

Unit I: Concept of Epidemiology
BPH, Second Year, Fourth Semester

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Unit I: Concept of Epidemiology

- Definition of Epidemiology
- Historical development and achievements of Epidemiology
- Aims, principles, scope and application of Epidemiology
- Modern Epidemiology and its ramifications
- Social Epidemiology, Environmental Epidemiology, Nutritional Epidemiology, Reproductive Epidemiology, Perinatal and Early Life Epidemiology.
- Epidemiology and its relationship with other disciplines,
- Epidemiologic functions in public health
- Practice of epidemiology in public health

Key messages in epidemiology

- Epidemiology is a **fundamental science** of public health.
- Epidemiology has made **major contributions to improving population health**.
- Epidemiology is essential to the process of identifying and mapping emerging diseases.
- There is often a **frustrating delay** between acquiring **epidemiological evidence** and **applying this evidence to health policy**.

Concept of epidemiology

- The word epidemiology is derived from Greek word “epidemic” means
 - Epi : among
 - Demos: people
 - Logos: study, knowledge, science

Epidemiological Concepts and Principles

- Events and diseases are not randomly distributed in a population.
- Determinants of events can be identified.
- Determinants are studied for entire populations.
- Prevention and control in the population are the main focus, rather than diagnosis and treatment of a single patient.
- Epidemiology uses rates to study populations and develop prevention and control programs.



Contd...

- Began with Adam and Eve, both trying to investigate the quality of forbidden fruits which dating back to third century B.C.
- Heavy toll of communicable diseases and its gloomy picture of consequences.

Contd...

- The initial concentration of epidemiology was directed to:-
 - infectious and communicable diseases
 - the epidemic conditions and their management.

Contd..

- Epidemiology is the study of occurrence, distribution and determinants of health problems and diseases among human population and use of this knowledge for prevention, control and treatment of diseases.
- The primary unit of epidemiology is group of people. Population can be defined in terms of geographical areas, specific age and attribute groups.

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Epidemiology is a multidisciplinary subject involving the ideas of many sectors such as biostatistics, research, clinical medicine, veterinary sciences, psychology and other social sciences.

Definitions of Epidemiology

- **Historical Definitions**

- Epidemiology is the science of epidemic and endemic disease —**Stedman's Medical Dictionary**
- The science of infective disease, their prime causes, propagation and prevention **Stallybrass 1931**

Contd...

- Epidemiology is the branch of medical science, which treats of epidemics: **Parkin 1873.**
- Epidemiology is the science of mass phenomena of infectious disease. - **Frost (1927)**

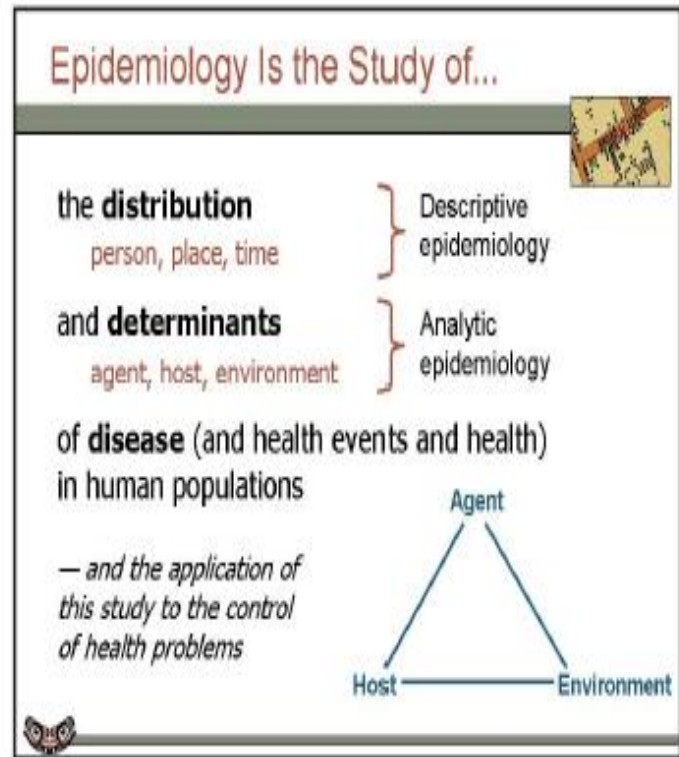
B) Modern Definitions

- Epidemiology is the study of distribution and determinants of disease frequency in man: Mac Mohan (1960).

Contd...

- The **latest** definition of 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 control health problems**”

John M Last (1988).



Contd..

Updated definition of Epidemiology:

“Epidemiology is the **quantitative** 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.”
(**John M Last** 2006).

Explanation of terms

Quantitative

It implies measurement of particular health states and of hazards (exposures, behaviours etc.), and the counting of individuals.

Contd..

Study

- Epidemiology is a scientific discipline, sometimes called “the basic science of public health.”
- It has its foundation, sound methods of scientific inquiry.
- It includes surveillance, observation, hypothesis testing and analysis by time, place and person and other in age/sex distribution.

Distribution

- Epidemiology is concerned with the frequency and pattern of health events in a population.
- Frequency includes not only the number of such events in a population, but also the rate or risk of disease in the population.
 - The rate (*number of events divided by size of the population*): allows valid comparisons across different populations.
- Pattern refers to the occurrence of health-related events by time, place, and person

Determinants

- Determinants include physical, biological, social, cultural and behavioral influence on health.

Health-related states

- It includes the **conditions of health**, disease, disability, discomfort dissatisfaction, health needs and demands, health activities, health care facilities, health care utilization and life style etc.

Health related events

- Health related **events include the vital events** like birth, death, marriage, divorce, migrations, calamities such as flood, famine, drought, earthquake and other accidents fall injuries injury by animals etc.

Specified populations

- Means population in a defined geographical area with specific characteristics

Control of health problems

- To make explicit aim that epidemiology **prevents, promotes and protects** /restores the life of individuals /groups

Historical development of epidemiology

1. Beliefs regarding disease causation was on supernatural forces

2. The environment as a factor in disease causation

- First expressed over 2000 years ago by **Hippocrates**.
- **Hippocrates** explained the occurrences of diseases form rational cause in stead of supernatural force.
- In his essay entitled' On air, water and place' suggested that environmental and host factors might have influences in the development of disease

Contd...

3. Use of Mortality counts

- **John Graunt**, who studied the mortality statistics, published mortality data in 1662.
- He quantified the pattern of birth, death and disease occurrences, infant mortality, urban/rural and seasonal variation of these events.

4. James Lind (1716 - 1794)

- In 1747, **James Lind** carried out experiments to discover the cause of scurvy.
- The symptoms of which included loose teeth, bleeding gums and haemorrhages.



Contd....

- Lind selected 12 men from the ship suffering from scurvy, and divided them into six pairs, giving each group different additions to their basic diet.
- Some were given **cider**, others **seawater**, others a mixture of **garlic, mustard** and **horseradish**.
- Another group of two were given spoonfuls of **vinegar**, and
- The last two groups with **oranges and lemons**.

Contd....

Lind selected 12 men from the ship suffering from scurvy, and divided them into six pairs, giving each group different additions to their basic diet.

