

## Faculty Development Program for IIHMR Group of Institutions

# Epidemic of Diseases: Investigations, Control and Prevention

Date: June 13, 2020



**Dr. S. D. Gupta**  
Chairman  
IIHMR University, Jaipur

Dr. Shiv Dutt Gupta is a leading Public Health professional with a distinguished academic and research career. He obtained his M.D. (Preventive & Social Medicine) from India, and Ph.D. (Epidemiology) from Johns Hopkins University, Baltimore, USA. He was conferred Fellowship of Academy of Medical Science, India (FAMS) for his outstanding contribution in the field of public health. He has done pioneering work of creating and establishing new discipline of health management, and promoting research in health policy and health systems and programmes. Currently Dr Gupta is Trustee Secretary of the Indian Institute of Health Management Research (IIHMR), India, Chairman and Distinguished Professor, IIHMR University, Jaipur. Dr. Gupta served as Director of IIHMR Jaipur for one and a half decade. He became the first President of the IIHMR University in 2014. He served as the Director of WHO Collaborating Centre for District Health Systems at IIHMR facilitating management research and interventions in the health systems to improve efficiency and effectiveness of health care. Dr Gupta is Adjunct Professor at the Johns Hopkins University, USA and Visiting Professor at University of Chester, UK. He is the President of WHO SEARO's South East Asia Public Health Education Network (SEAPHEIN). Dr. Gupta also served as Temporary Advisor to SEARO WHO on several consultation processes. He was member of the Technical Review Panel of the Global Fund. Dr Gupta is member of several research advisory committees of the Indian Council of Medical Research (ICMR) and Chairs Project Review Committee of Department of Health Research, Ministry of Health and Family Welfare, Government of India. He has championed the cause of quality improvement and capacity building in health care in India and South East Asia. Dr. Gupta is the recipient of QIMPRO Gold Standard Award 2009 for quality of Healthcare. Over the past three and a half decades of his distinguished career, he has completed more than 100 research studies and projects supported by various organizations/agencies and have more than 100 research publications to his credit. The areas of research include: public health, epidemiology, health systems and management.

