Morbidity

- “Any departure- subjective & objective, from state of physiological wellbeing”

e.g.- Sickness, Illness, Disability....

- Measured in terms of 3 units
  1. **Person** who were ill
  2. **The spells** of illness that these persons experience
  3. **The duration** of illness

Measured By

- **Frequency-**

  By Incidence rate (spells, persons) &
  Prevalence Rate (Point, Period)

- **Duration**- By average period of morbidity
- **Severity**- Mortality, Rate of complication

Importance Of Morbidity Data

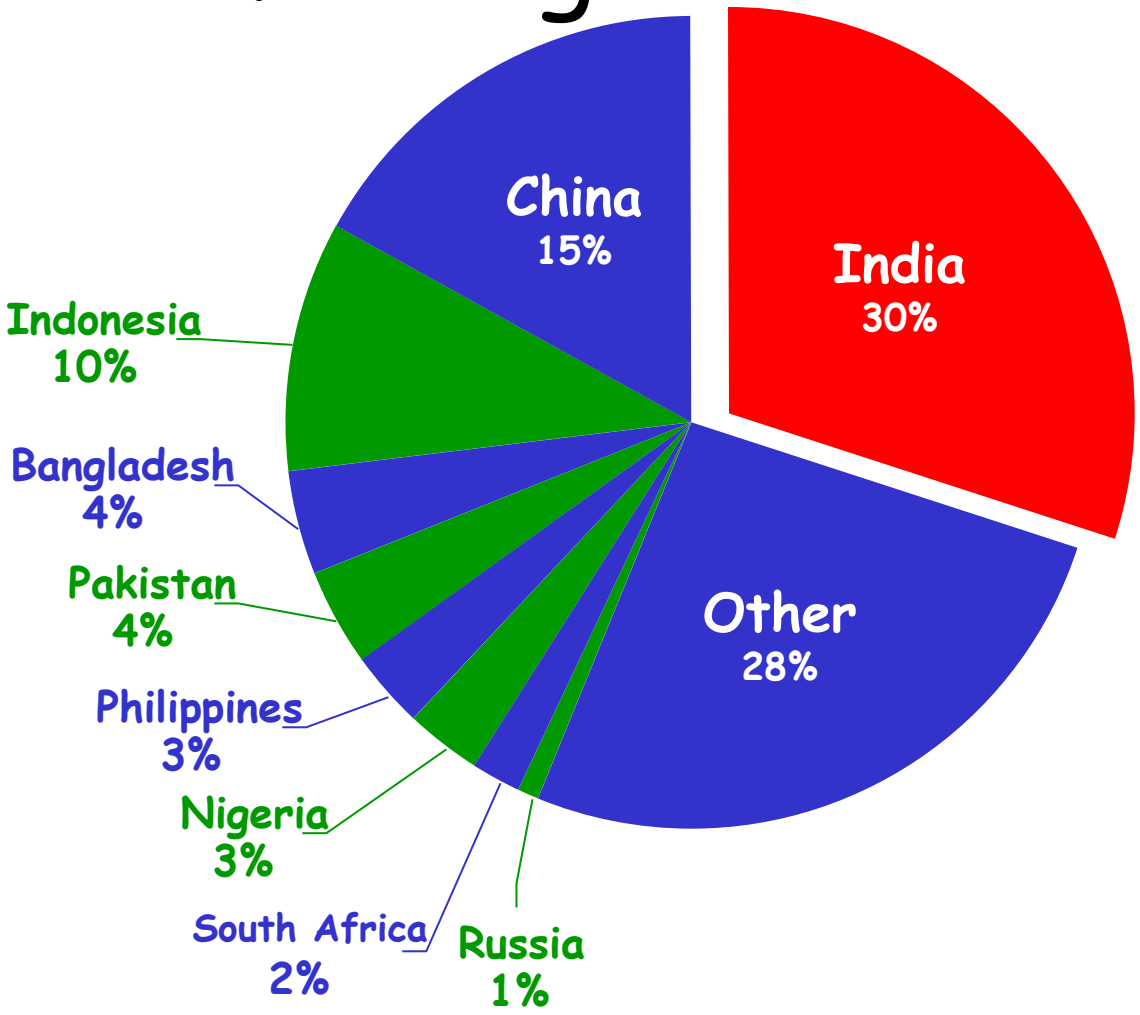
- No. of hypertensives- 3%.
- Rate Leprosy- 1\1000 pop.

  TB- 3\1000 pop.

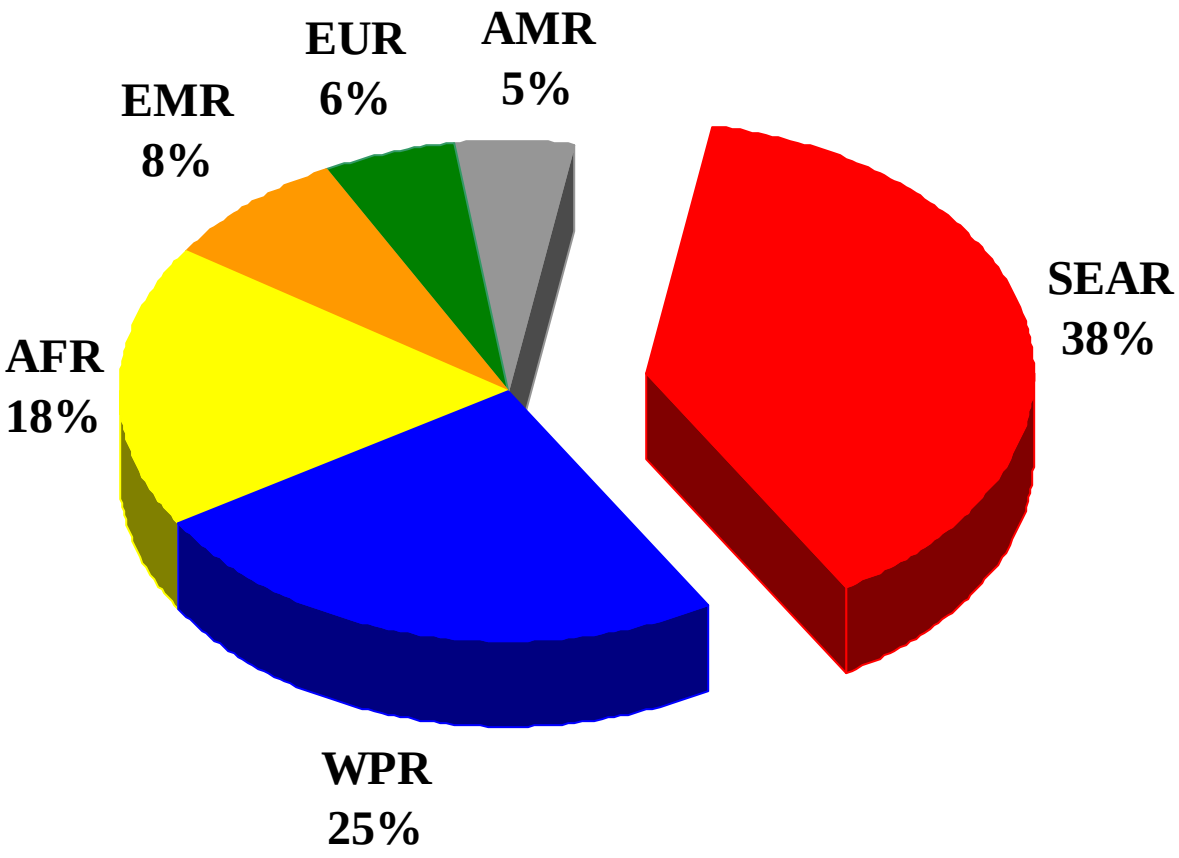
  Malaria- 60\1000 pop.

  Diarrhoeal diseases- 20\1000 pop.