Group 1

Diet + **cider**

Group 2

Diet + **seawater**

Group 3

Diet + **garlic, mustard oil and horseradish**

Group 4

Diet + **vinegar**

Group 5

Diet + **Orange**

Group 6

Diet + **Lemon**

Those fed citrus fruits experienced a remarkable recovery

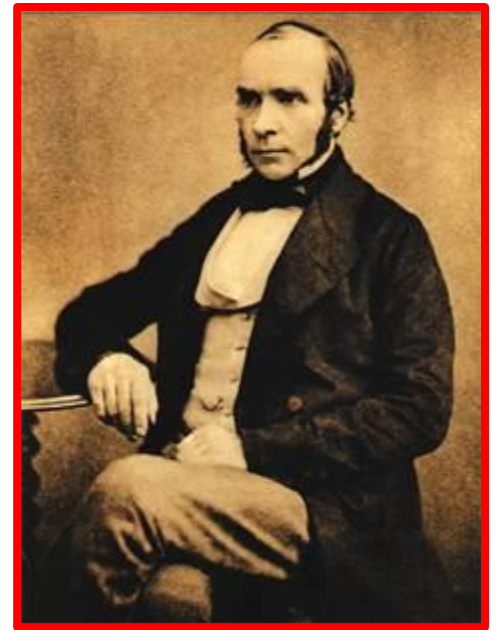
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- Scurvy disappeared almost completely on the supply of lemon juice to ships.

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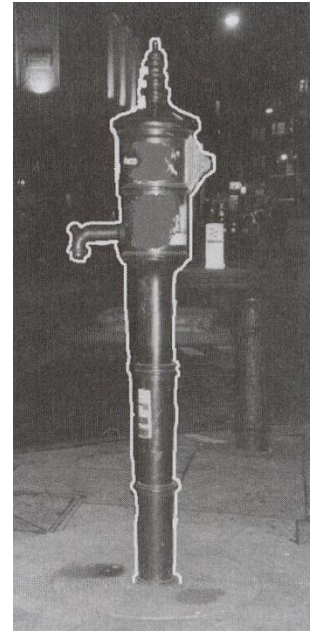
5. Use of Natural Experiments

- Anesthesiologist **John Snow** conducted several classical investigations in London around mid 1800s; probably, twenty years before the development of microscope.



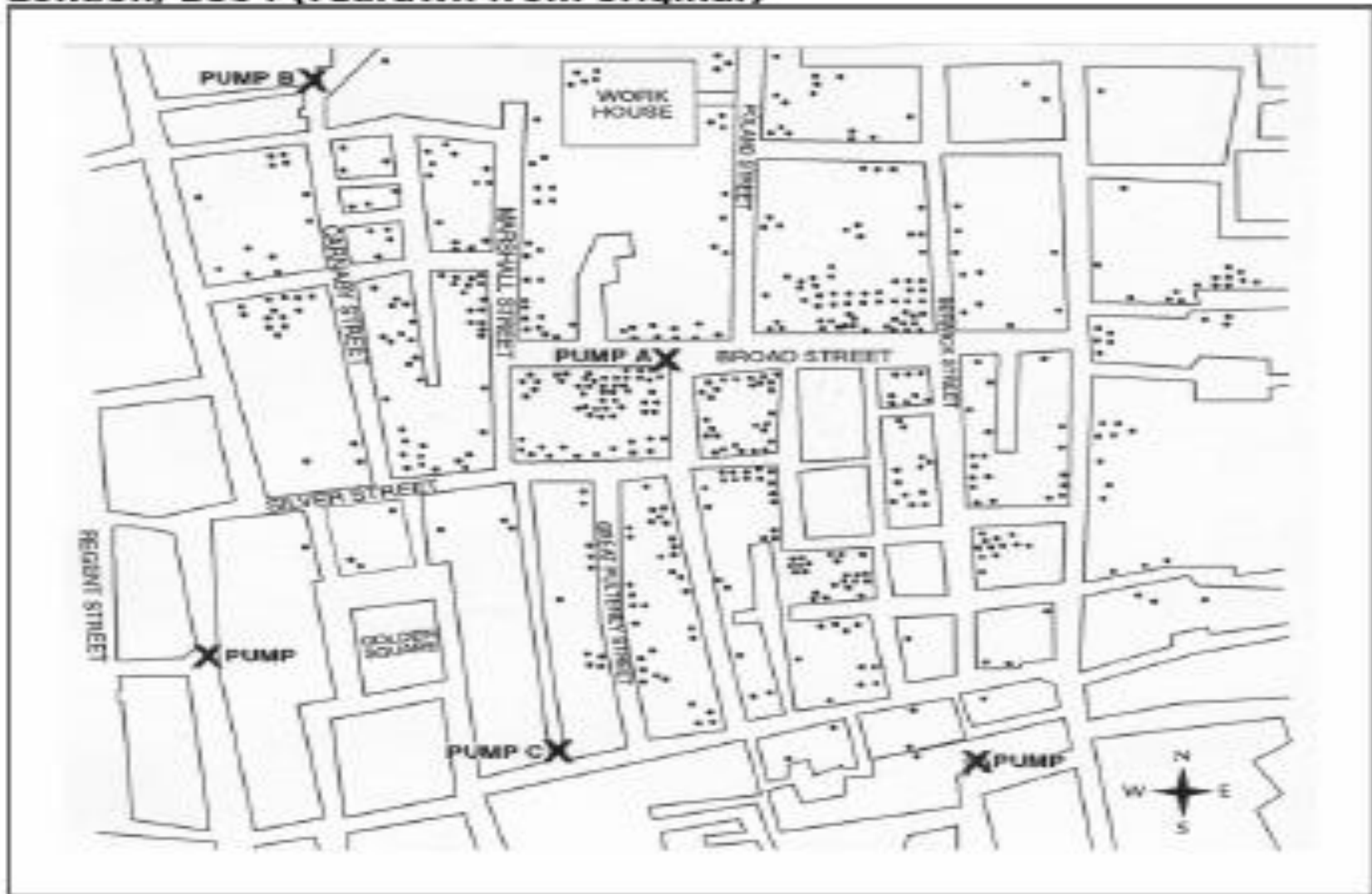
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- He performed epidemiological investigation of cholera outbreak (1848-1854 AD) to discover the cause of disease and to prevent recurrence.
- He sketched the spot map and pointed out the sources of drinking water to illustrate the outbreak and the area affected by cholera epidemic.



Spot map

Figure 1.1 Spot map of deaths from cholera in Golden Square area, London, 1854 (redrawn from original)



Source: Snow J. Snow on cholera. London: Humphrey Milford; Oxford University Press; 1936.

Contd..

- The source of infection for the cholera was suspected to be polluted water.
- He made an explanation on the basis of characteristics in terms of time, place and person.
- Then he tried to test it by applying more comprehensive studies.

Drinking Water supplied by two company.

The mortality rates were high among people supplied by the Southwark company (Southwark Population-6,54,884 **Death-167** and Lambeth poulation **19,133 and Death-18**)

5. William Farr, 1800s

- **William Farr** built upon the Graunt's works by systematically collecting and analyzing the mortality statistics in Britain
Concentrated on collection, analysis and evaluation of data on Vital statistics and disease classification.

6. 19th and 20th century

- During mid and late 1800s many other European and United States sphere countries began to apply the epidemiological methods for the study of chronic diseases and others non infectious diseases among the human population.

