



มหาวิทยาลัยราชภัฏนครปฐม
Nakhon Pathom Rajabhat University

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CHAPTER 1

Concept Principle and Scope of Epidemiology

แนวคิด หลักการ และ ขอบเขตของระบาดวิทยา

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CHAPTER OBJECTIVES

At the end of the chapter learners should be able to

1

Explain the definition of epidemiology

2

Explain the concepts or principles of epidemiology

3

Summarize the historical evolution of epidemiology

4

Specify the scope of epidemiology





What is epidemiology?

The word **“epidemiology”** comes from the Greek words:

epi	meaning	on or upon,
demos	meaning	people,
logos	meaning	the study of,



What is epidemiology?



DEFINITION ...1...

Epidemiology is a branch of medicine that is concerned with the occurrence, distribution, and control of epidemic diseases.

[Source: <https://www.collinsdictionary.com/dictionary/english/epidemiology>,
January 2022]



What is epidemiology?

DEFINITION ...2...

Epidemiology is the study of the distribution and determinants of infectious or chronic diseases.

เครือข่ายระหว่างประเทศด้านนโยบายทางระบาดวิทยา

The International Network for Epidemiology in Policy (INEP) is a consortium of 24 epidemiological societies based around the globe

[Source: <https://www.apha.org/apha-communities/member-sections/epidemiology>, 22 January, 2022]



What is epidemiology?

DEFINITION ...3...

“The study of the distribution and determinants of health-related states or events in specified populations and the application of this study to control of health problems”
(Porta, 2008; Celentano & Szklo, 2019)

study

distribution

determinants

health-related states or events

specified populations

application

control of health problems

THE IMPORTANT CONCEPTS/PRINCIPLES :

Study (การศึกษา)

- ✓ The foundation of epidemiology is a **scientific of inquiry**.
- ✓ Epidemiology uses a **systematic and unbiased approach** to the collection, analysis, and interpretation of data.
- ✓ Basic epidemiologic methods are careful **observation and use of valid comparison groups** to assess whether what was observed.
- ✓ Epidemiology derived methods from other scientific fields such as Biostatistics and Informatics, with Biologic, Economic, Social, and Behavioral sciences.



THE IMPORTANT CONCEPTS/PRINCIPLES :

Distribution (การกระจาย)

Epidemiology is concerned with the **frequency** and **pattern** of health events in a population:



- ✓ Frequency refers not only to the **number** of health events, but also to the **relationship** of that number to the size of the population.
- ✓ Pattern refers to the occurrence of health-related events by **time**, **place**, and **person**.

THE IMPORTANT CONCEPTS/PRINCIPLES





Determinants (ปัจจัยก่อโรค)

Determinants or potential risk factors are the **causes and other factors** that influence the occurrence of disease and other health-related events.

Different rates of disease differ in their *demographic characteristics, genetic or immunologic make-up, behaviors, environmental exposures.*

THE IMPORTANT CONCEPTS/PRINCIPLES:

Health-related states (ภาวะสุขภาพ) or Events (การเกิดโรค)

- ✓ Health-related states or events may be seen as anything that affects the well-being of a population.
- ✓ Many epidemiologists still use the term **“disease”**
 -  communicable diseases,
 - non-communicable infectious diseases,
 - chronic diseases,
 - injuries, 
 - birth defects,
 - maternal-child health,
 - occupational health, and
 - environmental health

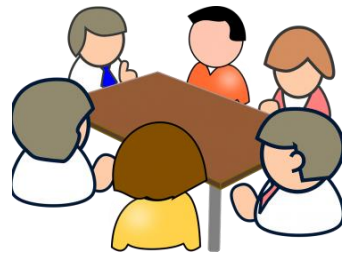
THE IMPORTANT PRINCIPLES :

Specified populations (ประชากรที่ระบุ)