India accounts for nearly one third of the global TB burden



South-East Asia accounts for nearly 40% of all tuberculosis cases



Importance Of Morbidity Data

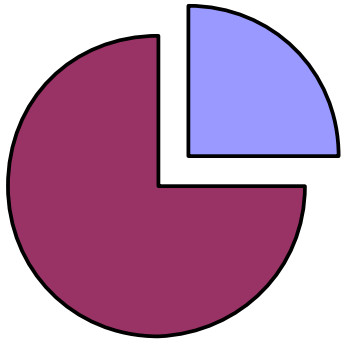
1. To describe the extent & nature of disease load in the community---To establish the priority

- **Carrier rate- Hepatitis A- 0%,**
- **Hepatitis- B- 20%,**
- **Hepatitis C- 90%**
- **Malaria- fever with rigor- 90% adults**
  10% children
- **Average Hospital stay-**
- **P. vivax- 1-2 days**
  P. falc. – 7-10 days

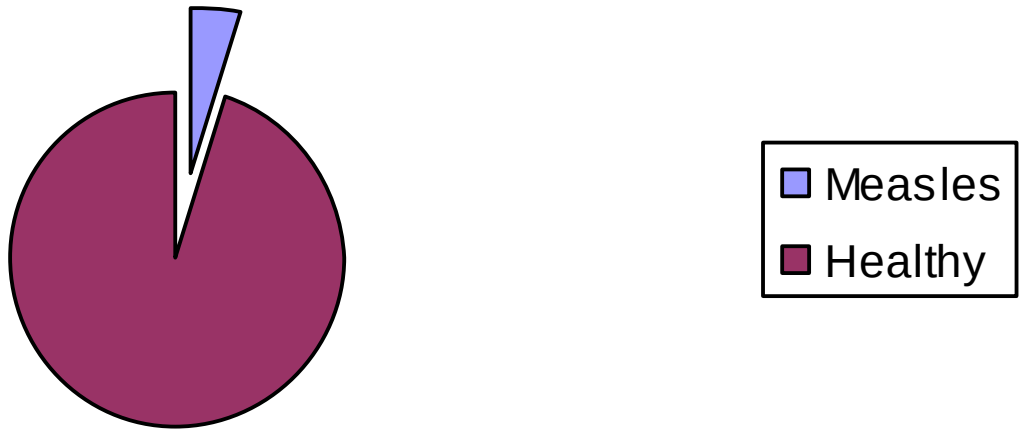
Importance Of Morbidity Data

1. To describe the extent & nature of disease load in the community---To establish the priority
2. Provide more comprehensive & accurate and clinically relevant information on patient characteristics than mortality data, so essential for basic research.

Incidence of measles in area with20% vaccination



Measles in area with 90% immunization



Importance Of Morbidity Data

1. To describe the extent & nature of disease load in the community---To establish the priority
2. Provide more comprehensive & accurate and clinically relevant information on patient characteristics than mortality data, so essential for basic research.
3. Serve as starting point of etiological study- play crucial role in disease prevention
4. Needed for monitoring & evaluation of disease control activities

- Incidence rate
- Prevalence rate

Incidence Rate

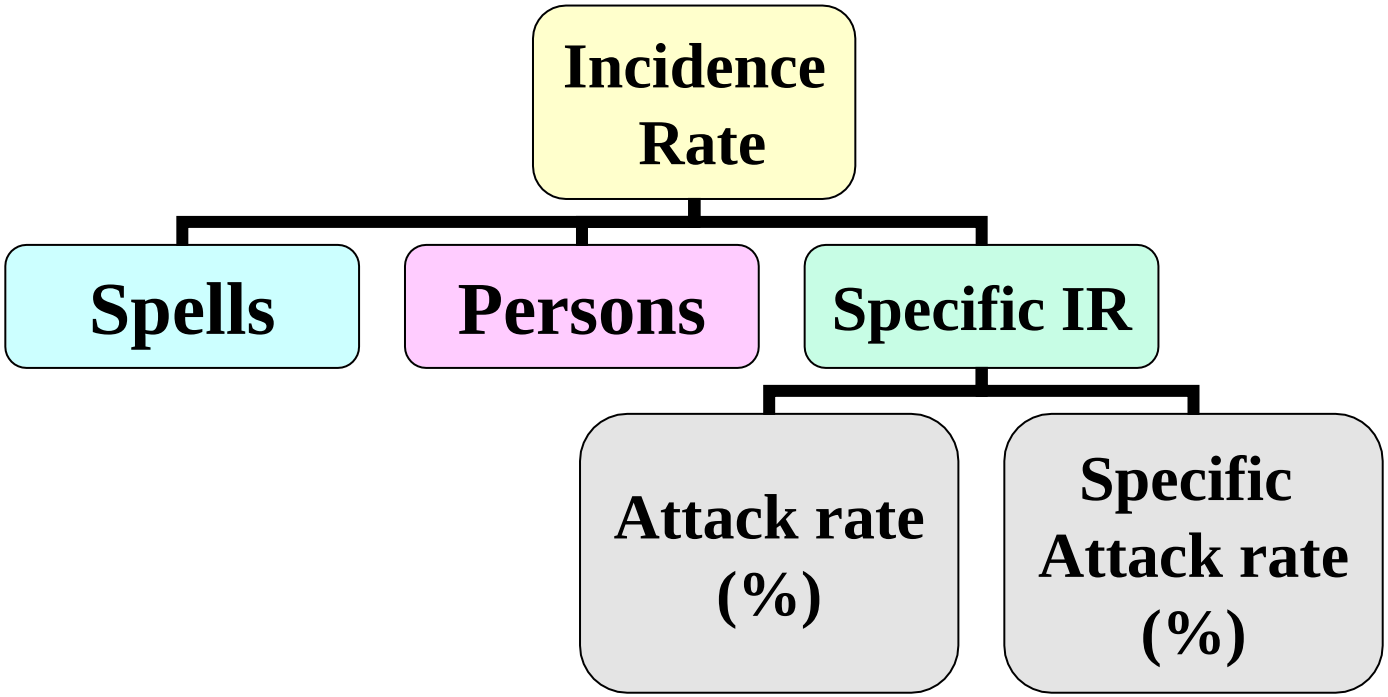
Incidence

- The no. of new cases occurring in a defined population during a specified period of time.

$$IR = \frac{\text{No. of new cases of specific disease during a given time period}}{\text{Population at risk during that period}} \times 1000$$

- Only new cases
- Given period of time
- Population at risk

- IR is more applicable to acute illnesses.


Incidence Rate
Spells
Persons
Specific IR
Attack rate (%)
Specific Attack rate (%)

Incidence Rate (Person)

$$\text{IR (Person)} = \frac{\text{No. of persons who start specific illness\sickness\disease during given time period}}{\text{Mean no. of persons exposed to risk during that period}} \times 1000$$

- In a town with population 10,000

  During the yr. 2006, 100 persons suffered from acute respiratory illness (ARI)

Find out IR

Example

- We took a sample of 1000 children aged 1 to 2 years from a rural community. We found that 10 of them were already suffering from measles.
- In addition to these, another 40 had already suffered from measles earlier, while yet another 50 had received measles vaccine. We now followed up these _____ children for a period of 1 year and found that over this one year period, 90 developed measles…..

- These (10+40+50) = 100 children, were no longer “at risk” of getting measles; the remaining 900 were “at risk” of the same.

IR of ARI

Episodes of illness in a year	Persons
1	80
2	10
3	10
Total	100

Incidence Rate (spells)

$$\text{IR (Spells)} = \frac{\text{No. of spells of sickness starting in defined period}}{\text{Mean no. of persons exposed to risk during that period}} \times 1000$$

IR of ARI

Episodes of illness in a year	**Persons**	**Episodes**
1	80	80
2	10	20
3	10	30
Total	100	**130**

Incidence Rate (spells)

$$\text{IR (Spells)} = \frac{\text{No. of spells of sickness starting in defined period}}{\text{Mean no. of persons exposed to risk during that period}} \times 1000$$

= 130/100*1000

=1300 spells of ARI/1000 persons in a yr.

= 1.3/ person

ARI episodes

- Adult- 1.2 / adult
- 4/ child (6-12 months)
- 2 / child (< 6 months)

ARI episodes

No BF	BF
• 6/ child (6-12 months)	• 3/ child (6-12 months)
• 4 / child (< 6 months)	• 1 / child (< 6 months)

Person Time IR

- Each person in a study population contributes one person to year.