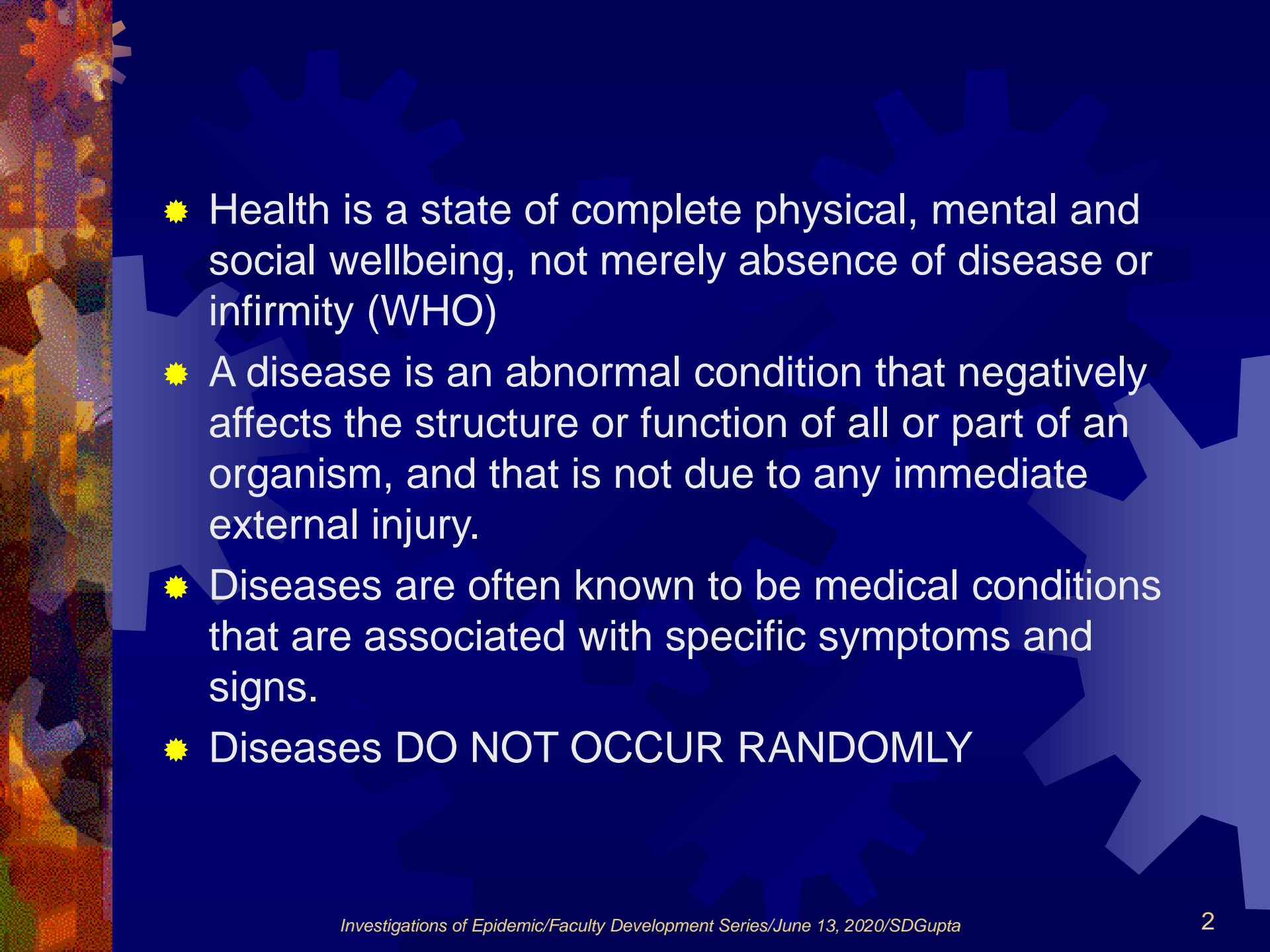


# Epidemic of Diseases: Investigations, Control and Prevention

IIHMR Faculty Development Series

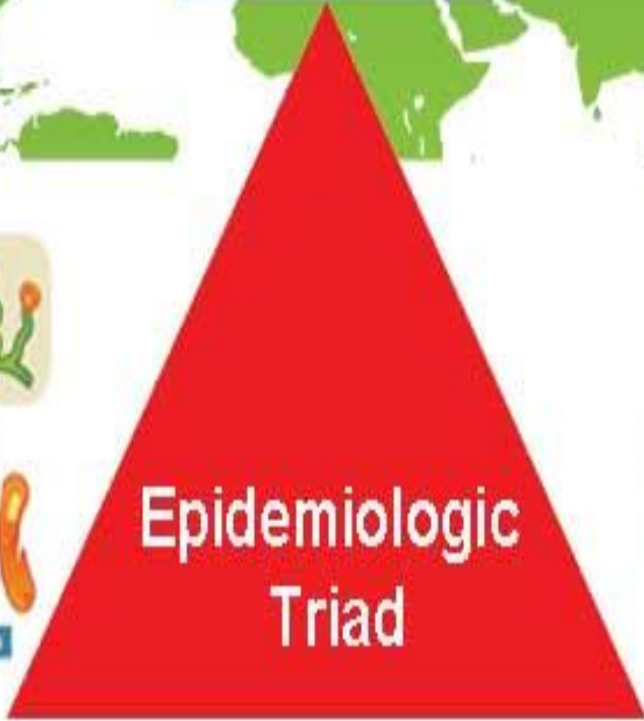
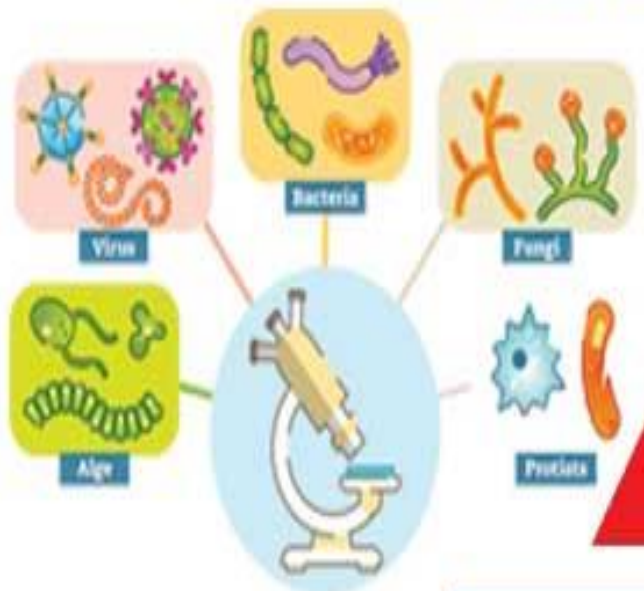
June 13, 2020

