Epidemiological Approach

- Asking questions
- Making Comparisons

Related to health events

- What is the event?
- What is its magnitude?
- Where did it happen?
- When did it happen?
- Who are affected?
- Why did it happen?

Related to health action

- What can be done to reduce this problem and its consequences?
- How can it be prevented in future?
- What action should be taken? (community, health services, other sectors)
- What resources are required? How are the activities to be organized?
- What difficulties may arise and how might they be overcome?

Making Comparisons

- Two or more groups
- Comparison between individuals
- Comparability
- Randomization
- Matching
- Standardization
- Standardization of definitions, classifications, criteria and nomenclature

Question	Method	Answer
What is the problem	Define the problem and measure	Magnitude of the problem
Where is it occurring	Descriptive study	Place distribution
When did it occur	Descriptive study	Time distribution
Who are affected	Descriptive study	Person distribution
Why did it occur	Hypothesis formation/ analytical/ experimental study	Determinants of disease/ problem

What can be done	Search for modifiable determinants Modify them Find out effect by epidemiological study	Whether the problem is reduced or not

Basic Measurements In Epidemiology

Learning Objectives

At the end of the classroom session on basic measurements used in epidemiology, the students should be able to:

1. Enumerate various tools of measurements in epidemiology
2. Define and describe each one of them in detail
3. Describe the importance of each in terms of applicability and usefulness

