the community.

- ❑ An **endemic** disease can be termed as that which occurs in a given population at a constant rate over a period of several years.
- ❑ An **epidemic** disease is that which occurs in a population at a higher rate than is usually the normal for that population over a given time interval.
- ❑ Some Common Epidemic Diseases in Kenya
 - ✓ Cholera
 - ✓ Typhoid fever
 - ✓ Highland malaria
 - ✓ Acute bacterial meningitis
- ❑ In Kenya, malaria is endemic in the lowlands, such as the Tana River basin, the coastal strip, and the Lake Victoria region.

- ❑ Schistosomiasis which is related to water use is endemic around the Lake Victoria region and the Mwea irrigation scheme.
- ❑ Leishmaniasis is endemic in Baringo, along Tana River, and along the River Athi in Machakos.
- ❑ In some parts of the country, some disease outbreaks occur only occasionally without a regular pattern. Such diseases are said to be **sporadic** in their occurrence.
- ❑ **NB: Agent:** Is an organism mainly a micro-organism but including helminths that is capable of producing the disease.
- ❑ **Reservoir or definitive host:** Is any human, animal, arthropod, plant, or soil in which an agent normally lives and multiplies and on which it depends primarily for survival reproducing in such a manner that it can be transmitted to a susceptible host.

HOST AND INFECTION

- ❑ A person who is invaded by a disease micro-organism is called a **host**.
- ❑ An **infection** occurs when this micro-organism begins to reproduce (multiply) and grow.
- ❑ When an organism infects a person, there are three possible **stages** to consider:

Incubation Period

- ❑ The incubation period is the time between infection and the appearance of symptoms and signs of an illness.
- ❑ During the incubation period the host does not realize that they have an infection until several days later when detectable symptoms and signs of the illness occur.

Sub-clinical Infection

- At this stage, infection does not produce clear signs and symptoms. The host's immune system is trying to fight off the agent. In some cases, the organism is overcome by the host immune cells hence no signs and symptoms are felt and the infection process is terminated.

Clinical Infection

- This is the period when the host develops detectable symptoms and signs of an illness. At this time the agent has multiplied within the host overcoming the host's immune system and has started causing abnormal functioning of some body cells and tissues. This produces overt signs and symptoms of the disease

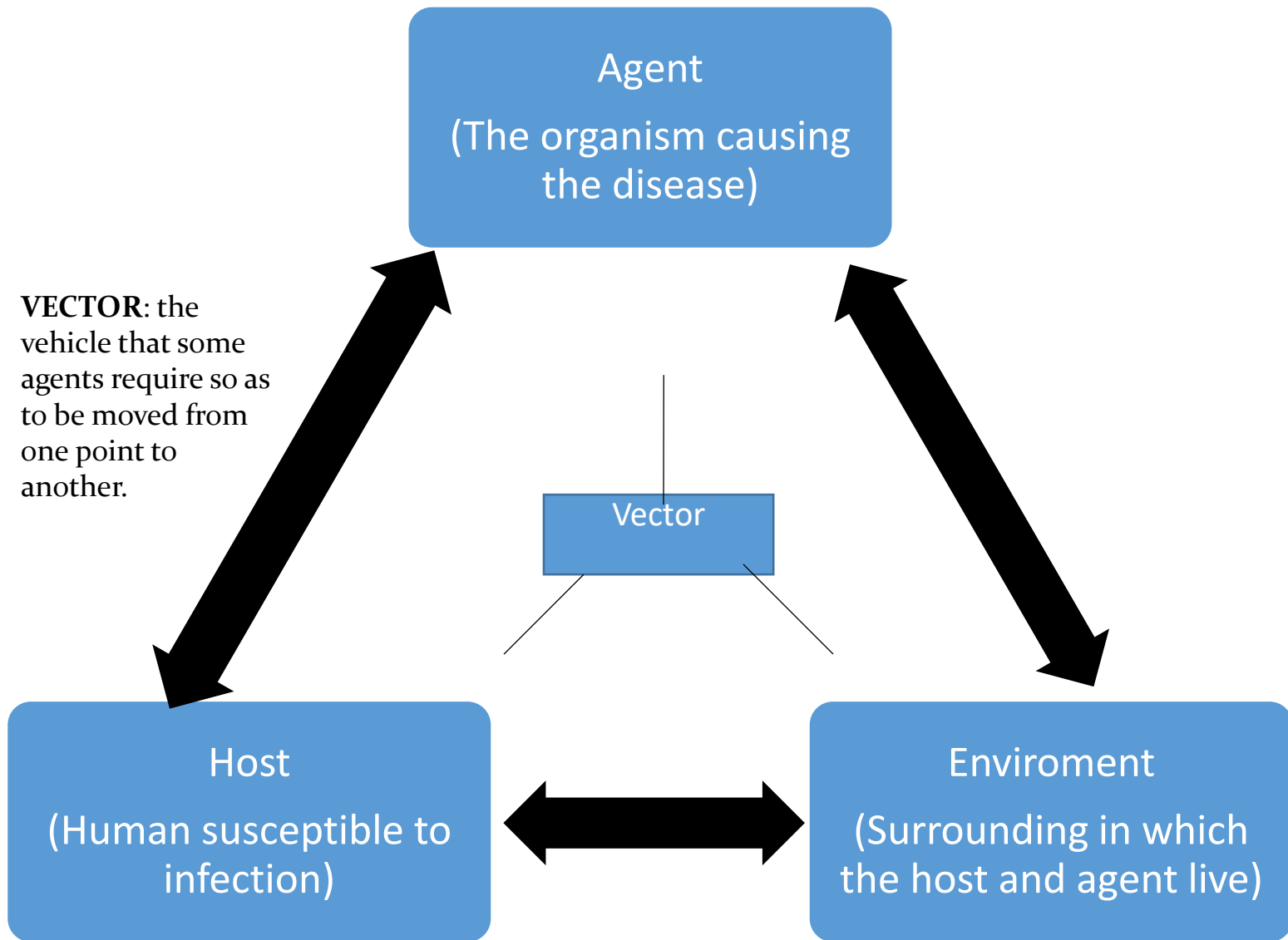
It is important for you to understand these stages because:

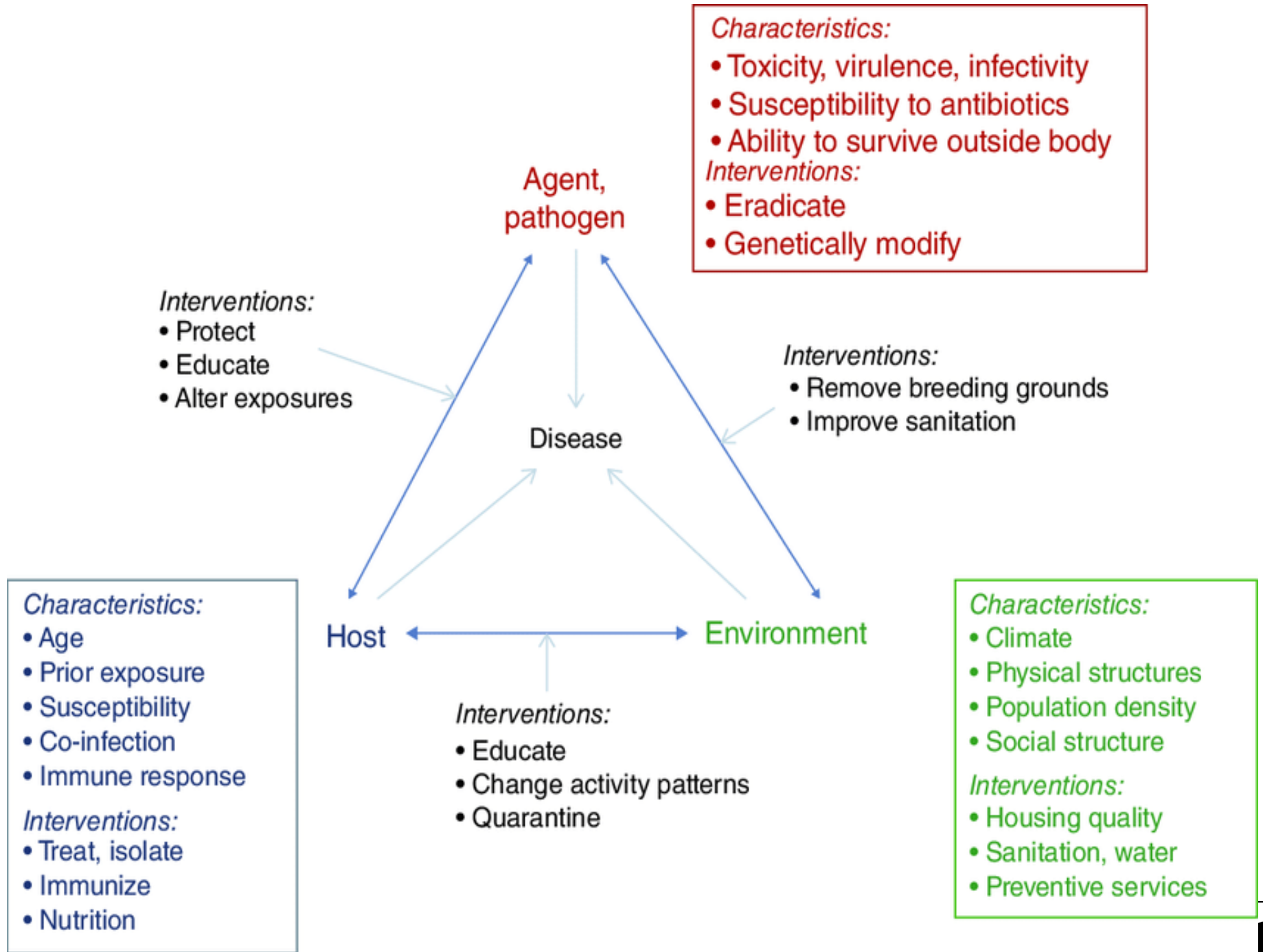
- ❑ People with symptoms are easier to identify as they come to your health facilities for treatment.
- ❑ People with subclinical infections do not always know they are infected and hence are a danger to other people. They are also difficult to detect in the general population without special tests.
- ❑ An individual who is suffering from a subclinical infection is also likely to infect others, as in the case of HIV infection. They are therefore known as **carriers**.
- ❑ An individual who develops a clinical or subclinical infection is said to be **susceptible** to the disease. A susceptible individual is one whose body lacks resistance to the disease. Resistance of the body to a disease occurs due to various immunity mechanisms

DISEASE CAUSATION CYCLE

- ❑ It is also referred to as an **epidemiologic cycle**, **epidemiologic triangle**.
- ❑ It is an illustration of the interaction between disease determinant factors.
- ❑ The determinant factors are; the host, agent and environment.
- ❑ These factors have to be conducive for the disease to occur.
- ❑ All communicable diseases require that the 3 factors are present for individuals to be affected.

THE DISEASE CAUSATIVE CYCLE





Factors in the triad that determine disease occurrence

HOST FACTORS

- Demographic characteristics (Age, gender etc.)
- Biological characteristics (genetic, immunity concurrent disease, diet etc.)
- Socioeconomic characteristics (poverty, housing global travel etc.)
- Smoking
- Risky behavior
- Occupation

AGENT FACTORS

- Biological agents (virulence, infecting dose)
- Drug resistance (ARVs' antimicrobial etc.)
- Phenotypic characteristics
- Genotypic characteristics
- Physical characteristics

ENVIRONMENTAL FACTORS

- Physical environment (bushes, water contamination etc.)
- Local prevalence and possibility of exposure
- Risky behavior (unprotected host)
- Biological environment
- Social environment (slums, global travel)

Epidemiological Triad /epidemiologic disease triad - continued'

- ❑ It examines three characteristics in the study of the causes of a disease; host, agent and environment.
- ❑ Host factors includes the personal traits, behaviors, genetic predisposition and immunologic factors.
- ❑ Agents factors include biological, physical and chemical
- ❑ Environment factors include the external conditions, physical, biological and social
- ❑ The interaction between this three leads to disease causation
- ❑ It is the interaction between the infectious agent, the environment and the susceptible host.
- ❑ In a state of balance between the agent and the host in the environment there is no disease.
- ❑ If the balance favors the agent there is an increase in disease incidence
- ❑ If the balance favors the susceptible host, there is decrease in incidence

The factors that influence development of a disease:

- Strain of the agent
- Virulence of the agent
- Dose of the agent
- Route of infection
- Age, nutritional status and immune status of the host
- Influence of treatment
- Influence of season

Types of hosts:

- ❑ **Definitive / primary** - host in which the agent reaches maturity and if applicable reproduces sexually
- ❑ **Intermediate /secondary** - host that harbors agent for a short transition period during which some developmental stage is complete. For trypanosomes, the cause of sleeping sickness, humans are the intermediate host, while the tsetse fly is the definitive host
- ❑ **Paratenic / reservoir** - similar to intermediate but there is no developmental cycle of the agent.
- ❑ **Dead end host / incidental** - an intermediate host that does not allow transmission to definitive host. humans are dead-end hosts for Echinococcus canine tapeworms. As infected humans are not usually eaten by dogs

- ❑ Paratenic host: It is not needed for the parasite's development cycle to progress. There are also reservoir hosts. These are animals that host a human pathogen while it isn't infecting humans, and are used by the disease as a source of maintenance.
- ❑ Paratenic or transport host: an organism that harbors the sexually immature parasite but is not necessary for the parasite's development cycle to progress. Paratenic hosts serve as "dumps" for non-mature stages of a parasite in which they can accumulate in high numbers.
- ❑ Paratenic hosts span a wide range of fauna and are not needed in the nematode's life cycle, but act as reservoirs in which different larval stages of the parasite can persist but not develop further; they include freshwater shrimp, flatworms, and frogs.

THE DISEASE TRANSMISSION AND DISEASE CYCLE

- ❑ It's a series of steps that a disease-causing organism undergoes in its disease-causing process.
- ❑ It describes how an organism grows, multiplies and spreads.
- ❑ It has 3 components; the **source**, **transmission route** and susceptible **host**.

The source (spreads from)

- ❑ It is the origin of the diseases causing organism. This could be the infected person, animal, place or object.

Transmission routes include; (way in which an organism leaves the source and passes to a new susceptible host)

- ❑ Direct contact
- ❑ Vectors such as mosquitoes
- ❑ Fecal-oral

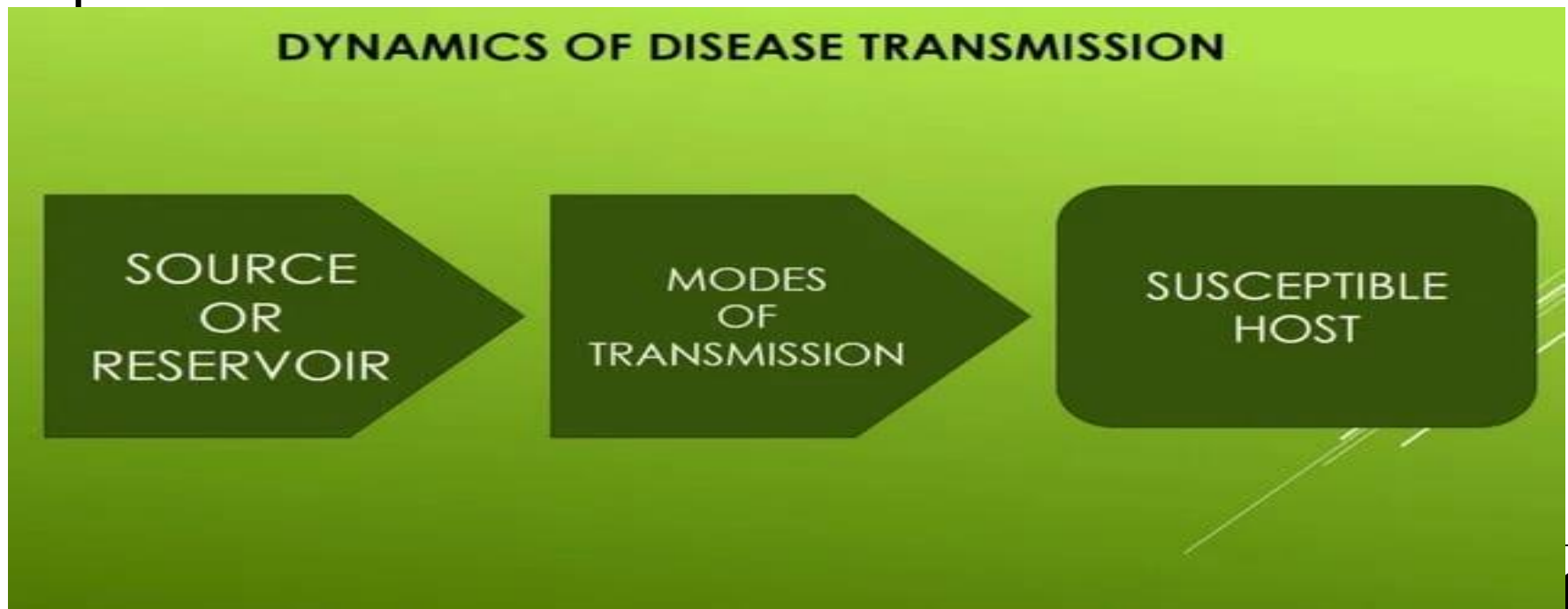
- ❑ Airborne
- ❑ Trans-placental
- ❑ Blood contact (transfusion, surgery, injection)
- ❑ Contact with animals or their products

A susceptible host

- ❑ This is an individual who has low resistance to a particular disease. This may be due to various factors such as:
 - ✓ Lack of previous contact with the disease hence no immune cells
 - ✓ Immunosuppression
 - ✓ Malnutrition
 - ✓ Drugs that a person may be consuming.

DISEASE TRANSMISSION

- Disease transmission is the passing of a communicable disease from an infected host individual or group to a conspecific individual or group, regardless of whether the other individual was previously infected.
- Conspecifics are all organisms belonging to the same species.



- ❑ **Initiation** of communicable diseases: existence of a reservoir or source of infection
- ❑ **Source of infection:** the person, animal, object or substance from which an infectious agent passes or is disseminated to the host
- ❑ **Reservoir:** any person, animal, anthropod, plant, soil or substance in which an infectious agent lives and multiplies, on which it depends primary for survival and where it reproduces itself in such manner that it can be transmitted to a susceptible host.

NB

- ❑ Reservoir and source are different: example: hookworm infection - man (reservoir), soil (source of infection)
- ❑ Reservoir and source are same: example: tetanus - soil (both reservoir and source)

- ❑ Homologous reservoir: another member of same species is the victim. Example: vibrio cholera: Man is a principal reservoir
- ❑ Heterologous reservoir: infection is derived from reservoir other than man. Example: Salmonella: Reservoirs are animals and birds.
- ❑ Three types of reservoir: Human, animal and non-living things.

Transmission cycle of disease:

- ❑ The transmission of pathogens from current to future host follows a repeating cycle.
- ❑ This cycle can be simple, with a direct transmission from the current to future host, or complex, where transmission occurs through (multiple) intermediate hosts or vectors.

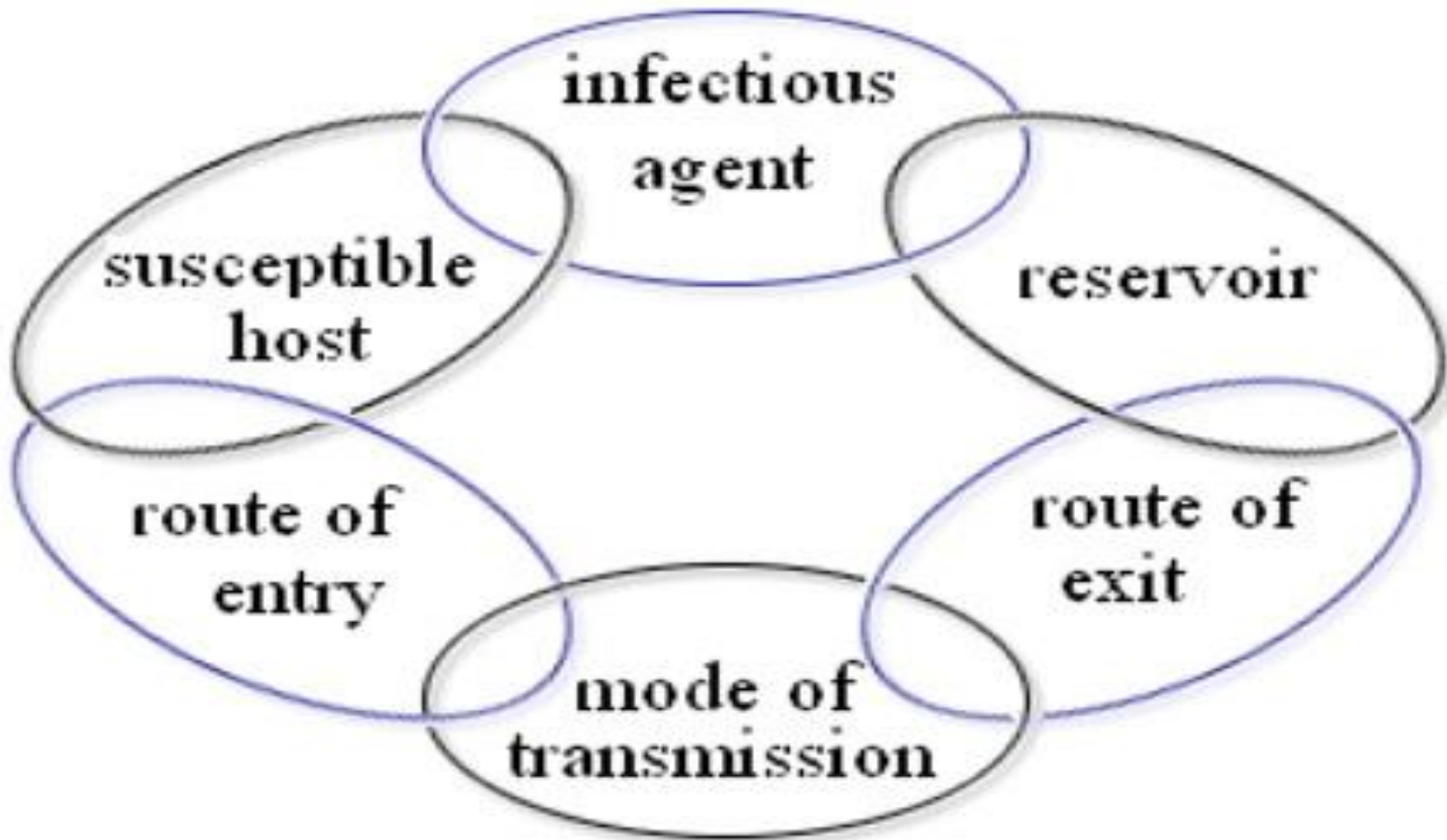
Elements of transmission cycle

- ❑ The pathogens: the organism causing the infection
- ❑ The host: the infected person or animal 'carrying' the pathogen
- ❑ The exit: the method the pathogen uses to leave the body of the host.
- ❑ Transmission: how the pathogen is transferred from host to susceptible person or animal, which can include developmental stages in the environment, in intermediate hosts, or in vectors

- ❑ **The environment:** the environment in which transmission of the pathogen takes place
- ❑ **The entry:** the method the pathogen uses to enter the body of the susceptible person or animal
- ❑ **The susceptible person or animal:** the potential future host who is receptive to the pathogen
- ❑ The importance of the host in the transmission cycle is its roles as both reservoir and source of pathogens

The disease transmission cycle outline

Infective agent → reservoir → portal of exit → mode of transmission → portal of entry → susceptible host.



- ❑ Specific infections also have specific transmission cycle.
- ❑ All pathogens go through a lifecycle, which takes the organism from reproducing adult to reproducing adult.
- ❑ This cycle includes phases of growth, consolidation, change of structure, multiplication/reproduction, spread, and infection of a new host.
- ❑ The combination of these phases is called the development of the pathogen.
- ❑ Two terms are commonly used to describe pathogens leaving the host through faeces or urine: **latency and persistence.**
- ❑ After excretion, a latent pathogen must develop in the environment or intermediate host before a susceptible person or animal can be infected.
- ❑ Persistency: describes how long a pathogen can survive in the environment.

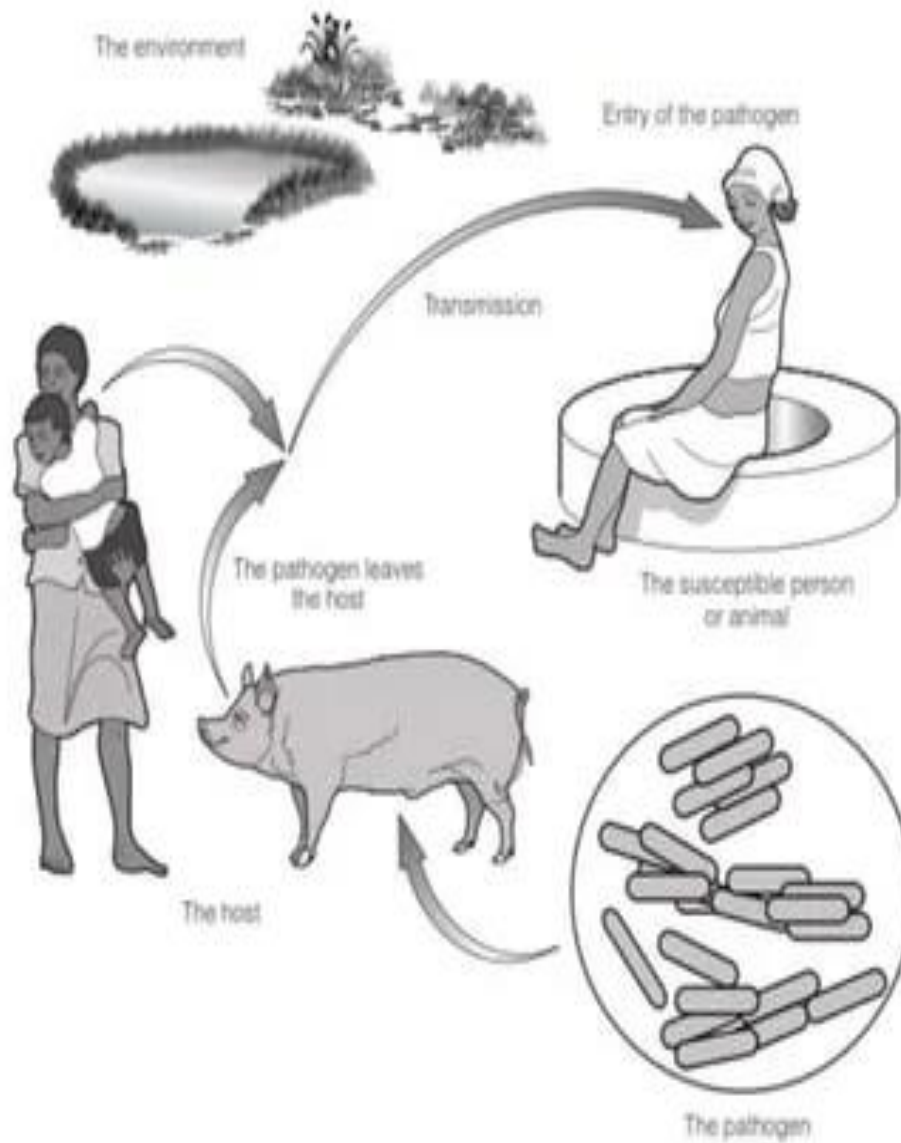


Figure 2.1. The different elements of the transmission cycle of disease

Modes of disease transmission

- ❑ The term modes of transmission refer to how an infectious agent, also called a pathogen, can be transferred from one person, object, or animal, to another.
- ❑ Viruses, bacteria, parasites, or fungi can spread infectious diseases. Understanding the modes of transmission for an infectious disease is an important way to limit its spread.

Direct modes of disease transmission

- ❑ Direct contact
- ❑ Vertical transmission / transplacental
- ❑ Droplet infection
- ❑ Animal bite transmission
- ❑ Contact with soil
- ❑ Inoculation into skin or mucosa

Indirect mode of disease transmission

- Vehicle - borne
- Vector-borne
 - ✓ Mechanical
 - ✓ Biological
- Air-borne
 - ✓ Droplet nuclei
 - ✓ Dust
- Fomite - borne
- Unclean hands and fingers

Direct Mode of disease Transmission:

1. Direct Contact:

- ❑ Kissing, touching, intercourse can cause AIDS, leprosy, leptospirosis, skin & eye infections:
 - ✓ Skin → Skin
 - ✓ Mucosa → Mucosa
 - ✓ Mucosa → Skin

2. Droplet infection:

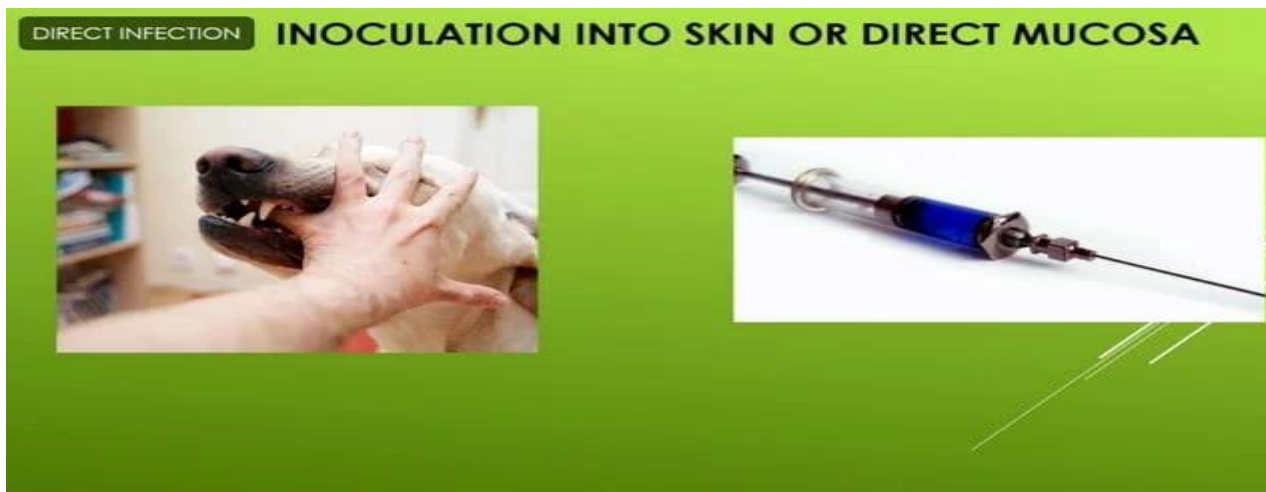
- ❑ Particle size: 10nm or > filtered by nose
- ❑ 5nm or < can reach the alveoli
- ❑ Spread distance: Limited to 30 - 60 cm between source and host
- ❑ Examples: TB, Influenza, Meningococcal meningitis, whooping cough, etc.

3. Contact with soil:

- Examples: Hookworm larvae, tetanus, mycosis



4. Inoculation into skin or direct mucosa

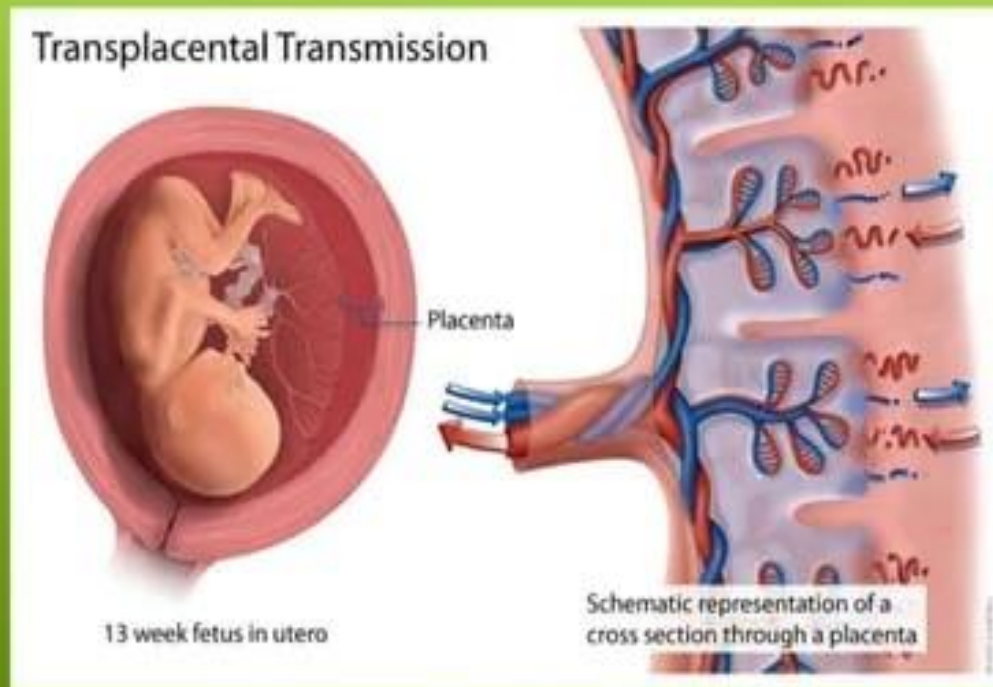


5. Transplacental (vertical) Transmission:

- Examples: TORCH agents, varicella virus, syphilis hepatitis - B, Coxsackie - B and AIDS

DIRECT INFECTION

TRANSPLACENTAL (VERTICAL) TRANSMISSION



Ex: TORCH agents, varicella virus, syphilis hepatitis – B, Coxsackie – B and AIDS

Indirect mode of disease transmission

1. Vehicle - Borne

- ❑ Transmission through water, food, ice, blood, serum, plasma or other biological products such as tissues and organs

Through water:

- ❑ Acute diarrhoea
- ❑ Typhoid fever
- ❑ Cholera
- ❑ Polio
- ❑ Hepatitis A
- ❑ Food poisoning
- ❑ Intestinal parasites

Through blood

- Hepatitis B
- Malaria
- Syphilis
- Brucellosis
- Trypanosomes
- Infectious mononucleosis
- Cytomegalovirus Infection

Organ

- Transplantation
- Cytomegalovirus
(Kidney transplant)

EPIDEMIOLOGIC FEATURE OF VEHICLE TRANSMISSION

- ❖ If dose of contamination is heavy outbreak may be explosive
 - ❖ Ex: Cholera & Hepatitis A epidemics
- ❖ Initially confined to those who are exposed to the contaminated vehicle
- ❖ When secondary cases occur, the primary case may be obscured.
- ❖ The distance travelled by the infectious agent may be great
 - ❖ Ex: outbreaks of food poisoning.
- ❖ It is not possible to isolate the infectious agent in the incriminated vehicle.
 - ❖ Ex: typhoid bacilli in contaminated water.
- ❖ When vehicle is controlled or withdrawn, the epidemic subsides
 - ❖ Ex: epidemics of Cholera
- ❖ Common source of infection is often traceable.