Dr S.D. Gupta MD, PhD, FAMS  
Chairman, IIHMR University

- 
- ✦ Health is a state of complete physical, mental and social wellbeing, not merely absence of disease or infirmity (WHO)
  - ✦ A disease is an abnormal condition that negatively affects the structure or function of all or part of an organism, and that is not due to any immediate external injury.
  - ✦ Diseases are often known to be medical conditions that are associated with specific symptoms and signs.
  - ✦ Diseases **DO NOT OCCUR RANDOMLY**



ENVIRONMENT



AGENT

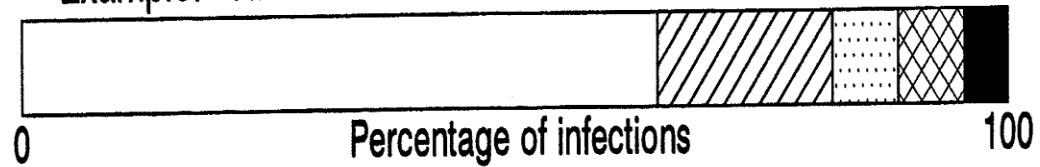
HOST

# Presentation of Disease

- Inapparent/Asymptomatic
- Sub-clinical
- Clinically manifest

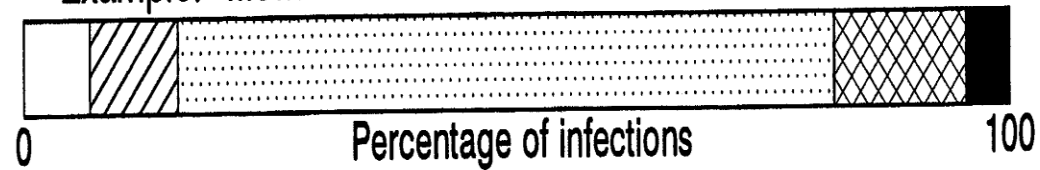
## CLASS A: INAPPARENT INFECTION FREQUENT

Example: Tubercle bacillus



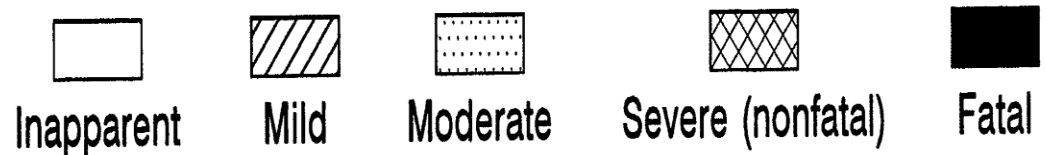
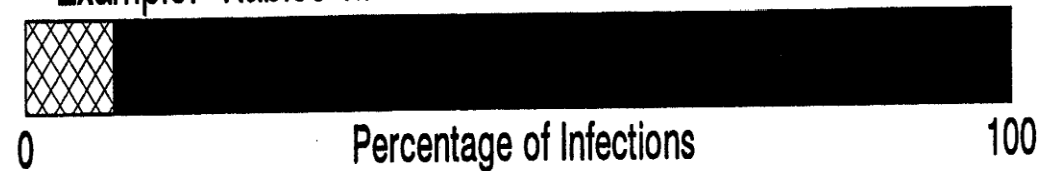
## CLASS B: CLINICAL DISEASE FREQUENT; FEW DEATHS

