

1<sup>st</sup> lecture:

# Health Indicators

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**Lecture objectives:**

At the end of the lecture students should be able to:

1. Recognize the concept of health indicators.
2. Define health indicators.
3. Understand uses of health indicators.
4. Classify types of health indicators and give examples of these indicators.



### What is health indicator?

- Linguistically indicator is an indication of a given situation.
- Health indicator is a variable that reflects the state of health of persons in a community. (Oxford Dictionary of Epidemiology)
- They are quantitative measures that can be used as a guide to monitor and evaluate the quality of health care. To know the health status in the whole community as if it's the thermometer that you use to measure temperature, here you use it to measure the community's health.

### Characteristics of a good indicator:

- ✓ **Valid** (applicable) – measures what it is supposed to measure.
- ✓ **Reliable** – provides same information under different observations, conditions. It means that when I repeat it, I should have the same measures.
- ✓ **Sensitive** – sensitive to changes in the situation. Should show changes in community.
- ✓ **Specific** – reflects changes only in that situation. It means that if I wanted to measure health in infants, I should select something related to infancy not other broad measures.
- ✓ **Relevant**: relevant to the community needs & problems. For examples, for a country with starvation and very high mortality rate, physical activity and exercise are not considered as relevant indicators. However, mortality rate is!
- ✓ **Realistic, applicable and feasible.**
- ✓ **Measurable and observable.**
- ✓ **Known and agreed to by the staff** whose performance is being assessed.
- ✓ **Clear and targeted to date or period.**
- ✓ **Used in assessment continuously over time**

### Uses of Health Indicators

1. Compare health status of one country with other countries or worldwide.
2. Compare health status of different areas or groups of people over time. (within the same country. and measure the trend)
3. Assessment of health care needs.
4. Proper allocation of human and non human resources according to the needs.
5. Monitoring and evaluation of health services, activities, and programs.

### Types of Health Indicators

1. Mortality indicators
2. Morbidity indicators
3. Disability indicators
4. Nutritional status indicators
5. Health care delivery indicators
6. Utilization rates
7. Social and mental health indicators
8. Environmental indicators
9. Socioeconomic indicators
10. Health policy indicators
11. Indicators of quality of life
12. Other indicators (example: risk factors)

### What Are the Leading Health Indicators?

- ✓ Physical Activity
- ✓ Overweight and Obesity
- ✓ Tobacco Use
- ✓ Substance Abuse
- ✓ Responsible Sexual Behavior
- ✓ Mental Health
- ✓ Injury and Violence
- ✓ Environmental Quality
- ✓ Immunization
- ✓ Access to Health Care.

### Mortality Rates

A mortality rate is a measure of the frequency of occurrence of death in a **defined population** during a **specified period of time**.

$$\text{Mortality rate} = \frac{\text{deaths occurring during a given time period}}{\text{size of the population among which the deaths occurred}} \times 10^n$$

### Crude Death Rate (CDR)

The crude mortality rate is the mortality rate from **all causes (no specific cause)** of death for an entire population. We usually multiply by 1000.

Crude Death Rate =

$$\frac{\text{Total number of deaths in a certain year and locality}}{\text{Estimated mid-year population (Same year and locality)}} \times 1000$$

= ... Deaths/1000 individual in the specified year and locality.

## Mid-year population

- It is important to use the population size at the midpoint of the time interval as an estimate of the average population at risk especially if:
- A denominator population is **growing or shrinking** during the period of time for which a rate is to be computed.
- E.g. If a death rate is to be calculated for the year 2012, then the population of July 1, 2012 is used for the denominator.

(MOH: Yearly statistical book)

## Crude death rate KSA

• 2000	• 6.02
• 2001	• 5.94
• 2002	• 5.86
• 2003	• 5.79
• 2004	• 2.66
• 2005	• 2.62
• 2006	• 2.58
• 2007	• 2.55
• 2008	• 2.49
• 2009	• 2.47
• 2010	• 3.34
• 2011	• 3.33
• 2012	• 3.32

Trend is generally going down

Average: 3 deaths per 1000

**Age-specific mortality rates** (U shaped curve, high mortality rate in young children and people above 65) it is very important because each group age has it's own risk factors

- ✓ An age-specific mortality rate is a mortality rate limited to a particular age group.
- ✓ The numerator is the number of deaths in that age group
- ✓ The denominator is the number of persons in that age group in the population.
- ✓ Examples of age-specific mortality rates are neonatal, post-neonatal, infant and under 5-years mortality rates.