Needs For Measurement

1) Quantifying the problems
2) Comparison
3) Effect of intervention
4) Research

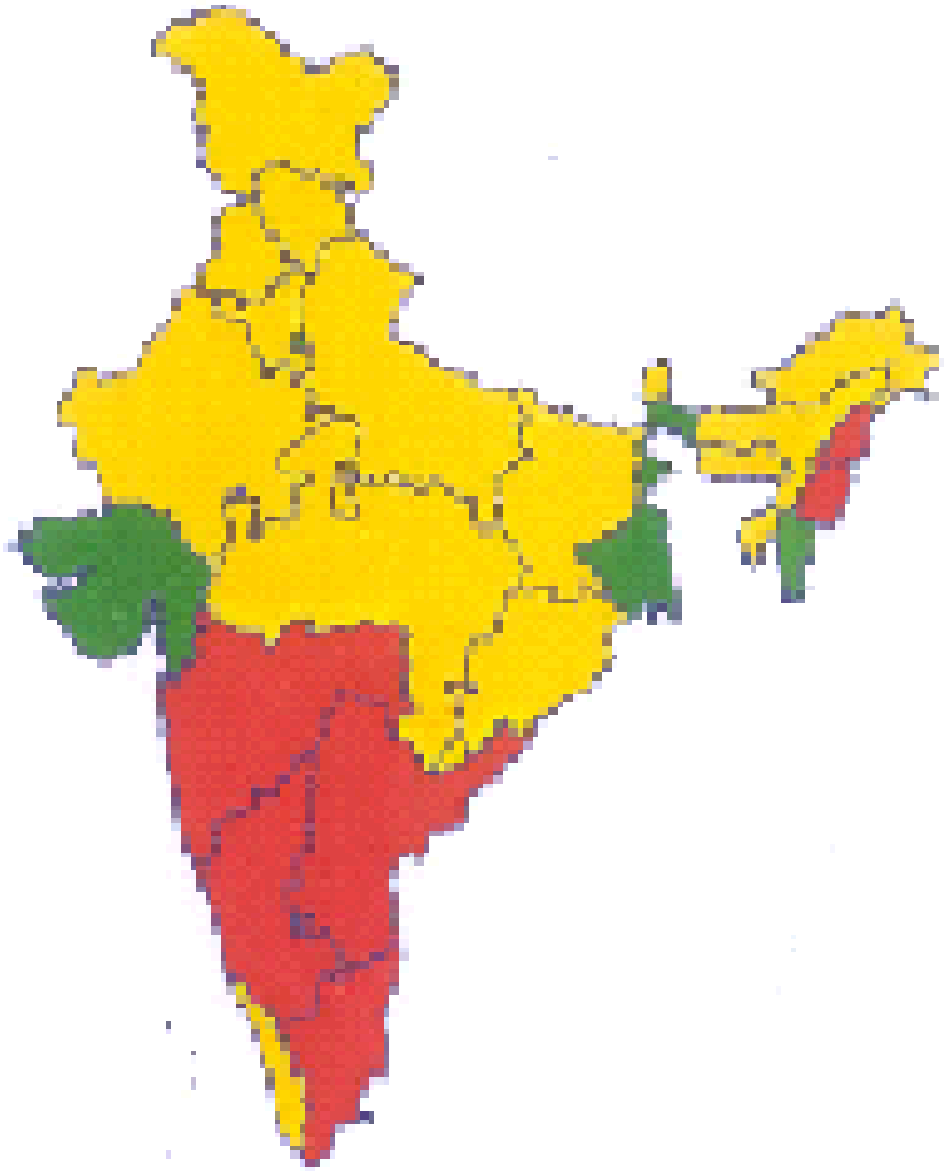
Needs For Measurement

1) **Quantifying the problems**
2) Comparison
3) Effect of intervention
4) Research

Quantifying the problems

- With measurement we can measure the quantum of problem at hand---- helps in deciding the priorities in the various problems.