Example: Measles virus



## CLASS C: INFECTIONS USUALLY FATAL

Example: Rabies virus



# Important Terms

- ✦ Endemic
- ✦ Epidemic
- ✦ Pandemic
- ✦ Incubation Period
- ✦ Herd Immunity

# Successful transmission of disease - Requirements

- ✦ Causative Agent
  - ✦ Portal of exit
  - ✦ Portal of entry
- ✦ Availability of susceptible Host
- ✦ Channels of transmission
- ✦ Survival of causative agent

# Investigations of Epidemics

- ★ How do we know that it is an Epidemic?
- ★ What is the disease?
- ★ What is the possible causative agent?
- ★ What is the source of infection?
- ★ What is (are) channel/mode of transmission?
- ★ *Answers to these questions will decide strategies for prevention and control*



# Decision - Management of Epidemic

		Source/Transmission Mode	
		Known	Unknown
Cause Known	Investigations	+	+++
	Control	+++	+
Cause Unknown	Investigations	+++	+++
	Control	+++	+

# Verification of diagnosis

- ✦ Characterize the disease
- ✦ History
- ✦ Clinical evidence
- ✦ Laboratory investigations
- ✦ Autopsy

# Confirm and Define Epidemic

- ☀ Confirm the existence epidemic
  - How to confirm ?