Contd...

- In USA, **Winslow** and **Sedgwick** taught epidemiology in the early 1920s, although the subject was not given departmental status in medical colleges.
- **In 1927 W.H. Frost** became the first professor of epidemiology in USA. Then after epidemiology has been evolved as a subject matter of study in medical colleges.

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- Study by **Doll and Hill (1950s)**, linking to smoking and cancer and study of cardiovascular diseases among the residents of Framingham, Massachusetts are two pioneering researches since World War II.

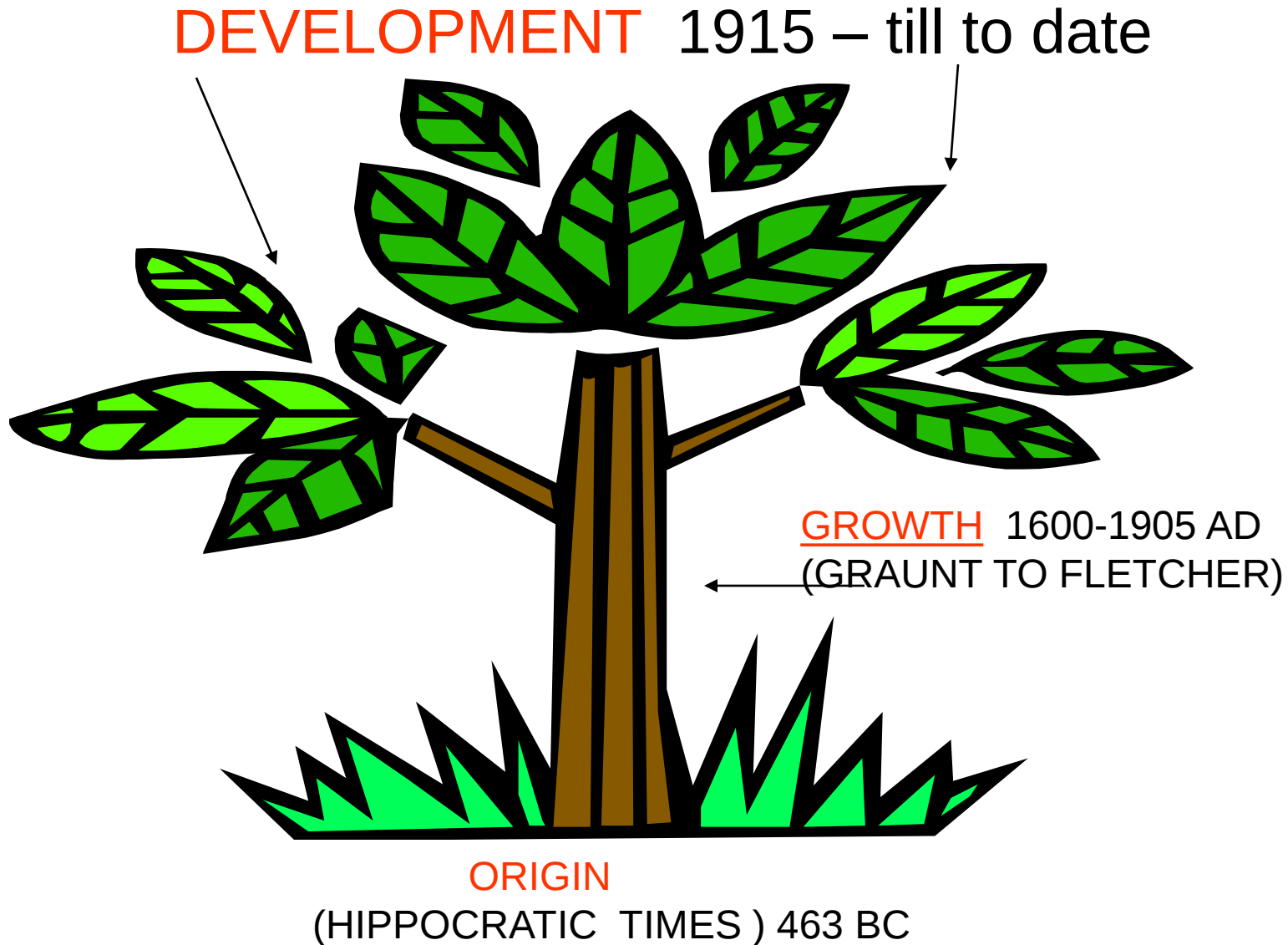
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- Finally, the epidemiological methods and principles were applied for the eradication of smallpox during 1960s and 1970s.

Contd...

- Epidemiology has been evolved rapidly during past three decades, with its many ramifications which cover the study of diseases and other health and health related events by identifying etiology / risk factors of chronic diseases, formulating and evaluating treatment modalities.

Epidemiology Tree



Epidemiology: Historical Evolution

Epidemic of infectious disease



Infectious diseases in human population



All diseases



Diseases and health related events



Diseases, health related events and systems

Epidemiology Tree

- Has taken roots in Hippocratic times.
- Started growing in 17th century. (John Graunt)
- Remain silence in next two centuries due to microbial era domination.
- Developed and blossomed in 20th & 21st centuries. (Mack Mohan, John M last.....)

Achievements of Epidemiology

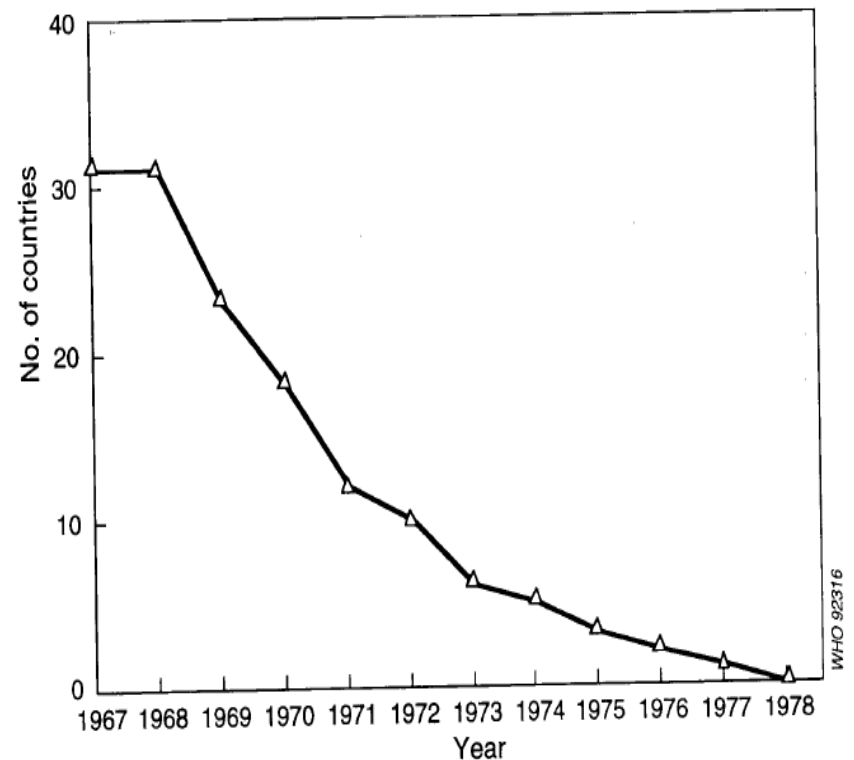
Achievements of Epidemiology

1. Small pox eradication from the world in 1980

success in Smallpox eradication is due to:

- Universal political commitment
- Defined goal
- Precise timetable
- Well-trained staff
- Flexible strategy
- Known epidemiology
- Effective vaccine

Number of countries with smallpox, 1967–1978



Contd...