2. Vector - Borne Disease

- ❑ Vector: Arthropod or any living carrier that transports a living agent to a susceptible individual
- ❑ It may be mechanical or biological
- ❑ Disease agent passes through a development cycle or multiplication in the vector.

Factors that influence the ability of vectors to transmit disease:

- ❑ Host feeding preferences
- ❑ Infectivity
- ❑ Susceptibility
- ❑ Domesticity
- ❑ Suitable environmental factors

CLASSIFICATION

BY VECTOR

A. Invertebrate Type

1. Diptera – Flies & Mosquitoes
2. Siphonaptera – fleas
3. Orthoptera – cockroaches
4. Anoplura – sucking lice
5. Hemiptera – bugs
6. Acarina – ticks & mites
7. Copepoda – Cyclops

B. **Vertebrate type:** Mice, rodents, bats

BY TRANSMISSION CHAIN

- A. Heterogenous Infectious Chain – 3 principal patterns
 1. A man-arthropod - man (malaria)
 2. Man – snail – man (schistosomiasis)
- B. Man, another vertebrate host, and a non vertebrate host
 1. Mammal-Arthropod-Man (plague)
 2. Bird-Arthropod-Man (encephalitis)
- C. Man & two intermediate hosts
 1. Man-Cyclops-Fish-Man (fish tape worm)
 2. Man-Snail-Fish-Man (clonorchis sinensis)
 3. Man-Snail-Crab-Man (paragonimiasis)

By methods in which vectors transmit agent

1. Biting
2. Regurgitation
3. Scratching-in of infective faeces
4. Contamination of host with body fluids of vectors

Methods in which vectors are involved in the transmission and propagation of parasites

- a) Mechanical transmission
- b) Biological transmission
 - I. Propagative
 - II. Cyclo-propogative
 - III. Cyclo-development

3. Airborne:

Droplet nuclei

❑ Formed by:

- Evaporation of droplets coughed or sneezed into air
- Generated purposefully by a variety of atomizing devices

❑ Particle size: 1 - 10 microns range

❑ Diseases: TB, influenza, chicken pox, measles, Q fever and many respiratory infections

Dust:

❑ Disease: Streptococcal & staphylococcal infections, pneumonia, TB, psittacosis

❑ Hospital acquired infections (dust settled on uncovered food and milk)

4. Fomite-Borne

- ❑ Fomites: Inanimate articles or substances other than water or food contaminated by infectious discharges from a patient and capable of harbouring and transferring the infectious agent to a healthy person.
- ❑ Soiled clothes, towels, linen, cups, spoons, pencils, etc.
- ❑ Diseases: diphtheria, typhoid fever, bacillary dysentery, hepatitis A, eye and skin infections

5. Unclean hands and fingers

- ❑ Transmission - directly or indirectly
- ❑ Disease: staphylococcal & streptococcal infections, typhoid fever, dysentery, hepatitis A, intestinal parasites

PRINCIPLES OF COMMUNICABLE DISEASE CONTROL

Principles in Management, prevention and control (CONTROL AND PREVENTION PRINCIPLES / MEASURES)

- Each and every communicable disease has its own unique source, route of transmission and susceptible host.
- Prevention and control principles are geared towards;
 1. Attacking the source of the disease causing organism (clearing & spraying mosquito breeding sites).
 2. Interrupting the transmission cycle (spraying and killing the mosquitoes).
 3. Protecting the susceptible host (LLTN, prophylactic treatment)

Attacking the Source:

- ❑ There are various specific measures which can be used to control the spread of an infectious disease.

They include:

- ❑ Treating the infected person/s
- ❑ Treating the carrier
- ❑ Mass treatment of persons at risk (chemoprophylaxis)
- ❑ Isolating the infected person/s
- ❑ Treating the sick animal such as cows
- ❑ Immunizing animals such as dogs and cattle
- ❑ Killing the animal reservoir such as rats
- ❑ Separating humans and animals
- ❑ Notification to local health authorities

Interrupting the Transmission Cycle

❑ A number of methods are used to interrupt the transmission cycle.

They include the following:

- ❑ Personal hygiene -Immunization -behaviour change
- ❑ Environmental health - (environmental sanitation, etc.)
- ❑ Water and sanitation
- ❑ Vector control
- ❑ Good and adequate housing
- ❑ Effective food handling and adequate nutrition
- ❑ Sterilization of medical equipment an use of sterile surgical equipment (Disinfection and sterilization)

Remember: A clean environment and good personal hygiene are the most important measures in the primary prevention of diseases.

Protecting the Host

- ❑ All susceptible hosts must be protected from contracting the infection.
- ❑ **Remember:** The most effective way of controlling communicable diseases is to use a combination of methods: attacking the source of the infecting organism, interrupting the route of transmission, and protecting the susceptible host.
- ❑ There are various specific and general measures for protecting the host.

Specific Measures

- ❑ Immunisation using vaccines such as the KEPI vaccine
- ❑ Chemoprophylaxis using for example:
 - Proguanil (PaludrineR) to suppress malaria parasites
 - Tetracycline during cholera outbreaks
 - Cotrimoxazole during plague outbreaks
- ❑ Personal protection
- ❑ Better nutrition

General Measures

- ❑ Use of barriers such as bed nets, gowns, gloves to prevent insect bites (especially mosquitoes)
- ❑ Use of chemicals for example insect repellents to prevent mosquito bites
- ❑ Wearing shoes to prevent penetration by hookworms from the soil
- ❑ Adequate housing to reduce overcrowding
- ❑ Improved nutrition
- ❑ Adequate ventilation
- ❑ Health education

Other Control Measures

- ❑ There are other useful measures that can be taken to control the spread of communicable disease. Among these is the **notification** of disease.
- ❑ Notification requires you to keep watch (**surveillance**) on the number of new cases of communicable diseases in your area of work and to immediately inform the local health authority when you come across a patient suffering from an infectious disease.
- ❑ One of the **main reasons** for notification is to help the health authorities take measures to confirm your suspicion and to control the spread of the disease.
- ❑ Notification of infectious communicable diseases is the responsibility of all health care workers. It is also a legal requirement according to the Public Health Act, Chapter (cap) 242, section eight of the laws of Kenya.

- ❑ Remember: It is your responsibility to notify your local health authority immediately should you suspect the presence of an infectious disease

Notifiable Diseases in Kenya

- ❑ **Plague**
- ❑ **Cholera**
- ❑ **Measles**
- ❑ **Poliomyelitis**
- ❑ **Diphtheria**
- ❑ **Tuberculosis**
- ❑ **Anthrax**
- ❑ **Trypanosomiasis**
- ❑ **Typhoid fever**
- ❑ **Whooping cough**

- ❑ Meningococcal meningitis
- ❑ Rabies
- ❑ **Yellow fever**

NB: The diseases in bold spread so quickly that they need international control measures. These diseases are reported by the Ministry of Health to the World Health Organisation (WHO).

Application of communicable disease control measures

- ❑ The actual application of the control methods can be undertaken by different groups of people and institutions at various levels.
- ❑ These include **individuals and village level, dispensary and health centre level, the sub county and county level and central government (Ministry of Health) level.**
- ❑ **Remember:** A successful communicable disease control program is the one that involves members of the community.

Control measures at individual and village level

At this level, each person and indeed every member of the village is responsible for:

- ❑ Completing the immunisation
- ❑ Personal and environmental hygiene
- ❑ Food hygiene and adequate nutrition
- ❑ Using bed nets and protective wear
- ❑ Abstaining from casual sex, being faithful to one sexual partner or using condoms
- ❑ Protecting water supply and using clean water
- ❑ Digging and using pit latrines
- ❑ Controlling vectors
- ❑ Healthy habits, for example not smoking, consuming alcohol and abuse of drugs

Controlling measures at dispensary and health centre level

- ❑ The health care workers should support and encourage their clients and community to establish and sustain community based disease control programs. In addition, the health care workers should:
 - ❑ Increase immunisation coverage
 - ❑ Participate in vector and reservoir control
 - ❑ Emphasise water protection and purification
 - ❑ Inspect food, markets and eating places
 - ❑ Encourage sanitation and refuse disposal
 - ❑ Promote health and prevent diseases using Information, Education and Communication (IEC)
 - ❑ Notify diseases

Control measures at sub county, county, and national level

At these higher levels, health care workers are responsible for:

- ❑ Vector control schemes
- ❑ Mass immunisation campaigns
- ❑ Mass treatment and chemoprophylaxis
- ❑ Mass media IEC programmes
- ❑ Health statistics registration
- ❑ Research on disease control methods
- ❑ Emergency, epidemiology and control teams
- ❑ Manpower training and continuing education for staff

Standard case definition

- ❑ A case definition is a set of uniform criteria/measure used to define a disease for public health surveillance.
- ❑ Case definition enable public health officials to classify and count cases consistently (time & again) across reporting jurisdictions (control).
- ❑ Case definition lists the clinical criteria by which public health professionals determine whether a person's illness is included as a case in an outbreak investigation.
- ❑ That is, whether a person is considered directly affected by an outbreak.
- ❑ Case definitions are used in the surveillance of public health (i.e. health of the population) in order to categorize those conditions present in a population (e.g., incidence and prevalence).

HOW CASE DEFINITION ARE USED

- ❑ A case definition defines a case by placing limits on time, person and place. **HOW?**
- ❑ **Time criteria** may include all cases of a disease identified from a certain period of time, for example, January 1, 2008 to March 1, 2008.
- ❑ **Person criteria** may include age, gender, ethnicity, and clinical characteristics such as symptoms (e.g. cough and fever) and the results of clinical tests (e.g. pneumonia on chest X-ray).
- ❑ **Place criteria** will usually specify a geographical entity/unit such as a town, state, or country, but may be as small as an institution, a school class, or a restaurant.

- ❑ Case definitions are often used to label individuals as **suspect, probable, or confirmed** cases according to clinical, epidemiological and laboratory test
- ❑ For example, in the investigation of an outbreak of pneumococcal pneumonia in a nursing home the case definition may be specified as:
 - ❑ **Suspect Case:** These are cases in which recovery is adequate/achieved but illness cannot be fully explained by an alternative diagnosis.
 - ❑ **Probable Case:** A clinically compatible case without laboratory confirmation, but is epidemiologically linked to a confirmed case i.e. through surveillance
 - ❑ **Confirmed Case:** Is a clinically compatible case with laboratory confirmation.

- ❑ By creating a case definition, public health professionals are better equipped to study an outbreak and determine possible causes.
- ❑ As investigations proceed, a case definition may be expanded or narrowed when taking action.

Definition of Terms Used in Case Classification

- ❑ **Clinically compatible case:** a clinical syndrome /condition generally as described in the clinical description.
- ❑ **Confirmed case:** a case that is classified as confirmed for reporting purposes.
- ❑ **Epidemiologically linked case:** a). a case in which the patient has had contact with one or more persons who either have/had the disease or have been exposed to a point source of infection (i.e., a single source of infection, such as an event leading to a food borne-disease outbreak, to which all confirmed case-patients were exposed)
- ❑ **Probable Case:** A clinically compatible case without laboratory confirmation, but is epidemiologically linked to a confirmed case.

- ❑ **Laboratory-confirmed case:** a case that is confirmed by one or more of the laboratory methods listed in the case definition under Laboratory Criteria for Diagnosis. Although other laboratory methods can be used in clinical diagnosis, only those listed are accepted as laboratory confirmation for national reporting purposes.
- ❑ **Supportive or presumptive laboratory results:** specified laboratory results that are consistent with the diagnosis
- ❑ **Suspect Case:** These are cases in which recovery is adequate but illness cannot be fully explained by an alternative diagnosis

NATURAL HISTORY OF DISEASE

- ❑ It refers to the process of disease/condition progression from the time it affects an individual to the time the individual recovers or dies if appropriate measures are not instituted.

The process has 2 distinctive periods;

- ❑ Pre-pathogenesis
- ❑ Pathogenesis

Pre-Pathogenesis period

- ❑ This is the period before the disease infects an individual.
- ❑ The agent & host are interacting in the environment
- ❑ At this level the host's immunity handles the agent hence no disease.

Pathogenesis period

- ❑ This period starts when the host's immunity has been overcome by the agent, resulting in the host cells dying.
- ❑ This period has 4 stages;
 - ✓ Subclinical
 - ✓ Clinical horizon
 - ✓ Early disease stage
 - ✓ Advanced disease.
- ❑ **Subclinical horizon** - host cells start dying but no major effects are felt and no signs or symptoms of the disease. Only laboratory test reveal extent of damage

- ❑ **Clinical horizon-** Damage of host cells is so much that host's body functions start failing. There are signs and symptoms of the disease and the host feels sick. If not treated the host can advance to the next stage
- ❑ **Early disease stage-** the disease effects are as a result of massive cell damages that are affect tissue functions. If the host does not receive intervention to correct tissue damage the disease advances to the next level.
- ❑ **Advanced disease stage** - at this level damage to the host system is massive and may be irreversible, leading to disability or permanent change.
- ❑ The host may have one of three outcomes at this stage:
 - ✓ Recovery
 - ✓ Permanent disability
 - ✓ Convalescence or in worst cases death

DISEASE PREVENTION:

- ❑ This is the deliberate action to halt disease progression from one stage to the next.
- ❑ The three levels of disease prevention are:
- ❑ Levels: Primary prevention, Secondary and tertiary prevention

1. Primary prevention.

- ❑ It is the most common prevention method. It targets the pre-pathogenesis period. Interventions include:
 - ✓ General measures- health education, safety measures and healthy behavior.
 - ✓ Specific measures- vaccination and prophylaxis medication

2. Secondary prevention.

- ❑ It targets the 2-4 stages of the disease process. The purpose is to prevent further damage to host cell and tissues and thus avoid disease complication
- ❑ Measures include early **diagnosis**, **screening** and prompt **treatment**.

3. Tertiary prevention.

- ❑ It targets the advanced stage to minimize the complication or reverse the effects.
- ❑ Measures are rehabilitative and include: physiotherapy, occupational therapy, psychotherapy and rehabilitative surgery.

A fourth level, called primordial prevention, was later added.

Primordial prevention consists of actions and measures that inhibit the emergence of risk factors in the form of environmental, economic, social, and behavioral conditions and cultural patterns of living etc.

Key terminologies

- Outbreak
- Epidemic
- Pandemic
- Endemic
- Hyperendemic - persistently high level of occurrence
- Holoendemic - is when the occurrence of a disease is common in a population, occurring early in life and decreasing as age increases, indicating development of immunity among younger victims and less disease among the adult population. e.g. Malaria, epilepsy etc.
- Disease notification
- Disease surveillance
- Emergency preparedness and response

Levels of prevention

Primordial prevention

Primary prevention

Secondary prevention

Tertiary prevention

OUTBREAK MANAGEMENT

- ❑ An outbreak is the occurrence of a number of cases of a disease, known or suspected that is larger than expected for a given time in a given place.

Factors that determine decision making during outbreaks

- ❑ Severity of the disease
- ❑ Risk of spread
- ❑ Number of cases expected to occur
- ❑ Risk of social and economic disruption

MANAGEMENT

- ❑ Set up an investigative team to include:
 - ✓ Clinician; laboratory technician;
 - ✓ Public health expert
 - ✓ Nurses

- ❑ Verify the presence of the outbreak by
- ✓ Get information from the local people and medical staff.
- ✓ Check medical and laboratory records
- ❑ Confirm the nature of the illness by assessing the affected
- ❑ Manage all cases without referring
- ❑ Determine the extent of the outbreak- Time, place person description (TPP)
- ❑ Determine the source and mode of transmission-examine contacts and sources.
- ❑ Determine the areas and persons at risk.
- ❑ Control the epidemic
- ❑ Communicate with the community and relevant authorities
- ❑ Prevent future outbreaks by health education
- ❑ Observe for surveillance.

Procedures Used in the investigation of Infectious Disease Outbreaks

Disease Outbreaks

Introduction to Disease Outbreak

- A disease outbreak is the occurrence of cases of disease in excess of what would normally be expected in a defined community, geographical area or season
 - may occur in a restricted geographical area
 - may extend over several countries
 - may last for a few days or weeks, or for several years.
- A single case of a communicable disease long absent from a population, or caused by an agent (e.g. bacterium or virus) not previously recognized in that community or area, or the emergence of a previously unknown disease, may also constitute an outbreak and should be reported and investigated. (WHO)

Outbreak

- An epidemic limited to localized increase in the incidence of a disease, e.g., in a village, town, or closed institution (epidemiology dictionary)
- An increase in cases of a disease compared with the expected number, but it lasts for only a short time, or it occurs only in a limited area (e.g. in a few nearby households).

Endemic

- The constant presence of a disease or infectious agent within a given geographic area or population group; may also refer to the usual prevalence of a given disease within such an area or group.
- Endemic is the habitual presence of a disease within a geographical area (Gordis)
- Also defined as usual occurrence of a given disease in a given geographical area
- Relatively stable pattern of occurrence in a given geographical area or population group at relatively high prevalence and incidence.

Epidemic

- An **epidemic** is also an *excess* of cases compared with the number *expected*. However, an epidemic is more general than an outbreak, the increase in the number of cases continues far longer (possibly months or even years), and the cases are distributed across a wider area.

Epidemic

- Occurrence in a community or region of a group of illness of a similar nature, clearly in excess of normal expectancy and derived from a common or a propagated source. (Gordis)
- Epidemics are defined as the occurrence of cases in excess of what is normally expected in a community or region. When describing an epidemic, the time period, geographical region and particulars of the population in which the cases occur must be specified. (Bonita)

Epidemic cont'

- The number of cases needed to define an epidemic varies according to the agent, the size, type and susceptibility of population exposed, and the time and place of occurrence.
- identification of an epidemic also depends on the usual frequency of the disease in the area among the specified population during the same season of the year
- A very small number of cases of a disease not previously recognized in an area, but associated in time and place, may be sufficient to constitute an epidemic

Epidemic cont'

- The dynamic of an epidemic is determined by the characteristics of its agent and its pattern of transmission, and by the susceptibility of its human hosts

Types of epidemics

1. **Common source epidemics** - from a single source of infection of the disease-producing agent
 - a) Point source or single exposure epidemics - agent responsible for spread of disease is exposed to susceptible population at one point of time and only once.
 - b) Continuous or multiple exposure epidemics - the source of infection is continuous and such epidemics will not cease to exist unless the source is removed.

Types of epidemics

2. Propagated epidemics - generally of infectious origin and results from person to person transmission of disease agents. The epidemic shows a gradual rise and tapers slowly over a period of time. Transmission continues until there are no susceptible individuals. Such epidemics are more likely where large number of susceptible individuals gather as in fairs and festivals.

Types of epidemics

3. **Seasonal Epidemics** - occur in particular season, are known as seasonal epidemics
 - Certain diseases such as influenza and pneumonia are more common during winter season where as diarrhoea diseases are more during summer and rainy seasons.

Types of epidemics

4. Cyclical Epidemics - Some epidemics tend to occur in cycles, which may repeat over a period of time, which may be days, weeks, months or years. An example of this type of epidemic is measles V which tends to occur in a cycle of 2-3years

5. Epidemic of Non-communicable Diseases

With the advances in science and technology, the changing life styles have led to living pattern, which is sedentary and affluent with little physical activity.. The NCDs have acquired epidemic proportions in recent times.

Pandemic

- An epidemic occurring worldwide or over a very wide area, crossing international boundaries, and usually affecting a large number of people. E.g HIV/AIDS

Holoendemic

- A disease for which a high prevalent level of infection begins early in life and affects most of the child population, leading to a state of equilibrium such that the adult population shows evidence of the disease much less commonly than do the children.
- Malaria in many communities is a holoendemic disease.

Hyperendemic

- A disease that is constantly present at a high incidence and /or prevalence and affects most or all age groups equally.

Cluster

- Refers to a group of cases in a specific time and place that may or may not be greater than normal.
- Investigations of disease clusters are used to determine the normal or expected rate of disease. A disease with a high background rate in a given place and time is said to be “endemic.”

Outbreak investigation

- **Epidemic investigation** is a set of procedures used to identify the cause, i.e. the infectious agent, responsible for the disease.
- Frequently the cause and source of an outbreak is unknown
- The main purpose of epidemic investigation is to control the spread of the disease before it causes more illness and deaths
- The study of outbreaks can facilitate the development of new vaccines and drugs, changes in human behavior, as well as legislation for the improvement of public health.

Outbreak investigation

- It is also used to identify the people affected, the circumstances and mode of spread of the disease, and other relevant factors involved in propagating the epidemic.
- This is especially important if the epidemic has unusual features, if it presents a significant threat to public health, and it is not **self-limiting** (i.e. it does not end spontaneously without professional intervention).

Outbreak investigation

- Also used as an opportunity for research and training;
 - additional knowledge
- program considerations

Steps in outbreak investigation

- 1. Prepare for field work** - includes lists of supplies, division of tasks among team members, and administrative and travel arrangements
- 2. Establish the existence of an outbreak** - an investigator can examine health department surveillance records, hospital records, and other disease registries. If this information is unavailable, other options include interviews with doctors or people within the community.

Steps cont'

3. **Verify the diagnosis** - An investigator will need to review clinical findings and lab tests in order to verify the diagnosis, as well as determine the specific nature of the disease. E.g. in infectious disease outbreaks, additional lab tests may be necessary to determine the specific strain of microbe implicated in the outbreak
4. **Define and identify cases** - investigator establishes what constitutes a case. A case definition include information about the disease, characteristics of the patients, information about the location, and a specific range in time in order to eliminate an excess of false-positives.
 - have open communication with personnel from healthcare facilities and other relevant facilities or people who will be on the radar for observing potential cases.

Steps cont'

- 5. Describe and orient the data in terms of time, place, and person** - an outbreak is well understood by compiling a comprehensive description of its trends over time, place, and kinds of people (age, race, sex, etc.) affected by the disease.
- 6. Develop hypotheses** - the hypothesis is an educated guess about the source of the disease, mode of transmission, and/or exposures that caused the disease, based on available information.

Steps cont'

- 7. Evaluate hypotheses** - the credibility of the hypotheses can be evaluated by looking at the facts or by analyzing numbers to get actual statistics on available information
- 8. Refine hypotheses and carry out additional studies** - additional studies may include lab tests or environmental studies, among other methods of evaluation.

Steps cont'

- 9. Implement control and prevention measures** - control and prevention methods are usually aimed toward the source of the disease, but may also include interrupting transmission or limiting exposure.
- 10. Communicate findings** - findings of the investigation should be communicated to local health authorities who are responsible for implementing control measures. In addition, a written report provides a legal record of the findings and contributes to public health awareness.

DISEASE SURVEILLANCE

- ❑ The process of continuous data collection, analysis, presentation, interpretation, and dissemination of information about a particular disease and the use of such results to make decisions and taking action to
Monitoring the level of disease in a population to detect rise early.
- ❑ It measures success of preventive strategies in a community
- ❑ **Active** - planned, frequent and in-depth searches for selected cases.
- ❑ **Passive**- regular collection of statistics at all levels of the health services

Notification and reporting of emerging and re-emerging infections and infestations

Notification of Diseases

- ❑ Is the act of reporting the occurrence of a communicable disease or of an individual affected with such a disease that is required by law to be reported to government authorities.
- ❑ All medical practitioners, including clinical directors of diagnostic laboratories, are required to notify the Medical Officer of Health(MOH)/Director of Public Health (DPH) of certain diseases.
- ❑ This information is used to investigate cases thus preventing spread of infection and further cases.
- ❑ The information will also facilitate the early identification of outbreaks.

- ❑ It is also used to monitor the burden of diseases which can provide the evidence for public health interventions such as immunisation.
- ❑ Many government have enacted regulations for reporting of both human and animal (generally livestock) diseases.
- ❑ This usually happens during pandemic

Emerging infectious disease

- ❑ Newly identified & previously unknown infectious agents that cause public health problems either locally or internationally

The WHO list of some emerging diseases that can cause severe outbreaks

- ❑ Ebola virus disease
- ❑ Marburg disease
- ❑ Chikungunya
- ❑ Lassa fever
- ❑ Hemorrhagic fevers
- ❑ Severe Acute Respiratory Syndrome (SARS)-
- ❑ Avian influenza
- ❑ Rift Valley fever among others

Re-emerging infectious disease

Infectious agents that have been known for some time, had fallen to such low levels that they were no longer considered public health problems & are now showing upward trends in incidence or prevalence worldwide. Eg Malaria and Tuberculosis

OTHER RE-EMERGING DISEASES INCLUDE.

- ❑ Cholera
- ❑ Influenza
- ❑ Schistosomiasis
- ❑ TB
- ❑ Malaria
- ❑ Typhoid fever among others

REPORTING OF EMERGING & RE-EMERGING DISEASES

Through Surveillance

- ❑ Disease Surveillance is the ongoing systematic collection, analysis, and interpretation of health data.
- ❑ This includes the timely dissemination of the resulting information to those who need them for action.

- ❑ The main role of disease surveillance is to predict, observe and minimize the harm caused by outbreak, epidemic, and pandemic situations, as well as increase knowledge about which factors contribute to such circumstances
- ❑ Disease surveillance is the foundation for prevention and control
- ❑ The changes that have occurred in the health sector in the last twenty years have included the emergence of new diseases that have resulted in the need to review mechanisms for surveillance and response to these diseases.

Integrated Disease Surveillance and Response (IDSR)

- ❑ The World Health Organization Regional Office for Africa proposed an Integrated Disease Surveillance and Response (IDSR) approach for public health surveillance and response in the African Region in order to improve health facilities at subcounty and national levels
- ❑ IDSR involves carrying out disease surveillance activities using an integrated approach.
- ❑ An integrated approach means that data on all important diseases will be collected, analysed, interpreted and reported in the same way, by the same people who normally submit routine report forms on health-related data.
- ❑ The goal of IDSR is to improve the ability of all levels of health care system to detect and respond to diseases and conditions that cause high morbidity and mortality

IDSR Core Functions

- ❑ Case detection
- ❑ Case registration and reporting
- ❑ Lab Confirmation
- ❑ Data analysis and interpretation
- ❑ Response
- ❑ Provide feedback
- ❑ Evaluate and monitor

IDSR Priority Diseases for reporting In Kenya

Epidemic Prone Diseases

- Cholera
- Typhoid Fever
- Dysentery
- Meningococcal Meningitis
- Plague
- Measles
- Yellow Fever
- Anthrax
- Other VHF among others

Diseases earmarked for Eradication/elimination

- Leprosy
- Poliomyelitis
- Neonatal Tetanus

Diseases of Public Health Importance

- Malaria
- Childhood Pneumonia
- HIV/ AIDS
- Childhood Diarrhoea
- Tuberculosis
- STIs
- Other infection

Immediate preliminary notification to a medical officer of health

- Acute poliomyelitis
- Anthrax
- Cholera
- Diphtheria
- Neisseria meningitidis
- Paratyphoid
- Plague
- Rabies

- ❑ Severe Acute Respiratory Syndrome (SARS)
- ❑ Smallpox
- ❑ Typhoid
- ❑ Viral haemorrhagic fevers
- ❑ Yellow fever

Who to notify

- ❑ Clinicians should notify cases of notifiable diseases to the Director of Public Health/Medical Officer of Health for the area of residence of the patient using the notification of infectious disease form.

How to notify

- ❑ Notifications may be made in writing, by email or by telephone to the MOH/DPH.

- ❑ Laboratory notifications are made electronically through the Computerised Infectious Disease Reporting System (CIDR).
- ❑ Clinical notifications are entered into CIDR in the Departments of Public Health.

When to notify

- ❑ Notification should be made by a medical practitioner as soon as he becomes aware or suspects that a person on whom he is in professional attendance is suffering from or is the carrier of an infectious disease.
- ❑ Notification should be made by a clinical director of a diagnostic laboratory as soon as an infectious disease is identified in that laboratory
- ❑ Timely notification is important to facilitate timely public health action

Use of the data/ information

- The information collected on notifiable diseases from doctors and laboratories is used to detect and investigate outbreaks, and prevent spread of infection, hence reducing further cases of disease.
- It is also used to examine disease epidemiology, implement and monitor interventions such as immunisation to protect public health

Reporting methods

1. (List A)

24 hour reporting - are diseases for immediate notification & reporting

- ❑ Each national health administration should inform WHO within the first 24 hours of being informed of the first suspected case on its territory of a disease subject to the Regulations.
- ❑ This includes both indigenous and imported cases. All subsequent cases and deaths should be reported to WHO
- ❑ Three diseases that are currently subject to the International Health Regulations are yellow fever, plague, and cholera, hemorrhagic fevers, and neonatal tetanus.
- ❑ For these diseases the report from the health professional to the next higher administrative level is done by a rapid method such as phone, e-mail, fax or telex.

2. List B

Includes diseases for weekly notification & reporting

They are as follows:

- Malaria, Acute watery diarrhoea,
- Acute bloody diarrhoea,
- Acute flaccid paralysis,
- Neonatal tetanus,
- Measles, Diphtheria,
- Whooping cough (pertussis)
- Pulmonary tuberculosis,
- Meningitis,
- Acute respiratory tract infection (ARI),
- Schistosomiasis,
- Haemorrhagic fever,
- Typhoid,
- Food poisoning,
- Jaundice (infectious hepatitis),
- Rabies, Scabies, Chickenpox,

How Disease reporting is carried out in Kenya

- ❑ Kenya adopted the IDSR strategy in 1998 following the world health organization resolution in Harare and implementation began in 2002.
- ❑ In Kenya, IDSR seek to capture health information of priority communicable diseases for prevention and control by linking communities, health facilities, counties and national levels .
- ❑ Each health facility detects, confirms, and records these diseases on specific predesigned forms using standard case definitions.
- ❑ These reports are then sent to sub-county disease surveillance coordinator (SDSC) each Monday who aggregates all reports and sends to the national level by Wednesday

- ❑ These weekly reports are submitted to the sub-county through various modes which includes:
 - ✓ Short messaging services (sms), email, fax or hand delivery of hand copy report
- ❑ Each facility must retain a copy of the reporting form and submit the original copy to the sub-county within the following week
- ❑ From the sub-county, the aggregated sub-county weekly report is send to the national level via a web based platform.
- ❑ The SDSC provides feedback on the weekly reporting to health facilities and arrange support supervision in liaison with sub-county health management team (SHMT) at least once in three months (quarterly)

Factors contributing to poor reporting

- ❑ Stock outs of the forms results in poor reporting and is considered a significant factor to poor surveillance reporting
- ❑ A facility without a designated surveillance focal person is factor associated to inadequate reporting
- ❑ Understaffing may also lead to poor reporting
- ❑ Reporting late or not reporting at all, may partly be due to lack of awareness of their roles in the prevention and control of disease outbreaks through disease surveillance and notification activities
- ❑ Ignorance of both on the reporting guidelines and list of notifiable diseases
- ❑ Lack of feedback information regarding notification.

- ❑ Essential human, technical, and financial resources
- ❑ NB: under reporting of disease increases the risk of disease outbreaks and prevents timely public health intervention, resulting in increased morbidity, disability and mortality

CAUSES OF UNDER REPORTING TO WHO

Because of the fear of:

- ❑ economic and political consequences, such as the
 - ✓ loss of tourism and trade, and
 - ✓ the imposition of travel restrictions.
- ❑ This causes underreporting and reporting delays. Therefore reported data for the diseases covered need to be interpreted with caution.

Surveillance Methods

1. Passive surveillance

- ❑ This system has proven to be useful in identifying outbreaks and trends over time.
- ❑ Health care providers report notifiable diseases on a case-by-case basis.
- ❑ Often gathers disease data from all potential reporting health care workers.
- ❑ Passive surveillance is advantageous because it occurs continuously, and requires few resources.
- ❑ However, it is impossible to ensure compliance by health care providers;
- ❑ Moreover, cases occurring in people without access to care will frequently go unreported.
- ❑ Consequently, passive systems tend to under-report disease frequency

2. Active surveillance

- ❑ An active surveillance system provides motivation to health care workers in the form of individual feedback or other incentives.
- ❑ Often reporting frequency by individual health workers is monitored;
- ❑ Health workers who consistently fail to report or complete the forms incorrectly are provided specific feedback to improve their performance.
- ❑ There may also be incentives provided for complete reporting.
- ❑ Active surveillance requires substantially more time and resources and is therefore less commonly used in emergencies.
- ❑ But it is often more complete than passive surveillance.