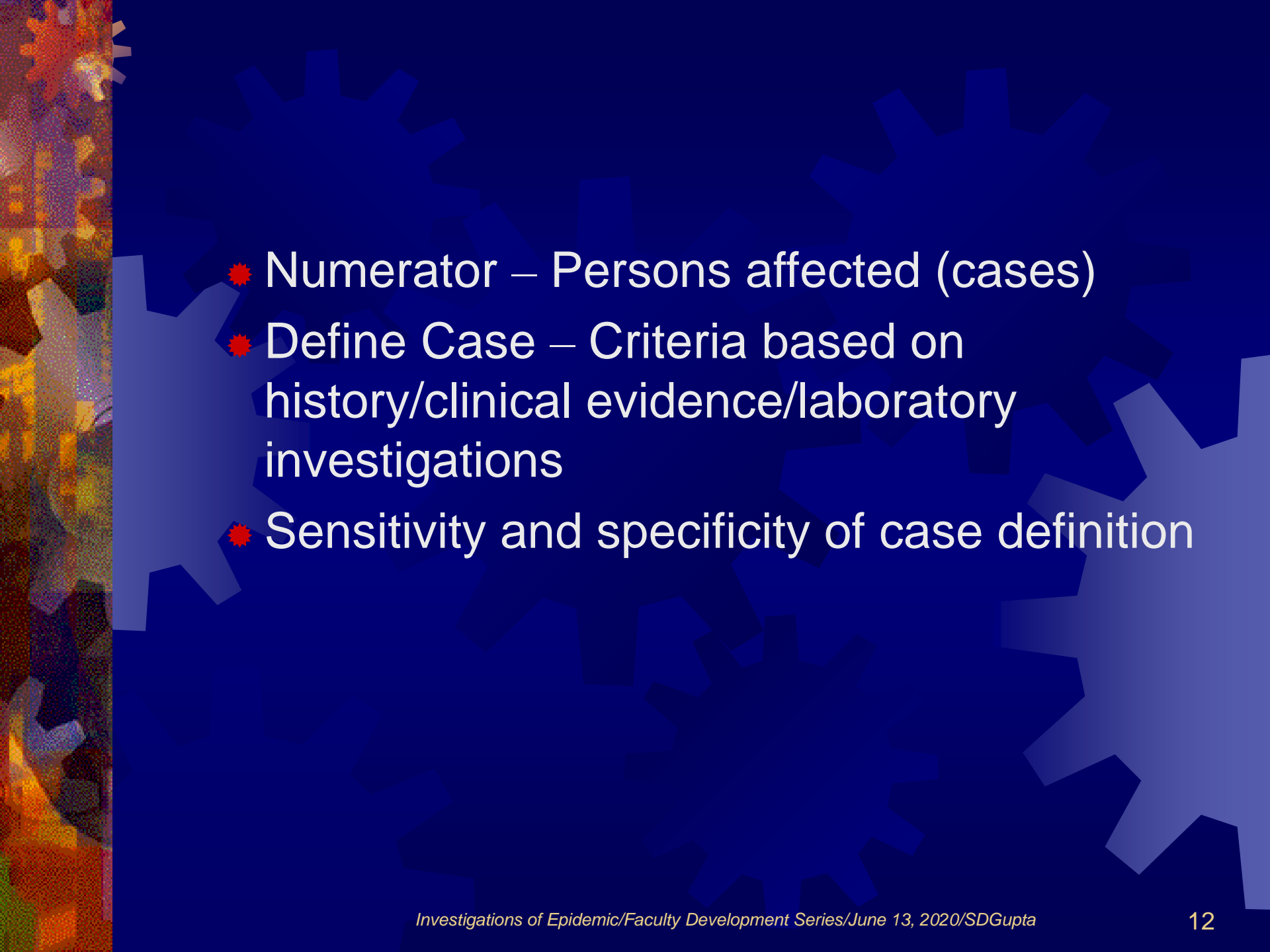
## *Confirm and Define Epidemic.....*

### ☀ Measure disease frequency

### ☀ Attack Rates

- Numerator
- Denominator

- Numerator – Persons affected (cases)
- Define Case – Criteria based on history/clinical evidence/laboratory investigations
- Sensitivity and specificity of case definition

- 
- Numerator – Persons affected (cases)
  - Define Case – Criteria based on history/clinical evidence/laboratory investigations
  - Sensitivity and specificity of case definition