2. Methyl Mercury Poisoning in Minamata, Japan 1850

- Identified the cause and control of epidemic of poisoning

In the 1850s, mercury compounds were released with the water discharged from a factory in Minamata, Japan, into a small bay. This led to accumulation of methyl mercury in fish, causing severe poisoning in people who ate them and it was observed that 121 patients whose main occupation was fishing and whose diet consisted mainly of fish.

3. Iodine Deficiency Disorder

Iodine deficiency which shows occurs in certain mountainous regions causes loss of mental and physical energy associated with inadequate production of iodine containing thyroid hormone.

Epidemiology identified the causes of iodine deficiency and suggested the methods of prevention and control of its deficiency; preventing its consequences. As a successful result of trial of iodized salt, the universal iodization of salt was introduced in various countries including in Nepal.

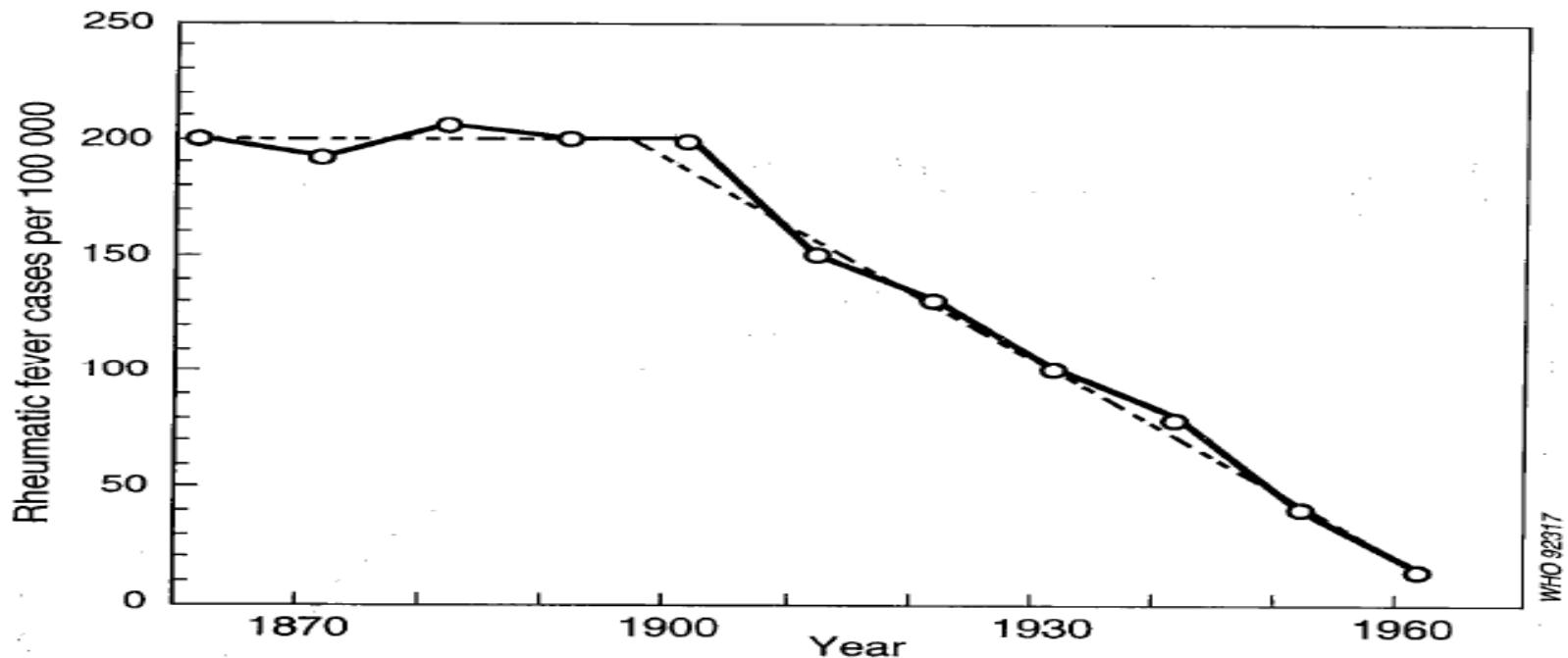
4. Study of Hip Fracture

- Injuries related to falls, in particular fracture of the neck of the femur in elderly have attracted a great deal of attention in recent years because of the implication for the health service needs of geriatric population.
- It has been counted that of all injuries, hip fracture captures a large number of cases and longer hospital stay. Fractures in elderly are associated with falling and the ability of the bone to withstand trauma.
- Epidemiology has contributed by providing magnitude and its health consequences among elderly population.

5. Rheumatic Fever and Rheumatic Heart disease

- a. Identified the relationship of Rheumatic fever with poverty and overcrowding
- b. Recommended the prevention, control and management

Reported rheumatic fever occurrence in Denmark, 1862–1962



6. Study of High Blood Pressure

Proportion of US white males aged 65–74 years with raised blood pressure according to criteria for hypertension

Blood pressure (systolic/diastolic) (mm Hg)*	Percentage of population
$\geq 140/90$	53
$\geq 160/95$	24
$\geq 170/95$	17

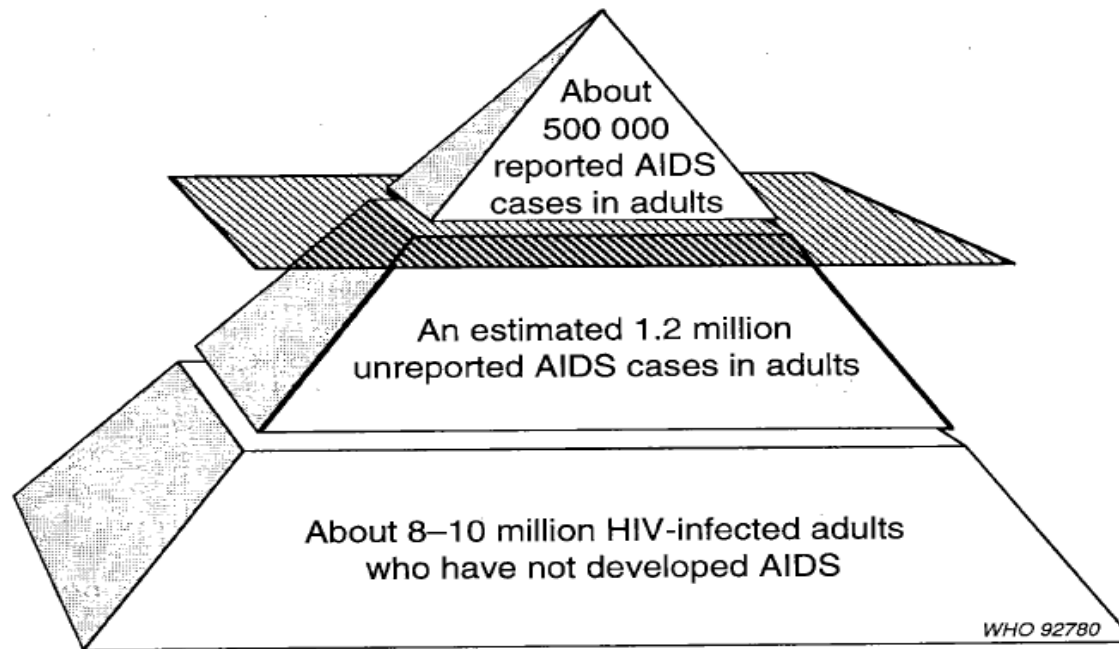
7. Smoking, Asbestos and Lung Cancer

**Age-standardized lung cancer death rates
(per 100 000 population) in relation to cigarette
smoking and occupational exposure to
asbestos dust**