- ❑ It is often used if an outbreak has begun or is suspected to keep close track of the number of cases.
- ❑ Community health workers may be asked to do active case finding in the community in order to detect those patients who may not come to health facilities for treatment

3. Sentinel surveillance

- ❑ Sentinel surveillance also requires more time and resources, but can often produce more detailed data on cases of illness because the health care workers have agreed to participate and may receive incentives.
- ❑ It may be the best type of surveillance if more intensive investigation of each case is necessary to collect the necessary data.
- ❑ For example, sentinel influenza surveillance in the United States collects nasopharyngeal swabs from each patient at selected sites to identify the type of influenza virus. Collection of such data from all health workers would not be possible.

Source of communicable disease surveillance data

Data is obtained from the health facility level from:

- ❑ The Outpatient register book,
- ❑ Laboratory register book,
- ❑ Admission forms,
- ❑ Death Certificate register and
- ❑ Case investigation sheets for diseases

Functions of surveillance system

- ❑ Guide immediate action for cases of public health importance;
- ❑ Measures the burden of a disease including changes in related factors, the identification of populations at high risk, and the identification of new or emerging health concerns;

- ❑ Monitor trends in the burden of a disease, including the detection of epidemics
- ❑ (outbreaks) and pandemics
- ❑ Guide the planning, implementation, evaluation of programmes to prevent and control disease, injury, or adverse exposure;
- ❑ Evaluate public policy; (course of action)
- ❑ Detect changes in health practices and the effects of these changes;
- ❑ Prioritize the allocation of health resources;
- ❑ Describe the clinical course of disease; and
- ❑ Provide a basis for epidemiologic research.

Challenges facing IDSR in Kenya

- ❑ Communication from health facilities
- ❑ Inadequate analysis at the peripheral level
- ❑ Weak laboratory capacity and network
- ❑ Inadequate involvement of clinicians in
- ❑ Surveillance
- ❑ Limited resources to carry out support
- ❑ Supervision
- ❑ Feedback to lower levels is poor, usually
Internet based

SPECIFIC COMMUNICABLE DISEASES

Areas of discussion:

- ❑ Introduction
- ❑ Epidemiology
- ❑ Clinical picture
- ❑ Diagnosis
- ❑ Management / Treatment
- ❑ Prevention & control

CONTACT DISEASES

- ❑ Also known as **contagious diseases**.
- ❑ This is a group of communicable diseases that are transmitted through direct or indirect contact between susceptible and infected persons.
- ❑ Transmitted by direct or indirect contact
- ❑ **Direct contact** is by skin -to- skin contact for example, by touching an infected person
- ❑ **Indirect contact** is by handling contaminated objects such as clothing, bedding, utensils etc.
- ❑ Contact diseases tend to occur within households, children's playgroups, schools and workplace

- ❑ Transmission of contagious diseases are facilitated by high population density (urban areas), overcrowding (poor housing), poor personal hygiene (e.g. during sexual intercourse).

Transmission of Contact Diseases

- ❑ Contact diseases tend to occur in clusters within households, children's play groups, schools and workplaces.
- ❑ They are passed from one person to another either directly by skin-to-skin contact or indirectly by handling contaminated objects such as clothing, bedding or combs.
- ❑ Such groups of infected people are known as clusters.

Factors increasing the transmission of contact diseases

- ❑ Close personal contact (for example: sexual intercourse)
- ❑ Inadequate housing leading to overcrowding
- ❑ Poor personal hygiene usually due to inadequate water supply
- ❑ High population density as in urban (slums) areas.

CONTACT (CONTAGIOUS) DISEASES.

- ❑ TRACHOMA
- ❑ FUNGAL SKIN INFECTIONS (dermatomycosis) i.e. ringworms and candidiasis
- ❑ SCABIES
- ❑ PEDICULOSIS
- ❑ BEDBUGS, FLEAS, FLIES
- ❑ Fungal skin infections
- ❑ ACUTE BACTERIAL CONJUNCTIVITIS

Diseases transmitted by contact:

1. SCABIES:

Definition

- ❑ Is a parasitic infestation of the skin characterised by severe itching with a typical distribution

Epidemiology

- ❑ Scabies is common in rural Africa.
- ❑ The prevalence in some village is very high, especially if there is shortage of water.
- ❑ Infection and symptoms are more severe in children than in adult

Causative organism

- ❑ Caused by a small arthropod, the itch mite, *sarcoptes scabiei*.
- ❑ The female mite enters the skin & makes a small burrow (hole or tunnel)

- ❑ The burrow is always superficial
- ❑ The skin selected for burrow is always thin and wrinkled, giving the scabies rash its typical distribution
- ❑ In the burrows, eggs and faeces are produced
- ❑ The eggs hatch in 4-5days
- ❑ The larvae leave the parent tunnel and burry themselves in other places of the skin

Transmission

- ❑ The infection is spread by direct close body contact, like
 - ✓ sharing a bed
 - ✓ contact between children and their parents
 - ✓ Children in playgroups or in school
- ❑ Indirect transmission is through:
 - ✓ Bedclothes and clothing
- ❑ NB: Scabies is a disease of the whole family

Clinical picture/presentation

- ❑ Intense itching at night leading to scratching & secondary infection with bacteria almost inevitable
- ❑ Eczema -like signs
- ❑ Thick crusts form on the skin

Diagnosis

- ❑ Should be confirmed by identifying the mite or mite eggs or faecal matter.
- ❑ This can be done by carefully removing the mite from the end of its burrow using the tip of a needle or
- ❑ By obtaining a skin scraping to examine under a microscope for mites, eggs, or mite faecal matter.

Treatment

- ❑ 10% benzyl benzoate emulsion (BBE), after the patient has taken a warm bath.
- ❑ A handful of BBE should be rubbed all over the whole body preferably using bare hands
- ❑ After 24 hours the patient should bath again and put on clean clothes.
- ❑ BBE has little effect on the eggs and therefore treatment should be repeated after 4-7 days to kill the larvae which have hatched since the first treatment
- ❑ Treat the itching symptomatically with calamine lotion
- ❑ For infants ensure to treat the scalp for scabies, but remember to protect the eyes
- ❑ Lindane lotion (1%) or 30g cream applied in a thin layer to the whole body & thoroughly washed off after 8hrs (should not be used as a 1st line therapy because of the toxicity)

Precautions for lindane 1% lotion or 30g cream

- ❑ Should not be applied immediately after bath or applied on the skin with extensive dermatitis.
- ❑ This is because lindane is absorbed through the skin and can lead to seizures (fits) and aplastic anaemia (is a blood disorder in which the body's bone marrow doesn't make enough new blood cells).
- ❑ Also its use should be avoided in pregnant women , lactating or children aged less than 2yrs

Prevention and control

- ❑ Regular bathing, washing of clothes and frequent use of soap.
- ❑ Health education stressing the use of soap and regular bathing of children.

- ❑ Treat the whole household even the apparently healthy
- ❑ If the disease is a problem at the village, treat as many families as possible by making house to house visit and discussing personal hygiene
- ❑ Carry a survey of the primary school children by looking at the hands and wrists.
- ❑ Stress to the local development committee the importance of improvement of water supply.

2. PEDICULOSIS

- ❑ Is the infestation of the scalp, hairy parts of the body, or clothing with adult lice (blood-sucking parasites), and their larvae or eggs

Caused by:

- ❑ Various parasites which includes:
 - ✓ Head lice - *Pediculus humanus capitis*
 - ✓ Body louse - *Pediculus corporis*
 - ✓ Pubic lice - *Phthirus pubis*
- ❑ The head lice and body louse are transmitted by direct contact with an infected person or personal belongings especially clothing where as pubic lice is usually acquired during sexual intercourse.
- ❑ The female parasite produces about 100 eggs (nits) daily.

- ❑ Each of these is attached to the hair with a special glue thus making it very difficult to remove.
- ❑ A larva hatches in 6-9 days and develops into a mature louse in 1-2 week

Epidemiology

- ❑ Head lice is common in school children and people with long hair which is seldom (rarely) washed
- ❑ Lice are especially common where people are crowded in unhygienic condition for example the displaced people.
- ❑ Its also common in cold areas where people seldom wash and change clothes
- ❑ Body louse is a vector of some important diseases like relapsing fever and typhus.
- ❑ These two diseases have been reported in some countries in Africa e.g. Uganda, Rwanda, and Ethiopia
- ❑ Pubic lice do not transmit disease

Clinical picture

- ❑ Irritating bites which form red papules which may lead to secondary infection due to scratching
- ❑ Nits can be seen on the shafts of hair

Treatment

Head lice

- ❑ Rub 0.1-1% lindane lotion into the hair and scalp, allow to dry and remove by washing after 24 hrs, repeat after 7 days
- ❑ Rub 0.5% malathion lotion into dry hair and scalp, comb and allow to dry ,remove by washing after 12 hrs, repeat after one week

2. Body lice

- ❑ Instruct the patient to take a hot bath and put on clean clothes, that are washed and ironed
- ❑ Apply 25% benzyl benzoate to the affected area for 24hrs, remove by washing, repeat 2-3times.
- ❑ Rub 0.1-1% lindane lotion on the affected area , allow to dry and remove by washing after 24 hrs, repeat after once per week
- ❑ Rub 0.5% malathion lotion on the affected area ,allow to dry ,remove by washing after 7-9 days

3. Pubic lice

- ❑ Malathion 0.5% applied 8-12 hrs and washed off in 10 minutes , repeated after 2weeks
- ❑ Ivermectin 250 micro-gram /kg, repeated after 2 weeks

Prevention and control

- ❑ Health education regarding cleanliness, this will remove nits and lice
- ❑ Case finding by direct inspection of bodies and clothing of schoolchildren and adults living in congested camps
- ❑ Examination of household contact
- ❑ Organising school survey
- ❑ Household contacts of children with lice

3. FUNGAL SKIN INFECTIONS

- ❑ Dermatomycosis is a term applied to fungal infection of the skin and mucous membrane
- ❑ Fungal skin infections are usually problems of appearance rather than illness
- ❑ They are sometimes indicators of immuno-suppression as occurs in AIDS, Cancer, diabetes, and TB.

Fungal skin infection includes:

- ❑ Tinea capitis- ringworm of the scalp
- ❑ Tinea corporis- ringworm of the body
- ❑ Tinea pedis- ringworm of the foot or athletes foot
- ❑ Tinea unguium- ringworm of the nails
- ❑ Candidiasis (thrush, or yeast infection)

EPIDEMIOLOGY

- ❑ All fungi may be spread by direct or indirect contact
- ❑ Genital infection may be spread during sexual intercourse.

Clinical picture

Ringworm of the scalp (tinea capitis)

- ❑ Begins as a small papule which spread to a larger area
- ❑ Hair in the affected skin becomes brittle (weak) and break off easily.
- ❑ Occurs mainly in children under 10yrs and disappears after puberty

Ringworm of the body- tinea corporis

- ❑ Characterized by flat, ring shaped spreading lesions
- ❑ The lesions are reddish, may be dry and scaly or moist and crusted (thick)
- ❑ The central area is clear, leaving apparently normal skin

Ringworm of the foot or athlete's foot (tinea pedis)

- ❑ Characterized by scaling and cracking of the skin between the toes,

Ringworm of the nails (tinea unguium)

- ❑ Characterized by thickening, discoloration and brittleness of one or more nails.
- ❑ There is accumulation of material beneath the nail which becomes chalky and disintegrate (break up)

Candidiasis

- ❑ Also known as thrush or yeast infection.

Has four (4) main manifestation

1. Oral thrush

- ❑ Characterized by patchy white dots on a red background that appears on the mucous membrane of the mouth.
- ❑ Ulcers are rare.
- ❑ Its common in AIDS patients, newborns, malnourished children or after antibiotic therapy.

2. Vulvo- vaginitis

- ❑ Characterized by genital itching and a white thick vaginal discharge

3. Balanitis

- ❑ Produces itching and redness of the penis ,
- ❑ Swelling of the prepuce , and eventually secondary bacterial infection with ulceration

4. Intertrigo

- ❑ Occurs in deep body folds e.g. axillae , under the breast or groin.
- ❑ The skin is moist and eroded.

Diagnosis

- ❑ Can be confirmed by laboratory investigation..
specimen collected are:
- ❑ Skin scrapings and pus from the lesions

Treatment

Tinea capitis (ringworm of the scalp)

- ❑ Griseofulfin is the drug of choice although oral therapy with itraconazole 200mg and terbinafine 250mg are effective alternatives

- ❑ Oral fluconazole seems to have similar efficacy to griseofulvin
- ❑ Griseofulvin is given at a dose of 250mg bd for 6-12 weeks adults
- ❑ And for children at 20-25mg/kg body weight for 6-12 weeks
- ❑ Plus whitefield ointment applied bd for 3-6weeks

Tinea corporis (ringworm of the body)

- ❑ Responds well with topical antifungals
- ❑ Clotrimazole 1% cream, lotion or solution used bd
- ❑ And ketoconazole 2% cream used od

Tinea pedis (ringworm of the foot or athlete's foot)

- ❑ Topical agents applied for a duration of 4 weeks

- ❑ Chronic or extensive disease may require oral systemic therapy with griseovulvin 250-500mg bd, terbinafine 250mg od, itraconazole 200mg od

Tinea unguium (ringworm of the nails)

- ❑ Systemic anti-fungals are indicated
- ❑ Terbinafine and itraconazole have been shown to be the best than other agents
- ❑ Terbinafine is given at dose of 250mg od for 6 weeks for fingernails infections and for 12 weeks for toenails infections
- ❑ Itraconazole can be given at a dose of 200mg same way with terbinafine

Candidiasis

- ❑ Topical or systemic azole agents are the drug choice

For oral candidiasis

- ❑ Nystatin suspension may be effective at a dose of 100,000 -200,000 IU 6hrly for 2-4 weeks

Vaginal candidiasis

- ❑ Single dose of fluconazole 150mg or clotrimazole pessaries inserted every night for 6days

For AIDS patients,

- ❑ Fluconazole 100-200mgdaily or
- ❑ Ketoconazole 200-400 mg daily for 2weeks

Prevention and control

- General personal hygiene and treatment of individuals
- Mass school treatment may be rewarding
- Oral thrush of the newborn can be prevented by treating maternal vulvovaginitis in the 3rd trimester of pregnancy.
- Refer all skin diseases of uncertain (not sure)
- Diagnosis for investigation but treat fungal infection

DISEASES CAUSED BY FAECAL - ORAL CONTAMINATION

- ❑ Acute gastro-enteritis,
- ❑ Bacillary dysentery,
- ❑ Campylobacter jejuni,
- ❑ Giardiasis, amoebiasis,
- ❑ Cholera, enteric fevers,
- ❑ Food poisoning,
- ❑ Poliomyelitis,
- ❑ Viral hepatitis

Introduction:

- ❑ Causative organisms of the diseases in this group are excreted in the infected stools of infected person.
- ❑ Portal entry of these organisms is the mouth

- ❑ Therefore the organism has to pass through the environment from the faeces of an infected person to the gastro-intestinal tract of a susceptible person. “This is known as faecal oral transmission route”.

Faecal oral transmission occurs through:

- ❑ In apparent faecal contamination of food, water, and hands
- ❑ Very small quantities of faeces can carry enough organisms to establish infection.
- ❑ Sparkling clear water may be dangerously polluted
- ❑ Hands that appear clear may carry and transmit enough micro-organisms to spread disease
- ❑ Contaminated food may smell, look, and taste normal and yet harbour pathogenic organisms.

DIAGNOSIS

- ❑ Stool are examined under the microscope using direct saline preparation, dark field microscopy, concentration methods and modified ziehl-Nielsen staining.
- ❑ Examination of stool in acute watery diarrhoea is usually not helpful unless cholera is suspected
- ❑ It is usually useful to examine stool in dysentery cases or patients with persistent diarrhoea (more than 2weeks duration)

TREATMENT

- ❑ Whatever the cause of diarrhoea or while waiting for investigation, rehydration must be started
- ❑ Oral Rehydration Salt (ORS) is the best fluid for preventing and treating all forms of dehydration.
- ❑ Breastfeeding and additional fluids to babies and other foods are also essential.

PREVENTION AND CONTROL

- ❑ Improvement of stool disposal by use of properly constructed pit latrines.
- ❑ Hand washing facilities (soap & water) should be provided outside toilets and latrines
- ❑ Control flies by disposal of refuse and faeces and spraying the refuse with insecticides
- ❑ Proper cooking of food
- ❑ Health education is always a helpful preventive measure
- ❑ Raw vegetables and fresh fruits with intact peels should only be eaten if they can be thoroughly washed e.g. Apple
- ❑ Public eating places should be inspected thoroughly

ACUTE GASTRO-ENTERITIS:

Introduction:

- ❑ Is a clinical syndrome/symptom of diarrhoea (more than 3 liquid stools in 24hrs), nausea, vomiting and often fever.
- ❑ It may affect any member of the population, but severity varies in different age groups.
- ❑ Dehydration occurs rapidly in children and is a common cause of death

GROUP AT RISK

- ❑ Infants
- ❑ Weanlings
- ❑ Bottle-fed children
- ❑ Travelers

- ❑ Low birth weight children and premature children easily get Escherichia coli
- ❑ In premature infants, case fatality rate may be high.
- ❑ In the weaning period, new types of food are introduced to children.
- ✓ In this case children are exposed to a variety of micro-organisms
- ✓ Malnutrition is common during this period due to lack to knowledge about the best weaning foods
- ✓ The incidence of diarrhoea in this period may be as high as 3 attacks per child per year
- ❑ Diarrhoea is more frequent during hot and dry periods clearly associated with a shortage of water

- ❑ Bottle-feeding is particularly dangerous in rural communities and among urban poor (mothers are poor and of low education standard)
- ❑ Its associated with a high mortality rate due to diarrhoea and should be firmly discouraged in favour of breastfeeding
- ❑ Travellers diarrhoea occurs in people who are exposed to a new environment.
- ❑ The situation can arise from human caused disasters (e.g. war refugees) or among migrants (seasonal labourers) and holidaymakers.
- ❑ Travellers diarrhoea is usually due to enterotoxigenic E.coli, a bacterial infection of the bowel acquired through faecal-oral contact,

- ❑ Acute gastro enteritis is endemic in all areas where sanitation is poor
- ❑ Diarrhoeal disease are important because they are a leading cause of infant mortality through dehydration.
- ❑ Numerous episodes interfere with nutrition and so they are an important cause of malnutrition (protein energy malnutrition & vitamin A deficiency)

EPIDEMIOLOGY

- ❑ Many organisms can cause diarrhoea, and it may be difficult to prove any particular organism is responsible
- ❑ In infants, diarrhoea may be caused by viruses such as rotavirus, enteroviruses, and bacteria such as enteropathic E. coli
- ❑ All these organisms are caused by faecal oral route

- ❑ Disease like bacillary dysentery, food poisoning, cholera infections may also be present as gastro-enteritis.
- ❑ In children, diseases like malaria and otitis media may cause diarrhoea
- ❑ Therefore it is vital that children with acute diarrhoea and fever are properly examined by a health worker to rule out local infection that can cause diarrhoea

CLINICAL PICTURE

- ❑ Depends on the cause of the diarrhoea
- ❑ E.coli infection of babies causes profuse watery diarrhoea with mucous but no blood
- ❑ Onset of diarrhoea is acute and may progress rapidly to severe diarrhoea with as many as 20 motions a day.

- ❑ Protein-caloric malnutrition is commonly associated with weaning diarrhoea and frank kwashiorkor may follow as attack.
- ❑ Severe dehydration
- ❑ In adult mild abdominal disturbances to a dysentery like disease is present.

MANAGEMENT

1. Treatment of choice of diarrhoea is oral rehydration therapy (ORT) with ORS solution

- ❑ For babies-use a dropper or syringe to put small amount of solution into the mouth
- ❑ Children <2yrs: teaspoonful every 1-2 minutes
- ❑ Children >2yrs: may take sips directly from the cup

2. Supplemental zinc 10-20mg or syrup daily for 10-14 days

- ❑ Give antibiotics only if there is an indication of blood in the stool,
- ❑ If there is fever, look for the cause and treat
- ❑ Give vitamin A if the child has several episodes

NB: can refer cases if no improvement with ORT with ORS

Prevention and control

For infants:

- ❑ Prevent low birth weight and prematurity by improved antenatal care
- ❑ Prevent malnutrition in the weaning period by nutrition education and improved care
- ❑ Continue breastfeeding up to the second year.
Discourage bottle feeding

- Control of diarrhoeal disease (CDD) programmes are now an active part of child survival in the health ministries of several countries in Africa.

The activities included in these programmes are:

1. Oral rehydration therapy to reduce diarrhoea related deaths

- Improvement of water and sanitation to reduce transmission and number of episodes of diarrhoea

3. Improved weaning practices and nutrition of children

4. Investigation of diarrhoea outbreaks

5. Immunization against measles

6. Sustained breastfeeding

7. Antenatal care reduce low birthweight

BACILLARY DYSENTRY (shigellosis)

Introduction:

- ❑ Is an acute diarrhoeal disease characterised by bloody stools, fever, vomiting and abdominal cramps.
- ❑ Common in areas where sanitation conditions are poor
- ❑ Factors to its occurrence are methods used in the disposal of faeces, availability of water, fly population, seasonal changes and nutrition.

Group at risk

- ❑ Poorly nourished children
- ❑ Old people
- ❑ Undernourished groups living in poor & overcrowded conditions such as prisoners, refugee
- ❑ Immune-suppressed patients

Epidemiology

- ❑ Bacillary dysentery is caused by non-motile Gram-negative bacilli of shigella spp
- ❑ Those responsible for outbreaks include:
 - ✓ *Shigella sonnei*
 - ✓ *S.dysenteriae*
 - ✓ *S.flexneri*
- ❑ Human are the only reservoir
- ❑ Following infection, people may be asymptomatic carriers for up to 3 months

Transmission

- ❑ By faecal oral contact
- ❑ The disease multiply in food.
- ❑ The food may be contaminated directly by flies or unwashed hands carrying the bacteria or unwashed dishes

- ❑ Children form the main reservoir of infection because they often defecate in and around the houses.
- ❑ As the bacilli are present in the stool of children, contamination of food and water can easily occur

CLINICAL PICTURE

- ❑ The Incubation period is short 1-4 days
- ❑ Mild diarrhoea in well nourished adult
- ❑ In undernourished child, it may result in a fatal disease
- ❑ Onset is sudden with fever, colicky abdominal pain and diarrhoea.
- ❑ After few motions the diarrhoea stops and dysentery syndrome sets in characterised by abdominal cramps and tenesmus (is painful contractions of the sphincter ani, producing irresistible and continuous urge to defaecate,

- ❑ However no faecal matter is produced only small mucous and blood.
- ❑ Vomiting
- ❑ Convulsions may occur in children
- ❑ Dehydration is common and may cause muscle craps, oliguria (reduced urine output) and shock

Diagnosis

- ❑ Confirmed by a positive stool culture for shigella spp

Management/Treatment

- ❑ Prevention or treatment of dehydration is all that is necessary in mild infection
- ❑ In severe infection, rehydration must be combined with antibiotics

- ❑ Spasmolytics will relieve pain
- ❑ Fluoroquinolones such as ciprofloxain

Prevention and control

- ❑ Take antibiotics as prescribed
- ❑ Dispose off faeces adequately
- ❑ Whenever there is an outbreak of the diseases, check the water supply.
- ❑ Give health education on use of latrines, safe water, safe food, refuse disposal and personal hygiene.
- ❑ At village development committee meetings stress the importance of prolonged breastfeeding etc.
- ❑ Inspect public eating places, markets and boarding institutions (schools, camps)

COMPYLOBACTER JEJUNI INFECTION

Introduction:

- ❑ Is an enteric Gram-negative micro-aerophilic bacterium
- ❑ Caused by *Campylobacter jejuni*
- ❑ Presents with various symptoms ranging from mild gastro-enteritis to severe dysentery
- ❑ Asymptomatic carriers may serve as a significant reservoir for the infection
- ❑ In many countries this organism is becoming recognised as an important cause of bloody diarrhoea
- ❑ The disease exist as a non-pathogen in cattle, sheep, pigs, dogs etc.
- ❑ Human may carry it as a commensal organism (asymptomatic carriers)

- ❑ The disease is particularly common in children under 2 years of age
- ❑ In many parts of Africa, poultry are a common source.

Epidemiology

- ❑ Ingestion of low bacterial loads (less than 500) is sufficient to cause clinical illness
- ❑ Symptoms and signs are related to dose bacterial virulence as well as host factors like immune responses
- ❑ Low gastric pH (high acidity) kills many of the bacteria
- ❑ Once the bacteria have passed through the stomach , they colonise the distal small intestine and colon
- ❑ The incubation period ranges from 1-7 days
- ❑ The bacteria may invade the intestinal wall, making small ulceration in the mucosa

- ❑ Transient blood invasion may occur .
- ❑ During this period large numbers of bacteria are shed into the stool.
- ❑ Symptoms are related to the time taken for the intestines to be ulcerated and it usually last 1-3 weeks

Clinical picture

- ❑ Abdominal pains
- ❑ Diarrhoea and fever
- ❑ Bloody stool are not common

DIAGNOSIS

- ❑ Stool culture is one of the best procedure used to confirm the diagnosis

MANAGEMENT/TREATMENT

For severe illness give:

- ❑ Erythromycin 500mg orally QID for seven days.
- ❑ Tetracycline 500mg QID for one week
- ❑ Ciprofloxacin 500mg orally BD for 5days

PREVENTION AND CONTROL

- ❑ Reducing household contamination by domestic animals
- ❑ Improved food hygiene techniques
- ❑ Environmental control including reducing the number of animals and poultry coming into houses and yard
- ❑ Ensure poultry products are cooked properly
- ❑ Regard all purchased chicken as potentially infected and observe good hygienic preparation & cooking methods

Poliomyelitis

- ❑ Occurrence: Worldwide
- ❑ Organism: Poliovirus
- ❑ Reservoir: Man
- ❑ Transmission: Food, water, droplets
- ❑ Control: Notification, isolation, safe disposal of faeces, hygiene, immunization
- ❑ Poliomyelitis is a viral disease that can affect nerves and can lead to partial or full paralysis.
- ❑ Poliomyelitis is a disease caused by infection with the poliovirus.
- ❑ The virus spreads by direct person-to-person contact, by contact with infected mucus or phlegm from the nose or mouth, or by contact with infected feces.

- ❑ The virus enters through the mouth and nose, multiplies in the throat and intestinal tract, and then is absorbed and spread through the blood and lymph system. The time from being infected with the virus to developing symptoms of disease (incubation) ranges from 5 - 35 days (average 7 - 14 days).

Signs and symptoms:

- ❑ Flaccid paralysis occurs in less than 1% of infections, greater than 90% of infections are inapparent consisting of fever, malaise, headache, nausea and vomiting.
- ❑ If disease progresses to major illness, severe muscle pain and stiffness of neck and back with or without flaccid paralysis may occur. The maximum extent of paralysis is reached in 3-4 days.
- ❑ The site of paralysis depends on the location of nerve destruction in the spinal cord or brainstem
- ❑ Legs are affected more than arms.

- ❑ Paralysis of muscles of respiration / swallowing is life threatening.
- ❑ Polio in pregnancy is associated with increased risk of abortion, prematurity and stillbirth.

Occurrence/Epidemiology:

- ❑ Between 1840 and the 1950s, polio was a worldwide epidemic.
- ❑ Since the development of polio vaccines, the incidence of the disease has been greatly reduced. Polio is on the verge of eradication in western Europe, North Africa, Arabian peninsula, southern and eastern Africa, East Asia and island nations of pacific Ocean.
- ❑ The greatest risk now occurs in Indian sub continent and, to a lesser extent, in the countries of West and Central Africa.

- ❑ War torn countries where health infrastructure has been destroyed are at particular risk of Epidemics.

RISK Groups:

- ❑ Polio remains primarily a disease of infants and young children. In many polio endemic areas 80-90% of cases are less than 5 years of age.
- ❑ Other susceptible persons include groups refusing immunization, nomads, refugees.
- ❑ Urban poor especially those living in slums. This is due to overcrowding of non immune groups and collapse of sanitary infrastructure.

Prevention and control

- ❑ Educate the public on advantages of immunization in early stage.
- ❑ Currently, both trivalent live, attenuated oral(OPV) and an injectable, inactivated poliovirus vaccine(IPV) are commercially available. Their use in different countries. Most use OPV alone, a limited number use IPV alone, and a few use a combination of both vaccines.
- ❑ Obligatory case report of paralytic cases as a disease under surveillance by WHO. In countries undertaking polio eradication a single case is considered a public health emergency. Mass immunization with OPV are indicated to stop transmission

HELMINTHIC DISEASES

INTRODUCTION:

- ❑ Are the largest of human parasites
 - ❑ The parasite are a major health hazard in low-income countries where malnutrition is also prevalent (common)
 - ❑ Intestinal helminthic infections worsens malnutrition
- Helminths are grouped into 3 zoological classes namely
1. Nematodes (roundworm) e.g. *Ascaris lubricoides*,
 2. Cestodes (tapeworm) e.g. *taenia saginata*, and
 3. Tremadodes (flukes) e.g. *schistosoma mansoni*
- ❑ The definitive host of all the helminths is the human being except for dog tapeworm for which the human is an accidental intermediate host.

- ❑ The Eggs are excreted in stools
- ❑ Control measures in African include school-based and community-based approaches, environmental sanitation, nutritional supplementation and health education.
- ❑ Proper disposal of human waste
- ❑ The true prevalence of worm infection in the community is unknown as most persons are asymptomatic and do not seek health care.
- ❑ Hookworm prevalence is dependent on climate because the larvae require moist warm soil for development and are more common in tropical coastal regions of east Africa.
- ❑ Prevalence rate of 60%

- ❑ Ascaris infestation is more perennial (persistent) in the damp humid areas of the tropics, where sanitation is poor.
- ❑ Its likely that an average of 25% of the rural population of any African country may be infected
- ❑ Taenia prevalence is depended on cattle keeping area of the savannah where meat consumption is high

1. ASCARIASIS

INTRODUCTION:

- ❑ Commonest and most widespread nematode infection of the small intestine
- ❑ Common in all areas of Africa
- ❑ Its prevalence is related to poor sanitation and hygiene.
- ❑ Children are more frequently infected with high burden than adults

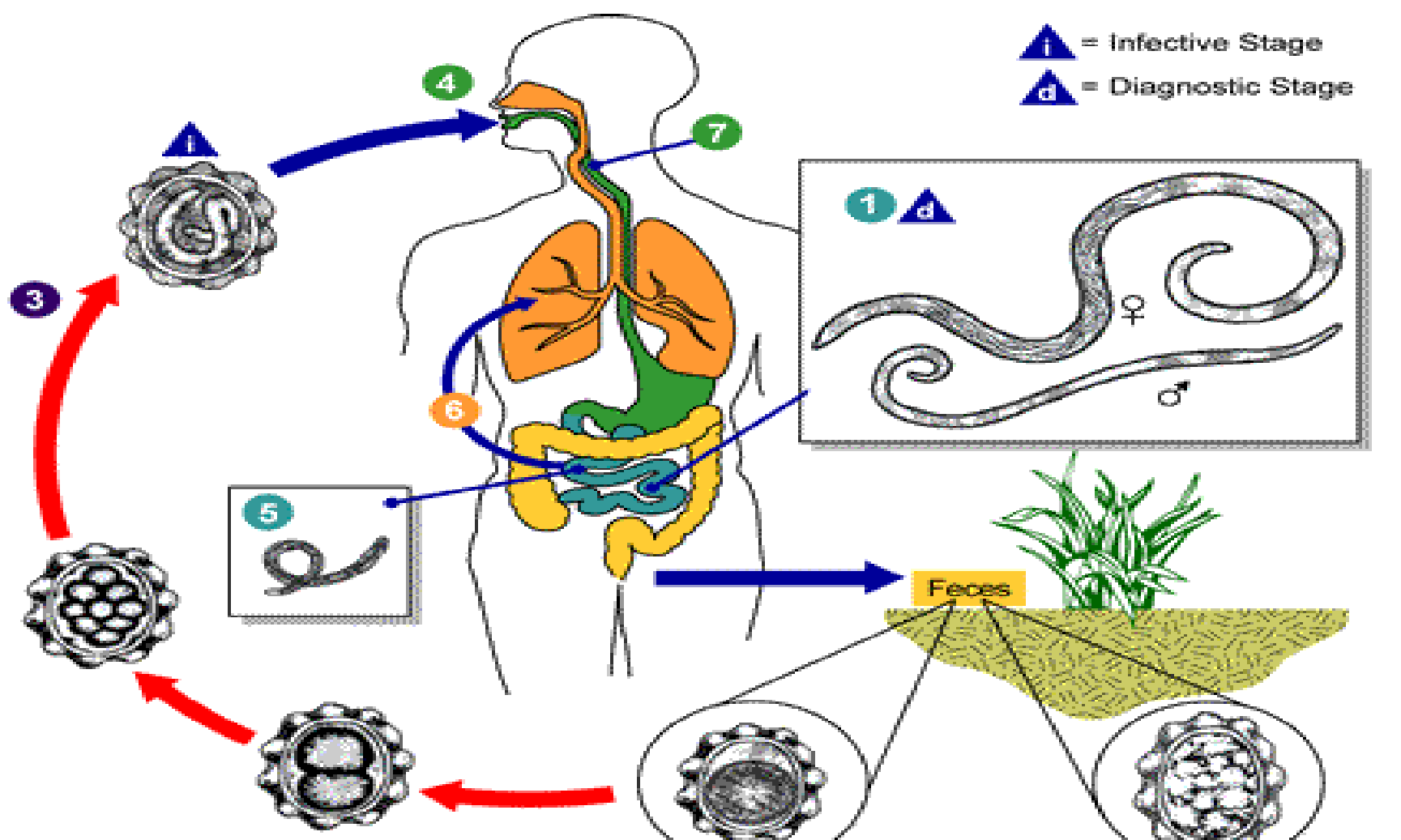
CAUSE

- ❑ By *Ascaris lumbricoides*, a large intestinal roundworm that lives in the small intestine.