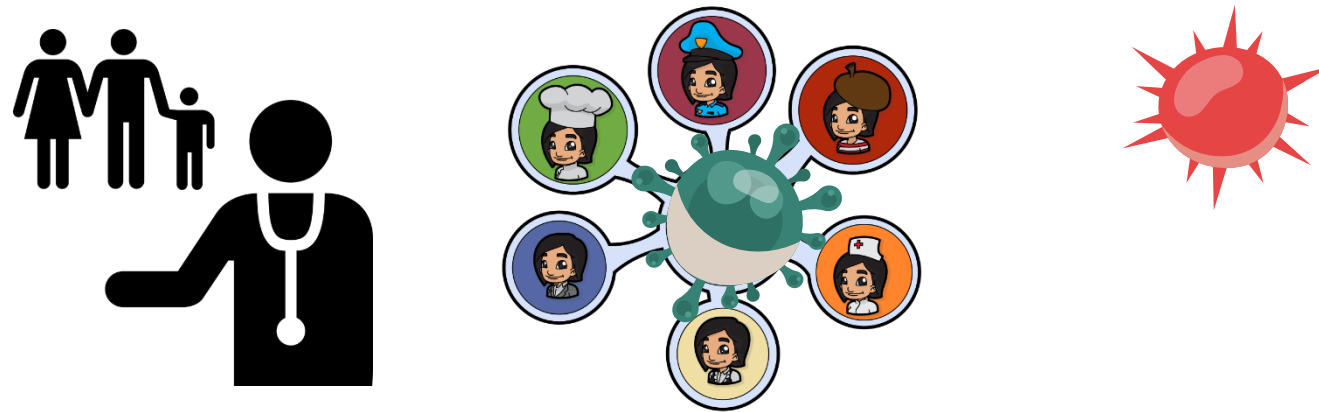
People in a community or population

- ❖ Clinician's "patient" is the individual
- ❖ The epidemiologist's "patient" is the community.



THE IMPORTANT PRINCIPLES : Application (การประยุกต์)

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**.





WATER BREAK



HISTORICAL EVOLUTION OF EPIDEMIOLOGY



- Epidemiologic thinking has been traced from **Hippocrates** through **John Graunt**, **William Farr**, and **John Snow**.

HISTORICAL EVOLUTION OF EPIDEMIOLOGY



Hippocrates: Circa 400 B.C. (ประมาณ 400 ปีก่อนคริสตกาล)

- Hippocrates proposed that disease occurrence from a rational rather than a supernatural viewpoint, “on airs, waters, and places”
- Hippocrates believed that environmental and host factors such as behaviors might influence the development of disease.

HISTORICAL EVOLUTION OF EPIDEMIOLOGY



John Graunt: 1662

- John Graunt, a London haberdasher and councilman (นักธุรกิจและสมาชิกสภาในลอนดอน) published the first landmark analysis of mortality data including quantify patterns of birth, death, and disease occurrence, high infant mortality, noting disparities between males and females (สังเกตความแตกต่างระหว่างชายและหญิง), urban/rural differences, and seasonal variations.

HISTORICAL EVOLUTION OF EPIDEMIOLOGY

William Farr : 1800

- **William Farr considered** the father of modern vital statistics and surveillance (บิดาแห่งการเฝ้าระวังและสถิติชีพสมัยใหม่)
- He built systematically collecting and analyzing Britain's mortality statistics, developed many of the basic practices used today in vital statistics and disease classification.
- He did collecting vital statistics, assembling and evaluating those data, and reporting to responsible health authorities and the general public.

