MEASUREMENT OF MORBIDITY AND MORTALITY

FREQUINCY MEASURES

RATES, RATIOS, AND PROPORTINS

- ***In epidemiology, the most important tool for measuring disease is the rate, but we also use ratios and proportions.***
- **A ratio expresses the relationship between two numbers in the form *x : y or x/y***

MEASUREMENT OF MORBIDITY AND MORTALITY

FREQUINCY MEASURES

- In a **ratio** the value of a variable, such as sex (*x* = female, *y* = male), may be expressed so that *x* and *y* are completely independent of each other, or *x* may be included in *y*

Female/male or *x/y*

MEASUREMENT OF MORBIDITY AND MORTALITY

FREQUINCY MEASURES

- **A proportion is a specific type of ratio, in which *x* is a portion of the whole, *x + y*, in a proportion the numerator is always included in the denominator.**

Female/(male + female) or *x*/(*x + y*)

MEASUREMENT OF MORBIDITY AND MORTALITY

FREQUINCY MEASURES
RATES, RATIOS, AND PROPORTINS

- **In epidemiology, the occurrence of a disease or condition can be measured using rates and proportions. We use these measures to express the extent of these outcomes in a community or other population.**
- **Rates tell us how fast the disease is occurring in a population.**
- **Proportions tell us what fraction of the population is affected.**

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FREQUINCY MEASURES

- **A rate is a special form of proportion that includes specification of time. In health care rates are often used to measure an event over time.**

Number of cases or events in a specified period	**x k**
Number of cases or population at risk during the same period	

MEASUREMENT OF MORBIDITY AND MORTALITY

POPUALTION BASED MORTALITY MEASURES

Crude Death Rate

The crude death rate is a measure of the actual observed mortality in a given population. Summary rate of the actual number of observed events in a population over a given time period (e.g. all cancer deaths in 2000)

$$\text{Crude Death Rate} = \frac{\text{Number of deaths*}}{\text{Estimated midinterval population**}} \times 1000$$

MEASUREMENT OF MORBIDITY AND MORTALITY

POPUALTION BASED MORTALITY MEASURES

Specific Rate

Rates for specific segments/groups of the population (e.g. sex, age, race, cause of death, cancer site).

$$\text{Age-specific death rate} = \frac{\text{Number of deaths of a specified age group*}}{\text{Estimated midinterval population of that age group**}} \times 1000$$

MEASUREMENT OF MORBIDITY AND MORTALITY

POPUALTION BASED MORTALITY MEASURES

Specific Rate

Rates for specific segments/groups of the population (e.g. sex, age, race, cause of death, cancer site).

$$\text{Cause Specific Death Rate} = \frac{\text{Total number of deaths due to a specific cause during a given time interval*}}{\text{Estimated midinterval population**}} \times 1000$$

MEASUREMENT OF MORBIDITY AND MORTALITY

POPUALTION BASED MORTALITY MEASURES

Specific Rate

Rates for specific segments/groups of the population (e.g. sex, age, race, cause of death, cancer site).

Adjusted rate:

Used to compare rates for entire populations, taking into account differences in variables we consider as influencing outcomes (age, gender, race)

MEASUREMENT OF MORBIDITY AND MORTALITY

POPUALTION BASED MORTALITY MEASURES

Two methods to adjust rates:

- **Direct Method:**

AAR (age-adjusted rate)

- **Indirect Method:**

SMR (standardized mortality ratio)

MEASUREMENT OF MORBIDITY AND MORTALITY

POPUALTION BASED MORTALITY MEASURES

$$\text{Proportionate Mortality Ratio} = \frac{\text{Total number of deaths due to a specific cause during a given time interval*}}{\text{Total number of deaths from all causes during the same time interval}} \times 1000$$

MEASUREMENT OF MORBIDITY AND MORTALITY

POPUALTION BASED MORTALITY MEASURES

- **Birth rate is the number of live births in a geographic area in a defined period, usually one year, relative to some specific population. For the crude birth rate, it is the average total population or the midyear population in the area during the period.**

$$\text{Crude Birth Rate} = \frac{\text{Number of live births*}}{\text{Estimated midinterval population**}} \times 1000$$

MEASUREMENT OF MORBIDITY AND MORTALITY

POPUALTION BASED MORTALITY MEASURES

- **Fertility rate is the number of children a woman would give birth to in her lifetime based on the current age-specific live birth rate**