Exposure to asbestos	History of cigarette smoking	Lung cancer death rate per 100 000
No	No	11
Yes	No	58
No	Yes	123
Yes	Yes	602

8. Study of HIV/AIDS

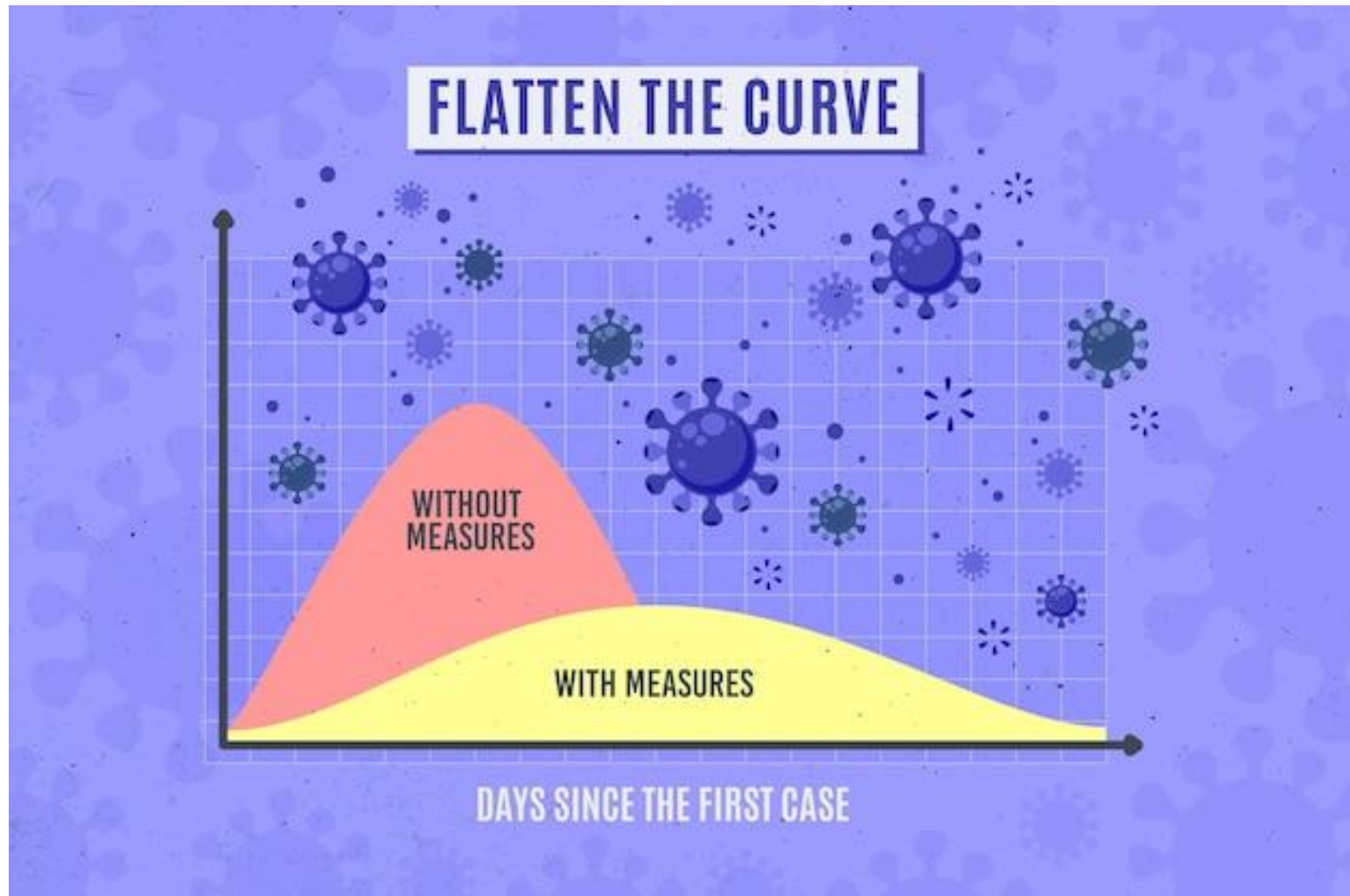
AIDS: the hidden epidemic



9. SARS

- SARS first appears in November in southern China with two patients with atypical pneumonia of unknown cause. The spread facilitated by air travel of high infectious people. Because of this 8000 cases and approximately 900 deaths in 12 countries.
- Deaths rates were lower in places where SARC was acquired in the community and higher in hospital.

10. COVID-19



Aims of epidemiology

Aims of epidemiology

Epidemiology has three main aims- IEA (International Epidemiological Association)

- To describe the distribution and size of problem in the specified human population
- To identify the etiological factors in the pathogenesis of disease
- To provide the data essential for planning, implementation and evaluation of health services for the prevention, control and treatment of disease to the setting of priorities among those services

The ultimate aim of epidemiology is to
eliminate or reduce the health problem and to
promote health and well being of society.

Principles/Tenets of epidemiology

- **Fundamental points to be followed in epidemiology are as follows**
 - The target of the study in epidemiology is human population
 - All findings in epidemiology must be related to defined population
 - Conclusions are based on comparison
 - There are six WH questions namely
 - When did it happen? -----Time
 - Where did it happen----- Place
 - Who are affected ----- Person

Scope of Epidemiology

- The accurate definition and determinants of health are not clear yet.
- Definition and dimensions of health are illusive.
- The study of epidemiology is not only concerned with death, illness and disability but also extended to other health and health related aspects too.
- It looks forward for the positive state of health

Therefore, scope of the epidemiology following ways- three utilitarian terms

A. As planning tools

1. Assess the problems in population
2. Trend of the problems
3. Compare the problems
4. Design interventions

B. As management tool

1. Evaluate programs
 - monitor the progress
 - output assessment
 - impact assessment
2. Surveillance of disease
3. Investigation of outbreak

Contd.....

C. As advocacy tool

- 1.policy advocacy
- 2.intervention choices

Application/Uses of epidemiology

Application/Uses of epidemiology

1. Natural history of disease

- Epidemiology studies the trends of a disease and predicts the disease trends. The results of epidemiological studies are useful in planning for health programs and services.

2. Community diagnosis

- Epidemiology determines the diseases, conditions, injuries, disorders, disabilities, and defects causing illness, health problems or deaths in a community or regions.

