

Topics to be discussed

1. Crude Death Rate
2. Age Specific Death Rate
3. Maternal Mortality Ratio
4. Mortality in early life
5. Proportional Mortality by cause
6. Proportional Mortality by age
7. Specific cause of death rate
8. Vital index

1. Crude Death Rate (CDR)

- Defined as the total number of deaths in a calendar year per 1,000 *mid-year estimated population* (approximation to the average population “exposed to risk” of death during the year)

$$\text{CDR} = \frac{D}{P} \times K$$

D= total number of deaths registered during the calendar year

P = total mid-year estimated population or the total population of the middle of the year i.e. as on 1st July

K = a constant usually taken as 1,000

1. Crude Death Rate (CDR)

Advantages

- Shows levels of mortality in entire population (usual index of mortality found in year books and general statistical publications)
- Its meanings can be communicated to the general public
- Easily and quickly computed
- Even where a detailed analysis is contemplated, CDR often gives a preliminary indication of the level or trend of mortality.

1. Crude Death Rate (CDR)

Limitations

- Mixes together many population groups whose mortality varies widely whereas the major results of mortality study have come from examinations of these components separately by means of more detailed analysis.
- Mixes those elements indiscriminately, in the form of an average.
- Weakness for international comparisons is that it makes no allowance for differential age and sex compositions

2. Age Specific Death or Mortality rate (ASDR) or (ASMR)

- Defined as the number of deaths of population of the particular age or age group during a year (D_x) per 1,000 of the mid-year estimated population at that age or age group (P_x).

$$\text{ASDR} = \frac{D_x}{P_x} \times 1,000$$

- **Advantageous** to prepare these rates separately for males and females “age and sex specific death rates”
- The only mean of calculation of age specific death rate that is unaffected by the age composition of a population

3. Maternal Mortality Ratio (MMR)

Maternal Deaths

- defined as “the death of a woman while **pregnant or within 42 days of termination of pregnancy**, irrespective of the duration and site of pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes”.
- Risk of dying from causes associated with childbirths is measured by MMR

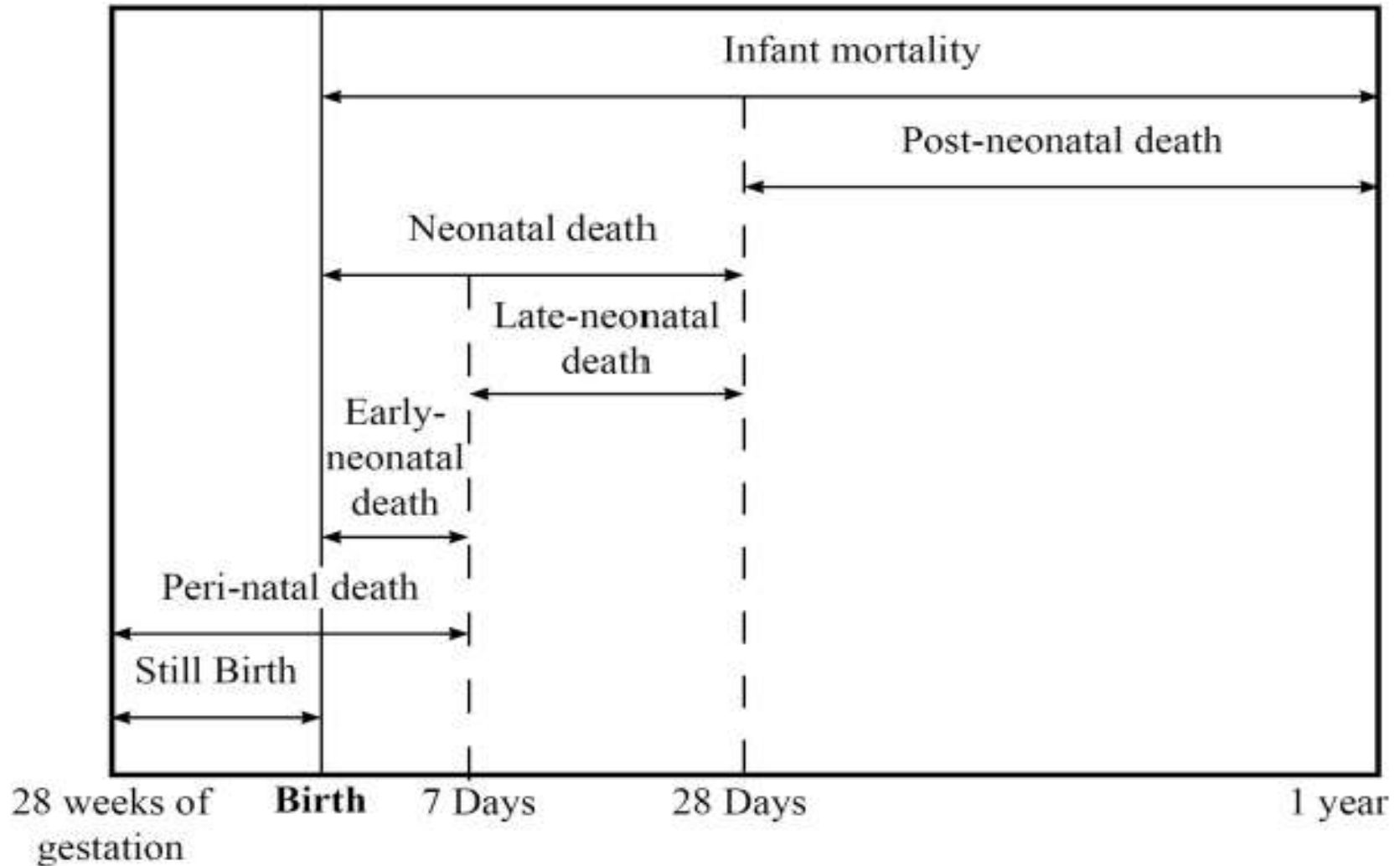
3. Maternal Mortality Ratio (MMR)