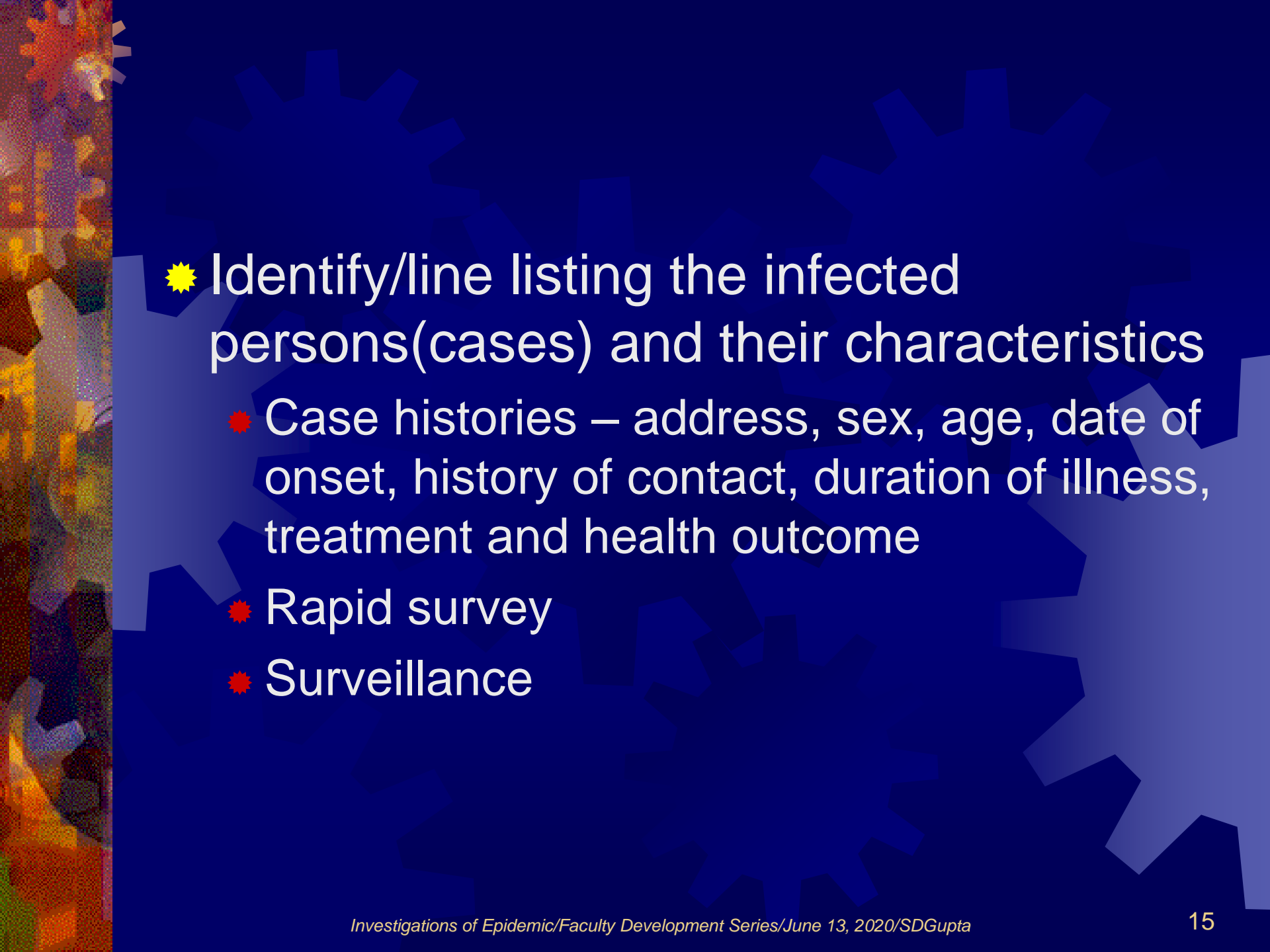
## ☀ Denominator

- ☀ What is the population at Risk

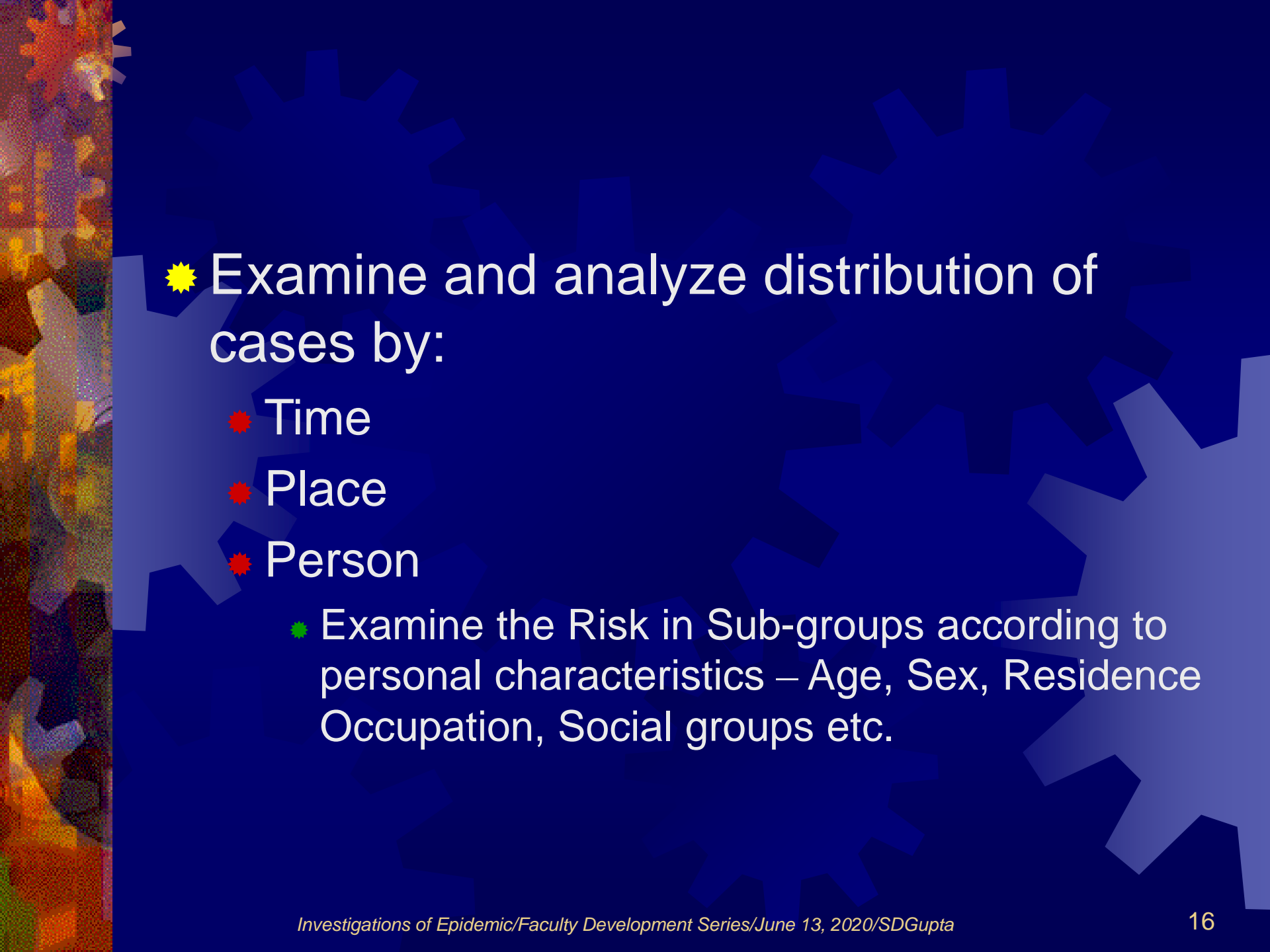


- ★ Make Comparisons between disease frequency

- Same year, during the preceding period (months/weeks)
- Same corresponding time, during preceding years

- 
- ✦ Identify/line listing the infected persons(cases) and their characteristics
    - ✦ Case histories – address, sex, age, date of onset, history of contact, duration of illness, treatment and health outcome
    - ✦ Rapid survey
    - ✦ Surveillance