Fertility Rate =	Number of live births*	X 1000
	Estimated number of females aged 15-44 (WHO uses 10-49) at midinterval **	

MEASUREMENT OF MORBIDITY AND MORTALITY

POPUALTION BASED MORTALITY MEASURES

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Fertility Rate =	Number of live births*	X 1000
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MEASUREMENT OF MORBIDITY AND MORTALITY

POPUALTION BASED MORTALITY MEASURES

Cause Fatality Rate

$$\text{Cause Fatality Rate} = \frac{\text{Total number of deaths assigned to a specific disease during a given time interval*}}{\text{Total number of cases of the disease during the same time interval}} \times 100$$

MEASUREMENT OF MORBIDITY AND MORTALITY

POPUALTION BASED MORTALITY MEASURES

Neonatal Mortality Rate

$$\text{Neonatal Mortality Rate} = \frac{\text{Number of deaths under 28 days during a given time interval*}}{\text{Number of live births during the same time interval}} \times 100$$

MEASUREMENT OF MORBIDITY AND MORTALITY

POPUALTION BASED MORTALITY MEASURES

Post neonatal Mortality Rate

Post neonatal Mortality Rate =	**Number of deaths from 28 days up to and not including one year of age during a given time interval** / **Number of live births during the same time interval less neonatal deaths**	**X 100**

MEASUREMENT OF MORBIDITY AND MORTALITY

POPUALTION BASED MORTALITY MEASURES

Infant Mortality Rate

$$\text{Infant Mortality Rate} = \frac{\text{Number of deaths under one year of age during a given time interval}}{\text{Number of live births during the same time interval}} \times 1000$$

MEASUREMENT OF MORBIDITY AND MORTALITY

POPUALTION BASED MORTALITY MEASURES

Maternal Mortality Rate

$$\text{Maternal Mortality Rate} = \frac{\text{Number of deaths assigned to pregnancy related causes during a given time interval*}}{\text{Number of live births during the same time interval}} \times 100$$

MEASUREMENT OF MORBIDITY AND MORTALITY

FREQUENTLY USED MEASURES OF MORBIDITY

Incidence Rate

The incidence rate is the commonly used measure for comparing frequency of a disease in populations.

$$\text{Incidence Rate} = \frac{\text{Total number of new cases of a specific disease during a given time interval*}}{\text{Total population at risk during the same time interval}} \times 100$$

MEASUREMENT OF MORBIDITY AND MORTALITY

FREQUENTLY USED MEASURES OF MORBIDITY

Prevalence Rate

The prevalence rate is the proportion of persons in a population that have a particular disease at a specific point in time or over a specific period of time.

$$\text{Prevalence Rate} = \frac{\text{All new and preexisting cases of a specific disease during a given time interval*}}{\text{Total population at risk during the same time interval}} \times 100$$

MEASUREMENT OF MORBIDITY AND MORTALITY

MEASUREMENT SCALE TYPES

Nominal scales *are the lowest level of measurement where the measurement of a variable involves the naming or categorization of a possible value of the variable, example sex male and female, nationality Saudi, non-Saudi.*

MEASUREMENT OF MORBIDITY AND MORTALITY

MEASUREMENT SCALE TYPES

Ordinal scales *the next level involves rank ordering values of variables. The number assigned to an ordinal scale signify order or rank, examples of ordinal scales are Likert scale or severity of condition, or degrees of burns.*

MEASUREMENT OF MORBIDITY AND MORTALITY

MEASUREMENT SCALE TYPES

Interval scales *these scales enables the identification of equal intervals between any two values of measurements, however, there is no absolute zero point, rather an arbitrary zero point is assigned, example heat (Celsius or Fahrenheit) intelligence (IQ).*

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MEASUREMENT SCALE TYPES

Ratio scales *is the highest scale of measurement, in that it involves all of the characteristics of the other scales as well as having an absolute zero, example of ratio scales weight or height of a person, blood pressure or heart beats.*

*A **measurement** on a higher scale can be converted or transformed to into one on lower level, but not vice versa.*

World Health Statistics

WHO's annual World Health Statistics reports present the most recent health statistics for the WHO Member States.

http://www.who.int/gho/publications/world_health_statistics/en/