3. Risk factors of the diseases

- Epidemiology looks the risk factors of the diseases, problems, behaviors of the affected groups. Groups are studied through assessments of risks and health appraisal approaches. E.g. health risk, appraisal, health screening, medical exams, disease assessment.

Contd...

4. Assessment, evaluation and research

- Epidemiology also assesses the impact of the health programs/services to meet the goal and objectives (meeting the problems of the populations).
- It helps on effectiveness, efficacy, quality, quantity, access, and availability of services to treat, control, or prevent diseases. It also studies the injury, disability or death in the population or sub group of population.

Contd...

5. Completing the clinical picture

- Identification or diagnostic processes to establish that conditions exist or that a person has a specific disease or ill- health condition.
- It also studies the cause –effect relationships. E.g. sore throat can cause the rheumatic disease.

Contd..

6. Identification of syndromes

- Epidemiology helps to establish and set criteria to define syndromes. E.g. sudden death in infants, fetal alcohol etc.

contd,...

7. Determining the cause and effect, source of disease.

- Epidemiological findings allow for the control, prevention, eradication and elimination of the causes of disease, conditions, injury, disability or death.

8. Design planning programs, implement, evaluate the program and develop control measures

- The systematic use of epidemiological principles and methods for the planning and evaluating of health services is relatively new development.
- Health services planning are a process of identifying key objectives and choosing among alternative means of achieving them. Thus it helps to control the disease or health related events in the population.

Modern Epidemiology and its ramifications

- The concept of modern epidemiology was started with the **search of non communicable diseases** and expanding its horizon towards different ramifications.
- The recent development in epidemiology can be illustrated by the work of **Doll, Hill and others** who studied the **relationship between cigarette smoking and lungs** cancer during 1950s.
- This study led the linkage of **clinical observation** to the **epidemiological interest** in chronic diseases.

Contd.....

- It was identified that the **numbers of factors might contribute** to develop the number of conditions/diseases.
- In modern context, modern epidemiology deals with, in addition to the infectious diseases, chronic diseases and other health related states that is not a medical condition but can give rise to health consequences.

Contd.....

Epidemiology has multiple branches and such branches deals with their specific causes and the relationships.

Some branches can be listed below:

- Nutritional epidemiology
- Social epidemiology
- Genetic epidemiology
- Infectious disease epidemiology
- Clinical epidemiology
- Spatial (geographical) epidemiology
- Statistical epidemiology
- Early life epidemiology
- Non communicable and communicable disease epidemiology
- Reproductive epidemiology
- Health system/health service
- Epidemiology of Road traffic accident
- Drug use epidemiology

Social Epidemiology

- The term *social epidemiology* refers to the branch of epidemiology that investigates how social interactions and social conditions impact the public's health.
- It focuses particularly on the effects of **social**-structural factors on states of health. **Social epidemiology** assumes that the distribution of advantages and disadvantages in a society reflects the distribution of health and disease.
- Social factors are part of this multicausative explanation, as they play a role in the individual's exposure to disease. Social epidemiologists study socioeconomic status, race, gender, workplace, impact of neighborhood, social networks and support, and a variety of other social factors in an attempt to understand how social conditions affect population health.

Environmental Epidemiology

- Environmental epidemiology is a branch of epidemiology concerned with the discovery of the environmental exposures that contribute to or protect against injuries, illnesses, developmental conditions, disabilities, and deaths; and identification of public health and health care actions to manage the risks associated with harmful exposure.
- Environmental epidemiology studies external factors that affect the incidence, prevalence, and geographic range of health conditions. These factors may be naturally occurring or may be introduced into environments where people live, work, and play.

Nutritional Epidemiology

- Nutritional epidemiology is a sub-discipline of epidemiology and provides specific knowledge to nutritional science.
- It provides data about the diet-disease relationships that is transformed by Public Health Nutrition into the practice of prevention.
- Its specific contributions of nutritional epidemiology include dietary assessment, description of nutritional exposure and statistical modeling of the diet-disease relationship.

Contd....

Nutritional epidemiology is an area of epidemiology that involves research to:

- Examine the role of nutrition in the etiology of disease
- Monitor the nutritional status of populations.
- Develop and evaluate interventions to achieve and maintain healthful eating patterns among populations.

Reproductive Epidemiology

- It is the area of epidemiology concerned with reproduction. Reproduction, which is fundamental to all known life, is the biological process by which organisms produce offspring.
- Reproductive epidemiology is the study of the distribution and determinants of health-related states or events in human population and the application of this study to promote complete physical, mental, and social well-being as they relate to the reproductive system and to its functions and processes.

Contd...

- **Elements of reproductive epidemiology**
 - Family planning
 - Safe-motherhood
 - Infant and children
 - Carcinoma of reproductive tract
 - Safe abortion
 - Adolescents reproductive health
 - HIV/AIDS, SRI and RTIs
 - Infertility
 - Reproductive health needs of disables
 - Male participation and responsibilities

Perinatal epidemiology

- A branch of epidemiology that focuses on diseases and disorders occurring during the perinatal period.
- The perinatal period commences at 22 completed weeks (154 days) of gestation and ends seven completed days after birth.
- Perinatal mortality refers to the number of stillbirths and deaths in the first week of life (early neonatal mortality)

Early Life Epidemiology

- It is **defined** as the study of long term effects on later health or disease risk of physical or social exposures during **gestation, childhood, adolescence, young adulthood and later adult life.**

Epidemiology and its relationship with other disciplines

Epidemiology and its relationship with other disciplines

- Epidemiology overlaps with various other domains that provide their **methods and knowledge to answer epidemiological questions** (asking questions and making comparisons).
- Biomedical, clinical and other related disciplines sometimes claim that **epidemiology belongs to their particular research area**.
- Therefore,
 - Biometricians think of epidemiology as a part of biometry and
 - Physicians define epidemiology as medical science
 - Epidemiology and biometricians think of as a part of biometry

Contd....

- Biometricians have in mind that epidemiology uses **statistical methods to investigate the distribution of health-related** entities in populations.
 - This perspective on distributions of events is statistics by its very nature.
 - Physicians view epidemiology primarily from a substantive angle on diseases and their treatment.

Epidemiology and its relationship with other disciplines

For example,

- Epidemiologist uses scales developed by psychologists to assess subjective well-being and psychological effects of medical treatments in addition to classical clinical outcome parameters.
- Social sciences provide indicators and methods of field work that are useful in describing social inequality in health, in investigating social determinants of health, and in designing population-based prevention strategies.
- Methods and approaches from demography that are used to provide health reports, from population genetics to identify hereditary factors, and from molecular biology to search for precursors of diseases and factors of susceptibility.

Contd....

- Epidemiology does not only borrow methods from other sciences but has also **its own core methodologies.**
- This pertains in particular to the development and adaptation of **study designs.**
- In most cases, statistics can **directly be applied to epidemiological data, but sometimes peculiarities in the data structure may call for the derivation of special methods** to cope with these requirements.

Relationship of epidemiology and public health

- Public Health is the planning, carrying out and evaluation of health measures and system services that both maintain and improve the health of a population group by preventing and controlling diseases within population groups.

Contd...

- Public Health in its present form is a combination of different disciplines of sciences like: epidemiology, medicine science, health education, social sciences, etc.
- These carry some public health function or provide base for public health services.

Contd..