- Study of 10 person in a year= 10 person year
- Study of 1 person for 10 years= 10 person year

Person Time Incidence Rate

- 100 persons observed for a year

  Accidents - 2 persons

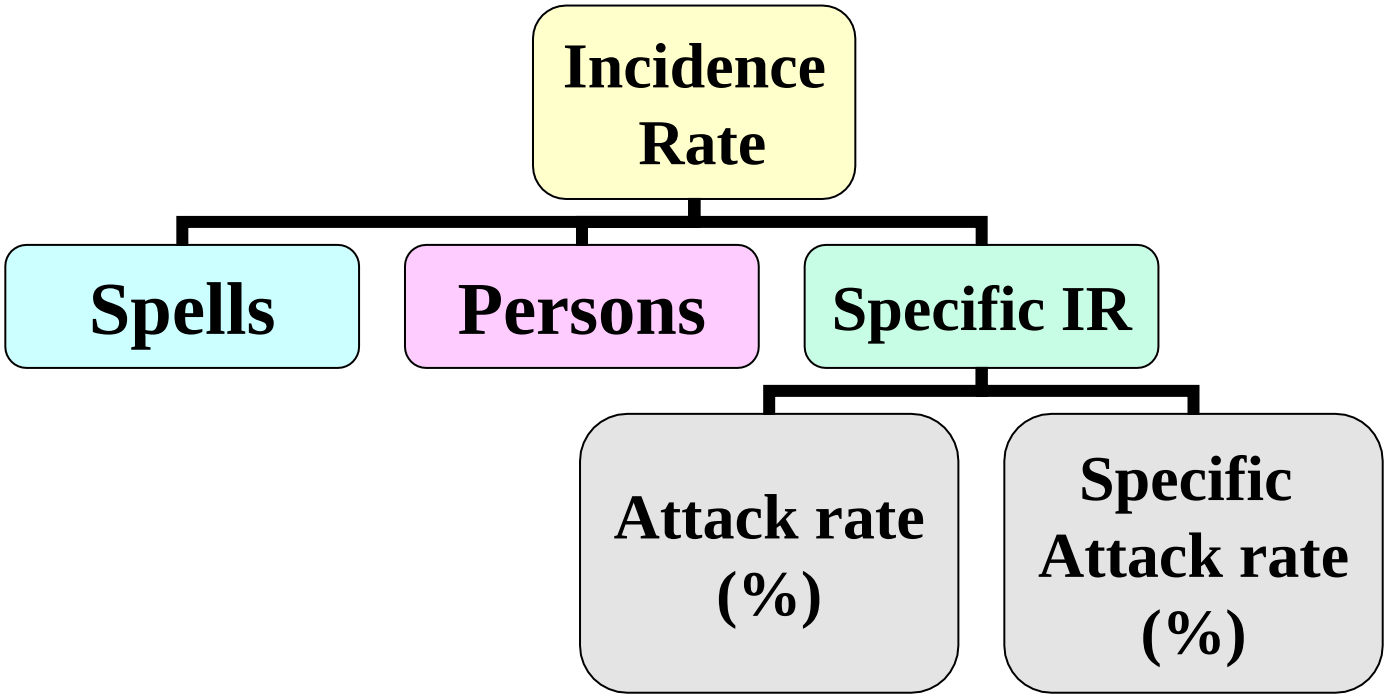
  2% per yr.

- 10 persons observed for 10 years

  10 x 10= 100 person year

  Accidents - 2 persons

  Accident rate is 2/100 person year


Incidence Rate
Spells
Persons
Specific IR
Attack rate (%)
Specific Attack rate (%)

Special Incidence Rate

- Attack rate
- Secondary Attack rate

Special Incidence Rate

Town A

- IR malaria- 2\1000 MYP

Town B

- IR malaria- 2\1000 MYP

MYP of both town 50000

Town A

During the yr. 2006, 10,000 people suffered from malaria ,

out of which 7000 suffered during the month of Aug. & Sept.

Town B

- During the yr. 2006, 10,000 people suffered from malaria , distribution of cases was almost equal through out the year.

Attack rate (%)

$$\text{AR} = \frac{\text{No. of cases of specified disease during a specified time period}}{\text{Mean no. of persons exposed to risk during that period}} \times 100$$

Town A

- **AR**= 7000 X 100
  50000
  AR= 14%
- **IR** = 2\1000 MYP

Town B

- IR- 2\1000 MYP

IR of malaria- 3\1000 pop at risk\ year

Month	AR(%)
Jan.- Mar.	0.1
Apr.- Jun.	0.1
July- Sept.	5
Oct.- Dec.	0.2

Attack rate -Uses

- Used only when the population exposed to the risk for a limited time period

  e.g During epidemic

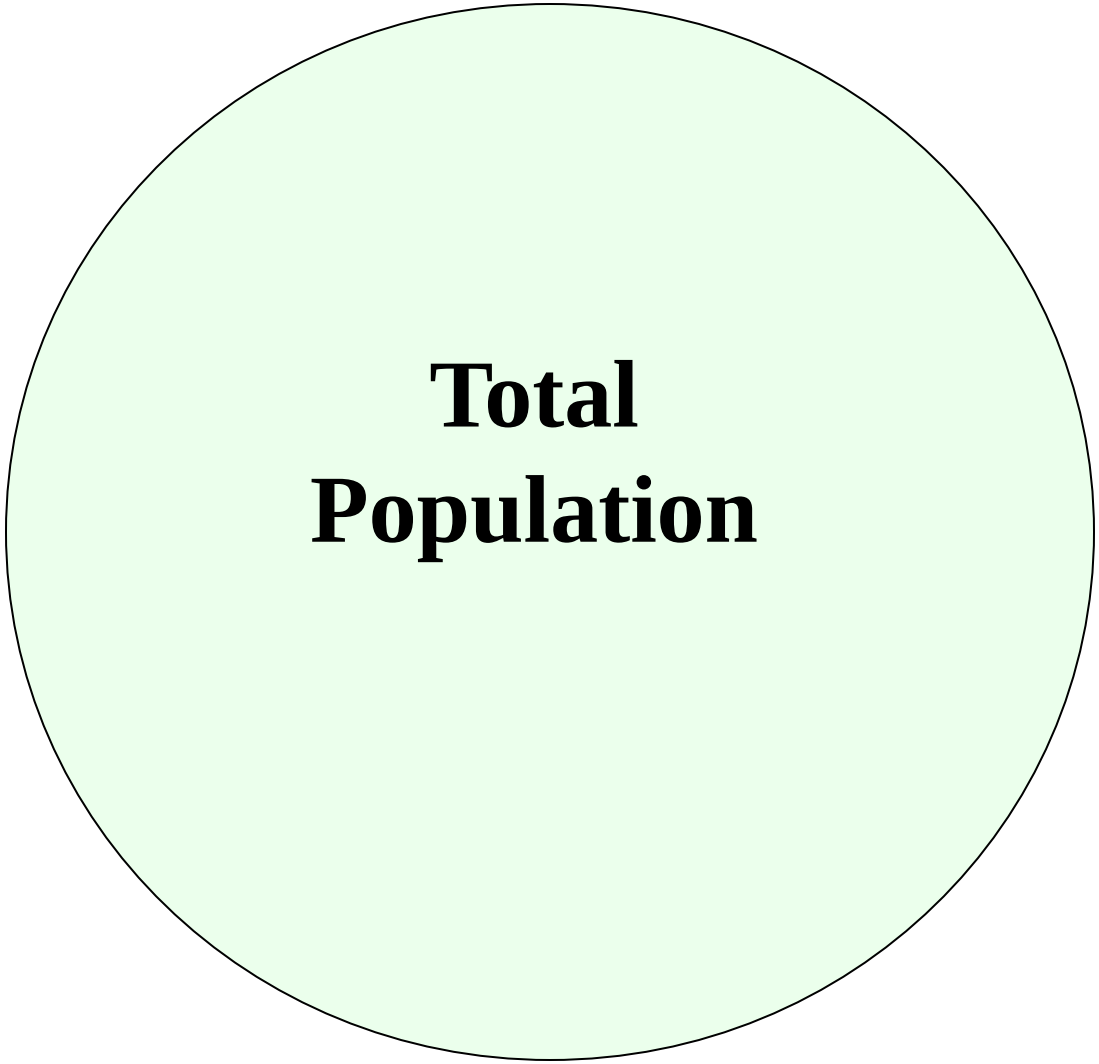
- Reflects the extent of an epidemic.

