

Prevalence and Incidence Rates

Prevalence

- The measures of disease most frequently used in epidemiology are prevalence and incidence.
- The point prevalence rate (PR) is the proportion of the population that has the health problem under study.

$$PR = \frac{\text{Problem at a specified point in time}}{\text{Total population}} \times 100$$

- We include all persons who have the health problem at a specified point in time in the numerator, regardless of the length of time the individuals have had the problem.
- The denominator includes the total population all persons diagnosed with the health problem and all persons unaffected by the health problem

Example

- Prevalence of Smoking among Women in Puerto Rico in 1982. In the 1982 Puerto Rico Fertility and Family Planning Assessment, women 15 to 49 years old were asked, "Do you currently smoke?"

- The point prevalence of smoking was:

$$PR = \frac{\text{Women currently smoking at time of interview}}{\text{Total women in the sample}} \times 100$$

Incidence rate

- The incidence rate (IR) is the number of new cases of a health problem that occurs in a population *at risk* within a specified period of time.
- This rate is based on the assumption that the entire population at risk is followed from the beginning of the observation period to the end of the observation period.

$$IR = \frac{\text{Number of new cases of disease during a specified period of time}}{\text{Population at risk}} \times 100$$

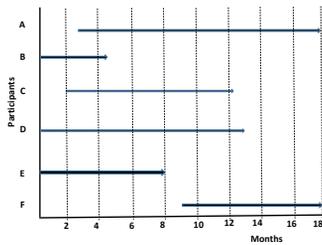
- For example, we should remove women who have had a hysterectomy from the denominator when calculating incidence rates for endometrial cancer because these women are not at risk for this type of cancer

- However, we may not always be able to record observations for the specified period of time.
- For example, participants may enter a study at different points in time, or some participants may not be available for follow-up.
- Consequently, the duration of observations will not be uniform for all participants. When the observation periods are not uniform,
- We need a more precise estimate of the incidence of a disease in a population.
- Then, **incidence density** is used

Incidence density

- The incidence density (ID), is calculated by using the exact amount of time each study participant is followed;
- It is considered the instantaneous rate at which a disease develops in a population.
- $ID = \frac{\text{Number of new cases of disease during a given period of time}}{\text{Total person time of observation}} \times 100$

Estimating total person years lived



- For the ID and the IR, the numerator is the number of new cases of disease in a population during a given period of time.
- The denominator for the ID, however, is the sum of the total time that each individual contributes to the observation period and remains disease-free.
- The units in the denominator must reflect time (i.e., person-days, person-months, person-years)