$$\text{Age specific death rate} = \frac{\text{Number of persons dying in a certain age and a certain year and area}}{\text{Total number in the same age group in the same year and same area}} \times 1000$$

### Examples: Infant mortality rate (per 1 000 live births)

Infant mortality rate is the probability of a child born in a specific year or period dying before reaching the age of one. **(0 to 364 days)**

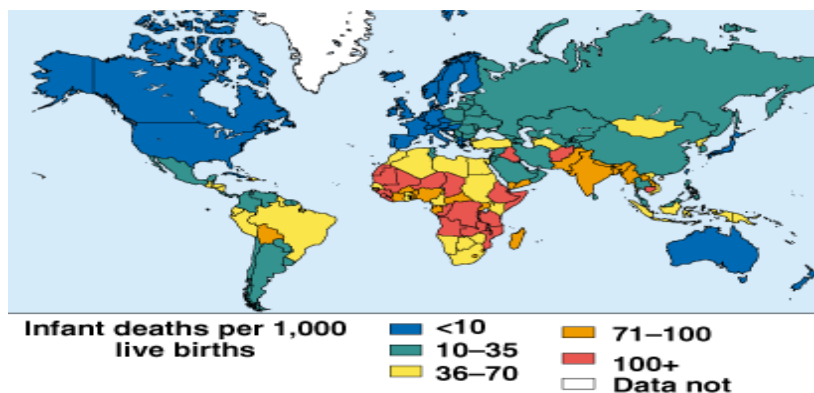
In Saudi Arabia (2006):

- ✓ both sexes 21.0
- ✓ female 20
- ✓ male 22.0 **(boys are more likely to die in the first year of life than girls)**

$$\text{Infant mortality rate} = \frac{\text{Total number of deaths from zero up to less than one year during a year and in a given locality}}{\text{Total number of live births in the same year and locality}} \times 1000$$

### Infant mortality rate in KSA

•2000	•52.9
•2001	•51.25
•2002	•49.59
•2003	•47.94
•2004	•13.7
•2005	•13.24
•2006	•12.81
•2007	•12.41
•2008	•11.94
•2009	•11.57



- States and Australia (blue): lowest rate
- Saudi (green): 25
- Africa, Somal..(red): highest rate
- It's important for the measurement of the community devolvement (socioeconomic status)

**Neonatal mortality rate (per 1 000 live births)**

The number of deaths of neonates (infants **<28 days of age**) in a calendar year, divided by number of live births in that year, multiplied by 1000.

In Saudi Arabia (2004):

- Neonatal Mortality Rate = **11**

$$\text{Neonatal mortality rate} = \frac{\text{Total number of deaths from zero up to less than 28 days during a year and in a given locality}}{\text{Total number of live births in the same year and locality}} \times 1000$$

**Post-Neonatal mortality rate (per 1 000 live births)**

Post-neonatal mortality rate is the number of deaths among infants from **28 days** up to **(before he/she completes 1 year)** 1 year of age during a given time period divided by the number of live births during the same time period multiplied by 1,000

$$\text{Post - Neonatal mortality rate} = \frac{\text{Total number of deaths from 28 days up to less than one year during a year and in a given locality}}{\text{Total number of live births in the same year and locality}} \times 1000$$

**Period of Infancy**

Neonatal (Birth, 0 - 28 day) + Post-Neonatal (28 day - 1 year) = Infancy (Birth, 0 - 1 year)

**In Saudi: Infancy (21 in 1000) – Neonatal (11) = Post-Natal (10) which considered high ...(it is because of the environment)**

**Stillbirth rate (per 1000 total births)**

- For international comparison purposes, stillbirths are defined as third trimester fetal deaths (> or = 1000 grams or > or = 28 weeks). **(Before 28 = abortion)**

- Total births: Total births is defined as the sum of live births and still births.

$$\text{Still birth rate} = \frac{\text{Number of still births during a year and in a given locality}}{\text{Total births (live births + still births) in the same year and locality}} \times 1000$$

### Still birth ratio (per 1000 total births)

Number of fetal deaths of **28 weeks of gestation or more** in certain year and locality per 1000 live births (**before 28 weeks is called abortion**)

$$\text{Still birth ratio} = \frac{\text{Number of fetal deaths of 28 weeks of gestation or more in a year and in a given locality}}{\text{Number of live births in the same year and locality}} \times 1000$$