Quantifying the problems



>1% Antenatal women

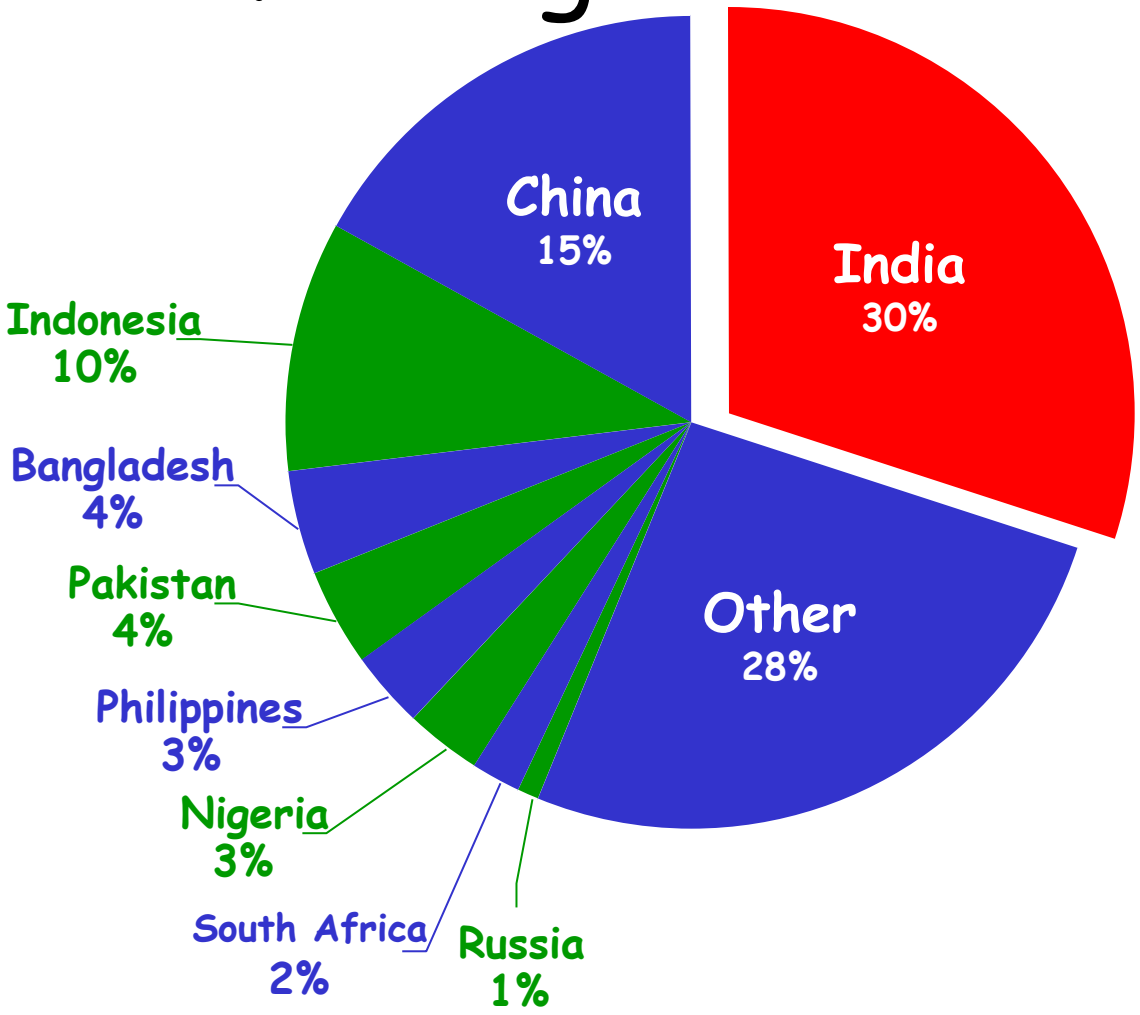
>5 % High risk groups

< 5 % High risk groups

Needs For Measurement

1) Quantifying the problems