LIFE CYCLE OF ASCARIS LUMBRICOIDES

1. Adult worms live in the lumen of the small intestine. A female may produce approximately 200,000 eggs per day, which are passed with the faeces .

2. Unfertilized eggs may be ingested but are not infective. Fertile eggs embryonate (early stage of growth in an egg) and become infective after 18 days to several weeks
3. After infective eggs are swallowed
4. The larvae hatch
5. Attack the intestinal mucosa, and then carried via the portal, then systemic circulation to the lungs .
6. The larvae mature further in the lungs (10 to 14 days), penetrate the alveolar walls, climb the bronchial tree to the throat, and are swallowed .
7. Upon reaching the small intestine, they develop into adult worms . life cycle begins



CLINICAL PICTURE

- ❑ Depends on the life cycle stage of the ascariasis
- ❑ The migration phase is associated with pneumonitis
- ❑ Presenting with fever, cough, wheezing and shortness of breath
- ❑ Abdominal discomfort
- ❑ Occasionally the worm may leave the body through stool or vomitus
- ❑ Malnutrition states such as kwashiorkor and vit A deficiency by interfering with absorption of nutrients in the small intestines.

DIAGNOSIS

- ❑ Stool microscopy that shows the characteristic of ascaris eggs.

MANAGEMENT/TREATMENT

- ❑ Mebedazole is most commonly used and it's a broad spectrum antihelminthic.
- ❑ Its given in a dose of 100mg bd daily for 3 days
- ❑ Albedazole (zental) 400mg single dose (alternative)
- ❑ Levamisole (ketrax) 3 tablets as a single dose (5mg/kg) or
- ❑ Piperazine (antepar) syr. 150mg/kg single dose to a maximum of 4g

PREVENTION AND CONTROL

- ❑ Provision of adequate and safe water supplies
- ❑ Provision of facilities for the proper disposal of faeces and prevention faecal contamination of food
- ❑ The use of fresh human faeces as manure should be discourages, however composting for more than six months is sufficient to kill *Ascaris* eggs
- ❑ health education
- ❑ Periodic de-worming of children whose growth is not satisfactory is done in some clinics in areas where ascariasis is endemic
- ❑ Inspection of latrines in schools and markets in the community should be undertaken periodically.

2. ENTEROBIASIS

INTRODUCTION:

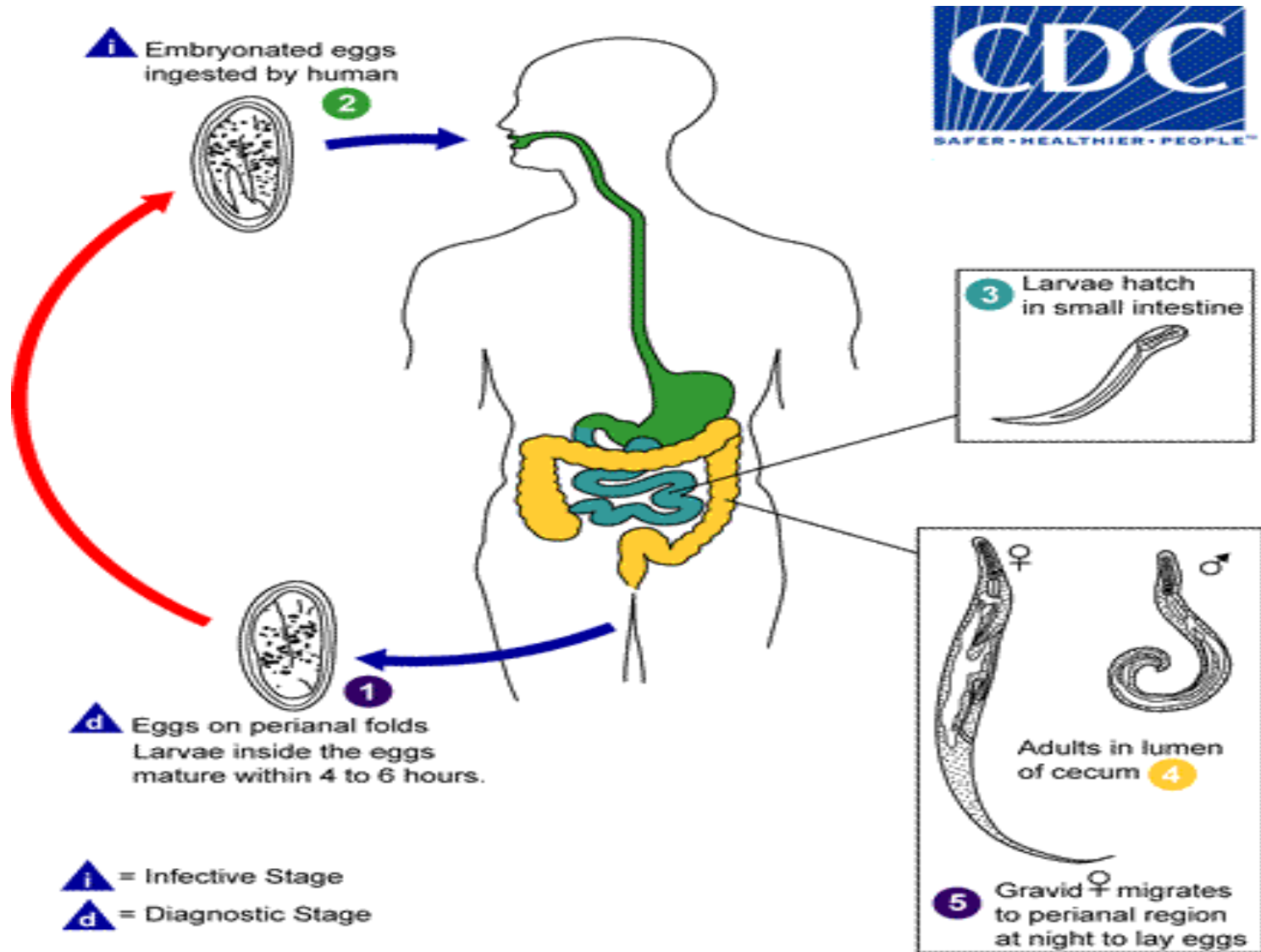
- ❑ Is a benign (not harmful) intestinal disease with a worldwide distribution
- ❑ More common in temperate countries (developed) than tropics (developing)
- ❑ It's a person-to-person spread
- ❑ Common among family members and boarding institutions.
- ❑ Control is by personal hygiene and treatment

EPIDEMIOLOGY:

- ❑ Caused by enterobius vermicularis , the thread-worm or pinworm.

- ❑ Initial infection occurs by the faecal oral route
- ❑ Infection is by direct transfer of infective eggs from the anus to the mouth
- ❑ Or indirect faecal-oral contact through clothing, bedding, food etc.
- ❑ Airborne infection through inhalation of dust containing eggs and consequent swallowing is also possible
- ❑ The larvae hatch and mature within the intestines.
- ❑ The young worm mature in the lower small intestine and upper colon
- ❑ Gravid worms (mature worm) migrate to the rectum to discharge eggs on the peri-anal-skin during the night
- ❑ This cause itching and consequent scratching
- ❑ The life cycle takes 3-6 weeks

ENTEROBIASIS LIFE CYCLE



CLINICAL PICTURE:

- ❑ Pruritus ani is the main symptom
- ❑ This provokes the scratching of the peri-anal region
- ❑ Resulting in secondary bacterial infection
- ❑ Disturbance of sleep, restlessness,
- ❑ Loss of appetite and weight loss

DIAGNOSIS

- ❑ Since pinworm eggs are not usually released in the bowel, diagnosis cannot be made by looking for eggs in the faeces.
- ❑ Instead, eggs deposited in the peri-anal region are detected by application of transparent adhesive tape or clear cellulose acetate tape over the anus early in the morning

- ❑ The tape is then transferred to a microscope slide and characteristic pinworm eggs are detected.

MANAGEMENT:

- ❑ Mebendazole 100mg as a single dose for all ages

PREVENTION AND CONTROL

- ❑ Personal hygiene is essential i.e. Regular bathing and hand washing
- ❑ Cut nails short
- ❑ proper disposal of faeces
- ❑ Treat the whole family
- ❑ Give health education to infected individuals to prevent re-infection

TRICHURIASIS

INTRODUCTION:

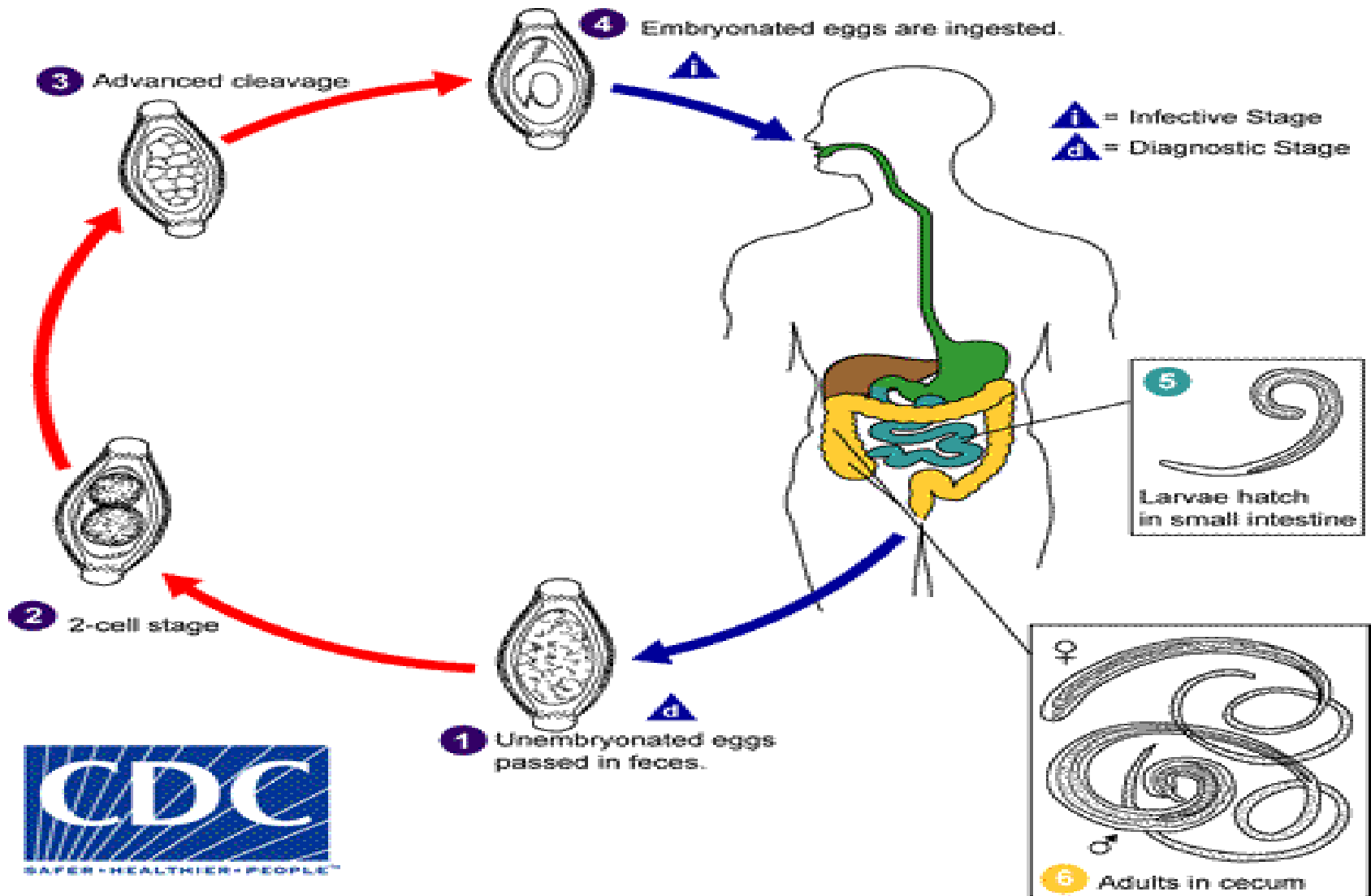
- ❑ Is a nematode infection of the large intestine
- ❑ Usually asymptomatic
- ❑ However, heavy infections may cause gastro-intestinal symptoms
- ❑ Most common among children from low-income families
- ❑ Proper faecal disposal and personal hygiene are key to its control

EPIDEMIOLOGY:

- ❑ Its caused by trichuris trichiuria
- ❑ Its also referred to as whipworm
- ❑ Transmission is indirect, as eggs passed in the faeces require embryonation in soil

- ❑ In the soil, the eggs develop into a 2-cell stage , an advanced cleavage (split or division) stage , and then they embryonate ; eggs become infective in 15 to 30 days
- ❑ When embryonated eggs are ingested, they hatch in the duodenum, releasing larvae that mature before migrating to the large bowel.
- ❑ The mature worms attach themselves to the mucosa of the cecum and colon and live for several years.

Lifecycle of Trichuriasis



CLINICAL PICTURE

- ❑ Tissue reaction to whipworm is mild
- ❑ Its asymptomatic to individuals infected
- ❑ Abdominal discomfort
- ❑ Bloody diarrhoea
- ❑ Loss of weight
- ❑ Anaemia

DIAGNOSIS:

- ❑ Stool examination through the microscope
- ❑ Presence of more than 200 eggs in an ordinary faecal smear indicates heavy infestation

MANAGEMENT:

- ❑ Mebendazole 100mg twice or three times daily will eliminate infection

PREVENTION AND CONTROL

- ❑ As for ascariasis: sanitation disposal of faeces and personal hygiene is key

HOOKWORM

INTRODUCTION

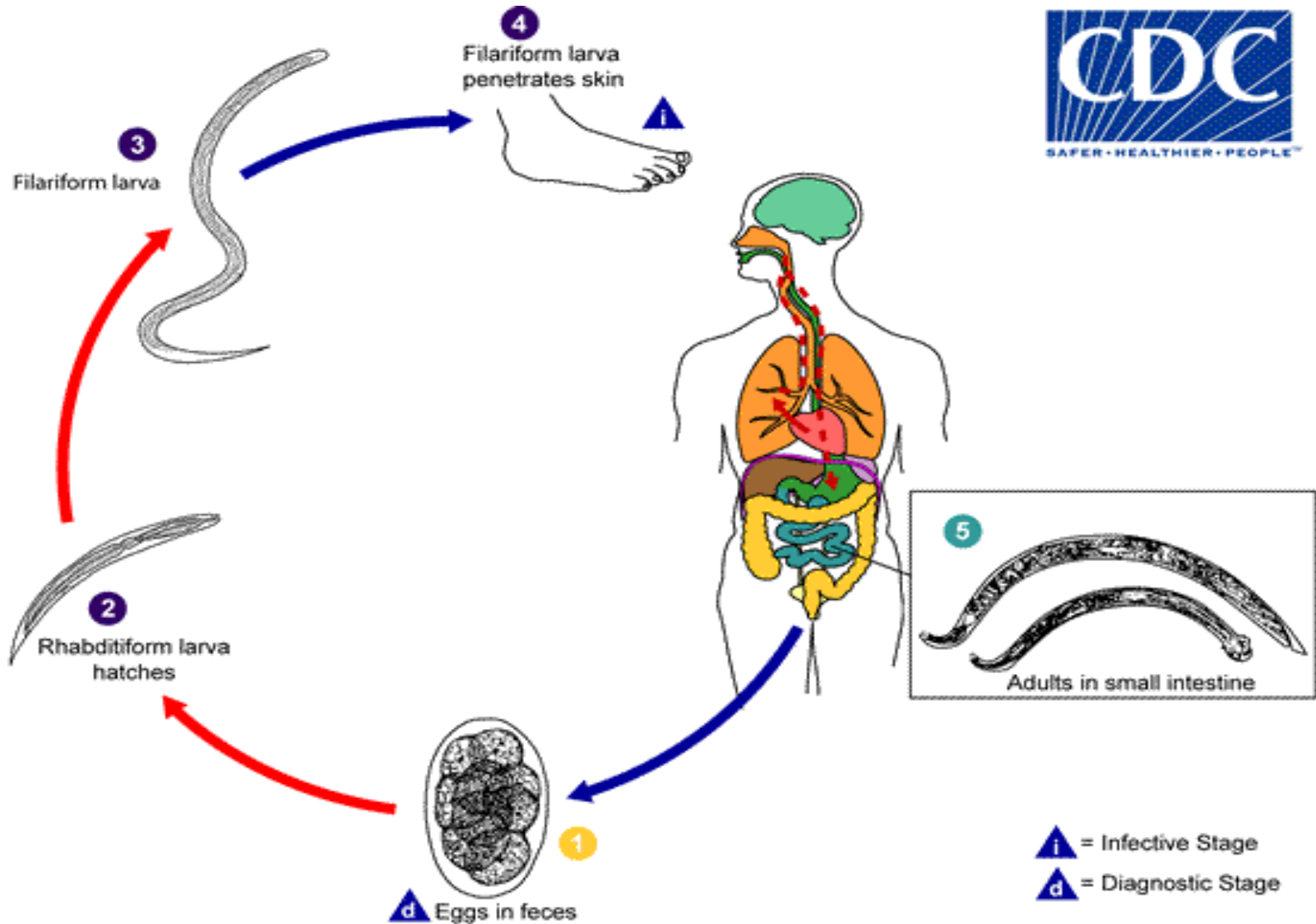
- ❑ Most infected individuals are asymptomatic
- ❑ The disease develops from a combination of factors which includes:
 - ✓ A heavy worm burden
 - ✓ Prolonged duration of infection
 - ✓ Nutritional state of the patient
- ❑ The chronic debilitating disease is characterised by iron deficiency anaemia and loss of protein leading to malnutrition
- ❑ Hookworm anaemia is one of the important causes of anaemia in many communities

EPIDEMIOLOGY

- ❑ Two types of hookworm which both of them are nematodes, they include: *Necator americana* and *Ankylostoma duodenale*
- ❑ The eggs are already embryonated when passed out with faeces
- ❑ The larvae leave the faeces and burry themselves in moist damp soil.
- ❑ These larvae are not infective before they have changed into filariform stage
- ❑ This occurs after about 5 days.
- ❑ The filariform larvae attach themselves to the grass and as soon as they are touched by human leg or foot, they penetrate actively through the skin and reach the lungs via blood stream through the venous system

- ❑ In the lungs, they penetrate the alveoli and carried up passively through bronchioli, and trachea to the larynx
- ❑ Next they are swallowed and reach the duodenum 3-5days after penetrating the skin
- ❑ The worms are attached to the mucous with hook-like teeth in their buccal cavity..
- ❑ and the whole cycle is complete in 40days

HOOKWORM LIFE CYCLE



CLINICAL PICTURE:

- ❑ Pruritic dermatitis or ground itch at the site of penetration
- ❑ Ground itch is most common in the toes and on the sole of the feet
- ❑ Coughing, and wheezing, especially when the larvae is migrating through the lungs
- ❑ Abdominal pains, distension and diarrhoea
- ❑ In heavy infection diarrhoea is mixed with blood
- ❑ The symptoms may be mistaken with those for duodenal and gastric ulcers
- ❑ Iron deficiency anaemia, usually occurs when the heavy hookworm load overtakes the iron reserves

DIAGNOSIS

- ❑ Established by finding out the characteristics of hookworm eggs in the faeces through stool examination under a microscopy.

Management/Treatment

- ❑ Mabendazole 100mg twice a day for 3 days
- ❑ Levamisole (ketrax) 3 tablets single dose. Can be used in mixed infection though not effective to Nacator, the most common hookworm
- ❑ Oral iron (ferrous sulphate) 200mg 3 times a day for at least two months (adults)
- ❑ For children, 200mg once or twice a day for at least 2 months

PREVENTION AND CONTROL

- Protective shoes should be worn during work in the field or around the house
- Proper disposal of faeces is the only way to eradicate hookworm infections
- Deworming campaigns or mass treatment should be advocated.
- Health education on balanced diet to prevent anaemia and personal hygiene
- Regular examination by mothers and health workers to detect anaemia

STRONGYLOIDIASIS

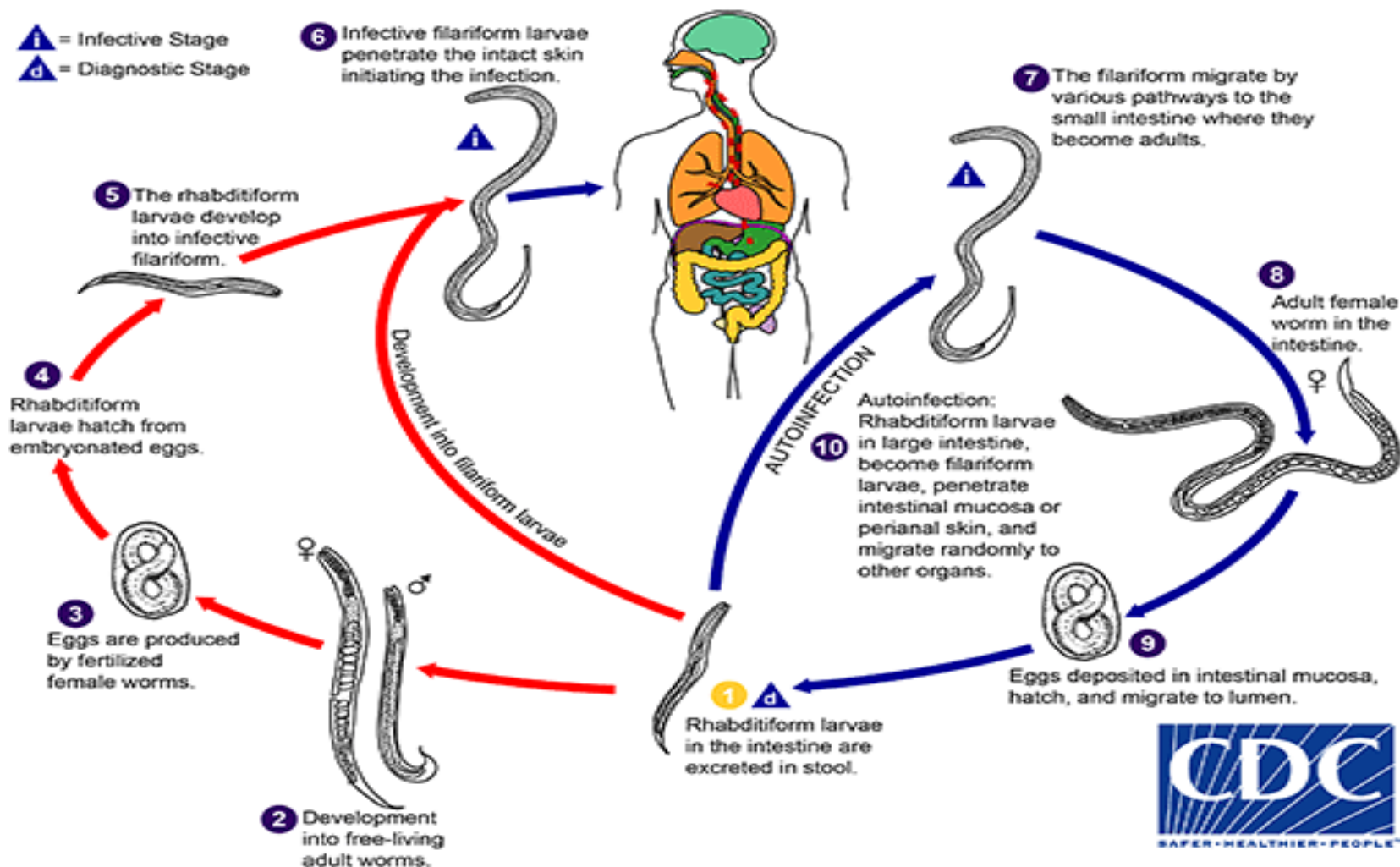
INTRODUCTION:

- ❑ Is an infection caused by *strongyloides stercoralis*.
- ❑ The adult female worm live in the duodenum and jejunum
- ❑ Most infections are asymptomatic
- ❑ Can persist for decades without further exposure of the host to infective larvae.
- ❑ The rest of the cycle is like hookworm
- ❑ Endogenous re-infection occurs within the bowel when the larvae became infective and penetrate the bowel wall.

LIFE CYCLE

- Strongyloides can undergo a free living cycle of development in addition to the parasitic cycle of development found in other nematodes.
- This adaptability facilitates the parasites survival in the absence of mammalian host.
- The larvae may therefore develop into free-living adults which continue to reproduce outside the body or they may develop directly into infective filariform larvae which penetrate the skin.

i = Infective Stage
d = Diagnostic Stage



EPIDEMIOLOGY

- ❑ Is common in warm, moist environments
- ❑ Humans are the principle hosts.
- ❑ The disease is prevalent in overcrowded areas with poor sanitation

CLINICAL PICTURE

- ❑ In heavy infections, the number of worms in the mucosa may interfere with the normal function of the bowel resulting in mal-absorption and diarrhoea
- ❑ The continuous re-infection may cause urticaria and other hypersensitivity reactions

DIAGNOSIS

- ❑ Examination of a fresh stool specimen

MANAGEMENT

- Both asymptomatic and symptomatic strongyloides must be treated because of the potential for fatal hyper-infection
- Drug of choice is Ivermectin 200mcg/kg once a day for 2 days
- Alternatives are: Albendazole 400mg twice a day for 2-3 days
- Mebendazole 100mg 3 times a day for 3 days
- Thiabendazole 25mg/kg twice daily for 2 days

TAENIASIS

INTRODUCTION:

- ❑ Is an infection of humans by tapeworms
- ❑ The cysticercus stage of *taenia solium* in human can cause serious problems such as epilepsy and death

EPIDEMIOLOGY

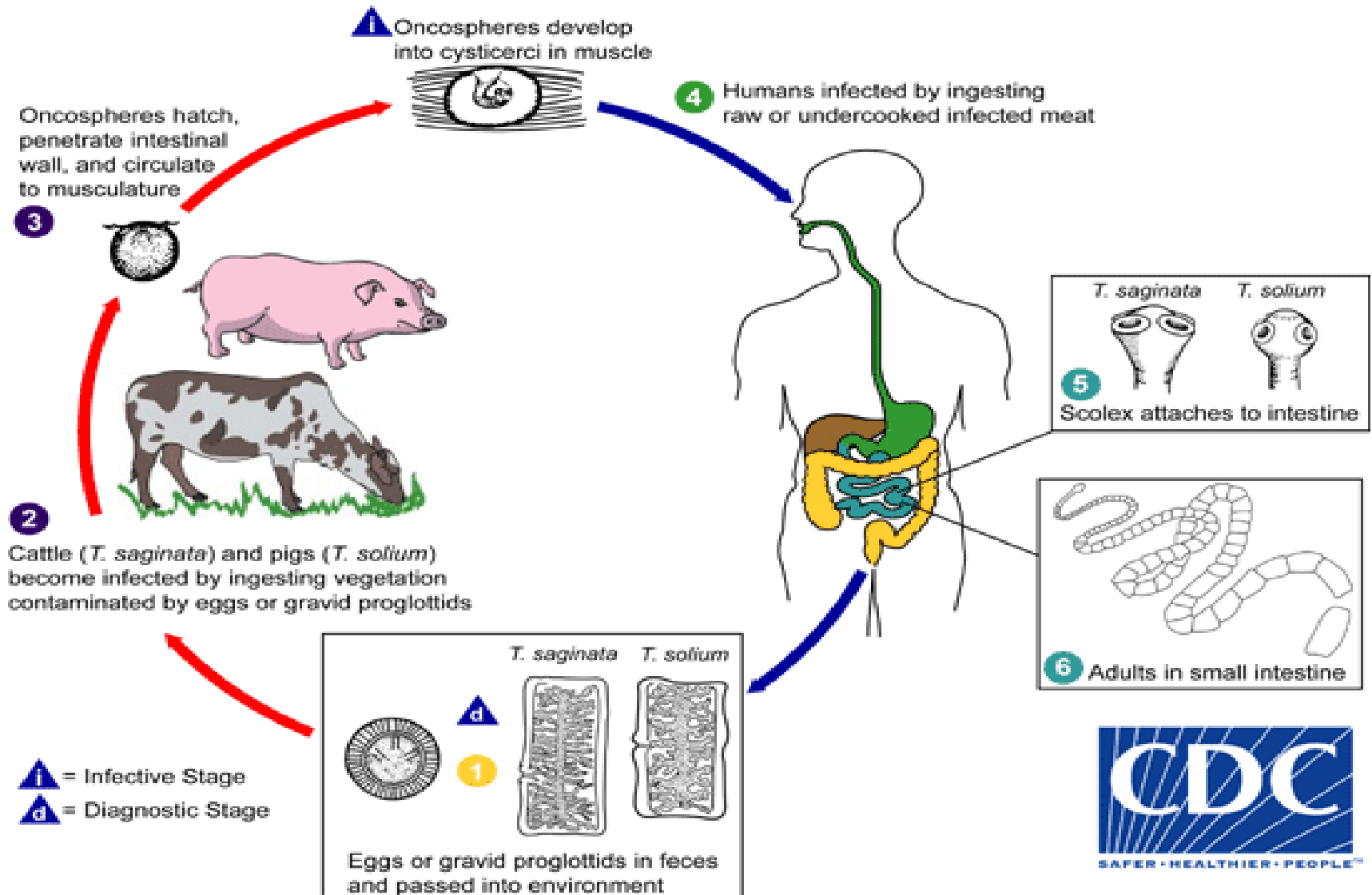
- ❑ Most cases of taeniasis reported in eastern Africa are caused by *Taenia saginata* (beef tapeworm).
- ❑ The disease is common in areas where beef is eaten raw or lightly cooked

LIFE CYCLE

- ❑ The adult ribbon-shaped tapeworms live in the small intestine of humans
- ❑ Broken segments of the worm containing the gravid uterus and the eggs are passed in the stool
- ❑ The eggs are ingested by cows (*Taenia saginata*) or pigs (*T. solium*)
- ❑ In the GIT of the animals, the embryo develops into a 6-hooked larva, the oncosphere (larval form of a tapeworm) which penetrates the bowel wall and carried via bloodstream to striated muscles
- ❑ Here the larvae, grow and form the infective cysts, known as cysticerci

- ❑ When a human ingests meat containing cysticerci, the cysts are dissolved by the gastric acid in the stomach to release embryos.
- ❑ The *Taenia saginata* embryo attaches itself to the wall of the bowel by its head and grows into an adult worm
- ❑ The *Taenia solium* embryos behave differently, by penetrating the bowel wall of the human as it does in the pig. It is then carried in the bloodstream to organs like striated muscle (e.g. skeletal or cardiac) or the brain.

TAENIASIS LIFECYCLE



CLINICAL PICTURE

1. For Taenia saginata

- Loss of weight
- Abdominal discomfort
- Pruritus ani (itching of the anus)

2. For Taenia solium

- They are dangerous especially when the cysticerci invade the brain.
- The patient may present with seizures or muscular pains

DIAGNOSIS

- Is by microscopy of stool

MANAGEMENT/TREATMENT

1. Praziquantel is the drug choice

- Given as a single dose of 5-10mg/kg.

2. Niclosamide is an alternative, effective against both *T. saginata* and *T. solium* infection,

- ❑ The dose is 2g (4tablets) for adult,
- ❑ For children 11-34 kg should get 2 tablet,
- ❑ while children more than 34kg are given 3 tablets.

PREVENTION & CONTROL

- ❑ Proper disposal of faeces (see ascariasis) and meat inspection.
- ❑ All infected meat should be condemned
- ❑ Health education should be given about the dangers of eating meat (beef & pork) that is uninspected or not thoroughly cooked
- ❑ Deep freezing of meat will kill all cysticerci in 24 hrs.

AIRBORNE DISEASES

INTRODUCTION:

- ❑ Are of a great public health important in sub-Saharan Africa.
- ❑ The 2 most common cause of death in children include pneumonia and measles.
- ❑ The two accounts for about 1/4 of all deaths occurring in hospitals across Eastern Africa.
- ❑ Pneumonia accounts for 1/3 of all death in children under 5yrs in developing countries.
- ❑ Pneumonia is worse in a malnourished child.
- ❑ The diseases causing organism is airborne.
- ❑ It enters the body via the respiratory tract.