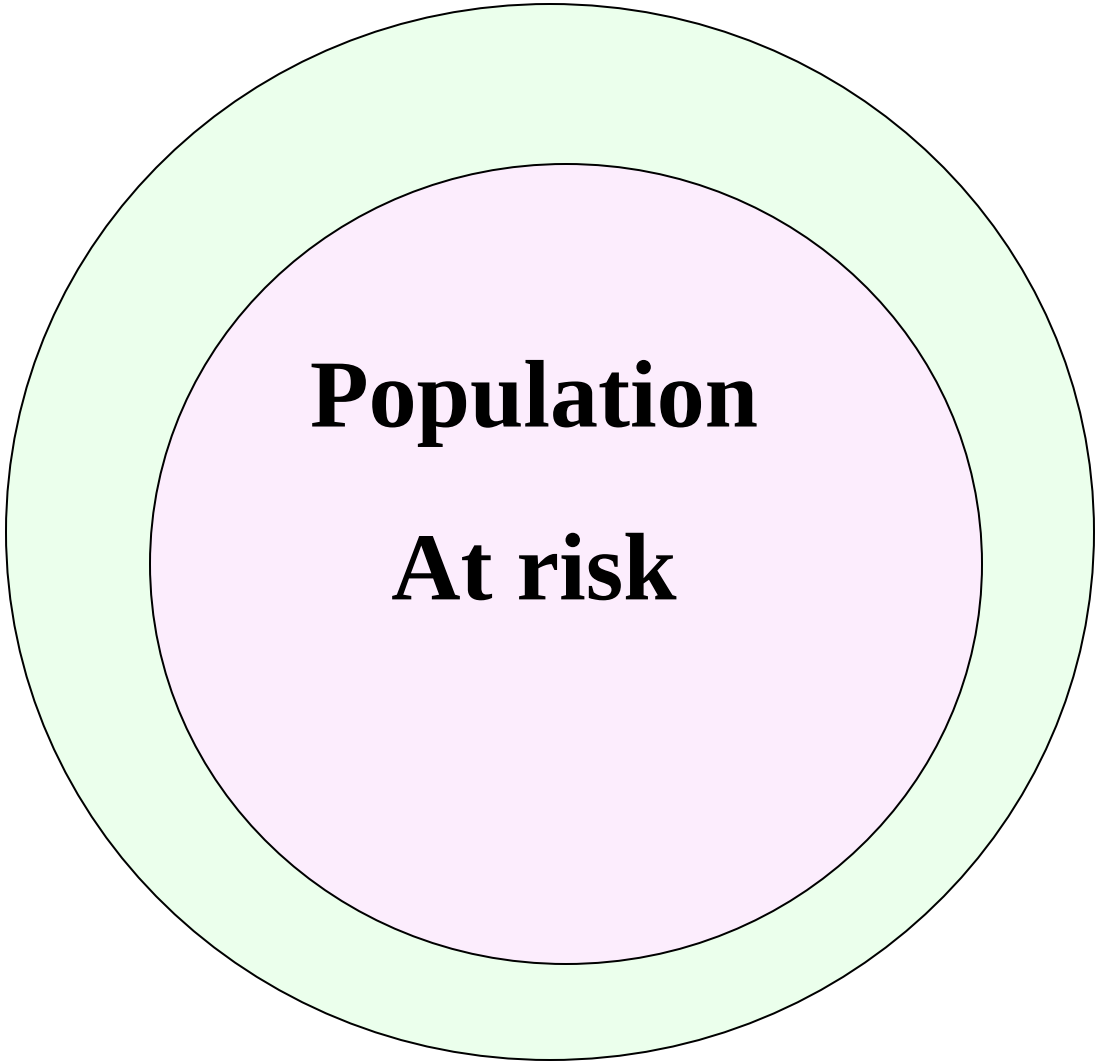
Special Incidence Rate

- Attack rate
- Secondary Attack rate

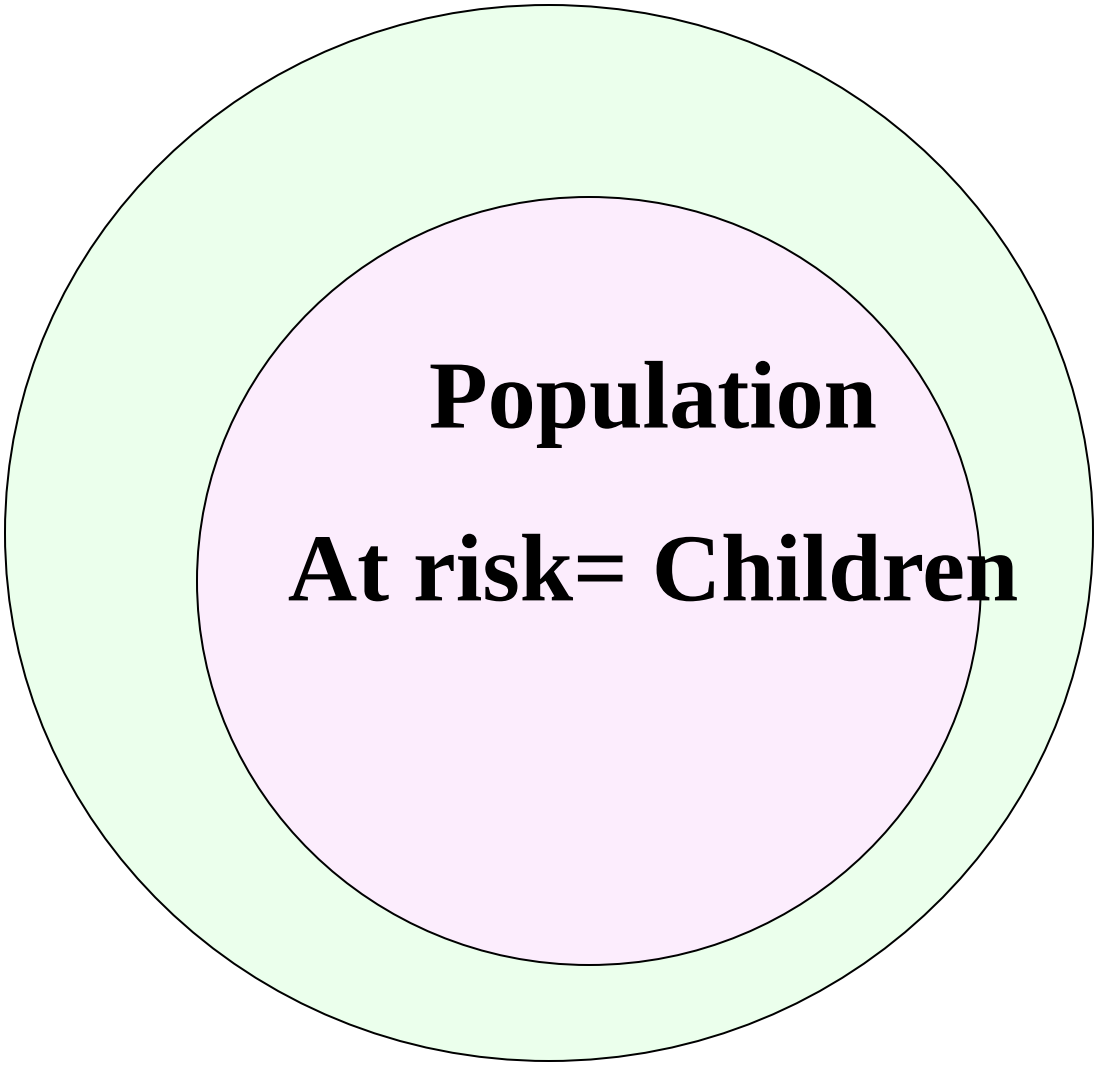
Secondary Attack rate (%)