2) **Comparison**
3) Effect of intervention
4) Research

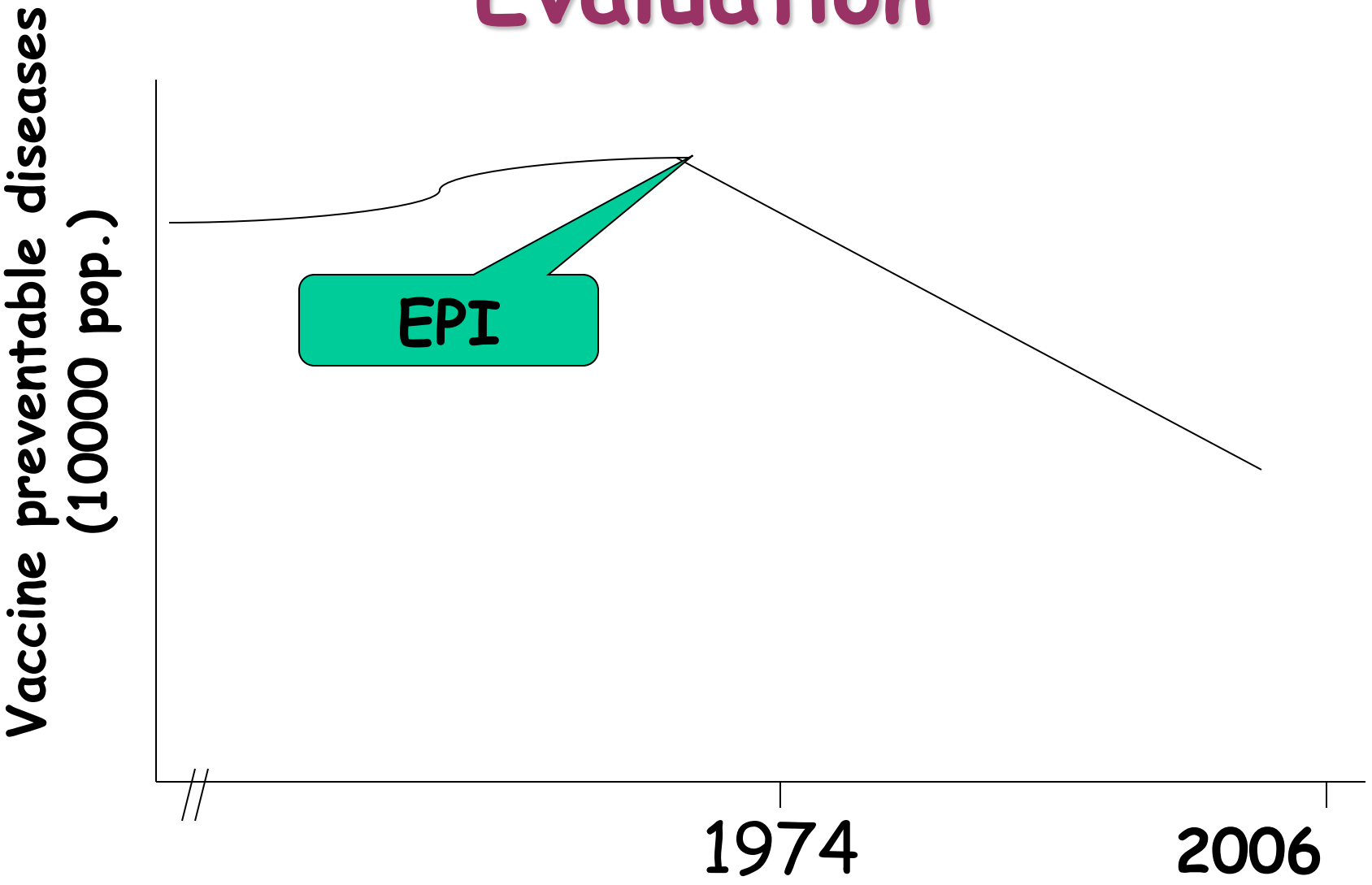
India accounts for nearly one third of the global TB burden