- Epidemiology is a basic science of public health as it measures events and conditions pertaining to health.
- Events are measured in terms of rate, ratio and proportion and these information are translated into policy events.

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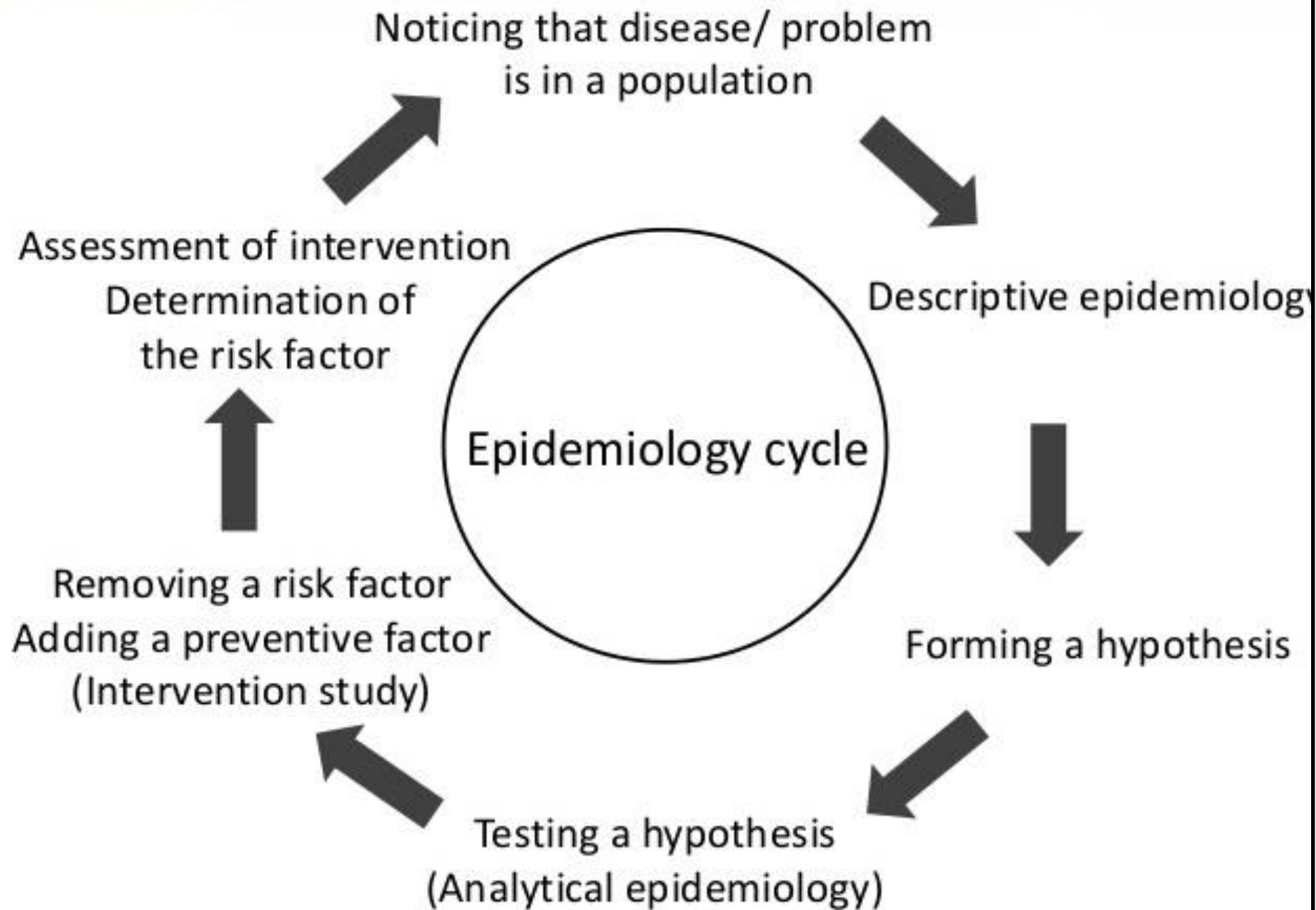
- The practice of public health is based on scientific knowledge of factors influencing health and disease: epidemiology.
- Epidemiology is “the core science of public health and preventive medicine” that is **complemented by biostatistics** and “knowledge and strategies derived from **biological, physical, social, and demographic sciences**”.

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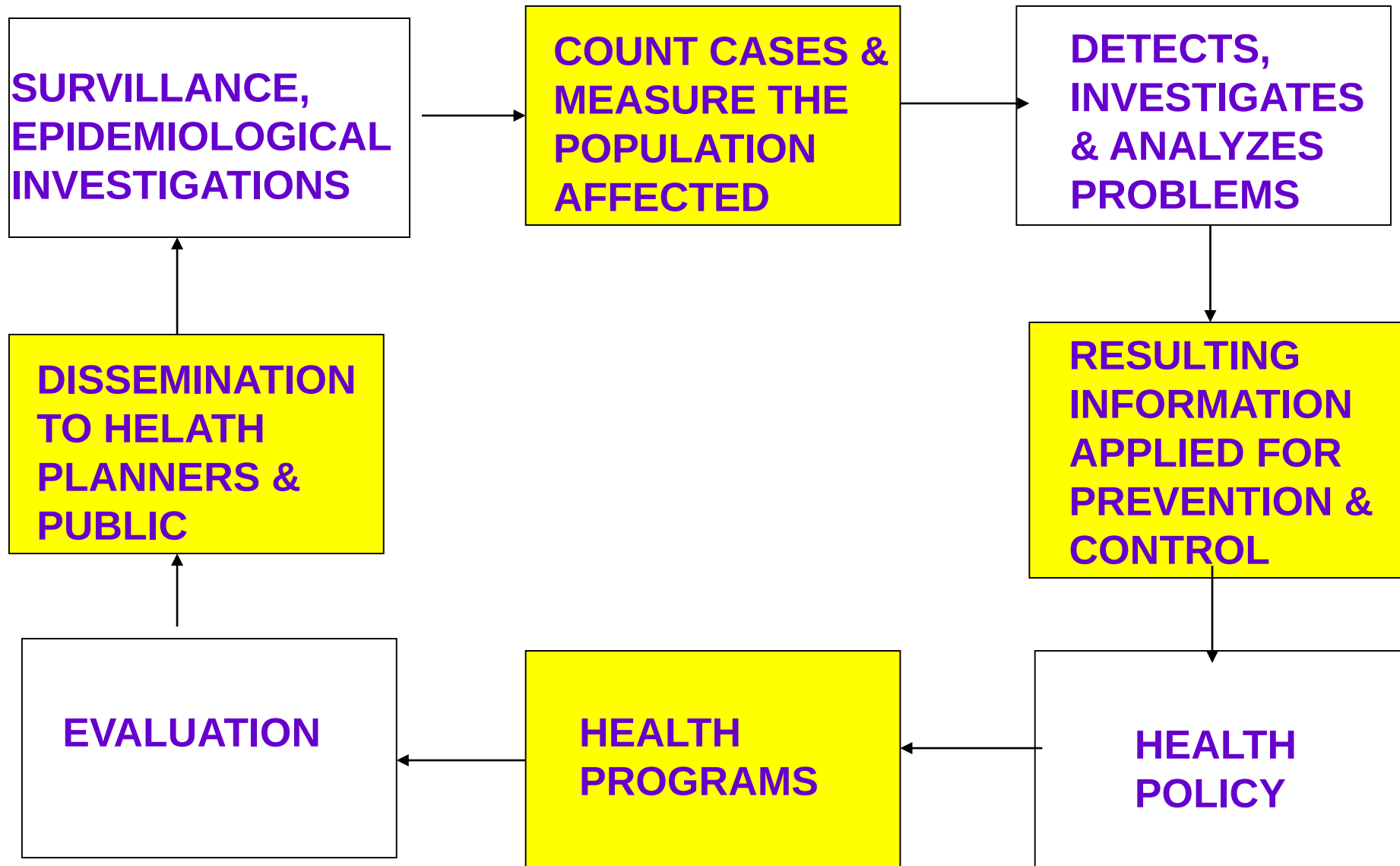
- In conclusion, epidemiology cannot be reduced to a sub-division of one of the contributing sciences but it should be considered as a multidisciplinary science giving input to the applied field of public health.