HISTORICAL EVOLUTION OF EPIDEMIOLOGY

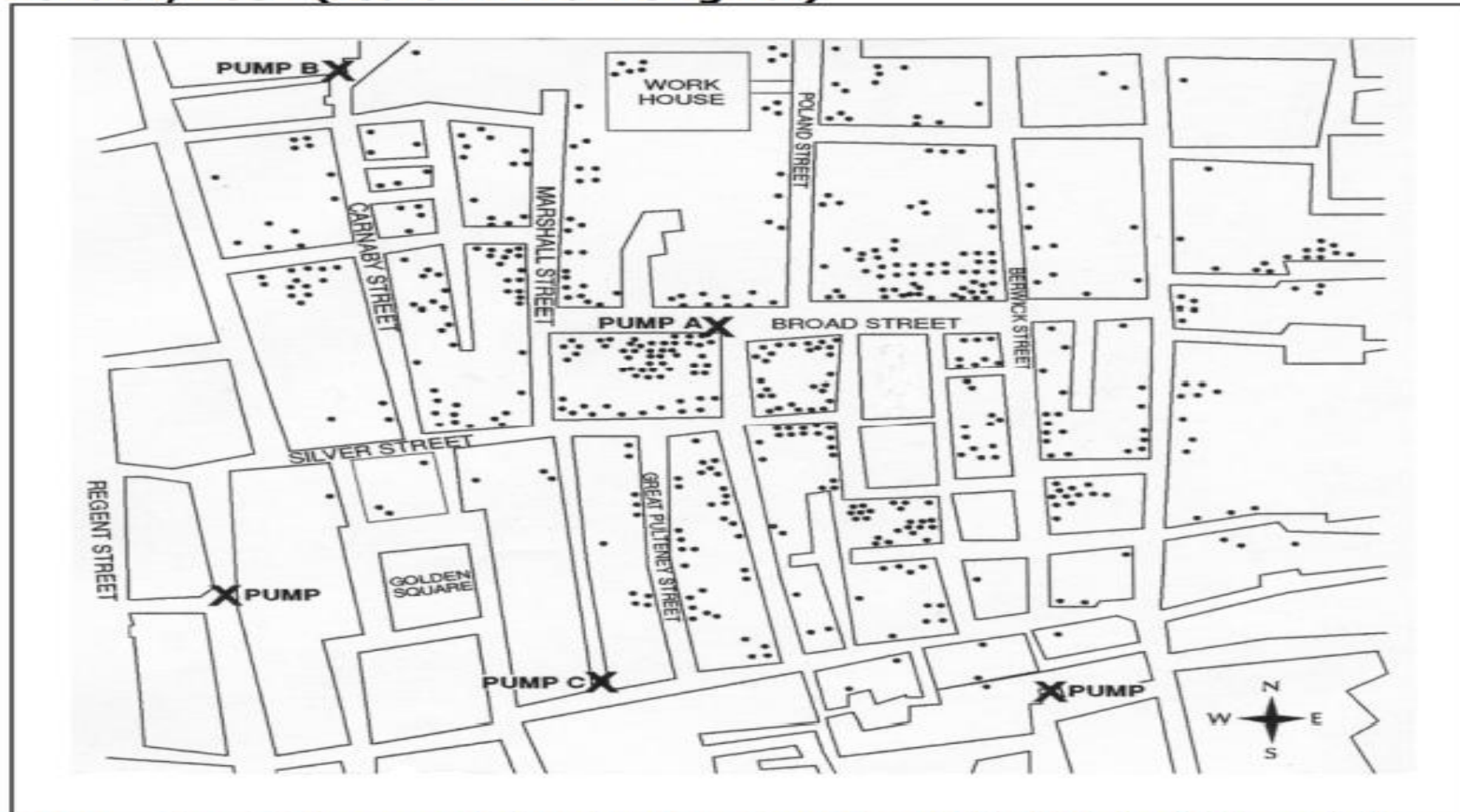


John Snow: 1854

- John Snow, an anesthesiologist and considered the father of field epidemiology (บิดาแห่งระบาดวิทยาภาคสนาม) conducted studies of cholera outbreaks both to discover the cause of disease and to prevent its recurrence.
- His famous studies emerged when an epidemic of cholera erupted in the Golden Square of London by determining where in this area persons with cholera lived and worked. Then marked each residence on a map of the area showing the geographic distribution of cases.
- Today his map is called a **spot map**.
- His work demonstrated the sequence from descriptive epidemiology to hypothesis generation to hypothesis testing (analytic epidemiology) to application.

HISTORICAL EVOLUTION OF EPIDEMIOLOGY

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.

HISTORICAL EVOLUTION OF EPIDEMIOLOGY



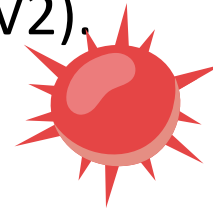
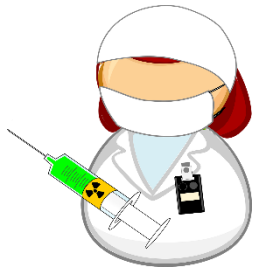
19th and 20th centuries

- In the mid-and late-1800s, epidemiological methods began to be applied in disease occurrence, and most of the investigators focused on acute infectious diseases.
- In the 1930s and 1940s, epidemiologists extended their methods to noninfectious diseases.
- In the 1980s, epidemiology was extended to the studies of injuries and violence.