Needs For Measurement

1) Quantifying the problems
2) Comparison
3) **Effect of intervention**
4) Research

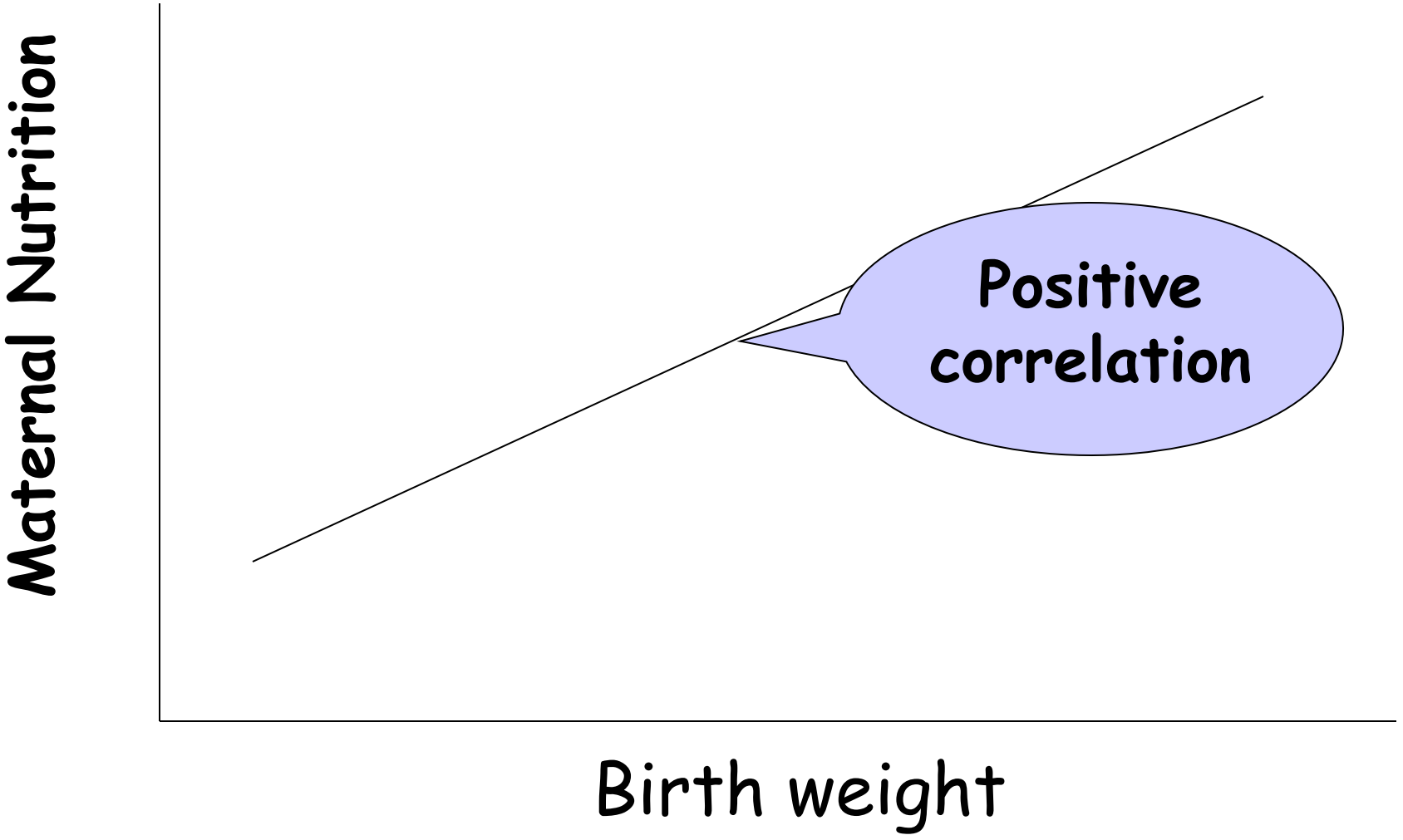
Evaluation



Needs For Measurement

1) Quantifying the problems
2) Comparison
3) Effect of intervention
4) **Research**

Research



- **Scope of Measurements in epidemiology:**

1. Morbidity
2. Mortality
3. Disability
4. Natality
5. Presence, absence or distribution of the characteristics or attributes of the disease
6. Presence, absence or distribution of the environmental and other factors suspected of causing the disease
7. Medical needs, health care facilities, utilization of services

? Measurements of psycho-social aspects of health and disease

? Measurement or identification of the components of well being

- Basic requirements of measurements are:
  - Validity
  - Reliability
  - Accuracy
  - Sensitivity
  - Specificity
  - Minimization of error

Tools of measurements

Tools of measurements

- Rates
- Ratios
- Proportions

  (used to express disease magnitude)
- Discrete variables
- Continuous variables, circumstances – mean, centiles, standard deviations

Formula

$$\frac{\text{Numerator}}{\text{Denominator}} \times \textbf{Multiplier}$$

Rate

- Measurement of occurrence of some particular event in a population during a given time period.
- It is a statement of the risk of developing a disease \ condition
- It indicates change in some events that takes place in a population over a period of time.

$$\text{Rate} = \frac{\text{Event}}{\text{Population}} \times \textbf{Multiplier}$$

Categories of rates

1. Crude rates
2. Specific rates
3. Standardized rates

Death Rate

$$\frac{\text{No. of death in a year}}{\text{Mid- year population}} \times 1000$$

Crude rates (Un-standardized rates)

- Actual observed rates
- Rate based on cases occurring in the population irrespective of demographic sub-groups of the population

Specific rates

- Actual observed rate due to specific causes or occurring in specific groups during specific time period.
- Limited to the individual having specific characteristics.

Standardized rates

- Obtained by direct or indirect method of standardization or adjustment.
- Used to compare two or more population of different age group that differs with respect to some basic characteristics that independently influence the risk.

Ratio

- A relation in size between two random quantities.
- It is the result of dividing one quantity by another.
- Numerator is not the part of denominator.
- $X:Y$ or $\frac{X}{Y}$ $\frac{\text{Event}}{\text{Event}}$

Proportion

- It is a ratio which indicates the relation in magnitude of a part of the whole.
- Numerator is always the part of denominator.
- Expressed as a percentage

$$\text{Ratio} = \frac{\text{Event}}{\text{Total}} \times 100$$

e. g. proportion of children with scabies among total children / total cases of scabies

- Total population- 10000
- Total No. of deaths- 210 (Males-130, F-80)
- No. of males- 6000
- No. of females- 4000

- Total population- 10000
- Total No. of deaths- 210 (Males-130, F-80)
- No. of males- 6000
- No. of females- 4000

- Crude death rate
- Specific death rate for males
- Total no of females \ 1000 population
- Female: Male ratio

Denominator

Related to Population

- Mid Year Population- 1st July of the year
- Population at risk
- Person- time
- Person-distance
- Subgroups-religion, age…

Related to total events

e.g. Accidents

- Per 100 vehicles
- Per 1000 vehicles miles
- Infant mortality
- Case fatality

"Epidemiologist are always in search of denominator"

	Rate	Ratio	Proportion
Definition	Occurrence of some particular event in a pop. During a given time period	It is the relation in size bet. Two random quantity	It is the relation in magnitude of a part of whole
Unit	No./pop-time	X:Y, X/Y	%
Numerator	Component of & related to denominator	Not a part of denominator	a part of denominator
Multiplier	10 or its multiplier	-	100
Population	Defined	-	-
Time	defined	-	-

Thank You