- **rate= divided by total births, ratio= divided by life births only**

### Perinatal Mortality Rate

It is expressed as the sum number of **still births and early neonatal deaths** (less than 7 days of life) per 1000 total births (still births plus live births). (**Related to the event of delivery, it means that there is problem in the health care; maternal and child care**)

$$\text{Perinatal M.R.} = \frac{\text{No. of stillbirths} + \text{No. of early neonatal deaths in certain year and locality}}{\text{Total births (Still and livebirths) in the same year and locality}} \times 1000$$

It the best indicator of Maternal and Child Health services

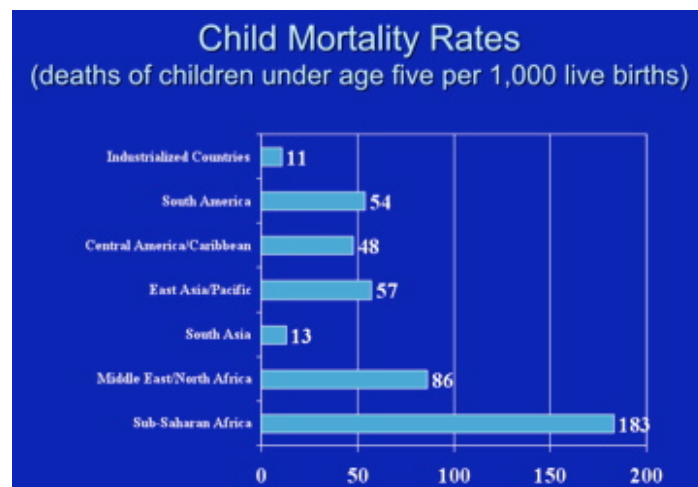
### Under-5 mortality rate (per 1 000 live births) (0 until 5)

Under-five mortality rate is the probability of a child born in a specific year or period dying before reaching the age of five.

In Saudi Arabia (2010)

$$\text{The under 5 - years mortality rate} = \frac{\text{Total number of deaths among children under 5 - years of age during a year and in a given locality}}{\text{Total number of live births in the same year and locality}} \times 1000$$

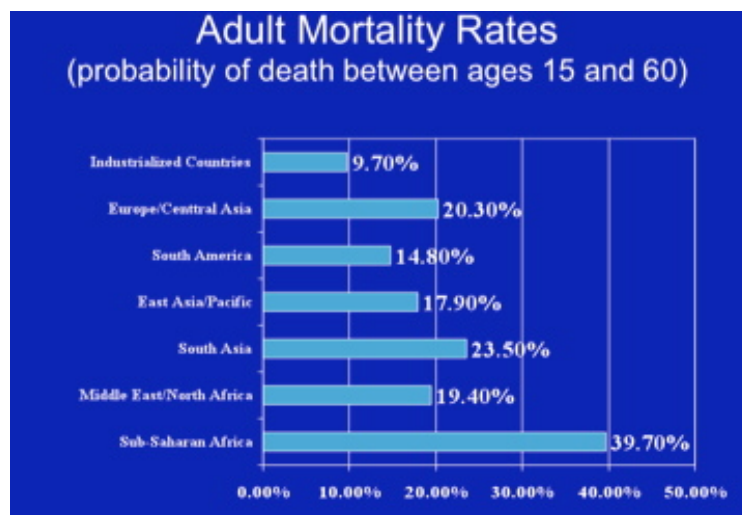
- both sexes 19.5



### Adult mortality rate (per 1000 population) (indicated mostly to non-communicable disease)

- Probability that a 15 year old person will die before reaching his/her 60th birthday.
- In Saudi Arabia (2006)
- both sexes 178
- female 136    male 205

$$\text{Adult mortality rate} = \frac{\text{Number of persons dying between 15 - 60 in a certain year and area}}{\text{Total number of population between 15 - 60 in the same year and same area}} \times 1000$$



### Maternal mortality ratio (per 100 000 live births)

The number of maternal deaths per 100 000 live births during a specified time period, usually 1 year.

- In Saudi Arabia (2010)
- MMR= 14

Maternal death is the death of a woman while pregnant or within 42 days after termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes.