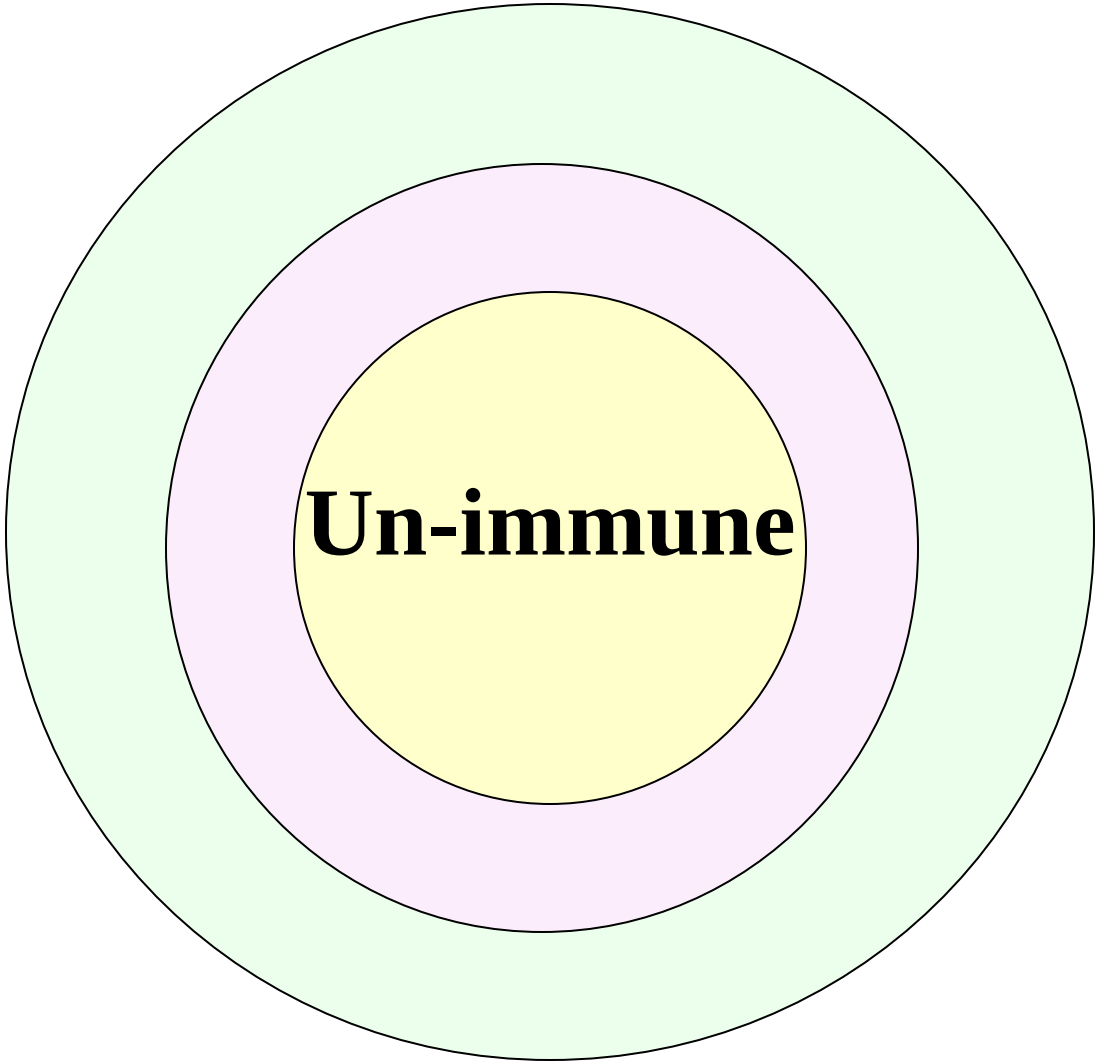
$$\text{SAR} = \frac{\text{No. of exposed susceptible within the range of incubation period}}{\text{Total no. of susceptible}} \times 100$$

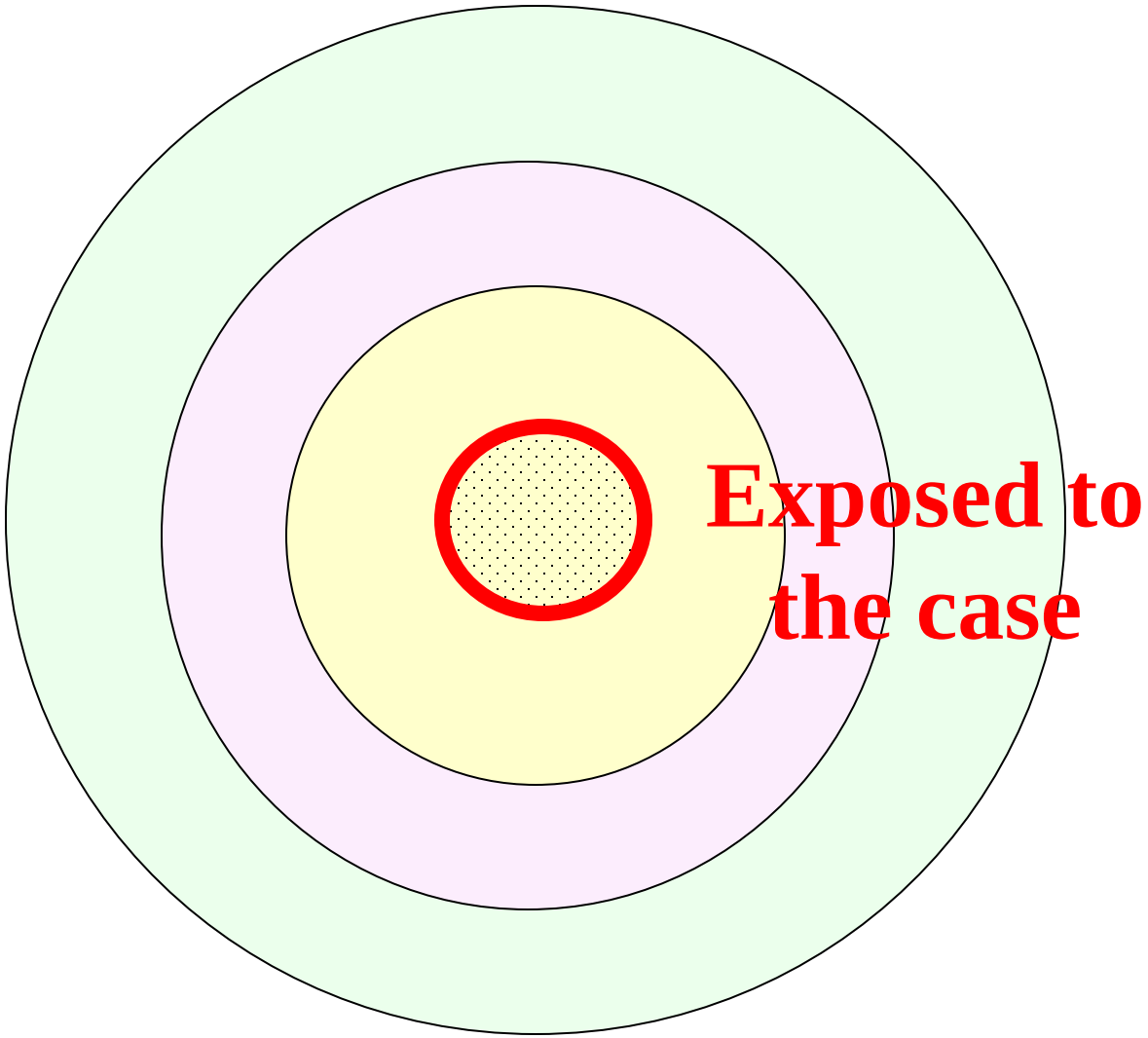

Total
Population


Population
At risk

Polio Myelitis




Un-immune


Exposed to
the case

Secondary Attack rate (%)

- The denominator consists of all persons who are exposed to the case.
- It is restricted only to the susceptible contacts, if means are available to distinguish the susceptible persons immune.
- The primary case is excluded from both the numerator & denominator.
- Numerator= Cases within the range of Max. Incubation Period.

- 3 year old nursery student developed rashes of measles on 15 Oct. .
- Total no. of enrolled students in his class- 50

Out of which

25 were vaccinated previously against measles,

4 already had measles in past.

- 18 students developed rashes of measles between 22nd Oct. -27th Oct., while 1 student developed rashes of measles on 5th Nov.

Find out SAR

Numerator- 18

Denominator- 50-1-25-4 =20

$$\text{SAR} = \frac{18 \times 100}{20} = 90\%$$

Secondary Attack rate- Uses

1. To find ability of disease to spread in the community.

   The communicable disease with high SAR in contacts is considered to be highly infectious.

2. The SAR calculated in different groups (age, occupation) helps in identifying the susceptible.
3. Fall in SAR after intervention indicates usefulness of preventive measures e.g. SAR in vaccines V/s non- vaccines.

Secondary Attack rate- Limitation

1. Disease with long infective period.
2. Infectious disease with long incubation period .
3. Disease which cannot be recognized on clinical examination alone or disease with many sub-clinical cases.

