TUTORIAL
Community Medicine 311

Health Indicators

Dr. Afnan Younis & A. Al Mazam
Dr Afzal Mahmood, Dr Salwa A Tayel
KSU, Department of Family & Community Medicine

Crude Death Rate

Year 2012

<u>Country X</u>

Population 30,000,000 Total Deaths 150,000

<u>Country Y</u>

Population 30,000,000 Total Deaths 180,000

Calculate Crude Death Rates for both countries

Crude Death Rate

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

Crude Death Rate = 150,000/30,000,000 x 1000

Crude Death Rate = 180,000/30,000,000 x 1000

= 5 & 6 deaths per 1000 per year, respectively

Q1. There was no epidemic in County Y in that year. What could be the reasons for this difference ?

Age specific mortality rate

In a certain Country in Year 2012

For age group: 25-34 Years; population: 5,000,000; and deaths: 200,000 within same age group

Calculate Age-specific death rate

Age specific mortality rate

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

Age-specific death rate=

200,000/5,000,000 x 1000

= 40 deaths per 1000 population per year for age group 25-34

Cause-specific death rate

In a certain Country in Year 2000,

Total population was 5,000,000;

Deaths due to (cause) injuries: 4,000

Calculate Cause-specific death rate

Cause-specific death rate

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

Cause-specific death rate= 4,000/5,000,000 x 100,000

= 80 injury deaths per 100,000 population per year

Proportional mortality ratio

Year 2000:

Country X

Total deaths from all causes was 150,000;

Deaths from cancer: 18,000

Country Y

Total deaths from all causes was 150,000;

Deaths from cancer: 15,000

Calculate Proportional mortality ratio for cancer for country X and country Y

Proportional mortality ratio

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

Proportional mortality ratio= 18,000/150,000 x 100

Proportional mortality ratio= 15,000/150,000 x 100

= 12% & 10% of total deaths per year from cancer

Q2. Both countries had same number & same types of cancers. What could be the reasons for the difference ?

Infant Mortality Rate

In a certain Country in Year 2000,

Number of live births was 325,000;

infant deaths: 1,750

Calculate Infant Mortality Rate

Infant Mortality Rate

$$\text{Infant mortality rate} = \frac{\text{Total number of deaths from zero up to less than one year during a year and in a given locality}}{\text{Total number of live births in the same year and locality}} x1000$$

Infant Mortality Rate = 1,750/325,000 x 1000

= 5.4 infant deaths per 1000 live births per year

Perinatal Mortality Rate

In a certain Country in Year 2000,

Still Birth (Fetal deaths): 3,250;

Early Neonatal Deaths: 5,750;

Number of live births: 475,000

Calculate Perinatal mortality rate

Perinatal Mortality Rate

$$Perinatal\ M.R. = \frac{No.of\ stillbirths + No.of\ early\ neonatal\ deaths\ in\ certain\ year\ and\ locality}{Total\ births\ (Still\ and\ livebirths)\ in\ the\ same\ year\ and\ locality} X1000$$

Perinatal mortality rate=

(3,250+5,750)/(475,000+3,250) x 1000

= 18.8 perinatal deaths per 1000 Total births

Neonatal Mortality Rate

In a certain Country in Year 2000,

Number of deaths at <28 days was 2,750;

number of live births: 325,000

Calculate Neonatal mortality rate?

Neonatal Mortality Rate

$$\text{Neonatal mortality rate} = \frac{\text{Total number of deaths from zero up to less than 28 days during a year and in a given locality}}{\text{Total number of live births in the same year and locality}} x1000$$

Neonatal mortality rate= 2,750/325,000x1000

= 8.5 neonatal deaths per 1000 live births

Maternal Mortality Ratio

In a certain Country in Year 2000,

Deaths due to maternal causes: 275,

Number of live births: 1,750,000.

Calculate Maternal Mortality Ratio

Maternal Mortality Ratio

$$\text{Maternal mortality ratio} = \frac{\text{Number of Maternal deaths asigned to causes related to pregnancy in a given year and locality}}{\text{Number of live births in the same year and locality}} \times 100{,}000$$

Maternal mortality ratio= 275/1,750,000 x 100,000

= 15.71 maternal deaths per 100,000 live births per year

Q3. What do you think why the IMR is calculated for every 1000 live births and MMR for every 100000 live births ?

Frequently used measures of mortality

Measure	Numerator (x)	Denominator (y)	Expressed per number at risk (10^n)
Crude Death Rate	total number of deaths reported during a given time interval	Estimated mid-interval population	1,000 or 100,000
Cause-specific Death Rate	# deaths assigned to a specific cause during a given time interval	Estimated mid-interval population	100,000
Proportional Mortality	# deaths assigned to a specific cause during a given time interval	Total number of deaths from all causes during the same interval	100 or 1,000
Death-to-Case Ratio	# deaths assigned to a specific disease during a given time interval	# new cases of that disease reported during the same time interval	100
Neonatal Mortality Rate	# deaths under 28 days of age during a given time interval	# live births during the same time interval	1,000
Postneonatal Mortality Rate	# deaths from 28 days to, but not including, 1 year of age, during a given time interval	# live births during the same time interval	1,000
Infant Mortality Rate	# deaths under 1 year of age during a given time interval	#l live births reported during the same time interval	1,000
Maternal Mortality Rate	# deaths assigned to pregnancy-related causes during a given time interval	# live births during the same time interval	100,000

Summary

- Rates whose denominators are total population:
  - Crude mortality rate (crude death rate)
  - Crude Birth rate (crude Birth rate)
  - Cause-specific mortality rate

- Rates whose denominators are live births:
  - Infant mortality rate
  - Neonatal mortality rate
  - Postneonatal mortality rate
  - Under 5 mortality rate
  - Still birth ratio
  - Maternal mortality ratio

Questions for Discussion

- Question 1: Crude Death Rate Differences across countries
  - There could be many reasons. Important ones include (1) different demography for example more elderly in one country (2) inadequate public health, so less prevention and more people suffer disease and death (3) Ineffective and poor quality health care. In that case even when the disease are same in number and types there could be high death rates. (4) Incorrect data. One country may not have reported all deaths.

- Question 2: Difference between proportionate cancer mortality across countries if the type and number of cancers are the same.
  - Again, there could be many reasons. Important are (1) Public Health Screening is effective in one country and cancers are identified in early stages and for that reason less deaths. (2) People have less knowledge and awareness in one country and people may not use early detection and screening services. (3) Cancer related curative and rehabilitative care may be less effective in one country

- Question 3. What do you think why the IMR is calculated for every 1000 live births and MMR for every 100000 live births.
  - These rates are calculated according to global conventions where each and every locality uses the same constant to make these rates comparable across communities and countries. Whether the constant is 100, 1000 or 1000 depends upon the relative frequency of the event. Maternal deaths are relatively fewer.