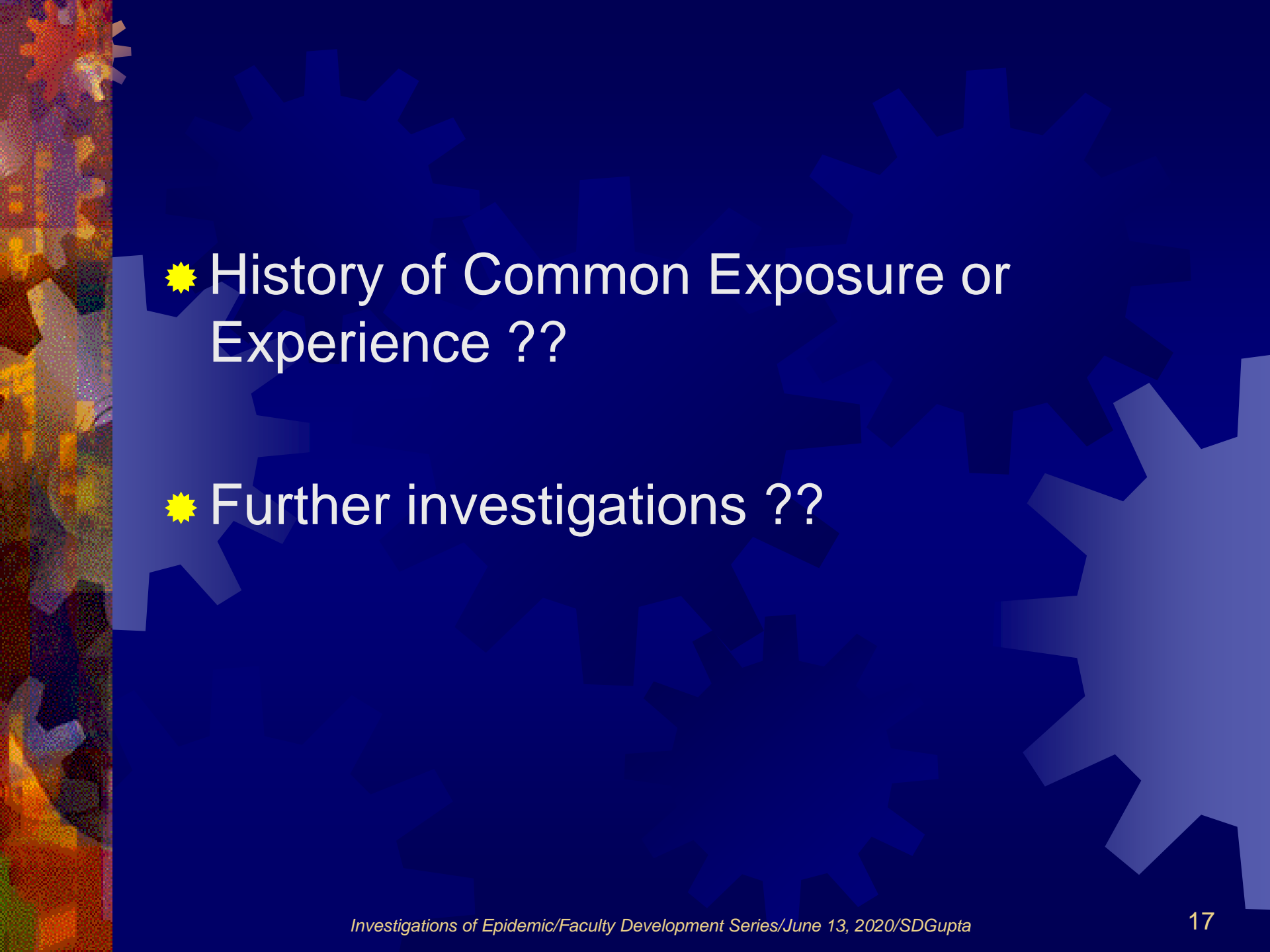
✦ Examine and analyze distribution of cases by:

- ✦ Time

- ✦ Place

- ✦ Person

- ✦ Examine the Risk in Sub-groups according to personal characteristics – Age, Sex, Residence Occupation, Social groups etc.

- 
- ✦ History of Common Exposure or Experience ??
  - ✦ Further investigations ??

The background features a dark blue field with several large, semi-transparent gears of varying shades of blue. On the left side, there is a vertical strip with a colorful, abstract pattern of gears and a bright sun-like icon at the top. The main text is centered in the upper half of the slide.

## ☀ Environmental Conditions ?

- ☀ Rainfall
- ☀ Temperature
- ☀ Humidity
- ☀ Water supply
- ☀ Sanitation
- ☀ Food Hygiene

# Formulate Hypothesis

- ✦ What is the Causative Agent ?
  - ✦ What is the Source/ Reservoir ?
  - ✦ What is the Mode of spread
- 
- Formulate Hypothesis on the basis of existing knowledge
  - Analogy of the diseases of known etiology

# Test Hypothesis

- ✦ Further analyze data (Case Control Study ?)
- ✦ Collect additional information/data

## *Management of Epidemic.....*

- ★ Identify/Detect cases (Testing and Contact tracing)
- ★ Isolation and Treatment of cases
- ★ Containment -Prevention of spread/control measures
- ★ Quarantine of apparently healthy contacts
- ★ Disease Surveillance
- ★ Sero-Surveillance