Epidemiologic functions in public health

- The **functions of public health** include:
Investigation of disease outbreaks, epidemics and risk to health.
- Establishing, **designing and managing health promotion and disease prevention programmes.**
- Enabling and empowering communities to **promote health and reduce inequalities.**



LANGMUIR ON EPIDEMIOLOGICAL PRACTICE



Major Epidemiological Functions in Public Health

1. Public health surveillance
2. Field investigation
3. Screening
4. Community Health Assessment
5. Analytic studies
6. Targeting the intervention programs
7. Evaluation
8. Policy development

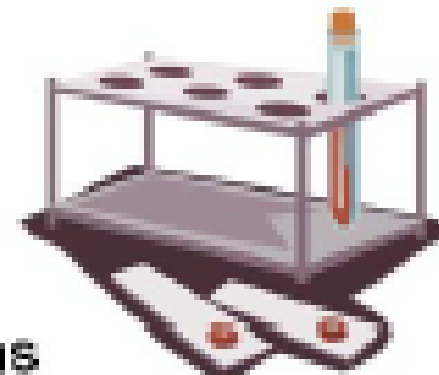
Epidemiologic functions in public health



- Descriptive and analytic epidemiology are used by epidemiologists.
- A variety of public health activities use epidemiologic principles and tools.



- Surveillance
- Disease investigation
- Community health assessment
- Screening
- Targeting intervention programs
- Evaluation of intervention programs



Public Health Surveillance



Ongoing, systematic

- Collection
 - Collecting health information routinely
- Analysis
 - Analyzing that information routinely
- Interpretation
- Dissemination of data
 - Communicating conclusions to the public



About a health-related event for use in public health action to reduce morbidity (disease) and mortality (illness) and to improve health.

—Centers for Disease Control and Prevention



For more information on this topic, see the NYC PHP [Introduction to Public Health Surveillance](#) online module.

Disease Investigation



Goals of a disease outbreak investigation:

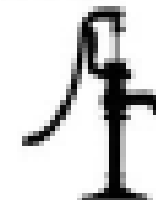
- Identify the source of illness
- Guide public health intervention

Outbreak recognition mechanisms:

- Routine surveillance activities
- Reports from clinicians, laboratories, individuals

Outbreak investigation methods:

- Descriptive epidemiology
- Analytic epidemiology



Source



- Houses with ill people



Community Health Assessment



- One of the three core public health functions

Assurance, policy development, and assessment

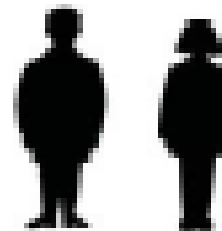
- Systematic process that periodically provides pertinent information to assess the health of a community

Who are we?

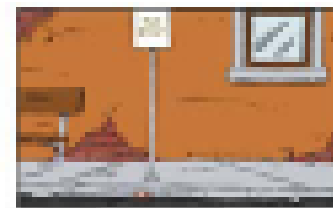
How healthy are we?

How healthy are our lifestyles and behaviors?

How healthy is our environment?



- Relies on local and regional knowledge to be effective



- Creates products for public and policy makers



Screening



Screening is the examination of *asymptomatic* people in order to classify them as likely, or unlikely, to have the disease that is the object of screening.

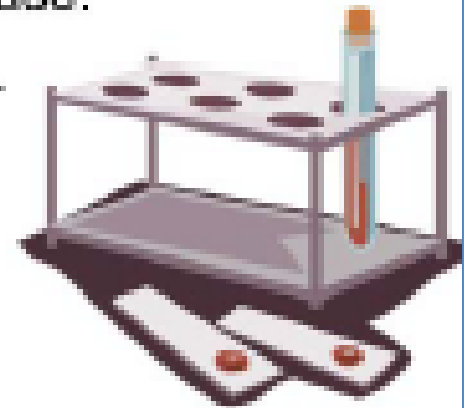
- Not the same as diagnosis

Screening is used when:

- The disease is an important public health problem.
- There is an asymptomatic stage of the disease.
- Treatment is more effective if initiated early.
- A suitable screening test is available.

Epidemiologists measure:

- The accuracy of screening tests
- The effectiveness of screening programs



Intervention Programs



Targeted interventions

- Public health actions aimed at groups with higher risk, with the goal of improving specific health outcomes
- Choice of target group based on assessment of condition.
 - What is the distribution within the specific population?
 - What are the determinants?
 - What interventions can affect the determinants?

Interventions are targeted to make best use of resources for greatest impact.

- SIDS prevention might target:
 - Groups at high risk
 - Older women who have other children



Public Health Program Evaluation



A systematic way to collect information about the characteristics, activities, and results of a program in order to make decisions about the program

Is the program making a difference?

Purpose of public health program evaluation

- Accountability to public and others
- Communication about what you do
- Documentation of program's progress
- Measurement of program's results



Epidemiologic approach to public health action

SURVEILLANCE

- Detect outbreaks & threats
- Find cases for intervention
- Monitor trends
- Direct interventions
- Evaluate interventions
- Generate hypotheses

DESCRIPTIVE

- What (case definition)
- Who (person)
- Where (place)
- When (time)
- How many (measures)

ANALYTIC

- Why (Causes)
- How (Causes)

MEASURES

- Count
- Time
- Rate
- Risk/Odds
- Prevalence

STUDY DESIGN

- Design
- Implementation
- Analysis
- Interpretation
- Reporting

THREATS TO VALIDITY

- Chance
- Bias
- Confounding

INFERENCES

- Epidemiologic
- Causal

ACTION

- Clinical
- Behavioral
- Community
- Environmental

Practice of epidemiology in public health

- Epidemiology is often described as the cornerstone science in public health.
 - To discover the agent, host, and environmental factors that affect health to provide the scientific basis for the prevention of disease and injury and the promotion of health;
 - To determine the relative importance of causes of illness, disability, and death to establish priorities for research and action;
 - To identify those sections of the population that have the greatest risk from specific causes of ill health so that the indicated action may be directed appropriately; and
 - To evaluate the effectiveness of health programs and services in improving the health of the population.

Contd....

- **In conclusion,** Epidemiology in public health practice uses study design and analyses to identify causes in an outbreak situation, guides interventions to improve population health, and evaluates programs and policies.

Thank You