Uses of Incidence Rate

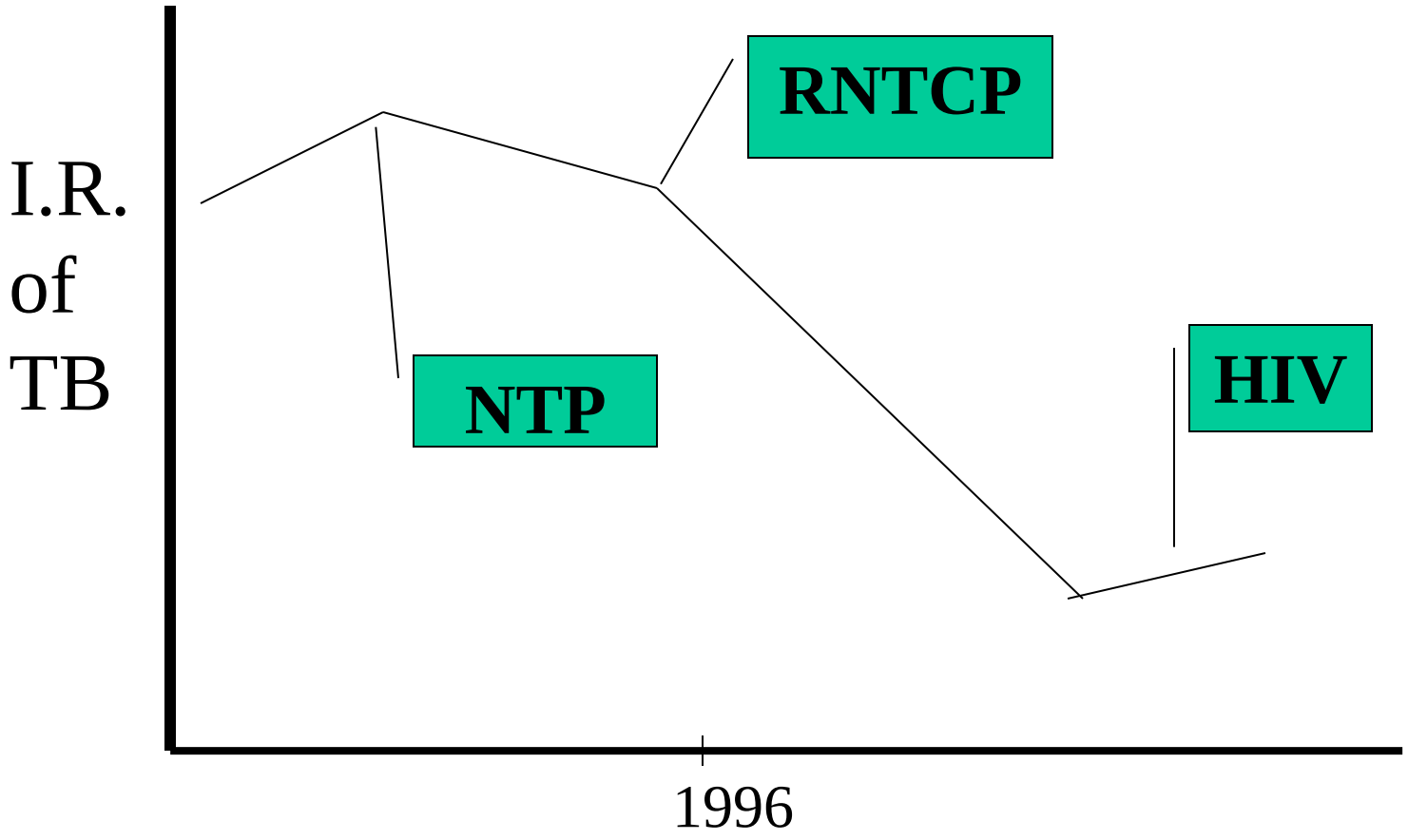
- Very sensitive index for taking an action

  a) to control the disease

  b) for research into etiopathogenesis & distribution of disease

  c) to know the efficacy of preventive & therapeutic measure

Analysis of different IR in various groups uncover the seasonal variation.


I.R.
of
TB
RNTCP
NTP
HIV
1996

Prevalence Rate

Prevalence Rate

- No. of all current cases (new & old) of a disease at given point\period of time in relation to define population.
- More applicable for non- communicable diseases.

- Point prevalence
- Period prevalence

Point Prevalence Rate

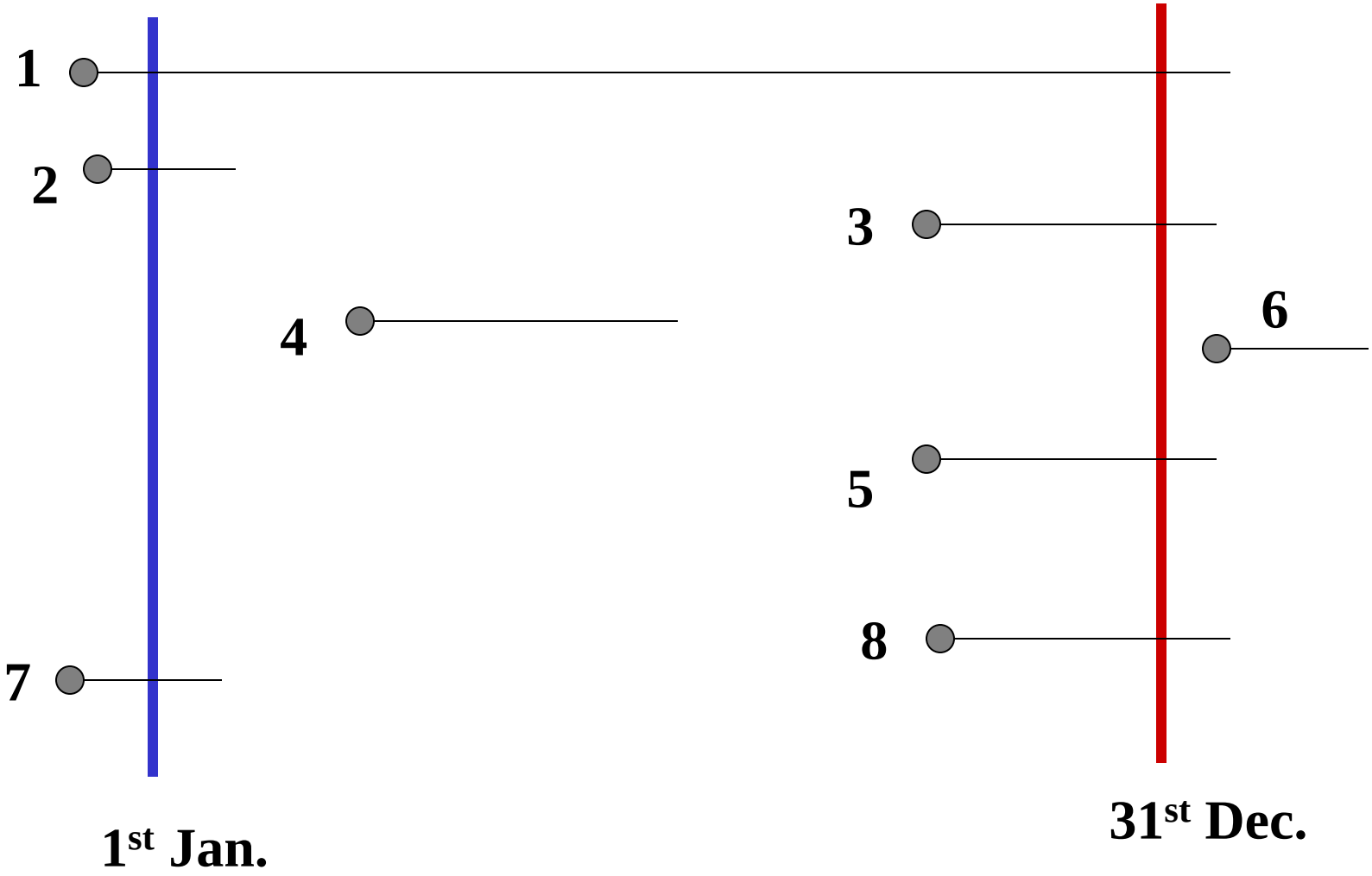
$$\textbf{PR} = \frac{\text{No. of all current cases (new \& old) of a specified disease existing at given point in time}}{\text{Estimated population at the same point in time}} \times \mathbf{100}$$