Maternal mortality ratio

- defined as the No: of deaths from puerperal causes per 1000 live births.
- MMR computed by this convention is only a rough measure of the puerperal risk, death related to live births instead of pregnancies

$$\text{MMR} = \frac{\text{No: of deaths from puerperal causes in a given population in a given year}}{\text{No: of LBs registered in the same population in the same area in the same year}} \times 1,000$$

4. Mortality in Early Life



Infant Mortality Rate (IMR)

- Mortality rates among infants is of special significance: one of the most sensitive indexes of health conditions of the general population.
- IMR is calculated as a ratio of the number of deaths of infants under 1 year of age to the number of live births occurring in an area during a given year.
- This is usually multiplied by 1,000 and the IMR is expressed as a rate per 1000 live births.

Infant Mortality Rate (IMR)

Method (1) Conventional Method

$$\text{IMR} = \frac{\text{No: of deaths of infants } \textit{under 1 year} \text{ of age among a population of a given area during a year}}{\text{No: of live births registered among the same population of the same area during the same year}} \times 1,000$$

$$\text{IMR} = \frac{\text{No: of infant deaths of infants for (178) towns in 1974}}{\text{No: of live births registered for (178) towns in 1974}} \times 1,000$$

for (178) towns

Infant Mortality Rate (IMR)

Year	Live Births	Infant Deaths	
Year 1	B_1	D_1'	D_1''
Year 2	B_2	D_2'	D_2''
Year 3	B_3	D_3'	D_3''

$$\text{IMR} = \frac{(D_2'' + D_2')}{B_2} \times K$$

Notes: the births and infant death do not all represent the same cohort

Infant Mortality Rate (IMR)

Year	Live Births	Infant Deaths	
Year 1	B_1	D_1'	D_1''
Year 2	B_2	D_2'	D_2''
Year 3	B_3	D_3'	D_3''

Method (2) Numerator Adjustment Method

$$IMR = \frac{D_2''}{B_1} + \frac{D_2'}{B_2} \times K$$

- Very often not known exactly which portion of a year's deaths belongs to each of the 2 birth cohorts.
- 2 portions may be separated approximately according to the data of another population or to some other data of same population

Infant Mortality Rate (IMR)

Year	Live Births	Infant Deaths		Infant Deaths
Year 1	B ₁	D ₁ '	D ₁ ''	D ₁
Year 2	B ₂	D ₂ '	D ₂ ''	D ₂
Year 3	B ₃	D ₃ '	D ₃ ''	D ₃

Method (2) Numerator Adjustment Method

$$IMR = \frac{fD_2}{B_1} + \frac{(1-f)D_2}{B_2} \times K$$

- f may be assigned an arbitrary value of **0.30** without danger of very serious distortion of the mortality rate

Infant Mortality Rate (IMR)

Year	Live Births	Infant Deaths		Infant Deaths
Year 1	B_1	D_1'	D_1''	D_1
Year 2	B_2	D_2'	D_2''	D_2
Year 3	B_3	D_3'	D_3''	D_3

Method (3) Denominator Adjustment Method

$$\text{IMR} = \frac{D_2}{fB_1 + (1-f)B_2} \times K$$

Infant Mortality Rate (IMR)

Year	Live Births	Infant Deaths		Infant Deaths
Year 1	B ₁	D ₁ '	D ₁ ''	D ₁
Year 2	B ₂	D ₂ '	D ₂ ''	D ₂
Year 3	B ₃	D ₃ '	D ₃ ''	D ₃

Method (4) Average Method

$$\text{IMR} = \frac{D_1 + D_2 + D_3}{B_1 + B_2 + B_3} \times K$$

Perinatal Mortality Ratio and Perinatal Mortality Rate

- Defined as the sum of the stillbirths (late foetal deaths) and the infant deaths under 1 week of age i.e. the first 7 days of life.