- ❑ When the patient or carrier of pathogens talk, cough, laugh or sneezes, droplets of fluid are discharged into the air.
- ❑ The smallest of these droplets remain in the air for some time and may be inhaled by a new host.
- ❑ The bigger droplets fall to the ground and mix with the dust which may later be inhaled with the dust
- ❑ Airborne diseases spreads more easily when there is overcrowding, like in congested houses, classroom, public transport, dance halls etc.
- ❑ Good ventilation can do much to counteract the effect of overcrowding
- ❑ Airborne diseases are mostly acquired through respiratory tract although not all that are acquired through respiratory tract

MEASLES:

INTRODUCTION

- ❑ Is an acute general infection caused by a virus
- ❑ It's a disease which mainly affect children.
- ❑ Its also called Rubeola or morbilli
- ❑ Found all over the world.
- ❑ The high fatality rate of measles in Africa has been attributed to malnutrition and under- nutrition.
- ❑ In malnourished children, the defence mechanisms are slow and week, so the virus has more opportunity to do damage before its arrested.
- ❑ Children are more likely to suffer from under-nutrition during the weaning period.

- ❑ This is the time when unimmunised African children get measles most
- ❑ in Africa most children develop measles before the age of 3 yrs
- ❑ In Europe, most children are immunised and a few who are infected by disease is after 5 yrs of age
- ❑ The overall fatality rate of measles in eastern Africa is between 3% and 5%. This is about 400 times higher than that of Europe.
- ❑ Thus there is an urgent need to increase immunization coverage for children under 1yr old to 80%

EPIDEMIOLOGY

- ❑ Measles is spread by invisible droplets containing virus particles.
- ❑ The virus particles come from the secretion of respiratory tract of patients suffering from measles
- ❑ The disease spreads very easily.
- ❑ Before it becomes clear that a child is suffering from measles, the disease has already spread to close contact.
- ❑ The disease gives a life long immunity once one is immunized
- ❑ Nearly everybody gets the disease once a lifetime, if not immunized

CLINICAL PICTURE

- ❑ Uncomplicated measles generally occurs in a well-nourished or slightly underweight child
- ❑ Fever
- ❑ Skin rash
- ❑ Conjunctivitis
- ❑ Rhinitis (is an inflammation of the nasal passages caused by allergic reaction to airborne substances)
- ❑ Cough
- ❑ Complicated measles occurs in a very underweight child or one with signs of malnutrition and they include:
 - ❑ Dyspnoea (shortness of breath)
 - ❑ Nasal flaring (burn)
 - ❑ Rapid respiration
 - ❑ Accompanied by hoarseness
 - ❑ barking cough
 - ❑ Sour mouth leading to inability to suck

MANAGEMENT

- ❑ Treat individuals as outpatients if there is uncomplicated measles
- ❑ Ensure proper fluid intake and nutritious food
- ❑ Apply tepid sponging, give paracetamol and follow up daily
- ❑ Give a single oral dose of 200,000 units of vitamin A
- ❑ Advise on extra meals 5 times a day

In complicated measles:

- ❑ Admit to hospital and give a balanced diet with protein and energy rich food
- ❑ Observe for signs of pneumonia
- ❑ If there is stomatitis, (inflammation of the mouth) clean mouth 4-6 hourly
- ❑ If there is diarrhoea and /or vomiting suspect gastro-enteritis and give oral fluids

- ❑ If there is convulsions, exclude malaria & meningitis and give phenobarbitone 30mg
- ❑ If there is xerophthalmia (a condition where the eye fails to produce tears due to vit A deficiency), give vitamin A 200,000 units/day orally and chloraphenicol or Atropine eye Ointment
- ❑ Treat Otitis media with fortified procaine penicillin inj. (ppf)
- ❑ NB: With very serious cases suspect TB

PREVENTION AND CONTROL

- ❑ Immunising all children both the health and the sick who have not been previously immunised
- ❑ Carry out a regular supply of measles vaccine (work of subcounty health officer)
- ❑ Ensure periodic checks of the cold box, vaccine carriers and icepacks.
- ❑ If the vaccine is given between 6 and 9 months, it must be repeated at age of 1yr to ensure effective protection
- ❑ Ensure to prevent and treat under nutrition. This is done through nutritional education to mothers and by weighing the children

PNEUMONIA:

INTRODUCTION:

- ❑ Is an acute respiratory infection with fever, cough and dyspnoea. (shortness of breath)
- ❑ It's a common disease of infancy and old age.
- ❑ It is the commonest cause of death in patients admitted to many hospitals in Africa
- ❑ Low birth-weight infants, those anaemic from malaria or hookworm infection are very susceptible and have high mortality.

PREDISPOSING FACTORS

- ❑ Upper respiratory tract infection (URTI) e.g. influenza in elderly people
- ❑ HIV/AIDS
- ❑ Measles

- ❑ Whooping cough in children
- ❑ NB: These infection cause damage to the epithelium of the lungs and clear the way for bacterial super-infection.
- ❑ Transmission is by droplet spread, direct oral contact, or indirect freshly infected articles.

CLINICAL PICTURE:

- ❑ Cough, Fever,
- ❑ In-drawing of the inter-costal muscles (is the rapid respiratory rate)

Types of pneumonia:

1. Bronchopneumonia
2. Lobar pneumonia

Bronchopeumonia

- ❑ Most common form of pneumonia
- ❑ Occurs in chronically ill patient
- ❑ Onset is usually not abrupt
- ❑ It presents with continuous fever
- ❑ The sputum is purulent

LOBAR PNEUMONIA

Onset is very sudden with the following symptoms

- ❑ Body chills,
- ❑ stabbing pains in the chest in a health person
- ❑ Fever is high and continuous (39-40 degrees C)
- ❑ Headache
- ❑ Anorexia
- ❑ Insomnia and vomiting
- ❑ Dry cough in the 1st day but becomes productive later
- ❑ Sputum is brick-coloured

DIFFERENTIAL DIAGNOSIS (is distinguishing of a particular disease or condition from others that present similar clinical features

- ❑ Severe malaria
- ❑ Typhoid fever
- ❑ HIV/AIDS lung infection

COMPLICATIONS OF PNEUMONIA

- ❑ Pleural effusion (a condition in which excess fluid builds around the lung)
- ❑ Lung abscess
- ❑ Heart failure (inability of the heart to pump enough blood to meet body's needs.
- ❑ Arthritis etc.

MANAGEMENT

- ❑ Cotrimoxazole twice daily for 5 days
- ❑ Amoxicillin 500mg three times daily for 5 days
- ❑ Benzyl penicillin 6 hrly in severe pneumonia
- ❑ Administration of oxygen to children with signs and symptoms of pneumonia and where supply is limited
- ❑ Oxygen is administered at a rate of 0.5 litres/min for children less than 2 months and 1 litres/min for those older than 2 months

CONTROL AND PREVENTION

1. Immunization to prevent diseases frequently complicated by pneumonia e.g. measles and whooping cough
2. Early diagnosis and treatment at community, dispensary and health centre level

3. Health education program should be started to both parents and community health workers on:

- What supportive measure can be given at home
- The importance of breastfeeding and immunization
- How to distinguish mild and serious pneumonia

INFUENZA

Introduction

- ❑ Is an acute RTI of specific viral origin characterised by sudden onset of headache, myalgia (muscle pain), fever and cough
- ❑ Its often referred to as flu.
- ❑ Its important because of its high attack rate

EPIDEMIOLOGY:

- ❑ Influenza are associated with a rise in general mortality
- ❑ Deaths occur in elderly and those with chronic diseases

CLINICAL PICTURE

- ❑ The incubation period is 1-3 days
- ❑ There is sudden onset of headache, malaise, muscle pains, fever,
- ❑ Congested nose and cough

DIFFERENTIAL DIAGNOSIS (used to distinguishing of a particular disease or condition from others that present similar clinical features).

They Includes:

- ❑ Malaria
- ❑ relapsing fever,
- ❑ And other viral URTIs

MANAGEMENT

- ❑ Encourage bed rest
- ❑ Give paracetamol tablet 500mg/suspension to relieve pain and diminish fever
- ❑ Give antibiotics if there are signs of pneumonia

PREVENTION AND CONTROL:

- Immunization is possible though not considered cost effective in Africa (due to its expense & limited protection)
- Ventilation
- Health education

STAPHYLOCOCCAL DISEASES

- ❑ Are bacteria which produce different clinical pictures depending on where they are
- ❑ They often produce pus
- ❑ Diseases caused by staphylococci are common
- ❑ Infections of the skin are of minor importance but are the portals of entry for the bacteria into the inner organs.
- ❑ Staphylococci infections of the internal organs are dangerous and are likely seen in people with a weakened defence system like chronically ill, inpatients undergoing major surgery etc.
- ❑ Staphylococci may be spread by flies, through the fingers of the nursing and medical staff or by invisible droplets containing the bacteria

CLINICAL PICTURE

- ❑ Depends on site of the infection
- ❑ e.g. a). if an unripe abscess is incised, or squeezed, bacteria may enter the blood stream and give rise to a septicaemia with fever, malaise and headache.
- ❑ b). When the bacteria are only causing superficial infection of the skin, toxins are not absorbed into the blood stream and therefore no signs of general infection appear.

DIAGNOSIS

- ❑ From gram stain of pus, sputum or CSF

MANAGEMENT

- ❑ For superficial skin infection no systemic antibiotic treatment is needed

- ❑ Local application of antiseptics e.g. gentian violet, and frequent changes of dressing will do
- ❑ Use of broad spectrum antibiotic in cases of localised bacteria in the internal organs
- ❑ Such as erythromycin, tetracycline 500mg and chloramphenicol
- ❑ In a newborn with generalised skin infection, systemic cloxacillin or ampiclox treatment is indicated

PREVENTION AND CONTROL

- ❑ Known patients with purulent lesions must be isolated
- ❑ Dressings from purulent wounds must be handled with care
- ❑ Aseptic techniques should be taught to and practised by all nursing staff.

NON COMMUNICABLE DISEASES

Introduction:

Non-communicable Diseases (NCD):

- ❑ A non-communicable disease (NCD) is a medical condition or disease that is not caused by infectious agents (non-infectious or non-transmissible).
- ❑ NCDs also known as chronic diseases last for long periods of time and progress slowly. NCDs are the leading cause of death globally.
- ❑ NCDs are distinguished only by their non-infectious cause
- ❑ These diseases are not passed from person to person.
- ❑ Are usually caused by more than one 'agent'. (risk factors)

In some definitions, NCDs also include:

- ❑ Chronic mental illness
- ❑ Injuries, which have an acute onset, but may be followed by prolonged convalescence and impaired function

Introduction:

- ❑ Non-communicable diseases are a diverse group of chronic diseases that are not communicable, meaning you can't catch them from another person.
- ❑ They are defined as diseases of long duration, generally slow progression and they are the major cause of adult mortality and morbidity worldwide.
- ❑ Non-communicable diseases are identified by WHO as Group II Diseases, a category that aggregates the following conditions/causes of death:
 - ❑ Diabetes mellitus, endocrine disorders, neuropsychiatric conditions, sense organ diseases, cardiovascular diseases, respiratory diseases (e.g. COPD, asthma, other), digestive diseases, genitourinary diseases, skin diseases, musculoskeletal diseases (e.g. Rheumatoid arthritis), congenital anomalies (e.g. Cleft palate, down syndrome), and oral conditions (e.g. Dental caries).

- ❑ Four main diseases are generally considered to be dominant in NCD mortality and morbidity:
- ❑ Cardiovascular diseases (including heart disease and stroke), diabetes, cancer and chronic respiratory diseases (including chronic obstructive pulmonary disease and asthma).
- ❑ In addition to these 4 main diseases, mental disorders are considered to be major contributors to the economic losses stemming from NCDs.
- ❑ Five types of mental illness (major depressive disorder, anxiety disorders, schizophrenia, dysthymia, bipolar disorder) that appeared in the top 20 causes of global burden of disease
- ❑ **NON- COMMUNICABLE DISEASE (NCDs):** Chronic conditions that do not result from an acute infectious process and hence are not communicable
- ❑ Diseases that have a prolonged course, that do not resolve spontaneously, and for which a complete cure is rarely achieved

CLASSIFYING DEATHS AND DISEASES

(WHO)

Communicable diseases [Group I]

Those where death is directly due to the action of a communicable agent

Non-communicable diseases

- Diseases [Group II]

Cancer, diseases of various organ systems (e.g. respiratory, cardiovascular etc.), diabetes, mental health, Heart Attacks, High Blood Pressure, Stroke, Arthritis, etc.

- External causes (injuries, poisonings and violence) [Group III]

How people get Non-Communicable Diseases:

Genetics or Heredity - Passed down through family

Environment - Where you live and work

Lifestyle - Decisions that you make regarding your health

Who is at risk of such diseases

- ❑ People of all age groups, regions and countries are affected by NCDs.
- ❑ These conditions are often associated with older age groups, but evidence shows that 15 million of all deaths attributed to NCDs occur between the ages of 30 and 69 years.
- ❑ Of these premature deaths, over 80% are estimated to occur in low- and middle-income countries.
- ❑ Children, adults and the elderly are all vulnerable to the risk factors contributing to NCDs, whether from unhealthy diets, physical inactivity, exposure to tobacco smoke or the harmful use of alcohol.

- ❑ These diseases are driven by forces that include rapid unplanned urbanization, globalization of unhealthy lifestyles and population ageing.
- ❑ Unhealthy diets and a lack of physical activity may show up in people as raised blood pressure, increased blood glucose, elevated blood lipids and obesity.
- ❑ These are called **metabolic risk factors** that can lead to cardiovascular disease, the leading NCD in terms of premature deaths.

NCD Risk Factors

These disease groups are linked by common risk factors:

- ❑ Social Determinants of Health (this is the environment in which we are born, live and grow and the opportunities we are given in those environments)
- ❑ Tobacco use
- ❑ Alcohol - the harmful use of alcohol
- ❑ Poor Nutrition (unhealthy diets)
- ❑ Physical Inactivity

KEY RISK FACTORS FOR NCDs

Risk Factor: The WHO defines a risk factor as “any attribute, characteristic or exposure of an individual that increases the likelihood of developing a disease or injury”.

- ❑ “An aspect of personal behaviour or lifestyle, an environmental exposure, or a hereditary characteristic that is associated with an increase in the occurrence of a particular disease, injury, or other health condition.”
- ❑ **Major risk factors:** Blood pressure, Cholesterol, Smoking

Intervention: An act/ treatment/ drug, etc. that is deliberately introduced to change/ modify a situation/ condition.

Examples: Health education, treatment with prescription drugs (medicines), vaccines, etc.

Modifiable Risk Factor:

- ❑ A risk factor (behavioural) that can be reduced or controlled by intervention, thereby reducing the probability of disease.
- ❑ Refer to characteristics that societies or individuals can change to improve health outcomes.

The WHO has prioritized the following four:

- ❑ Physical inactivity
- ❑ Tobacco use
- ❑ Alcohol use
- ❑ Unhealthy diets (increased fat and sodium, with low fruit and vegetable intake).

Non-Modifiable Risk Factor:

- A risk factor that cannot be reduced or controlled by intervention
- Refer to characteristics that cannot be changed by an individual (or the environment)

For example:

- Age
- Gender (sex)
- Race
- Family history (genetics) - Genetic makeup

Metabolic Risk Factors: (physiological risk factors)

- ❑ “Metabolic” refers to the biochemical processes involved in the body's normal functioning
- ❑ Behaviours (modifiable risk factors) can lead to metabolic/physiologic changes.
- ❑ WHO has prioritized the following four metabolic risk factors: *(i.e. Metabolic risk factors contribute to four key metabolic changes that increase the risk of NCDs:)*

1. Raised blood pressure (Hypertension)
2. Hyperlipidemia (Raised total cholesterol)
3. Hyperglycemia (Elevated glucose)
4. Overweight and obesity

These are also called intermediate risk that can lead to cardiovascular diseases

In terms of attributable deaths, the leading metabolic risk factor globally is elevated blood pressure (to which 19% of global deaths are attributed), followed by overweight and obesity and raised blood glucose.

Behavioral risk factors (modifiable)

- ❑ Tobacco: accounts for almost 6 million deaths every year (including 600,000 deaths from second hand smoke) projected to increase to 8 million by 2030
- ❑ Insufficient physical activity - 3.2 million
- ❑ Low fruit and vegetable consumption- 3.2 million
- ❑ Half of the 2.32 million deaths annual deaths from harmful drinking are from NCDs

Cancer-associated infections:

- ❑ At least 2 million cancer cases per year
- ❑ 18% of the global cancer burden, are attributable to a few specific chronic infections
- ❑ this fraction is substantially larger in low-income countries..
- ❑ The principal infectious agents are human papilloma virus, Hepatitis B virus, Hepatitis C virus and Helicobacter pylori.

These infections are largely preventable through vaccinations and measures to avoid transmission, or treatable.

Common Risk Factors

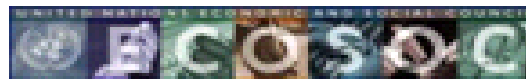
Noncommunicable Diseases

4 Diseases, 4 Modifiable Shared Risk Factors

	Tobacco Use	Unhealthy diets	Physical Inactivity	Harmful Use of Alcohol
Cardio-vascular				
Diabetes				
Cancer				
Chronic Respiratory				



Noncommunicable Diseases
World Health Organization
ECOSOC High-Level Segment



World Health Organization

Leading Causes of Attributable Global Mortality and Burden of Disease, 2004:

Attributable Mortality

Attributable DALYs

	%
1. High blood pressure	12.8
2. Tobacco use	8.7
3. High blood glucose	5.8
4. Physical inactivity	5.5
5. Overweight and obesity	4.8
6. High cholesterol	4.5
7. Unsafe sex	4.0
8. Alcohol use	3.8
9. Childhood underweight	3.8
10. Indoor smoke from solid fuels	3.3

	%
1. Childhood underweight	7.8
2. High blood pressure	7.5
3. Unsafe sex	6.6
4. Unsafe water, sanitation, hygiene	6.1
5. High blood glucose	4.9
6. Indoor smoke from solid fuels	4.8
7. Tobacco use	3.9
8. Physical inactivity	3.8
9. Suboptimal breastfeeding	3.7
10. High cholesterol	3.3

59 million total global deaths in 2004

1.5 billion total global DALYs in 2004

- ❑ The disability-adjusted life year (DALY) is a measure of overall disease burden, expressed as the number of years lost due to ill-health, disability or early death. It was developed in the 1990s as a way of comparing the overall health and life expectancy of different countries.
- ❑ In NCDs, all disease/events are generally independent of one another.
- ❑ In NCDs, the risk of disease largely depends on population characteristics and other health behaviours;

NB: (Refer to Common Risk Factors chart – 4 diseases, 4 modifiable shared risk factors)

Four Leading NCDs: (The four major chronic NCDs)

- ❑ Cardiovascular diseases
- ❑ Chronic Respiratory disease
- ❑ Diabetes
- ❑ Cancer

Types of NCDs:

- Cardiovascular disease (Coronary heart disease, Stroke)
- Cancer
- Chronic lung disease
- Diabetes
- Chronic neurologic disorders (Alzheimer's, dementias)
- Arthritis/Musculoskeletal diseases
- Unintentional injuries (e.g., from traffic crashes)

Other NCDs include:

- Nutritional Diseases:** rickets, goiter, beriberi, pellagra, and dental caries among others
- Congenital Problems:** congenital heart diseases, hernias, down syndrome, spina bifida, Some of them as a result of mother's lifestyle during pregnancy.

- ❑ **Mental Illnesses:** Such as psychosis (mania, schizophrenia) neurosis (Anxiety, depression) and puerperal psychosis.
- ❑ **Accidents/ Unintentional injuries:** Road traffic, industrial and home accidents.
- ❑ **Arthritis/musculoskeletal diseases**
- ❑ **Chronic neurologic disorders** (e.g., Alzheimer's, dementias)

-
- ❑ Cardiovascular diseases account for most NCDS or 17.3% million people annually (HTN is the leading risk factor,
 - ❑ Followed by cancers(7.6 million)
 - ❑ Respiratory diseases (4.2)
 - ❑ And diabetes (1.3 million)

Lifestyle disease types

- ❑ Lifestyle diseases: diseases associated with the way a person or group of people lives
- ❑ conditions usually attributed to dramatic shifts in the way humans live their lives, often due to advancements in a society or its scientific progress
- ❑ Conditions like certain forms of cancer, most types of heart disease, high blood pressure, obesity, and Type 2 diabetes are “contracted” from the way people live. Poor diet, lack of exercise, smoking, and excess alcohol, and in the late 2000s even poor sleep may contribute to these illnesses or be their primary cause

Lifestyle diseases include:

- ❑ Atherosclerosis,
- ❑ Heart disease,
- ❑ And stroke;
- ❑ Obesity and type 2 diabetes;
- ❑ And diseases associated with smoking, alcohol and drug abuse, and lack of regular physical activity.

Characteristics of NCDs:

- ❑ Complex aetiology (causes)
- ❑ Multiple risk factors
- ❑ Long latency period
- ❑ Non-contagious origin (non-communicable)
- ❑ Prolonged course of illness
- ❑ Functional impairment or disability
- ❑ Incurability
- ❑ Insidious (gradual and harmful) onset

Implications of increased burden of NCDs

- ❑ Increased budgetary allocation to prevention and control of NCDs
- ❑ Impoverishment/economic failure of already poor on account of continued Treatment over long periods
- ❑ Increased investment in human resources for health sector i.e. more doctors, nurses, nutrition etc.
- ❑ Increased investment on drugs- further increase in non affordability of many for Treatment
- ❑ Effect on society- especially nuclear families

DRIVERS OF NCDS AND LIFESTYLE DISEASES

- ❑ Nutrition transition/ globalization of unhealthy lifestyles.
- ❑ Rapidly growing and unplanned urbanization
- ❑ Demographic Change

NCDs: - Parameters for estimation of behavioural and metabolic risk factors:

- ❑ **Current daily tobacco smoking:** the percentage of the population aged 15 or older who smoke tobacco on a daily basis.
- ❑ **Physical inactivity:** the percentage of the population aged 15 or older engaging in less than 30 minutes of moderate activity per week or less than 20 minutes of vigorous activity three times per week, or the equivalent.
- ❑ **Raised blood pressure:** the percentage of the population aged 25 or older having systolic blood pressure ≥ 140 mmhg and/or diastolic blood pressure ≥ 90 mmhg or on medication to lower blood pressure.

NCDs: - Parameters for estimation of behavioural and metabolic risk factors:

- ❑ **Raised blood glucose:** the percentage of the population aged 25 or older having a fasting plasma glucose value ≥ 7.0 mmol/L (126 mg/dl) or on medication for raised blood glucose.
- ❑ **Overweight:** the percentage of the population aged 20 or older having a body mass index (bmi) ≥ 25 kg/m².
- ❑ **Obesity:** the percentage of the population aged 20 or older having a body mass index (bmi) ≥ 30 kg/m².
- ❑ **Raised cholesterol:** the percentage of the population aged 25 or older having a total cholesterol value ≥ 5.0 mmol/L (190 mg/dl).

Epidemiology of NCD:

The epidemiologic transition:

Change in the balance of disease in a population
from
communicable diseases
to
non-communicable disease

- ❑ There is decline in proportion of total mortality due to infectious diseases
- ❑ Different countries are at different stages of the epidemiological transition

Drivers of the epidemiological transition in low and middle income countries:

- Population ageing
- Major socio-economic changes (especially urbanisation)
 - changes in risk factors such as diet, physical activity, smoking etc.

NB:

- ❑ Non-communicable diseases are now the most common cause of death world wide
- ❑ Increasing rates in low and middle income countries because of change in lifestyles (urbanisation)
- ❑ Key risk factors have very large effects
- ❑ Interventions are effective and can reduce burden
- ❑ The need to combine results and have large studies

Why NCDs Are Important in Public Health?

- ❑ 57 million deaths that occurred globally in 2008
- ❑ 36 million – 63.2%, almost two thirds – were due to NCDs
- ❑ 9 million death that occurred among people under age 60
- ❑ Mainly cardiovascular diseases, cancers, diabetes and chronic lung diseases
- ❑ expected to become the leading cause of death in Africa by 2030

Socioeconomic impacts of NCDS

- ❑ NCDs threaten progress towards the 2030 Agenda for Sustainable Development, which includes a target of reducing premature deaths from NCDs by one-third by 2030.
- ❑ Poverty is closely linked with NCDs. The rapid rise in NCDs is predicted to impede poverty reduction initiatives in low-income countries, particularly by increasing household costs associated with health care

Impacts of NCDs

Key drivers

Economies

- Reduced labor supply
- Reduced labor outputs (e.g., cost of absenteeism)
- Additional costs to employers (e.g., productivity, insurance)
- Lower returns on human capital investments
- Lower tax revenues
- Increased public health and social welfare expenditures

Health systems

- Increased consumption of NCD-related healthcare
- High medical treatment costs (per episode and over time)
- Demand for more effective treatments (e.g., cost of technology and innovation)
- Health system adaptation (e.g., organization, service delivery, financing) and adaptation costs

Households and individuals

- Reduced well-being
- Increased disabilities
- Premature deaths
- Household income decrease, loss, or impoverishment
- Higher health expenditures, including catastrophic spending
- Savings and assets loss
- Reduced opportunities

Example impact areas

Country productivity and competitiveness

Fiscal pressures

Health outcomes

Poverty, inequity, and opportunity loss

Prevention and Control of NCDs:

- ❑ Millions of deaths can be prevented by stronger implementation of measures that exist today.
- ❑ These include policies that promote government-wide action against NCDs:
 1. Stronger anti-tobacco controls
 2. Promoting healthier diets,
 3. Physical activity,
 4. Reducing harmful use of alcohol;
 5. Along with improving people's access to essential health care.
- ❑ There is the 2008-2013 Action Plan for the implementation of the WHO Global Strategy on the Prevention and Control of Non communicable Diseases. This Action Plan was endorsed by the 2008 World Health Assembly.

Prevention and control of NCDs - Continued

- ❑ An important way to control NCDs is to focus on reducing the risk factors associated with these diseases.
- ❑ Low-cost solutions exist for governments and other stakeholders to reduce the common modifiable risk factors.
- ❑ Monitoring progress and trends of NCDs and their risk is important for guiding policy and priorities.
- ❑ To lessen the impact of NCDs on individuals and society, a comprehensive approach is needed requiring all sectors, including health, finance, transport, education, agriculture, planning and others, to collaborate to reduce the risks associated with NCDs, and promote interventions to prevent and control them
- ❑ Investing in better management of NCDs is critical. Management of NCDs includes detecting, screening and treating these diseases, and providing access to palliative care for people in need.

- ❑ High impact essential NCD interventions can be delivered through a primary health care approach to strengthen early detection and timely treatment.
- ❑ Evidence shows such interventions are excellent economic investments because, if provided early to patients, they can reduce the need for more expensive treatment.
- ❑ Countries with inadequate health insurance coverage are unlikely to provide universal access to essential NCD interventions.
- ❑ NCD management interventions are essential for achieving the global target of a 25% relative reduction in the risk of premature mortality from NCDs by 2025, and the SDG target of a one-third reduction in premature deaths from NCDs by 2030.

Challenges in control & prevention

- ❑ Lack of partnership between different sectors
- ❑ Weak surveillance
- ❑ Limited access to prevention and treatment
- ❑ Limited fund allocation

Burden of NCDs

- ❑ Disease occurrence- incidence and prevalence is increasing
- ❑ Lifestyle are changing- in absolute nos. of elderly persons
- ❑ Crude birth rate- compounded with increase in life expectance, increase in proportion of geriatric/elderly population who are dependants

KEY INTERVENTIONS FOR PREVENTION AND CONTROL OF NCDs AND LIFESTYLE DISEASES:

POPULATION-LEVEL PREVENTION

Their characteristics include:

- ❑ They are not reliant on health system for delivery
- ❑ Costs are relatively low and they may even generate funds
- ❑ They have relatively little “downside” and most people will be exposed to them
- ❑ People who are at high risk or already suffering from NCDs will benefit
- ❑ **The various interventions targeting specific risk factors:**

Population-level priority interventions

TABLE 9: Population-Level Priority Interventions for NCDs Relevant to SSA (by Incremental Cost-Effectiveness)

Area	Interventions	Status	Cost-effectiveness
Tobacco	Raise prices by raising taxes on tobacco	BEST BUY	Very cost-effective
	Inform on harm from use and benefits of quitting	BEST BUY	Very cost-effective
	Enforce bans on tobacco advertising	BEST BUY	Very cost-effective
	Protect people from tobacco smoke	BEST BUY	Very cost-effective
	Offer counseling to smokers	GOOD BUY	Quite cost-effective
Alcohol	Restrict access to retailed alcohol	BEST BUY	Very cost-effective
	Enforce bans on alcohol advertising	BEST BUY	Very cost-effective
	Raise prices by raising taxes on alcohol	BEST BUY	Very cost-effective
	Enforce drink-driving laws (breath-testing)	GOOD BUY	Quite cost-effective
	Offer brief advice for hazardous drinking	GOOD BUY	Quite cost-effective
	Promote reduced salt intake	BEST BUY	Very cost-effective
	Promote replacing of trans-fat with polyunsaturated fat	BEST BUY	Very cost-effective
	Promote public awareness about diet	BEST BUY in combination	Very cost-effective

Population-level priority interventions

Diet	Restrict marketing to children of nutrient-poor food and beverages, food high in salt, fats, and sugar	GOOD BUY	Very cost-effective*
	Replace saturated fat with unsaturated fat	GOOD BUY	Very cost-effective*
	Manage food taxes/subsidies to discourage consumption of unhealthy foods and encourage consumption of healthier options	GOOD BUY	Very cost-effective*
Physical Activity	Promote physical activity (mass media)	BEST BUY in combination	Very cost-effective
	Legislation and enforce bicycle helmet use, 80% coverage	BEST BUY	Very cost-effective
Injuries (road traffic)	Speed cameras + breath testing + motorcycle helmets, 80% coverage	BEST BUY in combination	Very cost-effective
	Seat belts + motorcycle helmets + bicycle helmets + speed cameras + breath testing, 80% coverage	BEST BUY in combination	Very cost-effective

Other interventions include

- ❑ Vaccination against hepatitis B and human papilloma virus
- ❑ Screening for various cancers such as prostate, cervical, breast etc.
- ❑ Healthy nutrition environments in schools
- ❑ Nutrition information and counseling in health care
- ❑ National physical activity guidelines
- ❑ School-based physical activity programs for children
- ❑ Workplace programs for physical activity and healthy diets
- ❑ Community programs for physical activity and healthy diets
- ❑ Designing the built environment to promote physical activity
- ❑ Protection against environmental or
- ❑ Protection against occupational risk factors for cancer, such as aflatoxin, asbestos and contaminants in drinking-water

INDIVIDUAL HEALTH-CARE INTERVENTIONS

- ❑ Hospital centered acute care:
 - ✓ Very expensive approach
 - ✓ Denies people the health benefits of taking care of their conditions at an early stage.
- ❑ Integration into primary healthcare:
 - ✓ Expanding the package of primary health care services to include essential NCDs interventions is central to any health system strengthening initiative.
 - ✓ Counseling and multidrug therapy
 - ✓ Aspirin therapy for acute myocardial infarction
 - ✓ Screening for cervical cancer, once, at age 40
 - ✓ Early case finding for breast cancer

- ✓ Early detection of colorectal and oral cancer
- ✓ Treatment of persistent asthma with inhaled corticosteroids and beta-2 agonists
- ✓ Individuals uptake of vaccinations

PRIORITIES FOR ACTION

- ❑ Actions to be taken in the three components of national NCD programs: surveillance, prevention, and health care

A comprehensive approach:

- ❑ Risk factors for NCDs are spread throughout society,
- ❑ and they often begin early in life and continue throughout adulthood
- ❑ Evidence indicates that both prevention and treatment interventions are necessary.

Multi-sectoral action

- ❑ Government (Health, Education, Foreign Affairs, Agriculture, planning...)
- ❑ Civil society and
- ❑ The private sector

Role of Civil society and private sector

- ❑ Mobilize political and public awareness, and support for NCD prevention and control efforts
- ❑ Play a key role in supporting NCD programs
- ❑ Strong, united advocacy
- ❑ Responsible marketing

Surveillance and monitoring

- ❑ Measuring key areas of the NCD epidemic
- ❑ integration into national health information systems
- ❑ Monitoring and surveillance of behavioral and metabolic risk factors

Health systems:

- ❑ Strengthening of country health-care systems
- ❑ Through reorienting existing organizational and financial arrangements
- ❑ Through conventional and innovative means of financing
- ❑ Strengthening the capacity of primary healthcare
- ❑ Improvements in health-system performance

Prevention and control (Best Buys)

- ❑ With clear evidence of effectiveness and high cost-effectiveness
- ❑ Population-wide interventions must be complemented by individual health-care interventions.