HISTORICAL EVOLUTION OF EPIDEMIOLOGY

19th and 20th centuries

- In the 1990s, epidemiology was extended to the studies of the related fields of molecular and genetic epidemiology, infectious agents emerged (Ebola virus, Human Immunodeficiency Virus (HIV)/ Acquired Immunodeficiency Syndrome (AIDS) Severe Acute Respiratory Syndrome (SARS), Avian influenza.
- Beginning in the 1990s, after the terrorist attacks of September 11, 2001, epidemiologists have had to consider not only natural transmission of infectious organisms but also deliberate spread through biologic warfare and bioterrorism.
- In December 2019, epidemiologists have to be concerned about the pandemic of COVID-19, an infectious respiratory illness caused by the severe acute respiratory syndrome–coronavirus 2 (SARS-CoV2).





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OBJECTIVES OF EPIDEMIOLOGY

What are the specific objectives
of epidemiology?

to identify the **etiology or cause**, of a disease and its relevant risk factors (factors that increase a person's risk for a disease)

to determine the **extent of disease** found in the community.

to study the **natural history and prognosis** of disease.

[Source: Celentano & Szklo, 2019]





OBJECTIVES OF EPIDEMIOLOGY

What are the specific objectives of epidemiology?

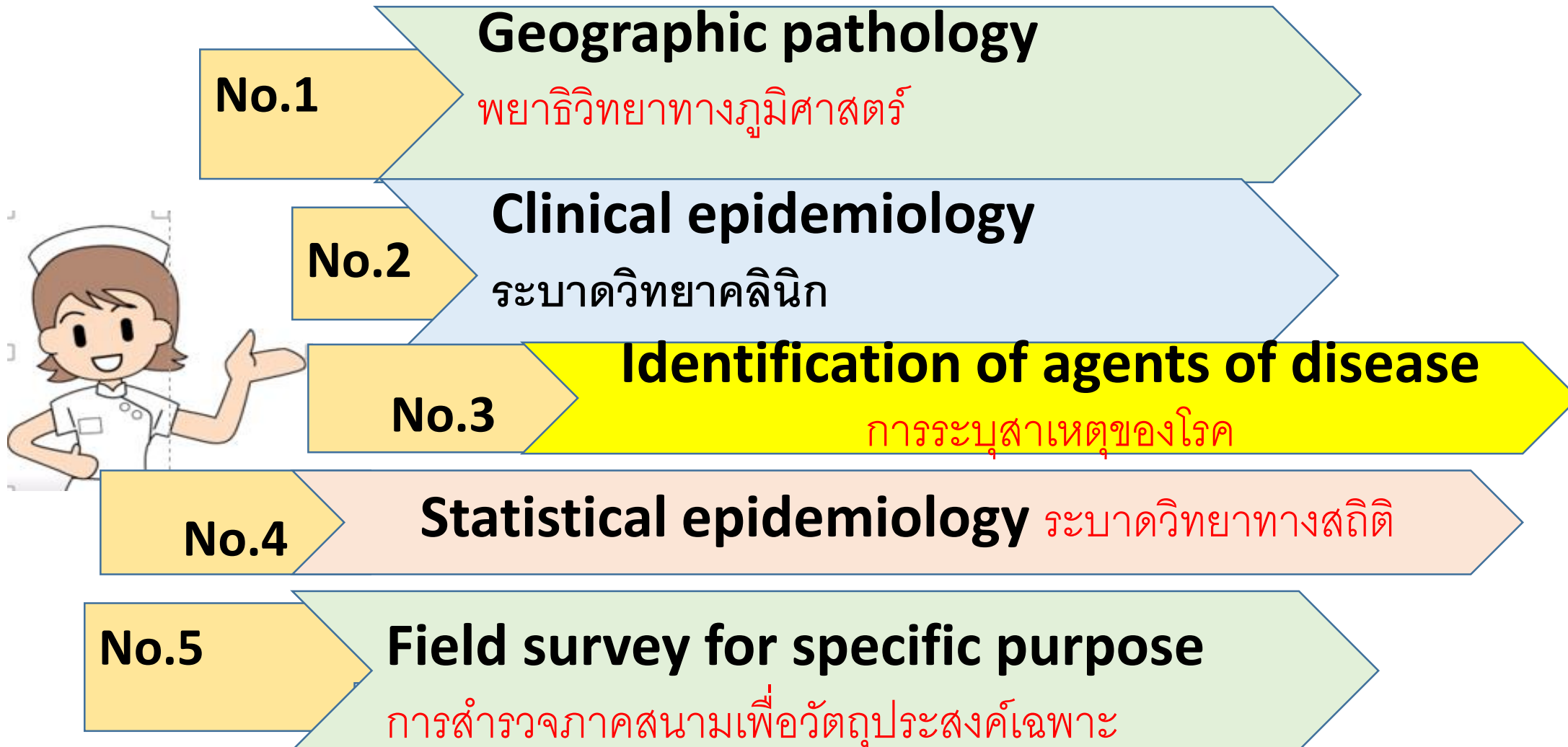
To evaluate both existing and newly developed preventive and therapeutic measures and modes of health care delivery.