Perinatal Mortality Ratio

$$\text{PMR} = \frac{\text{No: of } \textit{SBs + deaths under 1 week} \text{ of age among a population in a year}}{\text{Number of LBs in the same population in the same year}} \times 1,000$$

Perinatal Mortality Ratio and Perinatal Mortality Rate

Perinatal Mortality Rate

$$\text{PMR} = \frac{\text{No: of } \textit{SBs + deaths under 1 week} \text{ of age among a population in a year}}{\text{Number of } \textit{LBs and SBs} \text{ in the same population in the same year}} \times 1,000$$

Early Neonatal Mortality ratio

- Defined as the number of deaths of infants under 1 week during a year per 1,000 live births during the same year

$$\text{Early neonatal mortality ratio} = \frac{\text{No: of infant *deaths of under 1 week* of age among a population in a year}}{\text{Number of LBs in the same population in the same year}} \times 1,000$$

Late Neonatal Mortality ratio

- Defined as the number of deaths of infants at 7 to 28 days of age during a year per 1,000 live births during the same year

Late
neonatal =
mortality
ratio

No: of infant *deaths at 7 through 28 days* of age
among a population in a year

Number of LBs in the same population in the same
year

X 1,000

Post-Neonatal Mortality ratio

- Defined as the number of infant deaths at 4 to 51 weeks of age or 1 through 11 months of age during a year per 1,000 live births during the same year

$$\text{Post neonatal mortality ratio} = \frac{\text{No: of infant *deaths at 4 through 51 weeks* of age among a population in a year}}{\text{Number of LBs in the same population in the same year}} \times 1,000$$

Late fetal death rate or Still birth rate

- Late fetal death rate is the number of *fetal deaths with stated or presumed gestation of 28 weeks or more* divided by the sum of live births plus late fetal deaths, per 1,000 live births plus late fetal deaths. It is also known as Still Birth Rate.

$$\text{Still birth ratio} = \frac{\text{No: of infant } \textit{deaths of at 7 through 28 days} \text{ of age among a population in a year}}{\text{Number of } \textit{LBs + SBs} \text{ registered in same population in the same year}} \times 1,000$$

Late fetal death ratio or Still birth ratio

$$\text{Still birth ratio} = \frac{\text{No: of infant deaths of at 7 through 28 days of age among a population in a year}}{\text{Number of LBs registered in same population in the same year}} \times 1,000$$

Comparison of Still birth ratio and Still birth rate

Still birth ratio	Still birth rate
Only LBs in the denominator	Both SB & LBs are included
Expressed as 1,000 LBs	Expressed as 1,000 total births
Higher than still birth rate	Lower than still birth ratio
Used officially by vital statistics division, CSO, Myanmar	Not used
Internationally, comparable	Not comparable

4. Proportional Mortality by Cause

$$\text{Proportional cause mortality} = \frac{\text{Deaths due to any cause } i \text{ in a year}}{\text{Total deaths from all causes in a year}} \times 1,000$$

- Its use is generally limited to indicate the relative importance of a particular cause (i) of death

5. Proportional Mortality by Age

Proportional mortality for any age group of all ages death =
$$\frac{\text{Deaths at any age group } i \text{ in a year}}{\text{Deaths of all ages in the same year}} \times 1,000$$

- Its use is generally limited to indicate the relative importance of a particular cause (i) of death

6. Specific cause of death rate

$$\text{Specific cause of death rate} = \frac{\text{Deaths due to some particular cause}}{\text{Total mid-year estimated population}} \times 100,000$$

- These ratios also referred to ***“cause age specific death rate”***

7. Case fatality rate

$$\text{CFR} = \frac{\text{No of deaths assigned to a specific disease}}{\text{Number of cases of the disease}} \times 1000$$

- It predicts the risk of dying if the disease is contracted.

8. Vital Index

- A term coined by Raymond Pearl, is the ratio of the total number of births to the total deaths

$$\text{Vital Index} = \frac{\text{Total no: of birth of a population in a year}}{\text{Total number of deaths of a population in the same year}} \times 100$$

- Indicate the extent to which the forces of natality exceeds that of mortality at a given time (a year)

Calculate IMR by four different methods

Years	Births	Deaths
1	191998	11322
2	197003	9835
3	198016	9769

Thank you!