Sustainable development

- ❑ Included as a priority in national development initiatives and related investment decision
- ❑ Strengthening the prevention and control of NCDs should also be considered an integral part of poverty reduction

KENYA'S POLICY DIRECTION ON NCDS

- ❑ The current Kenya health policy 2012-2030 has for the very first time recognized the rising burden of NCDs in the country.
- ❑ Emerging trends point to the fact that non communicable conditions and injuries/ violence related conditions will increasingly, in the foreseeable future, be the leading contributors to high burden of disease in the country

- ❑ NCDs contribute to 26% of the annual mortality rates in the country.
- ❑ Consequently, the policy objective number two is on halting and reversing the rising burden of non-communicable conditions(MOMS & MOPHS, 2012)

Policy Objective 2: Halt and reverse the rising burden of non- communicable conditions

- ❑ This is to be achieved by implementing strategies to address all the identified non communicable conditions in the country

The priority policy strategies include the following:

- ❑ Ensure universal access to interventions addressing recognized non communicable conditions in the country

- ❑ Ensure that services relating to non-communicable conditions are of high quality standards with a view to maximize utilization of services the population has access to
- ❑ Strengthen advocacy for health promoting activities aimed at preventing increased burden due to non-communicable conditions
- ❑ Put in place programs for non-communicable diseases prevention and control
- ❑ Put in place interventions directly addressing marginalized and indigent populations affected by non-communicable conditions
- ❑ Design and implement integrated health services provision tools, mechanisms and processes with a view to enhance comprehensive control of non-communicable diseases
- ❑ Decentralize screening for non-communicable diseases to the lower levels to increase access

COMMON NON-COMMUNICABLE DISEASES:

1. Cardiovascular disease
2. Cancer
3. Chronic Respiratory Diseases
4. Diabetes

Disease Highlight:

- Definition
- Key facts and figures {Statistics} / Burden of disease
- Risk factors
- Symptoms
- Prevention / Control
- Treatment

CARDIOVASCULAR DISEASE (CVD):

- ❑ Caused by disorders of the heart and blood vessels.
- ❑ CVDs are group of disorders / diseases of the heart, vascular diseases of the brain and diseases of blood vessels.
- ❑ Includes:-
 - Coronary heart disease (heart attacks)
 - Cerebrovascular disease (stroke)
 - Raised blood pressure (hypertension)
 - Peripheral artery disease
 - Rheumatic heart disease
 - Congenital heart disease
 - Heart failure.

Cardiovascular disease (CVD): - Continued'

Coronary heart disease	Disease of the blood vessels supplying the heart muscle
Cerebrovascular disease (Stroke)	Disease of the blood vessels supplying the brain
Peripheral arterial disease	Disease of blood vessels supplying the arms and legs
Congenital heart disease	Malformations of heart structure existing at birth

Facts and figures: Global Burden of CVD

- ❑ CVDs are the #1 cause of death globally.
- ❑ An estimated 17.3 million people died from CVDs in 2008.
(30% of all global deaths)
 - ✓ 7.3 million were due to coronary heart disease
 - ✓ 6.2 million were due to stroke
- ❑ Over 80% CVD deaths occur in low- and middle- income countries.
- ❑ By 2030, almost 25 million people will die from CVDs.
- ❑ Cardiovascular disease (CVD) causes more than half of all deaths across the European Region.
- ❑ 80% of premature heart disease and stroke is preventable.
- ❑ Although heart attacks and strokes are major killers in all parts of the world, 80% of premature deaths from these causes could be avoided by controlling the main risk factors: tobacco, unhealthy diet and physical inactivity.

CVD - Risk Factors:

<p><i>Major modifiable risk factors</i></p> <ul style="list-style-type: none">– High blood pressure– Abnormal blood lipids– Tobacco use– Physical inactivity– Obesity– Unhealthy diet (salt)– Diabetes	<p><i>Other modifiable risk factors</i></p> <ul style="list-style-type: none">– Low socioeconomic status– Mental ill health (depression)– Psychosocial stress– Heavy alcohol use– Use of certain medication– Lipoprotein(a)
<p><i>Non-modifiable risk factors</i></p> <ul style="list-style-type: none">– Age– Heredity or family history– Gender– Ethnicity or race	<p><i>“Novel” risk factors</i></p> <ul style="list-style-type: none">– Excess homocysteine in blood– Inflammatory markers (C-reactive protein)– Abnormal blood coagulation (elevated blood levels of fibrinogen)

Cardiovascular diseases: - Continued'

Contributing factors:

- A person's genetic make-up
- The foundations of adult health are laid in early life
- Socioeconomic group
- Mental health
- Diet
- Overweight and obesity
- Inactivity
- Tobacco
- Alcohol
- Diabetes
- Globalization and urbanization

Cardiovascular diseases: - Continued'

Prevention:

- ❑ Focusing on a combination of risk factors for cardiovascular disease (e.g. decrease in cholesterol, reduction in smoking)
- ❑ Implementing medical screening for individuals at risk
- ❑ Providing effective and affordable treatment to those who require it
- ❑ Effective measures are available for people at high risk. For example, combination drug therapy (such as aspirin, beta blocker, diuretic and statin) can lead to a 75% reduction in myocardial infarction (heart attack) among those at high risk of having one.

Treatment: CVD

- ❑ Effective measures are available for people at high risk. For example, combination drug therapy (such as aspirin, beta blocker, diuretic and statin) can lead to a 75% reduction in myocardial infarction (heart attack) among those at high risk of having one.
- ❑ But many such interventions are not being implemented, and about half of coronary patients in the world still require more intensive blood pressure management.

CANCER:

Cancer:

- ❑ Cancer is the uncontrolled growth and spread of cells that arises from a change in one single cell.
- ❑ The change may be started by external agents and inherited genetic factors and can affect almost any part of the body.
- ❑ Generic term for a large group of diseases that can affect any part of the body.
- ❑ The transformation from a normal cell into a tumour cell is a multistage process where growths often invade surrounding tissue and can metastasize to distant sites.
- ❑ “Rapid creation of abnormal cells that grow beyond their usual boundaries, and which can then invade adjoining parts of the body and spread to other organs.” (WHO, 2012)
- ❑ Also referred to as Tumor

- ❑ Tumor is (a swelling) made of mass of cells. “Abnormal growth of cells”, “Unlimited growth of cells”, disorder of cells.

Two types of tumor: - 1) Benign 2) Malignant

Benign Tumors:

- ❑ Do not penetrate (invade) adjacent tissue borders, nor do they spread (metastasize) to distant sites.
- ❑ They remain localized overgrowths in the area in which they arise
- ❑ Are more differentiated than malignant tumors, that is, they more closely resemble their tissue of origin.

Malignant Tumors

- ❑ Malignant tumors (cancer) are capable of invasion (spread of the neoplasms into adjacent structures) and metastasis (implantation of the neoplasms into non contiguous sites).

Cancer – Continued'

- ✓ A **neoplasm** (Greek, Neo-New, plasma, thing formed) is the autonomous growth of tissue that have escaped the normal restraints on cell proliferation and exhibit varying degrees of fidelity to their precursors.
- ✓ It is usually appears as a tumor
- ❑ In general, neoplasms are irreversible, and their growth is for the most part, autonomous.

Global Burden of Cancer:

- ❑ 12.7 million new cases in 2008
- ❑ 7.6 million deaths from cancer (13.3% of overall deaths) in 2008
- ❑ 70% of all cancer deaths occur in low- and middle-income countries.
- ❑ Deaths from cancer are estimated to reach 13.1 million by 2030.
- ❑ About 30% of cancers are attributable to behaviour risk factors.

Cancer:

Loss of Normal Growth Control

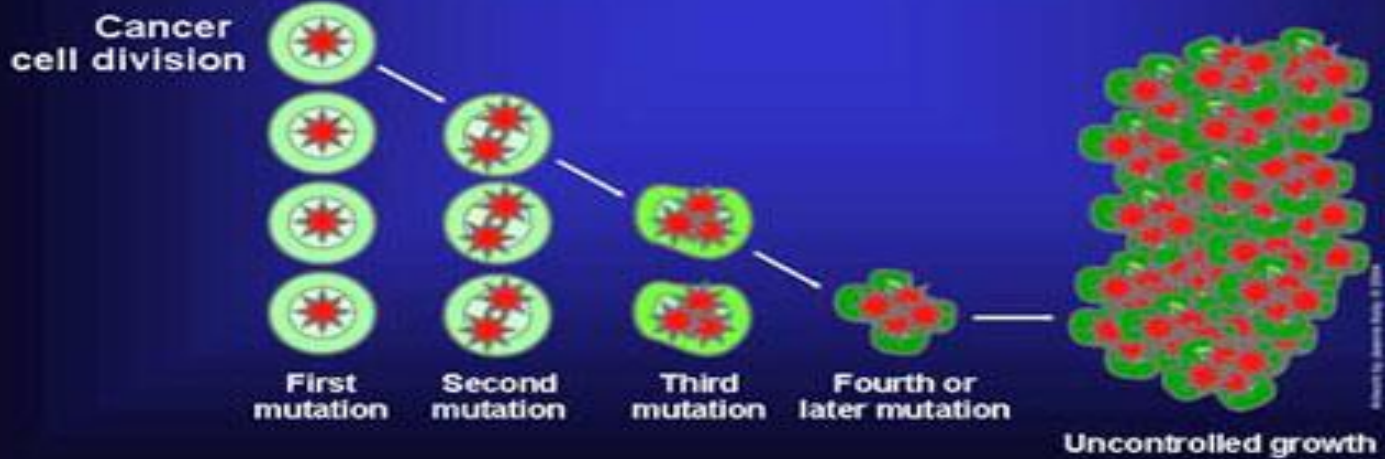
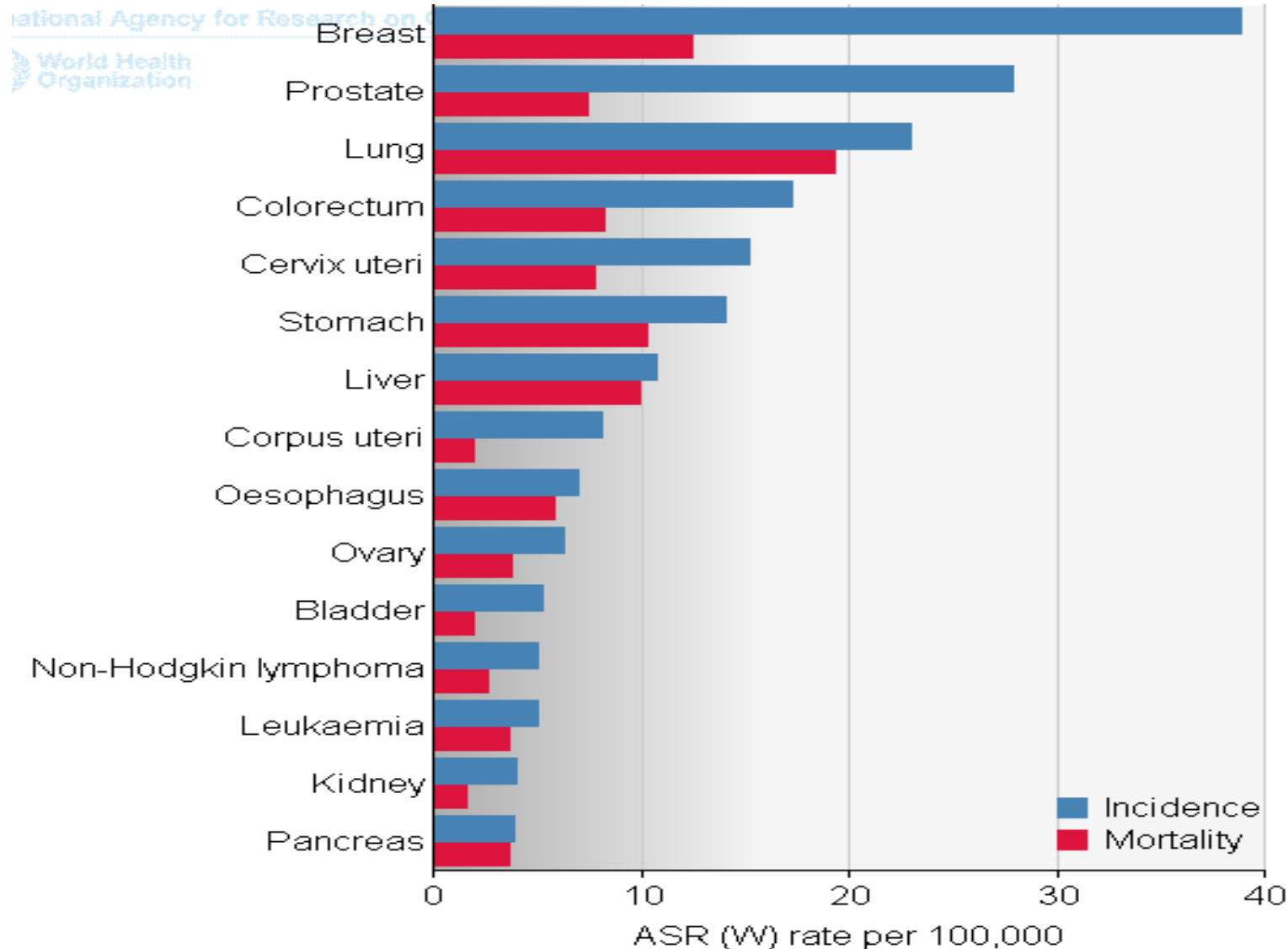


Illustration by American Society of Cell Biology

NATIONAL
CANCER
INSTITUTE

Cancer Epidemiology:

Estimated age-standardised incidence and mortality rates: total population:



Cancer: Interaction between a person's genetic factors and any of three categories of external agents:

- ❑ **Physical carcinogens**, such as ultraviolet and ionizing radiation or asbestos;
- ❑ **Chemical carcinogens**, such as vinyl chloride, or betnaphthylamine (both rated by the International Agency for Research into Cancer as carcinogenic), components of tobacco smoke, aflatoxin (a food contaminant) and arsenic (a drinking-water contaminant); and
- ❑ **Biological carcinogens**, such as infections from certain viruses, bacteria or parasites.
- ❑ Most chemicals to which people are exposed in everyday life have not been tested for their long-term impact on human health.

The majority of cancer deaths:

- ❑ Lung, breast, colorectal, stomach and liver cancers
- ❑ In high-income countries, the leading causes of cancer deaths are lung cancer among men and breast cancer among women.
- ❑ In low- and middle-income countries cancer levels vary according to the prevailing underlying risks. In sub-Saharan Africa, for example, cervical cancer is the leading cause of cancer death among women.

Risk factors for cancer:

- Tobacco use
- Unhealthy diet
- Insufficient physical activity
- The harmful use of alcohol
- Infections (hepatitis B, hepatitis C (liver cancer), human papillomavirus (HPV; cervical cancer), helicobacter pylori (stomach cancer))
- Radiation
- Variety of environmental and occupational exposures of varying importance

Cancer: Policy

WHO's approach to cancer has four pillars:

- Prevention,
- Early Detection,
- Screening,
- Treatment
- Palliative Care.
 - At least one third of the 10 million new cases of cancer each year are preventable through reducing tobacco and alcohol use, moderating diet and immunizing against viral hepatitis B.
 - Early detection and prompt treatment where resources allow can reduce incidence by a further one third.
 - Effective techniques are sufficiently well established to permit comprehensive palliative care for the remaining more advanced cases.

National cancer control programme

- ❑ WHO has consolidated tools for countries in a framework known as the national cancer control programme, which focuses government attention and services on all facets of the fight.
- ❑ A national cancer control programme is a public health programme designed to reduce cancer incidence and mortality and improve cancer patients' quality of life, through the systematic and equitable implementation of evidence-based strategies for prevention, early detection, diagnosis, treatment and palliation, making the best use of available resources.

CERVICAL CANCER: DEFINITION

Cancer of the female reproductive system:

- ❑ Two cell types present (squamous and glandular)
- ❑ Tend to occur where the two cell types meet
- ❑ 99% of cases linked to genital infection with human papillomavirus (HPV)



Cervical Cancer: Risk Factors

- Human papilloma virus infection (HPV)
- Smoking
- Immune Deficiencies
- Poverty
- No access to PAP screening
- Family history of cervical cancer

LUNG CANCER: DEFINITION

- Cancer that forms in tissues of the lung, usually in the cells lining air passages
- Leading cause of cancer death globally, 1.37 million deaths in 2008
- Affects more men than women
- Two main types:
 - ✓ Small cell lung cancer
 - ✓ Non-small cell lung cancer

Lung Cancer: Risk Factors:

- Smoking cigarettes, pipes, or cigars - now or in the past
- Being exposed to second-hand smoke
- Being treated with radiation therapy to the breast or chest
- Being exposed to asbestos, radon, chromium, nickel, arsenic, soot, or tar
- Living where there is air pollution

BREAST CANCER: DEFINITION:

- Cancer that forms in the tissues of the breast, usually in the ducts or in the lobules
- Occurs commonly in women, rarely occurs in men
- 1 of 8 women will be diagnosed with breast cancer in her lifetime.

Breast Cancer: Risk Factors:

- Hormone therapies
- Weight and physical activity
- Race
- Genetics or family history
 - BRCA1 and BRCA2 genes
- Age is the most reliable risk factor!
 - Risk increases with age

PROSTATE CANCER

- 2nd most common cancer among men
- The cancer develops inside of the prostate gland.
- Risk factors: age, race, obesity, weight gain

COLORECTAL CANCER

- 3rd most common type of cancer
- Forms in the lower part of the digestive system (large intestine)

Colorectal Cancer Risk Factors include:

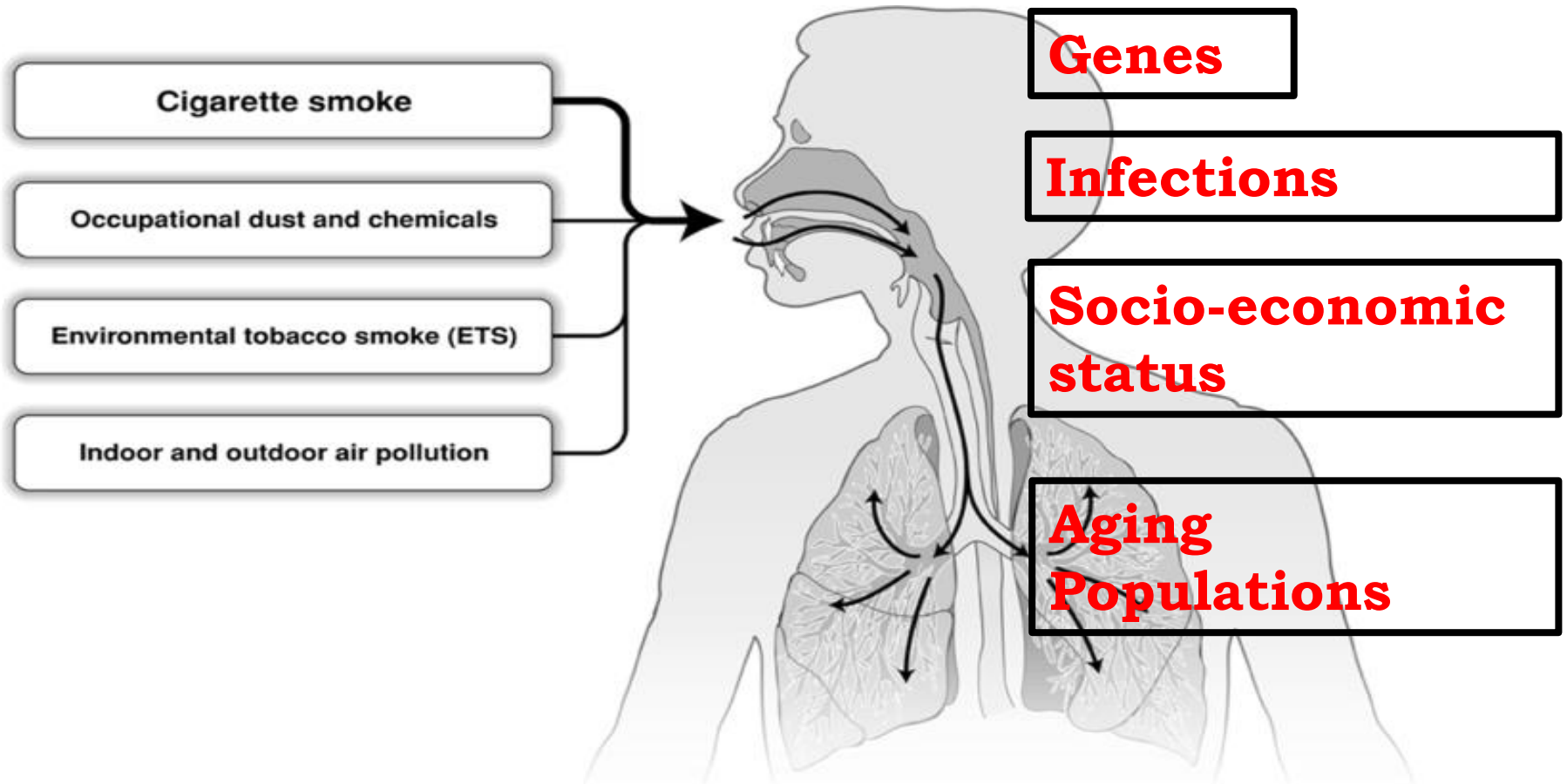
- Aging
- Black race
- Unhealthy diet and low exercise
- Diabetes
- Family history of colorectal cancer

Chronic Respiratory Diseases

Global Burden of Chronic Respiratory Disease

- ❑ A leading cause of death
- ❑ High under-diagnoses rates
- ❑ 90% of deaths occur in low-income countries

Chronic Respiratory Diseases: Shared Risk Factors



Chronic Respiratory Diseases

Facts and Figures:

- According to the WHO Global Status Report on NCDs 2010, smoking is estimated to cause about 71% of all lung cancer deaths and 42% of chronic respiratory disease worldwide. Of the six WHO regions, the highest overall prevalence for smoking in 2008 was estimated to be the in the European Region, at nearly 29%.
- Survey data from 2002–2007 indicate that over half of all children aged 13–15 years in many countries in the European Region are exposed to second-hand tobacco smoke at home. Second-hand smoke causes severe respiratory health problems in children, such as asthma and reduced lung function; and asthma is now the most common chronic disease among children throughout the Region.

Chronic Respiratory Diseases: Facts and Figures:

- ❑ According to the latest available data for 1997–2006, over 12% of infant deaths in the world are due to respiratory diseases.
- ❑ Increasing evidence suggests that allergic sensitization, which is the most common precursor to the development of asthma, can already occur antenatally. Emphasis on the health, nutrition and environment of the pregnant woman and the unborn child are therefore essential.
- ❑ Ozone pollution causes breathing difficulties, triggers asthma symptoms, causes lung and heart diseases, and is associated with about 21 000 premature deaths per year in 25 countries in the WHO European Region.
- ❑ An estimated 64 million people have CRD worldwide in 2004.¹
- ❑ More than 3 million people died of CRD in 2005, which is equal to 5% of all deaths globally that year.

Chronic Respiratory Diseases: Facts and Figures:

- ❑ Most countries in the world and the European Region have introduced a wide range of comprehensive policies to reduce and eliminate tobacco smoke. For example, the advertising of cigarettes and the sale of tobacco products to minors have been banned in more than 80% of the countries in the Region. Smoking in restaurants and bars continues to be regulated less strictly, however. Ireland, Turkey and the United Kingdom are the first countries to make public places 100% smoke free.
- ❑ The primary cause of CRD is tobacco smoke (through tobacco use or second-hand smoke).
- ❑ CRD is not curable, but treatment can slow the progress of the disease.

Risk Factors for Chronic Respiratory Diseases:

- Second-hand smoke
- Indoor air pollution from biological agents related to damp and mould
- ✓ Indoor air pollution from biological agents related to damp and mould increases the risk of respiratory disease in children and adults. Children are particularly susceptible to the health effects of damp, which include respiratory disorders such as irritation of the respiratory tract, allergies and exacerbation of asthma. Damp is often associated with poor housing and social conditions, poor indoor air quality and inadequate housing hygiene.

CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)

COPD: Definition:

- ❑ Chronic obstructive pulmonary disease
- ❑ COPD – term used for lung diseases that prevent proper lung airflow
- ❑ Chronic bronchitis, emphysema
- ❑ More than just “smoker’s cough”

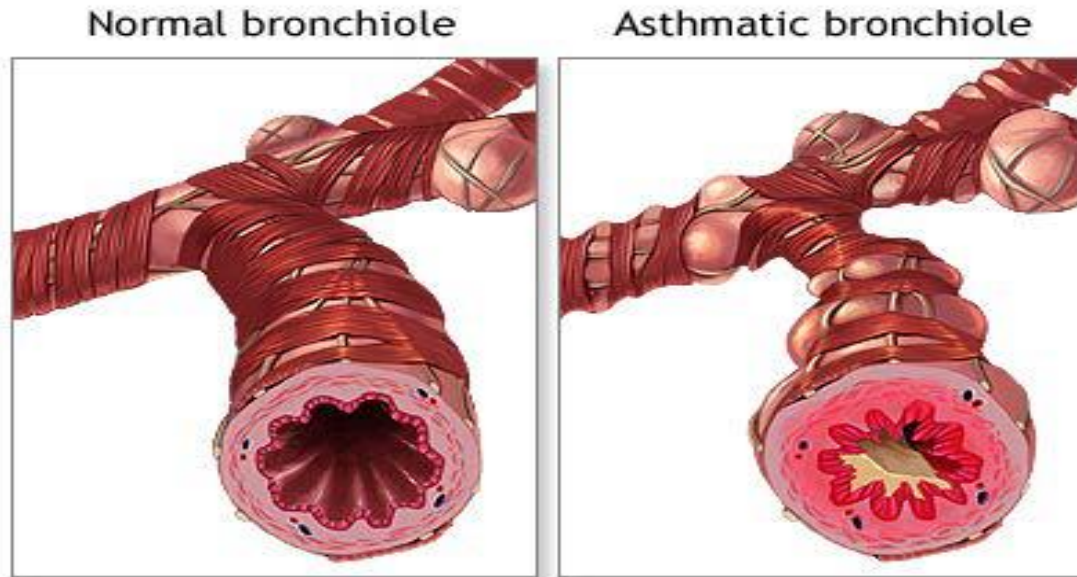
COPD: Burden

- ❑ Accurate epidemiologic data on COPD prevalence, morbidity, and mortality are difficult and expensive to collect.
- ❑ 65 million people worldwide have moderate to severe COPD.
- ❑ More than 3 million people died of COPD in 2005 (3% of all deaths globally).
- ❑ Almost 90% of COPD deaths occur in low- and middle-income countries.

Chronic Respiratory Diseases:

ASTHMA

- ❑ Recurrent attacks of “breathlessness and wheezing” (WHO, 2012)
- ❑ A gradient of severity
- ❑ Can cause sleepiness, fatigue
- ❑ Low fatality rates, but often underdiagnosed
- ❑ 235 million people affected
- ❑ Medications can help control asthma



Diabetes

Diabetes:

- ❑ Diabetes is a disorder of metabolism—the way the body uses digested food for growth and energy.
- ❑ Diabetes is a chronic disease that occurs when the pancreas does not produce enough insulin (a hormone that regulates blood sugar) or alternatively, when the body cannot effectively use the insulin it produces.
- ❑ The overall risk of dying among people with diabetes is at least double the risk of their peers without diabetes.
- ❑ There are 4 types: Type 1, Type 2, Gestational, and Pre-Diabetes (Impaired Glucose Tolerance).
- ❑ Type 2 is caused by modifiable risk factors and is the most common worldwide.

Diabetes:

- ❑ >90% of all adult diabetes cases are Type 2
- ❑ **Type 2 diabetes** results from the body's ineffective use of insulin.
- ❑ **Type 1 diabetes** is characterized by a lack of insulin production
- ❑ **Gestational diabetes.** This type is characterized by hyperglycaemia, or raised blood sugar, which has first appeared or been recognized during pregnancy.

Diabetes:

- ❑ Type 2 diabetes is much more common than type 1 diabetes.
- ❑ Type 2 accounts for around 90% of all diabetes worldwide.
- ❑ Reports of type 2 diabetes in children – previously rare – have increased worldwide. In some countries, it accounts for almost half of newly diagnosed cases in children and adolescents.
- ❑ Cardiovascular disease is responsible for between 50% and 80% of deaths in people with diabetes.
- ❑ Diabetes has become one of the major causes of premature illness and death in most countries, mainly through the increased risk of cardiovascular disease (CVD).
- ❑ Diabetes is a leading cause of blindness, amputation and kidney failure.

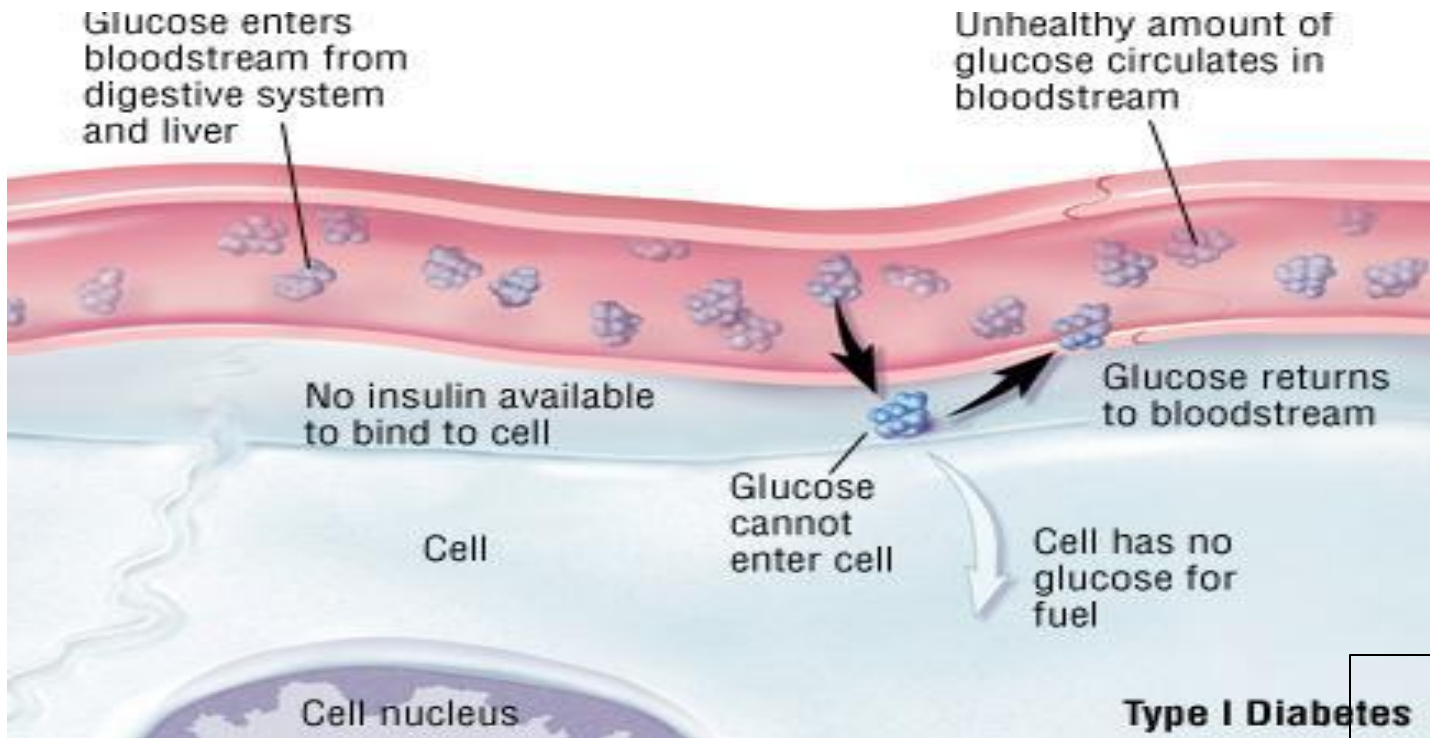
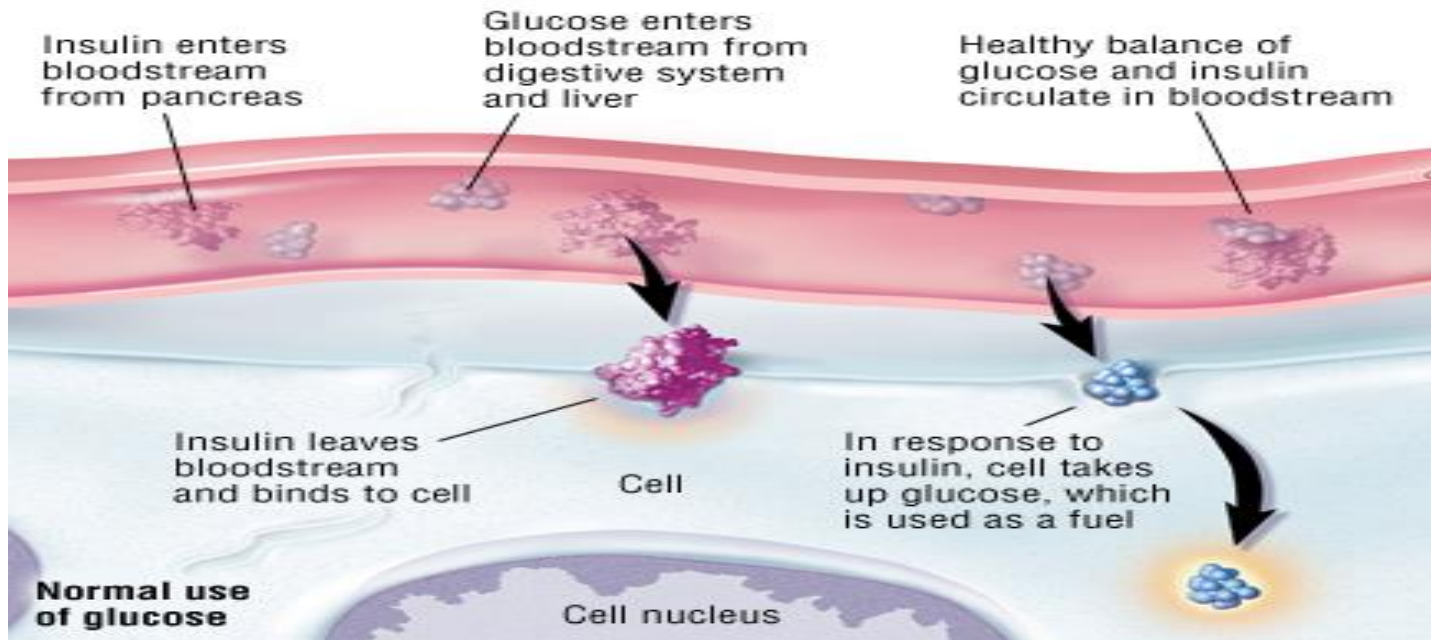
Diabetes:

- ❑ Lack of awareness about diabetes, combined with insufficient access to health services and essential medicines, can lead to complications such as blindness, amputation and kidney failure.