To provide the foundation for developing public policy relating to environmental problems, genetic issues, and other social and behavioral considerations regarding disease prevention and health promotion.



[Source: Celentano & Szklo, 2019]

SCOPE OF EPIDEMIOLOGY



SCOPE OF EPIDEMIOLOGY

No.6

Incidence study (Longitudinal study)

การศึกษารูปแบบการเกิด (การศึกษาระยะยาว)

No.7

Experimental epidemiology

ระบาดวิทยาเชิงทดลอง

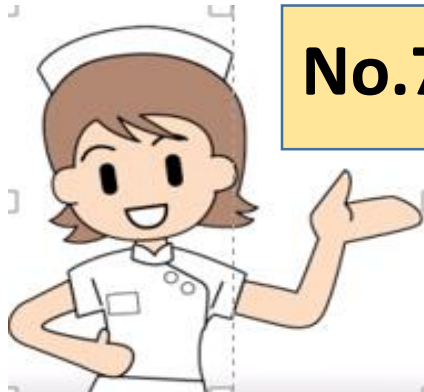
No.8

Tracing reservoirs and source of infection

ติดตามแหล่งกักเก็บและแหล่งที่มาของการติดเชื้อ

No.9

Administration control of disease



ADVANTAGE OF EPIDEMIOLOGY

Epidemiology and the information generated by epidemiologic methods have been used in many ways.

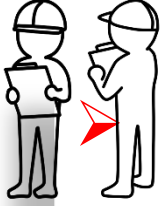
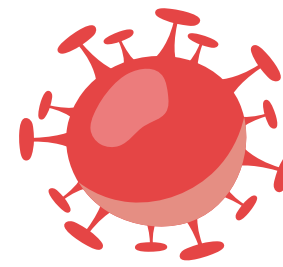
➤ Assessing the community's health

by assess the health of a population or community, relevant sources of data which must be identified and analyzed by person, place, and time

- What are the actual and potential health problems in the community?
- Where are they occurring?
- Which populations are at increased risk?
- Which problems have declined over time?
- Which ones are increasing or have the potential to increase?
- How do these patterns relate to the level and distribution of public health services available?



ADVANTAGE OF EPIDEMIOLOGY



Making individual decisions

Many individuals may not realize that they use epidemiologic information to make daily decisions affecting their health.

➤ Completing the clinical picture

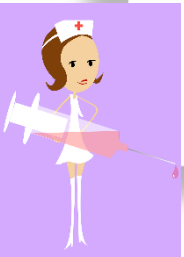
When investigating a disease outbreak, epidemiologists rely on health-care providers and laboratorians to establish the proper diagnosis of individual patients. But epidemiologists also contribute to physicians' understanding of the clinical picture and natural history of disease.



➤ Searching for causes

Much epidemiologic research is devoted to searching for causal factors that influence one's risk of disease.

Epidemiology often provides enough information to support effective action.



SUMMARY

- Epidemiology is the study of the **disease** distribution in populations and the factors that influence or source of this **distribution**.
- The important concepts/principles of epidemiology are study, distribution, **determinants**, health-related states or events, specified populations, and application.
- Epidemiology's roots are nearly 2500 years old, Since Hippocrates through John Graunt, William Farr, John Snow, and current epidemiologist, all of those that provide a lot of valuable knowledge for implementation.



Thank you



Ask & Questions

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