Point Prevalence Rate

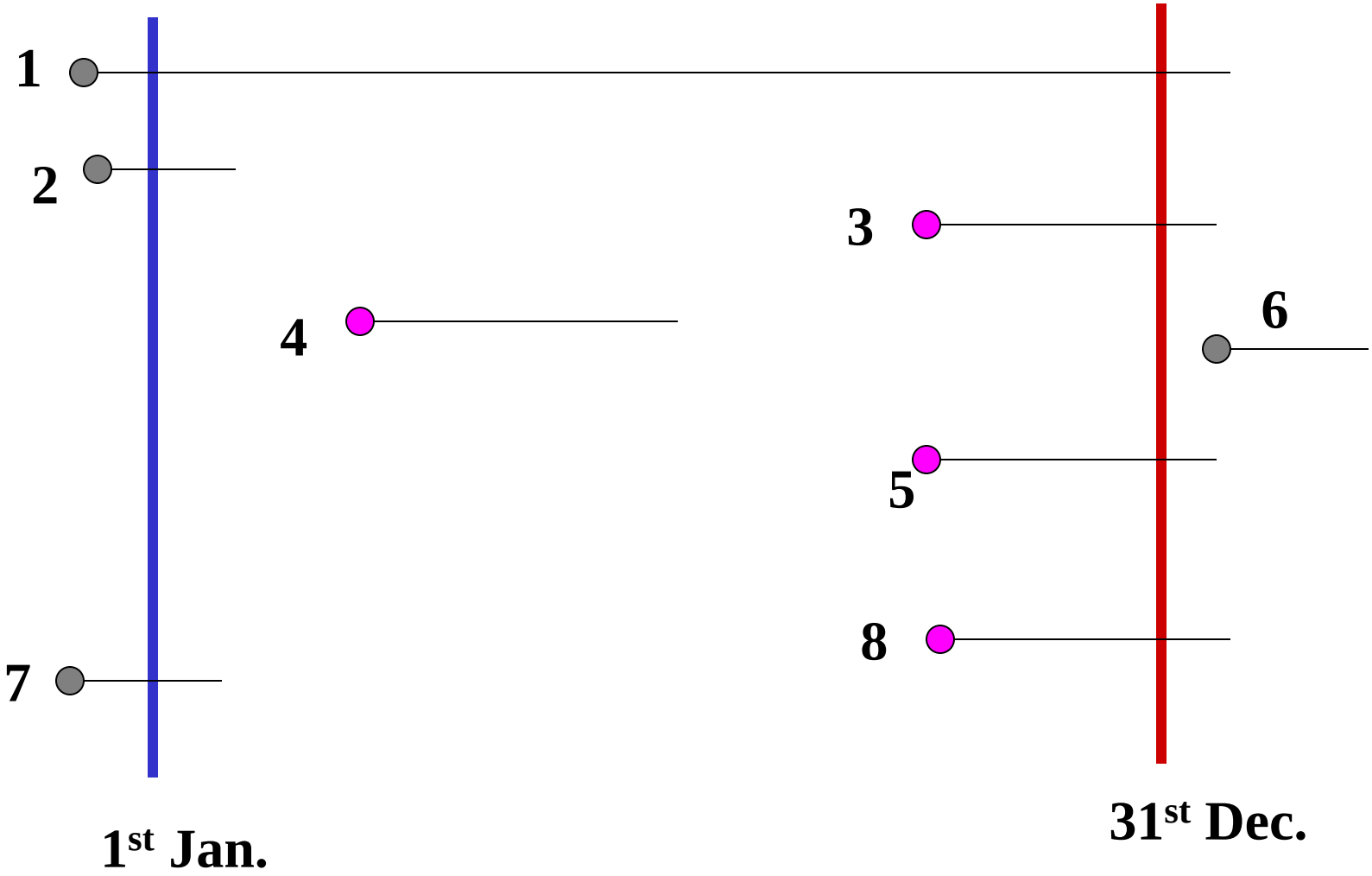
- When term PR is used , without any further qualification, it is taken to mean “Point Prevalence Rate”.
- Can be made specific for age, sex…..
- It is a measure of frequency where by we measure the quantum of disease load at point of time.

Period Prevalence Rate

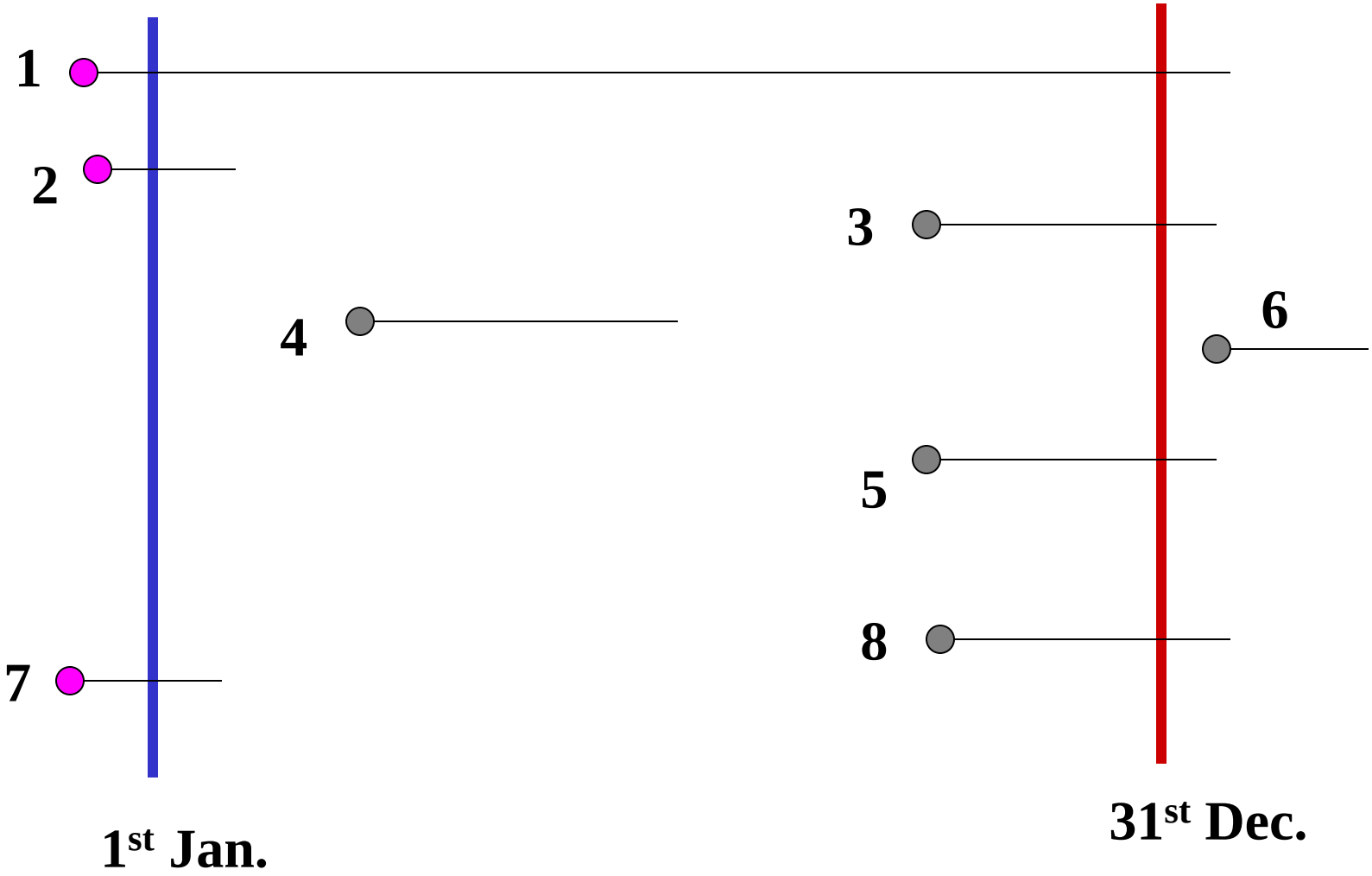
$$\textbf{PR} = \frac{\text{No. of all current cases (new \& old) of a specified disease existing at given period of time interval}}{\text{Estimated mid- interval population at risk}} \times \mathbf{100}$$


1
2
3
4
6
5
8
7
1st Jan.
31st Dec.