Type 2 diabetes can be prevented.

- ❑ Thirty minutes of moderate-intensity physical activity on most days and a healthy diet can drastically reduce the risk of developing type 2 diabetes. Type 1 diabetes cannot be prevented.

Diabetes:



Diabetes Quick facts and figures:

- ❑ About 347 million people worldwide have diabetes.
- ❑ There is an emerging global epidemic of diabetes that can be traced back to rapid increases in overweight, obesity and physical inactivity.
- ❑ Diabetes is predicted to become the seventh leading cause of death in the world by the year 2030.
- ❑ Total deaths from diabetes are projected to rise by more than 50% in the next 10 years.
- ❑ 80% of diabetes deaths occur in low- and middle-income countries.
- ❑ In developed countries most people with diabetes are above the age of retirement, whereas in developing countries those most frequently affected are aged between 35 and 64.

Diabetes: Burden of Disease

- ❑ 347 million people worldwide have diabetes.
- ❑ In 2004, an estimated 3.4 million people died from consequences of high blood sugar.
- ❑ More than 80% of diabetes deaths occur in low- and middle-income countries.
- ❑ WHO projects that diabetes deaths will increase by two thirds between 2008 and 2030.
- ❑ Healthy diet, regular physical activity, maintaining a normal body weight and avoiding tobacco use can prevent or delay the onset of type 2 diabetes.

Diabetes: Risk Factors:

Major modifiable Risk Factors

1. Unhealthy diets
2. Physical Inactivity
3. Obesity or Overweight
4. High Blood Pressure
5. High Cholesterol

Other Modifiable Risk Factors

1. Low socioeconomic status
2. Heavy alcohol use
3. Psychological stress
4. High consumption of sugar-sweetened beverages
5. Low consumption of fiber

Non-modifiable Risk Factors

1. Increased age
2. Family history/genetics
3. Race
4. Distribution of fat

Other Risk Factors

1. Low birth weight
2. Presence of autoantibodies

Diabetes Health Complications:

- ❑ Elevated blood sugar is a common effect of uncontrolled diabetes, and over time can damage the heart, blood vessels, eyes, kidneys, and nerves.

Some health complications from diabetes include:

- ❑ Diabetic retinopathy
- ❑ Diabetic neuropathy
- ❑ Diabetes is among the leading causes of kidney failure; 10-20% of people with diabetes die of kidney failure.
- ❑ Diabetes increases the risk of heart disease and stroke; 50% of people with diabetes die of cardiovascular disease (primarily heart disease and stroke).

Diabetes: Prevention

Without urgent action, diabetes-related deaths will increase by more than 50% in the next 10 years. To help prevent type 2 diabetes and its complications, people should:

- ❑ Achieve and maintain healthy body weight.
- ❑ Be physically active - at least 30 minutes of regular, moderate-intensity activity on most days.
- ❑ Early diagnosis can be accomplished through relatively inexpensive blood testing.
- ❑ Treatment of diabetes involves lowering blood sugar and the levels of other known risk factors that damage blood vessels.
- ❑ Tobacco cessation is also important to avoid complications.

Diabetes: Control

- People with type 1 diabetes require insulin; people with type 2 diabetes can be treated with oral medication, but may also require insulin.
- Blood pressure control
- Foot care

Other cost saving interventions include:

- Screening and treatment for retinopathy (which causes blindness);
- Blood lipid control (to regulate cholesterol levels);
- Screening for early signs of diabetes-related kidney disease and treatment.

These measures should be supported by a healthy diet, regular physical activity, maintaining a normal body weight and avoiding tobacco use.

Obesity

Obesity:

- ❑ Obesity is one of the greatest public health challenges of the 21st century. Its prevalence has tripled in many countries of the WHO European Region since the 1980s, and the numbers of those affected continue to rise at an alarming rate, particularly among children.
- ❑ In addition to causing various physical disabilities and psychological problems, excess weight drastically increases a person's risk of developing a number of NCDs, including cardiovascular disease, cancer and diabetes.
- ❑ The risk of developing more than one of these diseases (co-morbidity) also increases with increasing body weight.
- ❑ Overweight and obesity are defined as "abnormal or excessive fat accumulation that may impair health"

Obesity:

- Body mass index (BMI) – the weight in kilograms divided by the square of the height in meters (kg/m^2) – is a commonly used index to classify overweight and obesity in adults. WHO defines overweight as a BMI equal to or more than 25, and obesity as a BMI equal to or more than 30.

BMI classification	
Underweight	< 18.5
Normal range	18.5 - 24.9
Overweight	≥ 25.0
<i>Preobese</i>	25.0 - 29.9
Obese	≥ 30.0
<i>Obese class I</i>	30.0 - 34.9
<i>Obese class II</i>	35.0 - 39.9
<i>Obese class III</i>	≥ 40.0

Obesity – Continued'

- ❑ Body Mass Index (BMI) is a number calculated from a person's weight and height. BMI provides a reliable indicator of body fatness for most people and is used to screen for weight categories that may lead to health problems.
- ❑ Body Mass Index (BMI) is a simple index of weight-for-height that is commonly used to classify underweight, overweight and obesity in adults. It is defined as the weight in kilograms divided by the square of the height in metres (kg/m²). For example, an adult who weighs 70kg and whose height is 1.75m will have a BMI of 22.9.
- ❑ $BMI = 70 \text{ kg} / (1.75 \text{ m}^2) = 70 / 3.06 = 22.9$

Obesity: Quick Facts and Figures

- ❑ More than 1.4 billion adults were overweight in 2008, and more than half a billion obese
- ❑ In 2008, more than 1.4 billion adults were overweight and more than half a billion were obese. At least 2.8 million people each year die as a result of being overweight or obese. The prevalence of obesity has nearly doubled between 1980 and 2008. Once associated with high-income countries, obesity is now also prevalent in low- and middle-income countries.
- ❑ Globally, over 40 million preschool children were overweight in 2008
- ❑ Childhood obesity is one of the most serious public health challenges of the 21st century. Overweight children are likely to become obese adults. They are more likely than non-overweight children to develop diabetes and cardiovascular diseases at a younger age, which in turn are associated with a higher chance of premature death and disability.

Obesity: Quick Facts and Figures:

- ❑ Overweight and obesity are linked to more deaths worldwide than underweight.
- ❑ 65% of the world's population live in a country where overweight and obesity kills more people than underweight. This includes all high-income and middle-income countries. Globally, 44% of diabetes, 23% of ischaemic heart disease and 7–41% of certain cancers are attributable to overweight and obesity.
- ❑ Obesity is preventable.

Obesity: Prevention:

- ❑ Supportive environments and communities are fundamental in shaping people's choices and preventing obesity
- ❑ Individual responsibility can only have its full effect where people have access to a healthy lifestyle, and are supported to make healthy choices.
- ❑ WHO mobilizes the range of stakeholders who have vital roles to play in shaping healthy environments and making healthier diet options affordable and easily accessible.
- ❑ The global obesity epidemic requires a population-based multi-sectoral, multi-disciplinary, and culturally relevant approach

Obesity: Prevention:

- ❑ WHO's Action Plan for the Global Strategy for the Prevention and Control of Non communicable Diseases provides a roadmap to establish and strengthen initiatives for the surveillance, prevention and management of non communicable diseases, including obesity.

HYPERTENSION

Hypertension

- Raised Blood Pressure
- (Systolic)/(Diastolic) in mm of Hg (mercury)
- Systolic = amount of force your arteries use when the heart pumps
- Diastolic = amount of force your arteries use when the heart relaxes

Measurement	Normal	Pre-Hypertensive	Hypertensive
Systolic mmHg	<120	120-139	140+
Diastolic mmHg	<80	80-89	90+

- ❑ Blood pressure is the force exerted by the blood against the walls of blood vessels, and the magnitude of this force depends on the cardiac output and the resistance of the blood vessels
- ❑ Hypertension is defined as having a blood pressure higher than 140 over 90 mmHg, with a consensus across medical guidelines.
- ❑ A diagnosis of hypertension may be made when one or both readings are high: systolic (the pressure as the heart pumps blood around the body), given first; or diastolic (pressure as the heart relaxes and refills with blood), given second.
- ❑ Modern lifestyle factors are responsible for a growing burden of hypertension: physical inactivity, salt-rich diets with processed and fatty foods, and alcohol and tobacco use.

- ❑ High blood pressure can also be secondary to other conditions - kidney disease, for example - and can be associated with some medications.
- ❑ Hypertension itself does not cause symptoms but in the long-term leads to complications caused by narrowing of blood vessels.
- ❑ Doctors diagnose high blood pressure over a number of visits using a sphygmomanometer, which involves applying an inflatable cuff to the upper arm.
- ❑ Lifestyle measures are used first to treat high blood pressure, including salt restriction and other dietary changes, moderation of alcohol, and stress reduction.
- ❑ One or more drugs from a number of different classes may be used for treatment.

Raised Blood Pressure: Health Effects:

- ❑ Leading risk factor for stroke
- ❑ Major risk factor for coronary heart disease
- ❑ In some age groups, the risk of CVD doubles for each increment of 20/10 mmHg of blood pressure
- ❑ Other complications of raised blood pressure:
 - Heart failure
 - Peripheral vascular disease
 - Renal impairment
 - Retinal hemorrhage
 - Visual impairment

SCHIZOPHRENIA

Schizophrenia

Key facts

- ❑ Schizophrenia is a severe mental disorder affecting more than 21 million people worldwide.
- ❑ Schizophrenia is characterized by distortions in thinking, perception, emotions, language, sense of self and behaviour. Common experiences include hearing voices and delusions.
- ❑ Worldwide, schizophrenia is associated with considerable disability and may affect educational and occupational performance.
- ❑ People with schizophrenia are 2-2.5 times more likely to die early than the general population. This is often due to physical illnesses, such as cardiovascular, metabolic and infectious diseases.
- ❑ Stigma, discrimination and violation of human rights of people with schizophrenia is common.
- ❑ Schizophrenia is treatable. Treatment with medicines and psychosocial support is effective.
- ❑ Facilitation of assisted living, supported housing and supported employment are effective management strategies for people with schizophrenia.

Schizophrenia:

Symptoms

Schizophrenia is characterized by distortions in thinking, perception, emotions, language, sense of self and behaviour. Common experiences include:

- ❑ Hallucination: hearing, seeing or feeling things that are not there.
- ❑ Delusion: fixed false beliefs or suspicions that are firmly held even when there is evidence to the contrary.
- ❑ Abnormal Behaviour: strange appearance, self-neglect, incoherent speech, wandering aimlessly, mumbling or laughing to self.

Causes of schizophrenia

Research has not identified one single factor. It is thought that an interaction between genes and a range of environmental factors may cause schizophrenia.

Psychosocial factors may also contribute to schizophrenia

Schizophrenia:

Management:

❑ Schizophrenia is treatable. Treatment with medicines and psychosocial support is effective. However, the majority of people with chronic schizophrenia lack access to treatment.

Magnitude and Impact

❑ Schizophrenia affects more than 21 million people worldwide but is not as common as many other mental disorders. It is more common among males (12 million), than females (9 million). Schizophrenia also commonly starts earlier among men.

❑ People with schizophrenia are 2-2.5 times more likely to die early than the general population. This is often due to physical illnesses, such as cardiovascular, metabolic and infectious diseases.

EPILEPSY

❑ Epilepsy is a chronic disorder of the brain that affects people worldwide.

❑ It is characterized by recurrent seizures, which are brief episodes of involuntary movement that may involve a part of the body (partial) or the entire body (generalized), and are sometimes accompanied by loss of consciousness and control of bowel or bladder function.

Signs and symptoms

❑ Characteristics of seizures vary and depend on where in the brain the disturbance first starts, and how far it spreads. Temporary symptoms occur, such as loss of awareness or consciousness, and disturbances of movement, sensation (including vision, hearing and taste), mood, or other cognitive functions.

Key facts

- ❑ Epilepsy is a chronic non communicable disorder of the brain that affects people of all ages.
- ❑ Approximately 50 million people worldwide have epilepsy, making it one of the most common neurological diseases globally.
- ❑ Nearly 80% of the people with epilepsy live in low- and middle-income countries.
- ❑ People with epilepsy respond to treatment approximately 70% of the time.
- ❑ About three fourths of people with epilepsy living in low- and middle- income countries do not get the treatment they need.
- ❑ In many parts of the world, people with epilepsy and their families suffer from stigma and discrimination.

Causes:

❑ Epilepsy is not contagious. The most common type of epilepsy, which affects 6 out of 10 people with the disorder, is called idiopathic epilepsy and has no identifiable cause.

❑ Epilepsy with a known cause is called secondary epilepsy, or symptomatic epilepsy. The causes of secondary (or symptomatic) epilepsy could be:

1. Brain damage from prenatal or perinatal injuries (e.g. A loss of oxygen or trauma during birth, low birth weight),
2. Congenital abnormalities or genetic conditions with associated brain malformations,
3. A severe head injury

4. A stroke that restricts the amount of oxygen to the brain,
5. An infection of the brain such as meningitis, encephalitis, neurocysticercosis,
6. Certain genetic syndromes,
7. A brain tumor.

Treatment

- ❑ It's treated with anti-epileptic drugs (AEDs). Epilepsy can be treated easily and affordably with inexpensive daily medication.

Prevention

Idiopathic epilepsy is not preventable. However, preventive measures can be applied to the known causes of secondary epilepsy.

- ❑ Preventing head injury is the most effective way to prevent post-traumatic epilepsy.
- ❑ Adequate perinatal care can reduce new cases of epilepsy caused by birth injury.
- ❑ The use of drugs and other methods to lower the body temperature of a feverish child can reduce the chance of febrile seizures.
- ❑ Central nervous system infections are common causes of epilepsy in tropical areas, where many low- and middle-income countries are concentrated.
- ❑ Elimination of parasites in these environments and education on how to avoid infections can be effective ways to reduce epilepsy worldwide

BURNS

A burn is an injury to the skin or other organic tissue primarily caused by heat or due to radiation, radioactivity, electricity, friction or contact with chemicals.

Thermal (heat) burns occur when some or all of the cells in the skin or other tissues are destroyed by:

- ❑ Hot Liquids (Scalds)
- ❑ Hot Solids (Contact Burns), or
- ❑ Flames (Flame Burns).

Facts and Figures:

- ❑ Burns are a global public health problem, accounting for an estimated 265 000 deaths annually.
- ❑ Burns are among the leading causes of disability-adjusted life-years (DALYs) lost in low- and middle-income countries.
- ❑ In 2004, nearly 11 million people worldwide were burned severely enough to require medical attention.

Who is at risk?

Gender

Females and males have broadly similar rates for burns according to the most recent data

Age

Along with adult women, children are particularly vulnerable to burns.

Risk factors

- Socioeconomic factors - people living in low- and middle-income countries are at higher risk for burns than people living in high-income countries.
- Occupations that increase exposure to fire;
- Poverty, overcrowding and lack of proper safety measures;
- placement of young girls in household roles such as cooking and care of small children

- ❑ Underlying medical conditions, including epilepsy, peripheral neuropathy, and physical and cognitive disabilities;
- ❑ Alcohol abuse and smoking;
- ❑ Easy access to chemicals used for assault (such as in acid violence attacks);
- ❑ Use of kerosene (paraffin) as a fuel source for non-electric domestic appliances;
- ❑ Inadequate safety measures for liquefied petroleum gas and electricity.

Prevention:

- ❑ Enclose fires and limit the height of open flames in domestic environments.
- ❑ Promote safer cook stoves and less hazardous fuels, and educate regarding loose clothing.
- ❑ Apply safety regulations to housing designs and materials, and encourage home inspections.

- ❑ Improve the design of cook stoves
- ❑ Lower the temperature in hot water taps.
- ❑ Promote fire safety education and the use of smoke detectors, fire sprinklers, and fire-escape systems in homes.
- ❑ Promote the introduction of and compliance with industrial safety regulations
- ❑ Avoid smoking in bed and encourage the use of child-resistant lighters.
- ❑ Promote legislation mandating the production of fire-safe cigarettes.
- ❑ Improve treatment of epilepsy, particularly in developing countries.
- ❑ Encourage further development of burn-care systems,
- ❑ Support the development and distribution of fire-retardant aprons to be used while cooking around an open flame or kerosene stove.

First aid

- ❑ Stop the burning process by removing clothing and irrigating the burns.
- ❑ Extinguish flames by allowing the patient to roll on the ground, or by applying a blanket, or by using water or other fire-extinguishing liquids.
- ❑ Use cool running water to reduce the temperature of the burn.
- ❑ In chemical burns, remove or dilute the chemical agent by irrigating with large volumes of water.
- ❑ Wrap the patient in a clean cloth or sheet and transport to the nearest appropriate facility for medical care.

ANEMIA
(Anemia, also spelled anaemia)

❑ **Anemia** is a condition that develops when your blood lacks enough healthy red blood cells or haemoglobin.

❑ If you have too few or abnormal red blood cells, or your haemoglobin is abnormal or low, the cells in your body will not get enough oxygen.

❑ this blood related disorder affects the haemoglobin molecule, and causes the entire blood cell to change shape under stressed conditions. The haemoglobin molecule is defective. After haemoglobin molecules give up their oxygen, some may cluster together and form long, rod-like structures which become stiff and assume sickle shape.

❑ Unlike healthy red blood cells, which are usually smooth and donut-shaped, sickled red blood cells cannot squeeze through small blood vessels.

❑ They stack up and cause blockages that deprive organs and tissues of oxygen-carrying blood. This process produces periodic episodes of pain and ultimately can damage tissues and vital organs and lead to other serious medical problems. Normal red blood cells live about 120 days in the bloodstream, but sickled red cells die after about 10 to 20 days. Because they cannot be replaced fast enough, the blood is chronically short of red blood cells.

Symptoms and Signs

- ❑ Feel tired or lightheaded (sometimes with fainting)
- ❑ Weakness
- ❑ Fatigue easily
- ❑ Have decreased energy
- ❑ Appear pale
- ❑ Develop palpitations or rapid heart rate
- ❑ Experience shortness of breath

- ❑ Children with chronic anemia are prone to infections and learning problems.
- ❑ Anemia can be detected by a simple blood test called a complete blood cell count (CBC).
- ❑ The treatment of the anemia varies greatly and very much depends on the particular cause.

Causes:

- ❑ In general, anemia has four basic categories of causes. Sometimes more than one of these problems are causing the anemia:
 - ❑ Bleeding (haemorrhage)
 - ❑ Excessive destruction of red blood cells (haemolysis)
 - ❑ Underproduction of red blood cells (such as from bone marrow disorders)
 - ❑ Not enough normal haemoglobin

Risk factors for anemia:

Anemia can occur in people of all ages and race, males and females. However, there are certain factors that raise the risk for anemia:

- Women of childbearing age - due to menstruation
- Pregnancy and childbirth - due increased demands of iron, women should supplement with folic acid
- Preterm infants
- Children aged 1-2
- Individuals with poor diets, low in vitamins, mineral, and iron
- Blood loss from surgery or injury
- Long-term or serious illnesses, such as AIDs, diabetes, kidney disease, cancer, rheumatoid arthritis, heart failure, and liver disease
- A family history of inherited anemias
- Intestinal disorders-affects absorption of nutrients

Diagnosis of anemia:

- ❑ To diagnose anemia, several methods can be used; the most common of which is a complete blood count (CBC), which measures a number of blood components, including the patient's hemoglobin and hematocrit levels (ratio of the volume of red blood cells to the total volume of blood).
- ❑ The results of a CBC are examined and compared with the recommended healthy levels.

TREATMENTS FOR ANEMIA:

- ❑ There is a range of treatments for anemia, all ultimately aimed at increasing the red blood cell count which in turn increases the amount of oxygen the blood carries.
- ❑ Depending on the type of anemia, the treatment has to match the cause.

ARTHRITIS

❑ Arthritis is a term often used to mean any disorder that affects joints; a painful inflammation and stiffness of the joints

❑ Although the word "arthritis" means joint inflammation, the term is used to describe around 200 rheumatic diseases and conditions that affect joints, the tissues that surround the joint, and other connective tissue.

❑ Rheumatic conditions are typically characterized by pain, aching, stiffness and swelling in and around one or more joints. The symptoms can develop gradually or suddenly. Certain rheumatic conditions can also involve the immune system and various internal organs of the body.

❑ Arthritis is more common among adults aged 65 years or older, but people of all ages (including children) can be affected.

Types of arthritis:

There are around 200 types of arthritis - or musculoskeletal conditions - which are split into seven main groups:

1. Inflammatory arthritis
2. Degenerative or mechanical arthritis
3. Soft tissue musculoskeletal pain
4. Back pain
5. Connective tissue disease
6. Infectious arthritis
7. Metabolic arthritis.

Causes

❑ There is no single cause of all types of arthritis; the cause or causes in any given case vary according to the type or form of arthritis.

Potential causes for arthritis may include:

Potential causes for arthritis may include:

- ✓ Injury - leading to degenerative arthritis
- ✓ Abnormal metabolism - leading to gout and pseudogout
- ✓ Inheritance - such as in osteoarthritis
- ✓ Infections - such as in the arthritis of Lyme disease
- ✓ Immune system dysfunction

Risk factors for arthritis:

Non-modifiable arthritis risk factors:

- ❑ Age: the risk of developing most types of arthritis increases with age
- ❑ Sex: most types of arthritis are more common in females; 60% of all people with arthritis are female. Gout is more common in males than females
- ❑ Genetic: specific genes are associated with a higher risk of certain types of arthritis, such as rheumatoid arthritis (RA), systemic lupus erythematosus (SLE) and ankylosing spondylitis.

Modifiable arthritis risk factors:

- ❑ **Overweight and obesity:** excess weight can contribute to both the onset and progression of knee osteoarthritis
- ❑ **Joint injuries:** damage to a joint can contribute to the development of osteoarthritis in that joint
- ❑ **Infection:** many microbial agents can infect joints and trigger the development of various forms of arthritis
- ❑ **Occupation:** certain occupations that involve repetitive knee bending and squatting are associated with osteoarthritis of the knee

Signs and symptoms:

- 1. Pain.** Pain from arthritis can be constant, or it may come and go. Pain might be isolated to one place or felt in many parts of the body
- 2. Swelling.** Some types of arthritis cause the skin over the affected joint to become red and swollen, and to feel warm to the touch
- 3. Stiffness.** Stiffness is a typical arthritis symptom, with some forms of arthritis causing increased stiffness upon waking up in the morning, after sitting at a desk, or after sitting in a car for a long time, and others resulting in stiffness after exercise or characterized by persistent stiffness
- 4. Difficulty moving a joint.** Moving a joint or getting up from a chair should not be hard or painful and can indicate arthritis or other joint problem.

Diagnosis

- ❑ Most cases of arthritis are diagnosed with a detailed medical history of current and past symptoms, physical examination and particular radiographic and laboratory studies.
- ❑ It is possible to have more than one form of arthritis at the same time, and only a few rheumatic diseases have a definitive diagnosis, such as gout.
- ❑ The tests are ordered during the diagnostic process that depend on the type of arthritis suspected.
- ❑ **Examples of Test:**
 - ✓ Rheumatoid factor
 - ✓ Anti-CCP antibody
 - ✓ Complete blood count (CBC)

Treatment:

- The focus of treatment for arthritis is to control pain, minimize joint damage and improve or maintain function and quality of life.
- Whether you have a non-inflammatory or inflammatory type of arthritis or even a painful case of gout, there are numerous medications and recommendations to relieve pain and ensure that your joints do not become damaged further.

Treatment may involve:-

- Medications
- Non-pharmacologic therapies
- Physical or occupational therapy
- Splints or joint assistive aids
- Patient education and support
- Weight loss
- Surgery - joint replacement and joint surgery

TRAUMA:

- ❑ Trauma is a distressing event in which a person feels severely threatened emotionally, psychologically, or physically.
- ❑ It's the emotional response someone has to an extremely negative event.
- ❑ While trauma is a normal reaction to a horrible event, the effects can be so severe that they interfere with an individual's ability to live a normal life.
- ❑ In a case such as this, help may be needed to treat the stress and dysfunction caused by the traumatic event and to restore the individual to a state of emotional well-being.
- ❑ Trauma can manifest days, months or even years after the actual event.
- ❑ Longer term reactions include unpredictable emotions, flashbacks, strained relationships and even physical symptoms like headaches or nausea.

Main Sources of Trauma:

- Rape
- Domestic violence
- Natural disasters
- Severe illness or injury
- The death of a loved one
- Witnessing an act of violence

Signs and Symptoms:

- Person appear shaken and disoriented
- Anxiety

Emotional Symptoms of Trauma

- Denial, anger, sadness and emotional outbursts.

Physical Symptoms of Trauma

- Paleness, lethargy, fatigue, poor concentration and a racing heartbeat.

Trauma Medication:

- ❑ It can be treated through the use of certain medications.
- ❑ Not all trauma requires medication, but it can be a useful tool in treating the symptoms of trauma, such as anxiety and depression.
- ❑ It is important to work with a healthcare professional to determine whether medication is necessary.
- ❑ Drug options will depend on the individual's psychological and medical history as well as the severity of the symptoms.

EYE DISORDERS AND CANCER.

- ❑ Many eye diseases have no early symptoms. They may be painless, and you may see no change in your vision until the disease has become quite advanced.
- ❑ The single best way to protect your vision is through regular professional eye examinations.
- ❑ People with eye cancer may experience the following symptoms or signs.
 - ❑ Bulging of one eye
 - ❑ Complete or partial loss of sight
 - ❑ Pain in or around the eye (rare with eye cancer)
 - ❑ A pale raised lump on the surface of the eye (the conjunctiva or cornea)
 - ❑ Blurred vision
 - ❑ Change in the appearance of the eye

Eye cancer can also cause

- ❑ Seeing spots or flashes of light or wiggly lines in front of your eyes
- ❑ Blinkered vision (loss of peripheral vision) – you can see what is straight ahead clearly, but not what is at the sides
- ❑ A dark spot on the coloured part of the eye (the iris) that is getting bigger
- ❑ Eye irritation, red eye or chronic inflammation of the conjunctiva (conjunctivitis)

Causes of Eye Problem:

❑ Eyestrain

- ✓ Reading for hours, working at a computer, or driving long distances. It happens when you overuse your eyes. They get tired and need to rest, just like any other part of your body.

NON COMMUNICABLE DISEASES:

SPECIFIC RISK FACTORS

Tobacco Use:

- Tobacco kills up to half of its users.
- Tobacco kills nearly 6 million people each year.
- Annual death toll could rise to more than 8 million by 2030.
- Nearly 80% of the world's 1 billion smokers live in low- and middle-income countries.

Tobacco Use: Health Effects

Among smokers:

- Cancer
- Coronary heart disease
- Diseases of the lungs
- Peripheral vascular disease
- Stroke
- Fetal complications and stillbirth

Second-hand smoke causes:

- Heart disease, including heart attack
- Lung cancer



DISEASE CAUSED BY TOBACCO USE:

Cigarette smoking increases the risk of:

- ✓ Coronary heart disease
- ✓ Atherosclerotic peripheral vascular disease
- ✓ Cerebrovascular disease
- ✓ Cancers of the lung, larynx, mouth, esophagus, bladder, pancreas, kidney, and cervix
- ✓ Chronic obstructive pulmonary disease
- ✓ Intrauterine growth retardation, premature rupture of membranes
- ✓ Low-birthweight babies, perinatal mortality
- ✓ Cataract, macular degeneration; hip fracture
- ✓ Peptic ulcer disease
- ✓ Possibly liver, stomach, and colorectal cancers and acute myelocytic leukemia

DISEASE CAUSED BY TOBACCO USE: - Continued'

☐ Involuntary smoking (environmental tobacco smoke) is a cause of:

- Lung cancer and coronary heart disease in non smokers
- Respiratory infections and symptoms in the children of parents who smoke

Smokeless tobacco causes:

- ☐ Oral Cancer
- ☐ Oral leukoplakia
- ☐ Dental caries (possibly)

Cigars cause:

- ☐ Cancers of the mouth, larynx, and lung
- ☐ Coronary heart disease
- ☐ COPD

The Benefits of Physical Activity

Regular physical activity is one of the most important things you can do for your health.

- Control your weight
- Reduce your risk of cardiovascular disease
- Reduce your risk for type 2 diabetes and metabolic syndrome
- Reduce your risk of some cancers (colon, breast, endometrial and lung cancers)
- Strengthen your bones and muscles
- Improve your mental health and mood
- Improve your ability to do daily activities and prevent falls, if you're an older adult
- Increase your chances of living longer

PHYSICAL INACTIVITY:

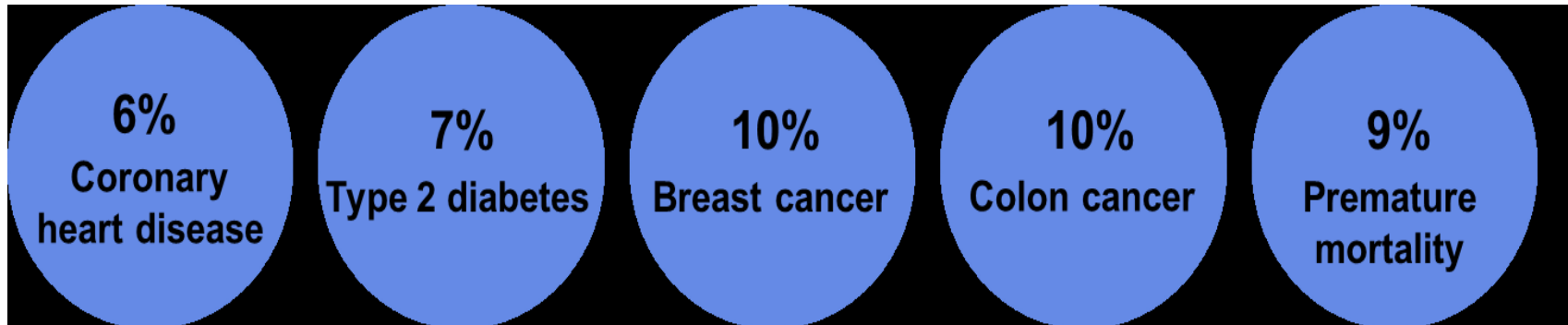
Global Changes in Physical Activity:

❑ 31% of the world's population does not get enough physical activity.

Many social and economic changes contribute to this trend:

- ❑ Aging populations,
- ❑ Transportation, and
- ❑ Communication technology.

Approx. 6-10% of major NCDs worldwide is attributable to physical inactivity



Physical Activity: Health Effects:

Reduces:

- High blood pressure
- Adverse lipid profile
- Arthritis pain
- Psychiatric issues

Reduces risk of:

- Type 2 diabetes
- Certain cancers
- Heart attacks
- Stroke
- Falls
- Early death

Global Changes in Diet:

Most countries have increased overall daily consumption of:

- Daily calories,
- Fat and meats, and
- Energy dense and nutrient-poor foods such as:
 - Starches
 - Refined sugars
 - Trans-fats

Unhealthy Diet: Health Effects

- Coronary heart disease
- Stroke
- Cancer
- Type 2 diabetes
- Hypertension
- Diseases of the liver and gallbladder
- Obesity

HARMFUL USE OF ALCOHOL:

Global Alcohol Consumption

- ❑ 11.5% of all global drinkers are episodic, heavy users.
- ❑ 2.5 million people die from alcohol consumption per year
- ❑ The majority of adults consume at low-risk levels.
- ❑ Estimated worldwide consumption of alcohol has remained relatively stable.

Harmful Use of Alcohol: Effects

Immediate effects:

- ❑ Diminished brain function
- ❑ Loss of body heat
- ❑ Fetal damage
- ❑ Risk for unintentional injuries
- ❑ Risk for violence
- ❑ Coma and death

Long-term effects:

Liver diseases
Cancers
Hypertension
Gastrointestinal disorders
Neurological issues
Psychiatric issues

COMMUNITY DIAGNOSIS

Topic Outline:

Major sections / units of community diagnosis for discussion;-

- ❑ Concept and purpose or aim of community diagnosis
- ❑ The process/steps undertaken in community diagnosis
- ❑ Formulation of data collection tool
- ❑ Report writing & dissemination of findings.
- ❑ Planning of interventions of the community. This helps in identification & meeting of the needs.
- ❑ Ethical consideration in community diagnosis

Introduction:

- ❑ **“Community”**: A cluster of people with at least one common characteristic (geographic location, occupation, ethnicity, housing condition.....)
- ❑ A group of people with a common characteristic or interest living together within a larger society
- ❑ A community is a whole entity that functions because of the interdependence of its parts or subsystems. Eight subsystems plus the community core are identified.
- ❑ **Community core**: history, socio-demographic characteristics, vital statistics, values/beliefs/religions. Core.
- ❑ The core of the community is its people: history, values, characteristics and beliefs.

