ALMAMON
University College

Department of Anesthesiology

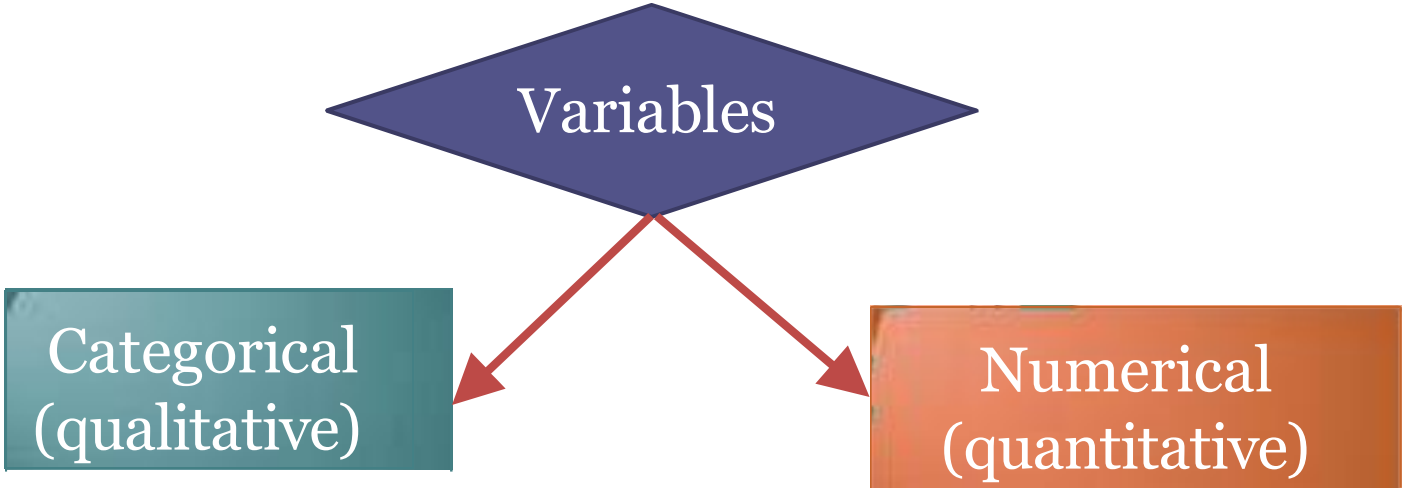
Statistics

Dr. SAJAD GHALIB IBRAHIM

Learning objectives

- Index to describe Health Status
  - Ratio, proportion, rate and percentage
  - Mortality rate
  - Morbidity rate-prevalence and incidence

Summary



- Ratio
- Rate
- Proportion
- Percentage

- Mean
- Mode
- Median

Ratio

- Relationship between 2 numbers in form of x:y
- Define as part divided by another part.
- E.g. male to female ratio in this class:

$$\frac{number\ of\ female}{number\ of\ male} = \frac{56}{23}$$

$$= 2.43 : 1$$

Ratio-Properties

- R = a/b
- R is always > 0
- Often rescale by multiplying by a constant e.g. 100, 1000, 10 000 etc
- May or may not have unit

Ratio -example

- R = number of doctors / population
- R multiply by k = 1000
- Unit = doctors per 1000
- E.g. R = 150 / 20 000 people

➡ R*k = 0 0075*1000

= 0.0075 doctors per person

= 7.5 doctors per 1000 people

Ratio -Odds

- P = proportion of people with disease.
- 1 –p = proportion of people without disease.
- Odds = p / (1–p) = “odds” of disease.
- No units

Ratio -Odds

- OR = odds ratio
- OR = odds of disease in exposed population / odds of disease in non-exposed population
- $OR = \frac{O1}{O2}$
- No units

Proportion

- Relationship between part to a whole.

$$\text{Proportion of X} = \frac{X}{x+y}$$

Can be used for categorical and numerical data (qy) in frequency table.

Proportion

- e.g. :
- x = number of male students = 120
- y = number of female students = 250
- Proportion of male students $= \frac{120}{120 + 250}$

$= 0.324$

Properties of Proportion

- p takes on values between 0 and 1 (p is a fraction)
- p has no units
- p may be multiplied by a constant k,

  where k is a number such as

  100, 1 000 or 100 000
- **Percentage** = Proportion X 100

Rates

- A proportion but has **multiplier** and **over specific period.**
- Calendar time period is the same in both the numerator and denominator of a rate.
- A rate expresses the relative frequency of an event per unit time (“risk”).

Rates

- e.g. :
- Failure rate among students:
- $= \dfrac{\text{\# students failed}}{\text{total \# students}} * 100 * 1 \text{ year}$
- $= \dfrac{12 * 100}{250} * 1 \text{ year}$

  $= 4.8\ \%$ per year

Rates

- Rates are used frequently in vital statistic
- Vital statistic describe health status of population
- E.g. : mortality rate, morbidity rate, fertility rate

Incidence

- Incidence:

= No of new cases of specific disease in specific period of time

No of person at risk in specific period of time

e.g. Incidence of thyrotoxicosis in 2008 = 10/100 000/year

Incidence

- Cumulative Incidence /Incidence Proportion

$$= \frac{\text{number of new cases within a specified time period}}{\text{size of the population initially at risks}}$$

- e.g. if a population initially contains 1,000 non-diseased persons and 29 develop a condition over two years of observation, the incidence proportion is 29 cases per 1,000 persons, i.e. 2 9%.

Incidence

Incidence Rate =

$$\frac{\text{\# of new case}}{\text{Total person years at risk}}$$

e.g. incidence rate of diabetes =

14 per 1000 persons-years

Incidence and prevalence

- Prevalence rate (point prevalence) =

$$= \frac{\text{\# of cases [old or new]of specific disease at time t}}{\text{total population at time t}}$$

- Prevalence rate (period prevalence) =

$$= \frac{\text{\#cases diagnosed with a specific disease in a time}}{\text{total population in the time period}}$$

Incidence and prevalence

- A proportion is always a ratio
- A rate is always a ratio
- A rate may or may not be a proportion

Incidence and prevalence

- Based on table below

	Smoking	Non -smoking
Men	67	93
Women	82	89

a) Calculate proportion and percentage of man among those subject who

i. Smoke

ii. Non smoking

iii. Odds ratio of smoking for men/women

Thank you