

Incidence and prevalence

* Incidence is a disease risk

→
$$\text{Incidence} = \frac{\text{number of new cases of a disease (during a specific time)}}{\text{number of people at risk for the disease (during that specific time)}}$$

* the number we get from the equation can be multiplied by (x1000) to get the new cases per 1000 population, or (x100) to get number of cases per 100 population.

* example: if we have 10 women free from disease, 4 of them developed uterine cancer during a year → $\text{incidence} = \frac{4}{10} \times 1000 = \underline{400}$ cases per 1000 population

• every person in the denominator must have the potential to become one of the people in the numerator

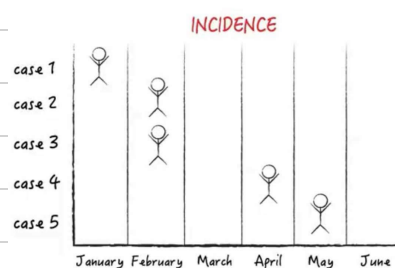
* example: if we have 10 women, two of them had their uterus removed, and 4 of these 10 women developed uterine cancer → $\text{incidence} = \frac{4}{7} \times 1000 = 570$ per 1000
- these two women who had their uterus removed are not at risk of developing the disease.

* Prevalence is a disease burden

→
$$\text{Prevalence} = \frac{\text{Affected People}}{\text{People in the population}}$$

* What is the difference between incidence and prevalence?

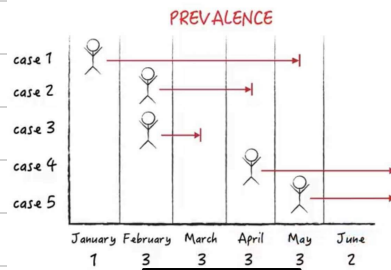
• If we have 5 people who developed a disease, over a period of six months one developed the disease in January, two in February, one in April and one in May. If we ignore the denominator, the incidence rate for February will be 2. 2 is also the numerator.



- Prevalence take in count the duration of the disease.

depending on the example before, if we have the same cases, but the one that was diagnosed in January is cured in may, case 2 is cured in April, case 3 is cured in march, etc.

Now, we have different numbers of cases in each month so that some cases were cured.



* So we can say that prevalence is determined by how many cases join and leave the prevalence pool by death or cure.

- if death ↑ → more people will leave the pool (duration ↓)

death ↓ → less people will leave the pool (duration ↑)

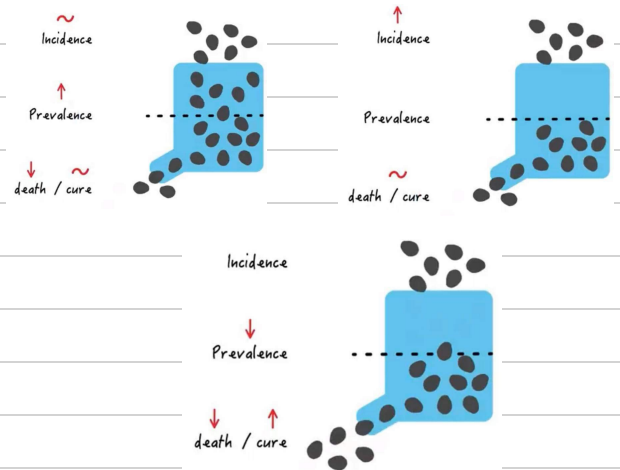
Cure ↑ → more people will leave the pool

Cure ↓ → less people will leave the pool (duration ↑)

- death rate and cure rate determine the duration

* Prevalence → good for planning health services

* $Prevalence = Incidence(cases) \times Duration$



- with longer duration prevalence will be higher, but in short duration prevalence will be less

* example: If I tell you that the CHD prevalence rate in Hollywood is 50 per 1000, and the prevalence rate of CHD in Bronx is 10 per 1000, but in both locations incidence rate is 5 per 1000, and the duration of the disease is 10 years in Hollywood due to better care, while it is 2 years in Bronx. At the end, the high prevalence rate in Hollywood was just because of better care.

	CHD Prevalence per 1000	Incidence per 1000 per year	duration of disease
Hollywood	50	5	10
Bronx	10	5	2



activity 1 / week 2 / Epidemiology
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