Eight Subsystems:

- Physical environment
- Education
- Safety and transportation
- Politics and government
- Health and social services
- Communication
- Economics
- Recreation

Community Diagnosis:

- ❑ It generally refers to the identification and quantification of health problems in a community as a whole in terms of mortality and morbidity rates and ratios, and identification of their correlates for the purpose of defining those at risk or those in need of health care.
- ❑ community diagnosis involves the translation of collected information describing resources and needs with the community and synthesizing it.
- ❑ Community diagnosis / survey:
- ❑ **Community Diagnosis Process:** “A means of examining aggregate and social statistics in addition to the knowledge of the local situation, in order to determine the health needs of the community”

- ❑ Community diagnosis is a systematic process, an on going process during which a health worker can assess the entire community and find out about the problems affecting the health of that community, hence work with the community leaders and others to develop ways for the community to meet their own health needs effectively.
- ❑ Community diagnosis can also be defined as;-
“Quantitative- { relating to considerations of an amount or size which is capable of being measured } and Qualitative;- { subjective quality of a thing which cannot be measured because the reality they represent can only be approximated. } description of health of citizens and the factors which influence their health.

- ❑ Community diagnosis identifies problems, proposes areas for improvement and stimulates action.

WHO INITIATES THE COMMUNITY DIAGNOSIS?

- ❑ The health workers may decide to do the community diagnosis in case of finding out a problem.
- ❑ The community itself may request for community diagnosis
- ❑ NB: Community diagnosis is carried out with active participation of members of the community.
- ❑ Community diagnosis reflects/indicates which of the local diseases or health problems are important, that is which should be given high priority by health workers.

From knowledge of local causes of diseases {morbidity} and death {mortality}, the following questions can be answered;-

- ❑ What are the ten commonest diseases seen in outpatients?
- ❑ What is the distribution of the common diseases in the area?
- ❑ What is the local distribution of uncommon but important diseases?
- ❑ What diseases have been epidemic in the area in the past?
- ❑ Which diseases are the community most concerned about?
- ❑ Which are the most important local health problems?

- ❑ NB: One of the challenges experienced by health professionals is that communities may be more concerned about water or access to markets or some other local problem than they are about strictly “medical” or “health” problems. Otherwise, health workers must look at all aspects of community development, an intersectoral approach so that the real needs are tackled. Active community participation and support is always much stronger when development programmes are seen to meet the real {felt} needs.
- ❑ Ideally health workers may have to show their willingness and interest in what the community wants before concentrating on the main health problems. Rushing into a health program there is real understanding and commitment is unlikely to be successful.

- ❑ When deciding on a health program, priority should be given to those diseases and health problems for which something effective and practical can be done by the local community, health centre or sub county health staff. A community survey/diagnosis establishes where the health services should put their main efforts and resources.
- ❑ NB: Community diagnosis highlights local priorities

CONCEPT OF COMMUNITY DIAGNOSIS

- Community diagnosis is the process through which health workers together with members of the community identify the community's priority health problems and together make plans of action and implement them
- Community's full participation depends on four concepts of primary health care:
 - Acceptability
 - Accessibility
 - Affordability
 - Availability

Community diagnosis involves:

- ❑ Determining the state of health in the community
- ❑ Determining the pattern of health services delivery in the community
- ❑ Determining the relationship between health status and health care in the community
- ❑ Identifying and establishing the determinants of the major problems relating to health needs and resources in the community.

Goal:

The mission of community diagnosis is to:

- ❑ Analyze the health status of the community
- ❑ Evaluate the health resources, services, and systems of care within the community
- ❑ Assess attitudes toward community health services and issues
- ❑ Identify priorities, establish goals, and determine courses of action to improve the health status of the community
- ❑ Establish an epidemiologic baseline for measuring improvement over time.

OBJECTIVES OF THE COMMUNITY DIAGNOSIS:

- ❑ To identify the felt and non-felt needs of a community.
- ❑ To assist the community to formulate the strategies to meet their needs.
- ❑ To advise the community on how better they can make use of government resources e.g., CDF donations/funds.
- ❑ For evaluation purposes
- ❑ For study purposes
- ❑ Also helps in collecting information on the following:
The causes of morbidity and mortality (by age and sex).

PURPOSE OF COMMUNITY DIAGNOSIS

Community diagnosis is carried out to collect information on the following:

- i. Demography including health statistics
- ii. Causes of morbidity and mortality by age and gender
- iii. Use of groups services especially MCH/FP
- iv. Nutrition, diet and weaning patterns of the community, growth of pre-school & school children

PURPOSE OF COMMUNITY DIAGNOSIS

cont..

- v. Societal culture and social economic stratification
- vi. Mental health and assessment of possible cause of mental illness
- vii. Patterns of leadership and communication within the community
- viii. State of the environment including water , housing and disease vectors
- ix. Community's Knowledge, attitude and practices in relation to health related activities
- x. Epidemiological details of endemic diseases

TOOLS USED IN COMMUNITY DIAGNOSIS

- Maps
- Weighing scale
- Specimen bottles
- Questionnaires

Methods of community diagnosis / surveys:

- Surveys can be done by using a variety of methods.

Three of most common methods are as follows:-

1. Personal Interview Survey:

- Investigator has collect the information personally from the source concerned. This has the advantage of obtaining in depth responses to questions, but the interviewer must be training in asking questions and recording responses, which makes it costly. There is also the responsibility of bias by the interviewer in the selection of respondents.

2. Telephone Surveys:

- They are less costly than personal surveys. People may be more open since there is no face-to-face contact. It has a disadvantage in that some people do not have telephones or might be a way from homes or office when calls are made, hence not interviewed.

3. Mailed Questionnaire Surveys

- This method can be used to cover a wider geographical area. Also the respondents can remain anonymous if desired, however it has low response, inappropriate answers as well as difficulty in reading or understanding questions by some people.

WHERE TO GET HEALTH INFORMATION

Health information may be obtained from several sources to include;-

- ❑ The local community
- ❑ The local primary health care facilities, i.e. the health centers and dispensaries, the local district hospital, provincial, national hospitals health offices, local health program offices, and field surveys.
- ❑ Sub County executive officer
- ❑ Sub County development officer
- ❑ Sub County accountant and personnel officer
- ❑ Non-governmental organizations {NGOs}
- ❑ Community based organizations {CBOs}
- ❑ Faith-based organizations {FBOs}
- ❑ Private clinics and Pharmacies.

ETHICAL CONSIDERATION IN COMMUNITY DIAGNOSIS

- The community diagnosis process should not cause any physical, emotional, spiritual or cultural harm to the community
- Steps to take in order to ensure ethical considerations are not violated
 1. Obtaining permission to enter into the community boundaries
 2. Obtaining informed consent before interviewing clients, families or groups
 3. Establishing rapport before exploring sensitive areas
 4. Confidentiality of data collected
 5. Selecting good interviewer
 6. Training interviewers

- ❑ During community diagnosis avoid taking any: action that may be considered to be offensive to the community.
- ❑ The tools used to collect information should not be offensive to the community i.e. they should not cause any physical, emotional, spiritual or cultural harm.

How is the community diagnosed?

In community diagnosis:

- ❑ 1st, Data collected in the community analysis are pulled together and major trends of problems are identified.
- ❑ With this identification, understanding of the community is more than simply a list of facts and figures
- ❑ It identifies the segment of the population where health problems seem to be concentrated.
- ❑ The identification of a target population enables individuals engaged in programme planning and service delivery to distinguish a group/groups of people with common needs and characteristics so that programmes are more cost effective and have greater potential to demonstrate measurable change after implementation.

- ❑ 2nd, In determining the state of health, the raw data are transformed into rates and proportions which provide an understanding of how the community compares to similar communities.
- ❑ By determining the pattern of health services in the community, you can assess the resources that provide health and medical care.
- ❑ In the 3rd step you investigate the relationship between health status and health care in the community. Health indicators for potential target populations are correlated.
- ❑ Populations with health status problems are compared to populations for whom services are available or accessible.

- The 4th step of the diagnosis involves identifying and establishing the determinants of the major issues and problems related to health needs and resources of the community. Once the target population has been identified, there is a need to enquire about their specific characteristics. These may include education, age, race, sex, geographic location, behavioral attitudes or religious benefits.

Community Analysis:

- ❑ Community analysis is the process of examining data to define needs strengths, barriers, opportunities, readiness, and resources. The product of analysis is the “community profile”.
- ❑ To analyze assessment, data is helpful to categorize the data. This may be done as following:
 - Demographic
 - Environmental
 - Socioeconomic
 - Health resources and services
 - Health policies
 - Study of target groups.

- ❑ Community analysis involves the collection of detailed information concerning the community for whom a program is targeted.
- ❑ Also referred to as needs assessment it is the investigation of resources and needs within a community.
- ❑ It is done to obtain information and facts in order to plan effective programmes to address a health problem in the community.

The three levels of Diagnosis:

1. Individual community diagnosis
 2. Family diagnosis
 3. Community diagnosis
- NB. For the three levels of community diagnosis to be successful the problem solving process has to be involved i.e. objectives, assessment / gather information, diagnosis, planning, implementation, evaluation

Patient diagnosis versus community diagnosis:

- ❑ The learners previously learnt the pertinent/relevant steps used while making patients diagnoses which include the following;
- ❑ Greet, welcome the patient / client, and offer him/her a seat
- ❑ Ask for patients name, marital status and residential address
- ❑ Take history including detail of the patients progress so far.
- ❑ Perform a physical examination
- ❑ Carry out special investigations
- ❑ Make differential diagnosis, following a specific diagnosis once results of investigations are confirmed

- ❑ Prescribe the most appropriate regimen/treatment
- ❑ NB: Its mandatory that when we take care of an individual patient, we usually make a patient diagnosis to facilitate in organisation of treatment / management
- ❑ Give the patient a date when they should return for review if need be or hospitalize /admit when necessary.
- ❑ The appropriate treatment / management.
- ❑ Similarly in order to look after a **community** we must make a community diagnosis and organize a community health programme.

❑ Tools used in patients diagnosis verses Community diagnosis:

Tools for patients diagnosis;

- ❑ Sphygmomanometer
- ❑ Weighing scales
- ❑ Specimen bottles
- ❑ Questionnaires

Methods used to find out community health problems:

- ❑ Can review monthly data from health centers
- ❑ Do mapping to plan, organize and evaluate health activities—maps gives a lot of information i.e. can see schools, hospitals, rivers, etc.
- ❑ Can interview the following;
 - Community leaders
 - Healthy workers
 - School workers
- ❑ Observations in specified aspects

Factors to consider when planning for a community

Diagnosis:

- ❑ You need time to build trust and friendship before doing the survey
- Community members may be worried due to past experience, especially if surveys have been done and never resulted in any benefit to the community.
- ❑ Always avoid raising false promises
- ❑ It is much helpful if the local people can be involved in the diagnosis e.g. community health workers, community members with genuine interest in their community
- ❑ Choose the right timing depending on the season

- ❑ Observation and listening are as important as questioning
- ❑ Go slowly about giving people advice—find out what they already know and build on that—never assume that they know nothing.
- ❑ Always practice what you preach and members of the community will take your words seriously.
- ❑ Some indicators of health are easily measured e.g. death rates, nutritional and immunization status, however other equally important indicators will be difficult to measure therefore require creative thinking beforehand to make sure that they are assessed. These include;- attitude of the people, community decision making etc.

- ❑ People may live within the same geographical area and have things in common, but this does not mean they get on well together or can work well together. These potential or real conflicts must be taken into account.
- ❑ Not all community leaders are just to serve their community
- ❑ Therefore you may need to assess the quality of the leaders and work with those who genuinely want to work for the good of the community.
- ❑ Communities and individuals need to work through the change process before lasting change will come as a result of community diagnosis. Help them achieve that.

Implications of Community Diagnosis:

- ❑ Improves the care rendered to the community
- ❑ Increases the potential for cost–effective services
- ❑ Improves the quality of communication from hospital to the community and vice versa
- ❑ Community problems become more clearer
- ❑ Makes community participation a reality that is, -- improves community participations

Health Indicators

- ❑ Community is diagnosed using: Health Indicators
- ❑ **Indicators of health** are variables used for the assessment of community health.
- ❑ **Indicators of Community Health:** These are the events which can be measured to reflect the health or well being of a community or a group within the community.

Characteristics of Indicators:

1. **Valid**, i.e., they should actually measure what they are supposed to measure;
2. **Reliable** and objective, i.e., the answers should be the same if measured by different people in similar circumstances;
3. **Sensitive**, i.e., they should be sensitive to changes in the situation concerned,
4. **Specific**, i.e., they should reflect changes only in the situation concerned,
5. **Feasible**, i.e., they should have the ability to obtain data needed, and;
6. **Relevant**, i.e., they should contribute to the understanding of the phenomenon of interest.

Classification of health Indicators

- ❑ Mortality indicators
- ❑ Morbidity indicators
- ❑ Disability rates
- ❑ Nutritional status indicators
- ❑ Health care delivery indicators
- ❑ Utilization rates
- ❑ Indicators of social and mental health
- ❑ Environmental indicators
- ❑ Socio-economic indicators
- ❑ Health policy indicators
- ❑ Indicators of quality of life
- ❑ Other indicators

Mortality Indicators:

❑ Mortality Rates:

- The traditional measures of health status
- Widely used because of their ready availability (death certificate is a legal requirement in many countries)

❑ Crude death rates

❑ Specific death rates: age / disease

❑ Expectation of life

❑ Infant mortality rate

❑ Maternal mortality rate

❑ Proportionate mortality ratio

❑ Case fatality rate

Morbidity Indicators:

Morbidity rates

- Data on morbidity are preferable, although often difficult to obtain.
- Incidence and prevalence
- Notification rates
- Attendance rates: out-patient clinics or health centers.
- Admission and discharge rates
- Hospital stay duration rates

Disability Indicators:

- Disability rates
 - No. of days of restricted activity
 - Bed disability days
 - Work/School loss days within a specified period.
 - Expectation of life free of disability

Nutritional Indicators

Nutritional Status Indicators

- It is an indicator of positive health
- Anthropometrics measurements
- Height of children at school entry
- Prevalence of low birth weight
- Clinical surveys: Anemia, Hypothyroidism, Night blindness

Health Care Delivery Indicators

- Health Care Delivery Indicators
 - Reflect the Equity / Provision of health care
 - Doctor / Population ratio
 - Doctor / Nurse ratio
 - Population / Bed ratio
 - Population / per health center

Utilization Indicators

- Health care utilization Rates
 - Extent of use of health services
 - Proportion of people in need of service who actually receive it in a given period
- Proportion of infants who are fully immunized in the 1st year of life. i.e. Immunization coverage.
- Proportion of pregnant women who receive ANC.
- Hospital-Beds occupancy rate.
- Hospital-Beds turn-over ratio

Social/Mental Health Indicators

- Indicators of Social and Mental Health
 - Valid positive indicators does not often exist
 - Indirect measures are commonly used
- Suicide & Homicide rates
- Road traffic accidents
- Alcohol and drug abuse.

Environmental Indicators

- Environmental health Indicators
 - Reflect the quality of environment
- Measures of Pollution
- The proportion of people having access to safe water and sanitation facilities
- Vectors density

Socio-economic Indicators

- Socio-economic Indicators
 - Is not a direct measure of health status.
 - For interpretation of health care indicators
- Rate of population increase
- Per capita GNP
- Level of unemployment
- Literacy rates - females
- Family size
- Housing condition e.g. No. of persons per room

Health Policy Indicators

□ Health Policy Indicators

- Allocation of adequate resources.
- Proportion of GNP spent on health services.
- Proportion of GNP spent on health related activities.
- Proportion of total health resources devoted to primary health care

Other Indicators

- Other health indicators
 - Indicators of quality of life.
 - Basic needs indicators.
 - Health for all indicators.

PROCESS OF COMMUNITY DIAGNOSIS

Steps involved:

1. Exploration
2. Planning of the survey
3. Developing and Pre-testing survey tools
4. Execution of the survey
5. Data analysis
6. Report writing, dissemination
7. Community action

1. Exploring the Community

- It is means mapping out of a community in order to learn or discover about it.
- It is also known as community inventory.
- The exploration phase is made up of three main activities:
 - Seeking permission and informing the various leaders
 - Seeking reactions of members of the community
 - Gathering background data about the community

2. Planning the Survey

During the planning phase, you should attempt to answer the following questions?

1. Why is the Survey Being Done (OBJECTIVES)
2. Where will it take place?(STUDY AREA)
3. Who will be interviewed ?
(SAMPLING&INTERVIEWERS)
4. When will the survey take place? (TIMING)
5. What will be covered in the survey? (TOOLS, RESOURCES)
6. How are the research assistants selected and trained?

Qualities of interviewers

- Be literate and well known to the community
- Have the ability to display the right attitudes and opinions
- Be able to explain the questionnaire effectively to the community
- Be able to use the tools
- Be able to establish good rapport with individuals, families or groups they will meet
- Be good listeners and sensitive towards other people's feeling
- Be able to relate well to community members

- ❑ The people who are selected as interviewers have different educational background therefore always train them appropriately on how to administer the survey tools. When training the interviewers its of vital importance to explain the following;-
- ❑ The purpose of the study
- ❑ How they should record the various expressions used by the people to answer particular questions
- ❑ What procedure they should follow to get co-operation from the people being surveyed
- ❑ If you intend to use a questionnaire you should discuss it with them several times to ensure that they have a common understanding of the questions and are able to use them

- ❑ They should understand the need to follow the questionnaire closely and in a standardized manner.
- ❑ If each interviewer asks questions in his/her own fashion the answers will differ and be unreliable because they may refer to different things
- ❑ Mock / Pre-test interviews should be held during the training with the interviewers so that just to ensure that each one of them can handle the assignment.
- ❑ Once the interviewers get acquainted it gives them a feel of the real situation and helps you to assess them further so as to be satisfied
- ❑ NB: Remember that the pilot group should not be included in the study group.

Sampling for a survey

- It is the process of selecting a number of individuals or units of the study population in such a way that the individuals selected represent the larger groups from which they are select for the purpose of determining parameters or characteristics of the whole population.

Sampling terminologies

- A sample is a part of a statistical population whose properties are studied to gain information about the whole. When dealing with people, it can be defined as a set of respondents selected from a larger population for the purpose of a survey.

Sampling terminologies cont..

- Study population: the entire group of individuals, events or objects that have common observable characteristics. For example: All first years in nursing
- The accessible population: is a group of individuals, objects and event which one can access
- The representative sample is a group from the study population, which has all the important/relevant characteristics of the total population.

Sampling Methods

Sampling techniques fall under two main groups, namely:

- Probability sampling
- Non probability sampling.

Probability Sampling

- Sampling that utilizes some form of random selection such that different units in your population have equal probabilities of being chosen.
- Probability sampling has been found to give accurate results when one is studying groups that are too large to study in their entity.
- Probability sampling methods include:
 - Simple random sampling
 - Systematic sampling
 - Stratified sampling
 - Cluster sampling
 - Multi-stage sampling

Simple Random Sampling

- In this method, every sampling unit has in the population has an equal chance of being selected
- You can draw a simple random sample using the following steps:
 - Make a list of all the units in the population to be studied
 - Decide on the sample size
 - Select the required number of units methods such as balloting, Use a table of random numbers, a computer random number generator or a mechanical device.

Systematic sampling

- A systematic random sample is obtained by selecting one unit on a random basis and choosing additional elementary units at evenly spaced intervals until the desired number of units is obtained.

Systematic sampling cont..

Example:

You have a target population of 200 ANC clients. You want a sample of 50 from these 200

1. Have their ANC numbers are written on a piece of paper. If you choose to use systematic random sampling,
2. Divide 200 (N) by 50 (n), you will get 4 (k).
3. Randomly select any number between 1 and 4. Suppose the number you have picked is 2, that will be your starting number. So ANC client number 002 has been selected. From there you will select every 4th (Kth) client until you reach the last fourth client of the 200 clients. You will end up with 50 selected ANC clients

Stratified Sampling

- This is dividing the sample frame into smaller sub samples (strata) in order to enable you to capture the variable aspects of each subgroup.
- You then apply simple random sampling to each subgroup or stratum to select the number of units you need.
- This method is used when the study population is very variable, for example, different ethnic groups, different ecological areas, or age groups.
- It allows you to subdivide the population into sub populations which are more homogeneous.

Cluster Sampling

- In this method, you randomly select groups or clusters and not the individuals or cases.
- This method is used when it is not possible to obtain a sampling frame because the population is either too large or scattered over a large geographical area.
- In cluster sampling you select an intact group and include all the members of that group in the sample..

Cluster Sampling cont..

Example

- You want to study patients suffering from malaria in your district
- It would be expensive and time consuming to compile a list of all malaria patients.
- So the logical thing to do would be to list all health facilities in your district and then randomly select them according to your sample size. Once you select them, you would then include all the malaria patients in those health facilities in your sample.

Non Probability Sampling Methods

- These methods are used when a researcher is not interested in selecting a sample that is representative of the population.
- They are mainly used in qualitative studies where the focus is on in-depth information rather than making generalisations.
- They include:
 - Convenient sampling
 - Quota sampling
 - Purposive sampling.
 - snowballing

Convenience Sampling

- In this method, you select cases or units of observation as they become available.
- For example, a health worker wanting to study attitudes of villagers towards family planning may decide to interview all adults visiting Maternal Child Health or Family Planning (MCH/FP) clinic on that day.
- Such a sample is useful for giving a first impression of a situation. However it is not representative of the community since some units can easily be missed out or under selected.

Quota Sampling

- In this method, the researcher simply selects subjects to fit in identified quotas, say for example, a certain religion or social class.
- Quota sampling ensures that various groups or quotas of the population are included in the study according to some criteria.
- The selection is not random as the individuals are just picked as they fit into the identified quotas.

Purposive Sampling

- Here the researcher simply picks individuals or cases that have the information or characteristics which they requires.
- It is sometimes used in one of the stages in the sampling procedure, for instance, to get the location or district in which the units of observation have the required characteristics.
- Once the units are selected, the researcher may then apply random sampling to obtain the actual sample of cases.

Snowballing

- Initial subjects with the desired characteristics are identified using purposeful sampling. The few identified name others that they know have the required characteristics until the researcher gets the number of cases she requires.

Bias and sampling error

- Sampling bias. The tendency to favor the selection of units that have particular characteristics.
- Sampling error. The differences between the sample and the population due to the particular units that happen to have been selected.

3. Developing and pretesting survey

- Tools are implements that help us with our work and before embarking on the survey, one should ensure they have all needed and they are in the best condition.
- Tools used for data collection include:
 - Questionnaires
 - Focus group discussions
 - Measurements, physical examination and lab tests
 - Interview schedules
 - Observation checklist

Questionnaire

- It is a set of standardised questions designed to collect information about a specific aspect or issue.
- Information from a questionnaire helps make plans for health services and to evaluate them.

Qualities of a Good Questionnaire

- Has simple and specific questions.
- Has short and precise questions.
- Avoids use of abbreviations or jargon.
- Avoids questions that are too demanding and time consuming.
- Avoids bias in questions.
- Avoids making assumptions
- Avoids double questions

Qualities of a good questionnaire

Cont.

- Questions ask about simple common happenings
- Has clear wording.
- Questions range from known to unknown and from simple to complex.
- All the questions should relate to the purpose of study
- A questionnaire should be laid out in such a way that it provides easy flow from one topic to another.
- It should have both open- and closed-ended questions.

Qualities of a good questionnaire

Cont.

- Questions should not screen disease if no effective treatment can be offered for the cases found.
- Questions are acceptable to the people included in the survey. You should view the questions through the respondents eye and ask yourself the following:
 - Will the question be seen as reasonable?
 - Will it infringe on the respondents privacy?
 - Will the respondent be able and willing to answer the question?

Open-ended Question

- An open-ended question is a type of question that allows the respondent to provide their own answer.
- It encourages the respondent to think and describe a situation in their own words.
- The respondent is not given any answers to select from.
- The answer given is best recorded in the respondent's own words. Although it is the easiest way to ask for information the responses are not easy to analyse.

Open ended questions Cont.

Open-ended questions are useful because they give more information on:

- Facts and details which the researcher may not be familiar with
- Opinions, attitudes and suggestions
- Sensitive issues

Examples of open-ended questions

- What did the traditional birth attendants do when your labour started?
- What do you think are the reasons for the high dropout rate of health committee members?
- What would you do if you noticed that your daughter (a schoolgirl) has a relationship with her teacher?
- These questions require deeper thinking and provoke the respondent to elaborate when responding.

Closed-ended Question

- These are questions that offer the respondents a list of possible answers to choose from.
- They are specific and useful when you are interested in certain aspects of an issue.
- Although they produce more uniform answers than open-ended questions, they depend upon our knowing and including all the relevant answers in the list.

Focus Group Discussions (FGDs)

- This is a group discussion that gathers together people from similar backgrounds or experiences to discuss a specific topic of interest to the researcher.
- The group of participants are guided by a moderator (or group facilitator), who introduces topics for discussion and helps the group to participate in a lively and natural discussion amongst themselves.

FGD Cont.

- A focus group is not a group interview where a moderator asks the group questions and participants individually provide answers.
- The focus group relies on group discussion and is especially successful where the participants are able to talk to each other about the topic of interest. This is important as it allows the participants the opportunity to disagree or agree with each other.

Pre-testing the Instruments

- It is very important to pre-test all the instruments you intend to use before they are finally administered in order to alter or delete questions which are being misinterpreted or are too sensitive to be asked without offending people.
- It also gives you the opportunity to discover if the various parts of the questionnaire flow in a logical order.

Pretesting procedure

- Asking colleagues to review the questions critically
- Pre-testing the questionnaire on people who are very similar to your target group
- Simulating the actual data collection procedure
- Obtaining feedback about the form and content of the questionnaire
- Checking if the questions produce the information we need
- Trying out your tabulation and analysis procedure
- Revising

4. Execution of the Survey

- It involves going out to the field to collect information from the sample population you have selected.

Stages include:

- Interviewing the respondents
- Data collection
- Data handling

Interviewing the respondents

- When interviewing respondents the interviewer should:
 - Greeting the respondents
 - Introduce themselves by name
 - Show their identity cards for the activity
 - Show their letter of permission to carry out the exercise
 - Explain carefully why they have come and what is the purpose of the survey

Interviewing the respondents

cont..

- Ask if they are welcome to interview the family and if it is convenient for them at that time.
- Explain that they will be recording the information they collect
- Emphasise that all information collected is confidential
- Give them a chance to ask questions for clarification
- Should the person refuse to cooperate, the interviewers should do their best to persuade such a person to agree

Data Collection

To ensure quality data you should:

- Avoid bias when designing the questionnaire as explained earlier
- Provide an instruction sheet on how to ask certain questions and how to record answers
- Select interviewers with care

Data Collection Cont...

- Select and train the assistants carefully in all the procedures together with interviewers
- Involve them in the pre-testing phase
- Limit the number of interviews that interviewers can conduct in a day so that they do not become too exhausted
- Identify assistants to carry out quality checks everyday

Data Handling

Data is checked for completeness and organised for analysis. It involves:

- Check to confirm that all the forms have been completed satisfactorily
- Ensure that questionnaires are numbered
- Identify one person to be responsible for storing data and specimens securely
- Record forms should be sequenced and stored with clear labels
- Make sure that all the information you need has been collected in a standard way
- Develop an insight into the possible ways of analysing data
- Ensure availability of any resources needed for analysis, such as a computer

5. Data Analysis

- Data obtained from the field is known as raw data and its difficult to interpret.
- Data analysis is the separation and categorisation of numerical data into groups in order to make of its meaning.
- Statistical methods are used to do analyse data, because they:
 - Summarise the data.
 - Make inferences about the data, that is data gathered on a sample can be used to indicate the probability happening to the entire population

Data analysis Cont.

- This process involves:
 - Data cleaning
 - Sorting or tallying
 - Coding and entering data
 - Analysis of results

Data Cleaning

Here you will need to do the following:

- Find 'missing data'.
- Correct mistakes committed by interviewers after confirming with them, for example, putting a tick against female instead of male
- Exclude all inconsistent information if you can not verify its correctness.

Sorting

Sorting is arranging raw data in groups or in a particular order.

- You should select a system of sorting which facilitates data analysis.
- Data which has been sorted or arranged into some order according to magnitude is called an array.

Tallying

- Raw and arrayed data are ungrouped.
- Tallying is one of the methods used to help you organise data before you analyse it. It entails the setting up of classes or clusters which are tied by a slanting stroke.
- Usually four vertical strokes are made then a fifth stroke is drawn through them to represent the fifth item.
- This data is then presented using a frequency distribution table.

Coding and Entering Data

- This involves the conversion of data into numerical codes which represent attributes or measurements of the variables.
- Coding eases the burden of calculation.
- Researchers recommend that the coding process should start with the preparation of a code book which describes in detail the codes assigned for each response category and item in the questionnaire.
- When coding data you should include as much information as you can.

Analysis of Results

- Analysis can either be:
 - Qualitative analysis or
 - Quantitative analysis
- **Qualitative analysis** is usually applied on data which can be counted but can not be measured, such as opinions. It allows you to analyse the information in a systematic way in order to reach some useful conclusions and recommendations.
- **Quantitative analysis** is usually applied to data that can be given a numerical basis or can be measured, for example, age in years, weight in kilograms.

Data Presentation

- Data can be presented in:
 - Tabular presentation
 - This is use of tables
 - Graphical presentation
 - Histogram
 - Frequency polygon
 - Bar graph
 - Pie chart
 - Maps

Qualities of a good graph

- Should have a title
- The titles should be clear, concise and unambiguous
- Clear and concise statement of units in which the figures are measured
- Correct vertical and horizontal scaling
- Statement of units used on vertical and horizontal axis
- A key/legend to explain the various features of a graph, if need be
- Correct graphing according to the scales specified on the horizontal and vertical axes

6. Feedback and Report Writing

- Feedback means giving comments about how well or badly a person is doing in order to help them do better.
- It is a form of communication.
- When planning feedback you need to consider to whom it shall be given and in what form.
- This will help you to deliver the message effectively and in a way that it is well understood by the people concerned.
- All individuals in the community who are concerned with the health of the people are entitled to feedback..

Types of report feedback

a) Individual report

- The individuals who formed a part of your survey sample as well as those who provided you with specimens and tests deserve to be given feedback on your findings.
- You should tell them at the time of examination that they will be contacted later if anything abnormal is found.
- Those who you took specimens from or on whom you conducted tests should be told if anything abnormal was found.

Individual reports cont...

- When giving such feedback you should be cautious not to arouse anxiety about harmless conditions.
- You should only give feedback on those conditions that require treatment.
- If you diagnose a condition that requires treatment, you should start it at once or refer the person to the nearest health facility for follow-up care.
- If during the survey you find specific notifiable diseases you should report to the relevant authorities, such as the medical officer in charge.

b) Preliminary Report

- This goes to the community in which the diagnosis was conducted in order to thank them for their cooperation.
- It is given soon after the field work is completed by arranging meetings for the people and their leaders.
- This report covers your general impressions of the community's health status as well as preliminary survey findings.
- Do not give specific information on this day, since analysis will not be ready yet.
- You should promise them a more detailed report later.

c) **Non-medical Reports**

- This report is less scientific and is usually produced for non-medical people.
- It comes out after full analysis has been done and conclusions and recommendations have been formulated.
- It is an important report because its message can influence social and political leaders to start doing something about improving the health of the population.

The Medical or Community Diagnosis Report

- This is a detailed scientific report that provides an account of planning and execution of the survey as well as the results.
- This report should have the following headings
 - Title
 - Table of content
 - List of figures and tables
 - List of abbreviations and acronyms
 - Acknowledgements
 - Introduction
 - Aims and objectives of the study
 - Materials and methods (methodology)

The Medical or Community Diagnosis Report cont..

- Headings cont.
 - Limitations of the study
 - Results/findings
 - Discussions
 - Conclusions and recommendations
 - References
 - Appendices (questionnaire, map of the area)

7. Community Health action

- Community health survey identifies a host of health problems that need to be addressed.
- It may have revealed need for greater emphasis on MCH services, Youth clinic services or environmental sanitation.
- The community is mobilized to take action through a number of interventions namely:
 - Making them aware of their problems and prompting PHC
 - Health education
 - Immunization
 - Environmental improvement

Summary: Process/Steps of Community Diagnosis/Survey

1. **Exploration** – mapping, helps to find out where/when the survey would be conducted
2. **Interaction with community leaders** e.g. Chief. Meet to determine their needs and enlighten them as much as possible
3. Decide what can be investigated, formulate objectives – that is among all the numerous needs discussed with the community resource persons
4. Planning the survey and formulation of the questionnaires
5. Training the interviewers
6. Pre-testing the questionnaire to ensure its validity

7. Rectifying/Reworking the questionnaire in case of any required corrections
8. Sampling / Selecting the sample for the survey/Population to be interviewed
9. Executing the survey / Carrying out the exercise
10. Data analysis
11. Writing report
12. Feed back to the community and finding out their interpretations
13. Planning for action and health programme
14. Taking action
15. Evaluation.

NB: Appropriate planning of the survey is quite vital. If one fails to plan the survey carefully the study will be unsuccessful.

END

THANKS