Epidemiological Measures

Measures of disease frequency

1. **Counts:** These are the number of people who meet a specific case definition for a health event. This could be disease, injury or death. It is the total number of cases of a health event or behavior.

2. **Prevalence:** The proportion of a population with a specific health event at a given time. Prevalence includes both existing and new cases of a health event.

   Prevalence = $\frac{\text{\# of existing and new cases}}{\text{Population size}}$

   a. **Point Prevalence:** The proportion of individuals with the health event in a specified population measured at a given point in time.

      Point Prevalence = $\frac{\text{\# of existing and new cases}}{\text{Population size at specified point in time}}$

   b. **Period Prevalence:** The proportion of individuals with the health event in a specified population measured over a specified period of time.

      Period Prevalence = $\frac{\text{\# of existing and new cases}}{\text{Population size during specified period of time}}$

3. **Incidence:** The number of new cases of a disease that occurs during a specified period of time, in a population **at risk**. For incidence, the population of interest is the population at risk of developing the disease. Existing cases are not included.

   a. **Incidence proportion**, also called risk or cumulative incidence, is the proportion of the population at risk that develops new cases during a specified period of time.

      Incidence Proportion = $\frac{\text{\# of new cases}}{\text{Population at risk}}$

   b. **Incidence rate**, also called incidence density, is the rate at which new cases occur during a specified time interval in a population at risk, taking into account the person-time measurement, or the total time persons were at risk. Incidence is usually expressed per 1,000/10,000/100,000 population, depending on the condition.

      Incidence Rate = $\frac{\text{\# of new cases}}{\text{Total person-time while at risk of disease}}$

      Person time = sum of the total time (months, years etc.) at risk contributed by all subjects

Epidemiological Measures

Measures of association

EXPOSURE STATUS	OUTCOME VARIABLE		TOTAL
	DISEASED	NON-DISEASED	
EXPOSED	a	b	a+b
NON-EXPOSED	c	d	c+d
TOTAL	a+c	b+d	a+b+c+d

1. **Risk ratio/relative risk:** A relative comparison of the risks in two separate populations.

   RR = $\frac{[a/(a+b)]}{[c/(c+d)]}$

2. **Risk difference/excessive risk:** The absolute difference between two risks.

   RD = [a/(a+b)] - [c/(c+d)]

3. **Prevalence ratio:** A comparison of the proportion of individuals with disease to the proportion with the exposure.

   PR = $\frac{[a/(a+b)]}{[c/(c+d)]}$

4. **Odds ratio:** The ratio of the odds of an event occurring in one group (the exposed) to the odds of it occurring in another group (the unexposed).

   OR= $\frac{a/b}{c/d}$

Measures of potential impact

1. **Population attributable risk (PAR):** Expected reduction in disease occurrence if a harmful exposure could be eliminated, or the actual reduction in disease occurrence attributable to a beneficial protective exposure. PAR can be calculated using the formulas below.

   PAR = $\frac{[P_e(RR-1)]}{[P_e(RR-1)+1]}$ where P_e is the proportion of population exposed

   PAR = $\frac{P^c[(RR-1)]}{RR}$ where P^c is the proportion of cases (events) exposed

2. **Mortality Rates:** Incidence of death within a certain period time in a given population

   Cause-specific mortality rate = $\frac{\#\text{ of deaths due to cause}}{\text{Mid-year population}}$

3. **Excess mortality:** Deaths that occur due to excess risk from a specific factor. The calculation for excess mortality is based on the rate difference.

   Excess mortality = Rate difference * population at risk
   Excess mortality = Number of observed deaths – number of expected deaths