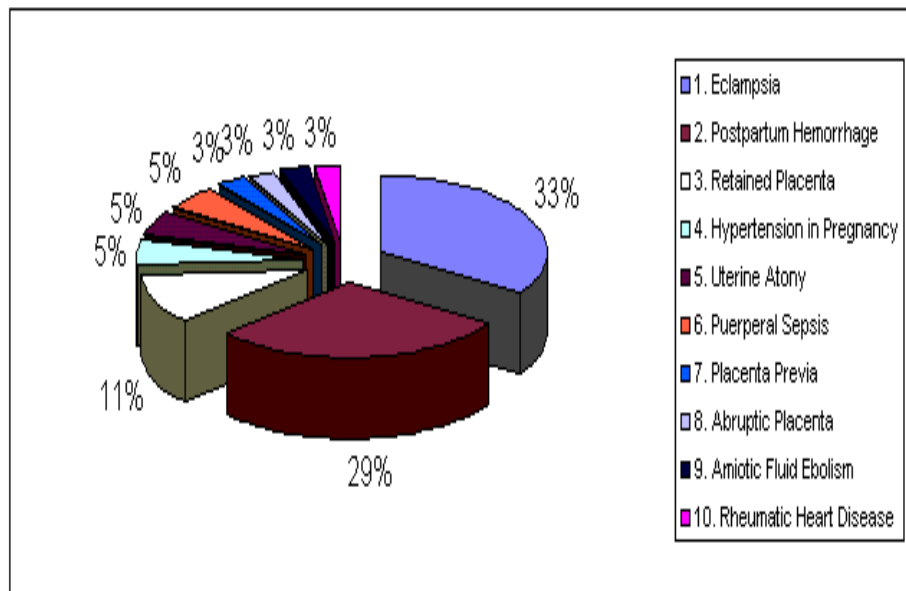
### Maternal mortality ratio (per 100 000 live births)

$$\text{Maternal mortality ratio} = \frac{\text{Number of Maternal deaths assigned to causes related to pregnancy in a given year and locality}}{\text{Number of live births in the same year and locality}} \times 100.000$$



### Maternal Mortality: Leading Causes

Percent Distribution  
2001



#### Cause-specific mortality rate

- The number of deaths attributed to a specific cause divided by the population at the midpoint of the time period multiplied by 100,000.

$$= \frac{\text{Deaths of a specific cause in a given year and locality}}{\text{Estimated mid - year population in same year and locality}} \times 100,000$$

#### Example of Cause-specific mortality rates

- Deaths due to tuberculosis (per 100 000 population)
- In Saudi Arabia (2006) =5.0

$$\text{Specific death rate due to tuberculosis} = \frac{\text{No. of deaths of TB in a certain year and locality}}{\text{Estimated mid - year population in same year and locality}} \times 100,000$$

#### Proportionate mortality rates

$$\text{Proportionate mortality} = \frac{\text{Deaths due to a particular cause}}{\text{Deaths from all causes}} \times 100$$

### Proportionate mortality rates KSA 2010

Disease Groups %

- Injury, Poisoning and External Causes 18.5
- Dis. Circulatory System 16.74
- Cond. Orig..Perinatal Period 9.05
- Dis. Respiratory System 4.09
- Neoplasms 4.75
- Infect & Parasitic Diseases 3.31
- Dis. Genitourinary System 3.09
- Congenital Anomalies 2.66
- Endocrine. Nutr. Metab Diseases 2.46
- Dis.Digestive System 1.93

### Case fatality rate (Death to case ratio)

$$\text{Case fatality rate} = \frac{\text{Total number of deaths from a certain disease in a year and in giver locality}}{\text{Total number of cases having the same disease in the same year and locality}} \times 100$$

It reflects severity and virulence of diseases

### Indicators of quality of life

- This indicator measures not only how long an individual will live, but also the high quality of life during this period.
- There are many scales that measure the health related quality of life of he individual.
- E.g. Looking after physical health, Eating a balanced diet, Freedom from anxiety, Understanding right and wrong, Access to community places...

**Reference book & page number for the lecture resource**

- Last JM, editor. Dictionary of epidemiology. 4th ed. New York: Oxford University Press; 2001
- Principles of EPIDEMIOLOGY in Public Health Practice *Third Edition* An Introduction to Applied Epidemiology and Biostatistics. Centers for Disease Control and Prevention (CDC)