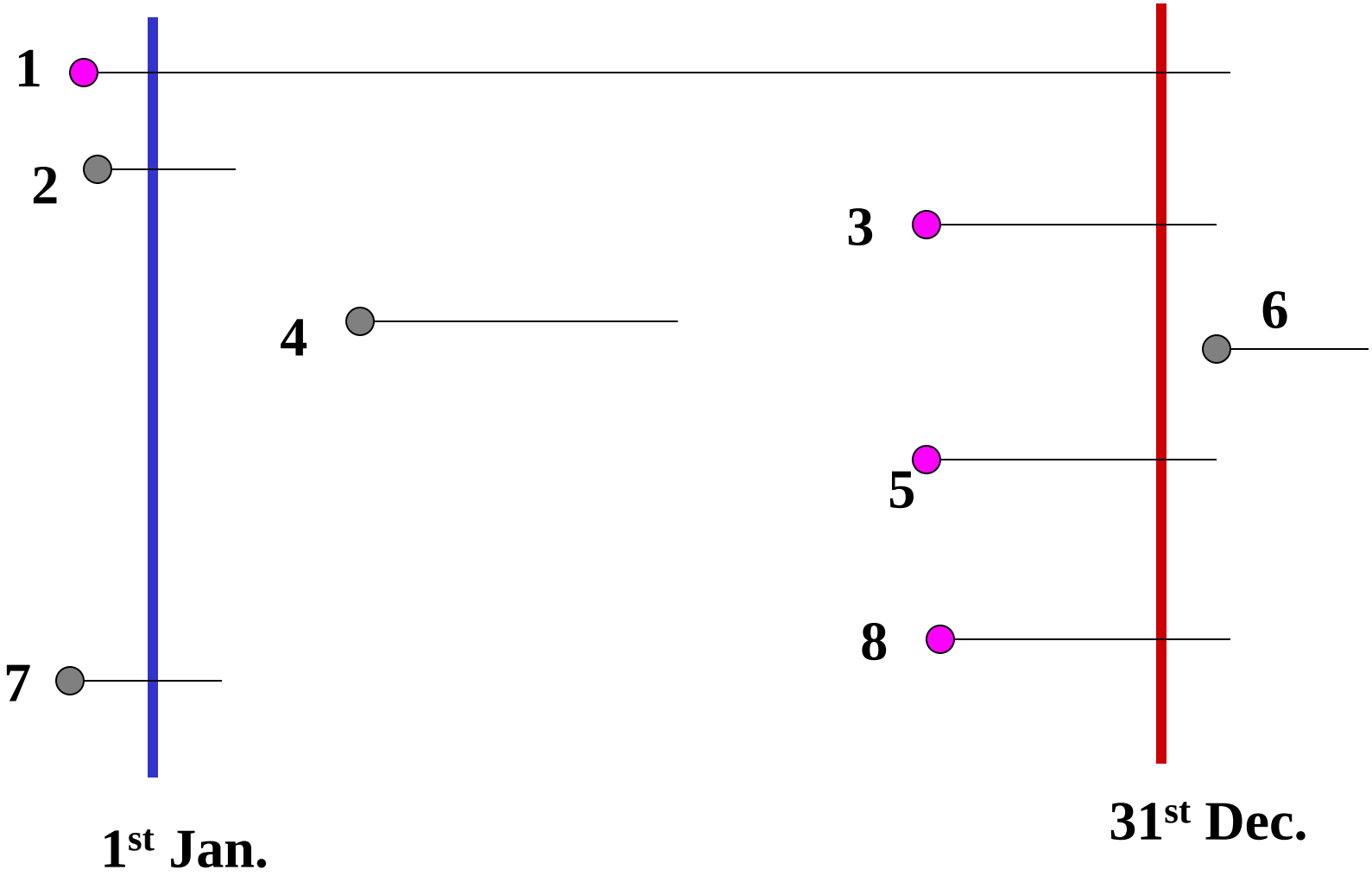
IR – 1st Jan. to 31st Dec.



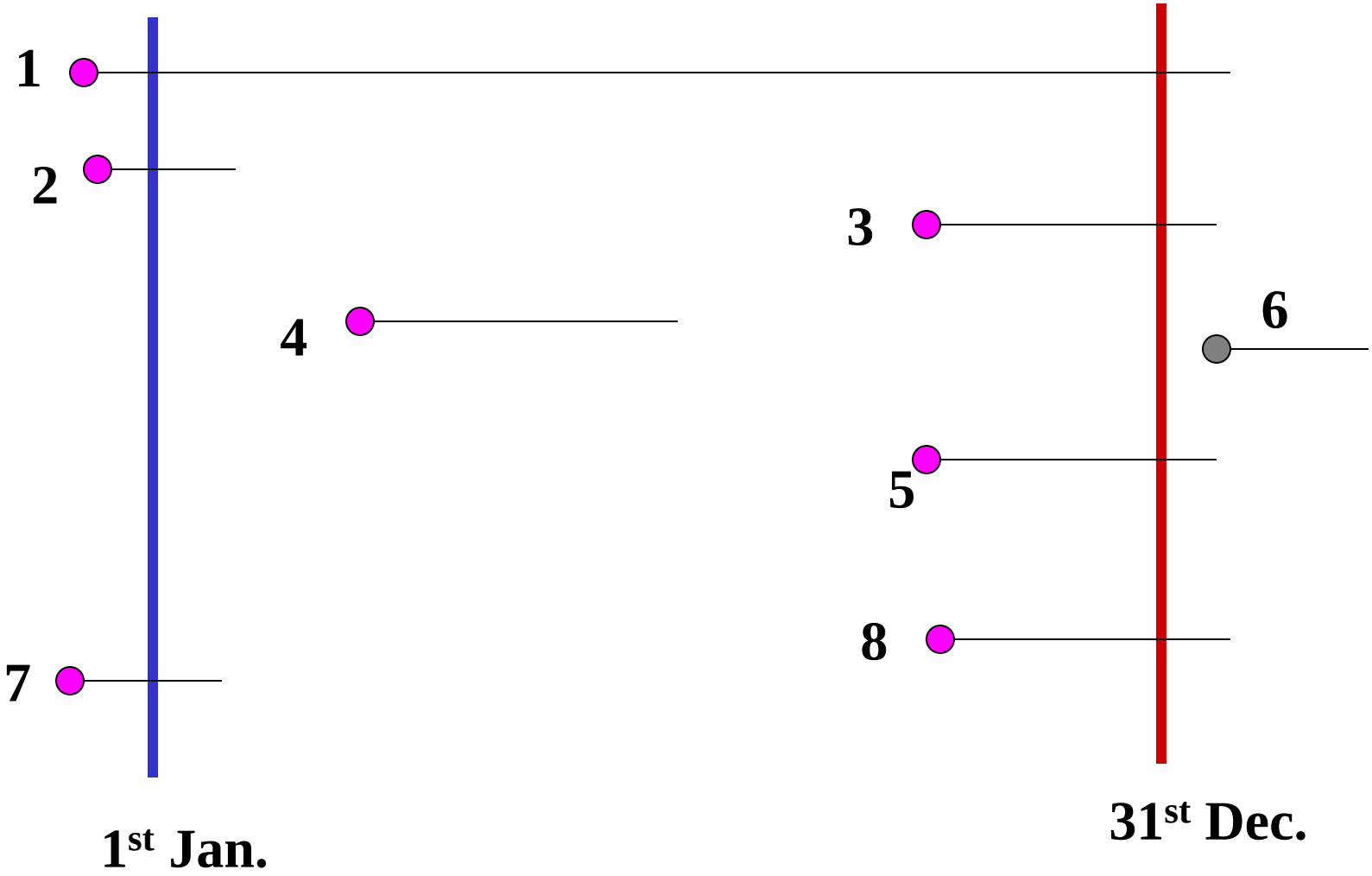
Point PR –1st Jan.



Point PR –31st Dec.



Period PR –Jan.- Dec.



Relation Between Incidence & Prevalence

- Prevalence = Incidence X Duration

Factors That Influence the Prevalence of Disease

- Increase By
- Decrease By

Prevalence is Increase By

- Longer duration of disease
- Increase in new cases
- Prolongation of patient's life without care
- Improved diagnostic techniques
- Better reporting
- In migration of cases
- Out migration of healthy population

Prevalence is Decrease By

- Shorter duration of disease
- Decrease in new cases
- High case fatality rate
- Improved care rate
- Better reporting
- Out migration of cases
- In migration of healthy population

Use of Prevalence Rate

1. Helps to estimate the magnitude of problem in the community.
2. Identify potential high risk population

   e.g. HIV- .CSW, truck driver
3. Useful for administrative & planning purposes e.g. Hospital beds, Man power need, Rehabilitation facilities

Limitations of Prevalence Rate

- It is not ideal measure for studying the disease etiology or causation

  - it depends on IR & duration.
- When IR is not available PR may have to be used in etiological hypothesis, but contribution of duration element always has to be assessed.

	Incidence	Prevalence
Definition	The no. of new cases occurring in a defined pop. During a specified period of time	No. of all current (old & new) cases of a disease at a given point\ period of time
Types	Spells	Point
	Person	Period

	Incidence	Prevalence
Applicability	Acute disease like diarrhoea, Malaria…	Chronic disease like TB , Leprosy, HT,DM
Type of study required	Cohort	Case control
Observation	Independent observation	Depends on incidence & duration

	Incidence	Prevalence
Use	IR is more useful in identifying aetiological factor, seasonal variation than PR	PR is more useful in identifying magnitude of problem, for planning the health services & evaluating the intervention than IR
Interpretation	↓ IR indicates ↓ in ds. transmission	↓PR not only due to ↓ IR but may be ↓ duration or ↑ in death or recovery. So not useful for studing ds. Aetiology.
	Can be compared with film	Can be compared with photograph.