Measument of Health
Vital statistics

Vital statistics

- The branch of medical statistics concerned with measurement of health status of the community through registration and presentation of vital events as **indicators.**
- **Morbidity indicators**: 1- Incidence rate
  2- Prevalence rate.
- **Mortality indicators**: 1- Crude death rate
  2- Age specific death rate
  3- Cause specific mortality rate
  4- Proportionate mortality rate
  5- Case fatality rate.
- **Fertility indicators:** 1-Crude Birth Rate
  2-General Fertility Rate
  3-Fecundity Rate
  4-Age Specific Fertility Rate
  5-Total Fertility Rate

1- MORBIDITY STATISTICS

- There are two basic measures to assess the frequency of the disease: incidence rate and prevalence rate

- A **RATE** is composed of a **numerator** (number of events), a **denominator** (population at risk for the event) and the **specified time** in which events occur ***(in case of incidence rate)*** or the specific time in which the data were collected (***in case of prevalence rate)*** and a **multiplier** (constant: 100, 1000, 100,000)

1- INCIDENCE RATE

- It is the number of **new** (reported) cases of a particular disease over a certain time period and locality per 1000 at-risk population in the same time period and locality.
- Example: the incidence of meningitis in Egypt in 2008.

- It measures newly diagnosed cases per unit of person-time (e.g. the incidence of influenza is 10 cases per 100,000 individuals per year)

- Measuring the frequency of acute diseases (communicable) per time.
- Measuring the incidence of chronic diseases (e.g. non-communicable) by detection of new cases among free individuals throughout time.
- The decrease in the incidence rate may be due to :

1- Resistance to disease.

2- Change in the disease etiology.

3- Effective prevention program (e.g. immunization, antismoking program and cancer lung)

2- PREVALENCE RATE

- It is the number of all cases [new and old] of a particular disease diagnosed during a survey study in a given locality (area) at a particular time per 100 examined at-risk individuals.
- Example: Prevalence of Diabetes in Egypt 2008.

- Measures the amount of disease already present in a population.
- It is a good measure for chronic diseases.
- It is used for measuring the prevalence of non-communicable diseases and some communicable diseases (e.g. TB, Schistosomiasis)
- Survey studies (using screening tests/diagnostic tests) are used to measure the prevalence of the diseases where reporting and registration are lack.
- High prevalence = high incidence or long duration of the disease.
- Low prevalence = low incidence or short duration (rapid recovery or death) or both.

2- MORTALITY STATISTICS

(1) Crude Death Rate:

$$\frac{\text{No. of total deaths in a certain year and locality}}{\text{Mid year population in the same year and locality}} \times 1000$$

Factors affecting CDR:

1- Socioeconomic status.

2- Incidence and prevalence of diseases.

3- Age structure of the population.

4- Health system, wars and disasters.

(2) Age Specific Death Rates:

It is the number of deaths in a certain age group in a certain year and locality per 1000 midyear population of the same age and in the same year and locality.

1- Infant Mortality Rate (IMR):

$$\frac{\text{No. of deaths in the first year of life in a certain year and locality}}{\text{No. of live births in the same year and locality}} \times 1000$$

2 Neonatal Mortality Rate (NMR):

$$\frac{\text{No. of deaths in the first 4 weeks of life in a certain year and locality}}{\text{No. of live births in the same year and locality}} \times 1000$$

3- Post-neonatal Mortality Rate (PNMR):

No. of infant deaths during the period 28 days to less than 12 months of life in a certain year and locality x 1000

No. of live births in the same year and locality

4- Children Mortality Rate (CMR):

No. of deaths of children 1-4 years of age in a certain year and locality x 1000

Midyear population of children 1-4 years of age in the same year and locality

5- Under-5 Mortality Rate (U5MR):

No. of deaths of children in the first 5 years of life in a certain year and locality x 1000

Midyear population of the under-five children in the same year and locality

N.B: U5 Mortality Ratio is the number of deaths of children in the first 5 years of life in a certain year and locality per 1000 live births in the same year and locality

6- Still Birth Rate and Ratio:

Still birth: is intrauterine fetal death after viability (after 22 weeks of gestation).

Stillbirth rate: the number of stillbirths per 1000 total births

Stillbirth ratio: the number of stillbirths per 1000 total live births

7- Perinatal Mortality Rate and Ratio:

Perinatal period: This period starts at the completed 22 weeks of gestation and ends at seven completed days after birth.

Perinatal Mortality Rate is the number of fetal and early neonatal deaths per 1000 total births

Perinatal Mortality Ratio is the number of fetal and early neonatal deaths per 1000 live births.

3- CAUSE SPECIFIC MORTALITY RATE:

1- Cause Specific Mortality Rate from a specific Disease:

The number of deaths of a certain disease in a certain year and locality per 100,000 populations in the same year and locality.

2- Maternal Mortality Ratio (MM Ratio):

Number of deaths of mothers due to causes related to pregnancy, labor or puerperium in a certain year and locality per 100,000 live births in the same year and locality.

3- Maternal Mortality Rate (MMR):

Number of deaths of mothers due to causes related to pregnancy, labor or puerperium in a certain year and locality per 100,000 females in the child bearing period (15-49) in the same year and locality.

4- PROPORTIONATE DEATH RATE:

It is the proportion of deaths from a specific disease (or deaths in a specific age) to total deaths in a certain year and locality. This indicator measures the severity of the disease at the community level.

5- CASE FATALITY RATE:

Number of deaths from a specific disease in a certain year and locality per 100 cases of the same disease. It measures the severity of the disease.

3- FERTILITY STATISTICS

- Crude Birth Rate (CBR)
- General Fertility Rate (GFR)
- Fecundity Rate (FR)
- Age Specific Fertility Rate (ASFR)
- Total Fertility Rate (TFR)

1- Crude Birth Rate (CBR):

$$\frac{\textit{Number of live births (year/locality)}}{\textbf{Mid Year Population in the same year \&locality}} \times 1000$$

less sensitive indicator for measurement of fertility because it relates births to the midyear population, with no consideration to the age and sex structure of the population.

2- General Fertility Rate (GFR):

The number of live births per 1000 females aged 15-49 years in a given year and locality.

It's more sensitive in fertility because it relates births more nearly to the age-sex group at-risk of giving birth (women 15-49 years of age).

3- Fecundity Rate (FR):

Fecundity rate is a more sensitive fertility indicator than the GFR, because it relates births to *Married Women in the Reproductive Age* ***(MWRA).***

4- Age Specific Fertility Rate (ASFR):

The number of live births to women in specific age interval (usually 5 years ex. 20: 25) per 1000 females in the same age interval, in a certain year and locality.

ASFR is more sensitive indicator for measurement of fertility but, it considers all females in the reproductive age (married and unmarried).

It's used to calculate the Total Fertility Rate.

5- Total Fertility Rate (TFR):

TFR is calculated by multiplying the ASFR for each group (5-year age group) by 5, then adding the seven groups together.

Age Groups	ASFR, 2008	TFR, 2008
15-19	50 x 5	250
20-24	169 x 5	845
25-29	185 x 5	925
30-34	12 x 5	610
35-39	59 x 5	295
40-44	17 x 5	85
45-49	2 x 5	10
Total fertility / 1000 Women		The sum = 3020
Total Fertility/Woman		3.0