

MORTALITY

Mortality means death. Death is defined as "the permanent disappearance of all evidence of life at any time after birth has taken place."¹ Thus death does not include abortions and still births.

The study of causes and measures to reduce mortality are very important in demography which can be analysed in terms of the death rates. The following are the methods of measuring mortality rate:

Crude Death Rate (CDR)

The crude death rate is the number of deaths per 1000 people in a year in relation to the total population. It can be calculated as follows:

$$\text{Crude Death Rate} = \frac{D}{P} \times K$$

where

D = Total registered deaths in a year

P = Total mid-year population of that year

K = 1000

In other words,

$$\text{CDR} = \frac{\text{Total deaths in a year}}{\text{Total mid-year population}} \times 1000$$

If the total mid-year population of an area is 50,000 and the number of deaths is 500, then

$$\text{CDR} = \frac{500}{50,000} \times 1000 = 10.$$

It indicates that the crude death rate is 10 per 1000 people.

It is a simple method to measure the death rate because it takes only the data of total mid-year population and total deaths. But it has certain defects. *First*, it combines the death rates of different age groups. So it fails to give a correct measure of mortality because in less developed countries infant mortality rates, maternal death rates and old people death rates are high. *Second*, it is also not possible to make inter-regional comparisons in a country due to variations in death rates, as noted above. *Third*, the sources of data for population and deaths are different. The population data are based on the census and that of deaths on registration authorities. This is unscientific.

In order to overcome the first two limitations, age specific death rate and infant mortality rate are calculated.

Age Specific Death Rate (ASDR)

As the death rates in the case of infants and old people are high and that of

1. UN, *Principles of a Vital Statistical System*, 1950.

young people are low, it is advisable to classify people under different categories according to their age groups. The age specific death rate is calculated as under:

$$\text{Age Specific Death Rate} = \frac{D_A}{P_A} \times K$$

where,

D_A = Number of deaths in a particular age group

P_A = Mid-year population of the age group

$K = 1000$

In other words,

$$\text{ASDR} = \frac{\text{No. of deaths in a specific age group of population}}{\text{Total mid-year population in that age group}} \times 1000$$

While calculating the age specific death rate, the age group of 5 year interval is taken such as 0-4, 5-9, 10-14 years, etc.

Cause Specific Death Rate (CSDR)

Death is a biological event and may occur due to any reason. The causes responsible for death may be accident, injury, child birth, pregnancy, fever, specific diseases of childhood and old age, etc. The formula for measuring cause specific death rate is

$$\text{CSDR} = \frac{D_C}{D} \times K$$

where,

D_C = Number of deaths due to a particular cause in a year

D = Total number of mid-year deaths

$K = 1000$

Data regarding deaths due to different causes are helpful in taking preventive measures against respective factors for death. In addition, we can know the causes of sex-wise and group-wise deaths, and of males and female deaths in particular age groups.

Infant Mortality Rate (IMR)

A child in the age group of 0-1 is called an infant. According to Barclay, "Infants are defined in demography as an exact age group, namely, age 'zero', or those children in the first year of life, who have not yet reached age one." The formula for computing infant mortality rate is

$$\text{Infant Mortality Rate} = \frac{D_I}{B} \times 1000$$

where,

D_I = Number of deaths among infants registered during the year

B = Number of registered births in the same year

$K = 1000$

In other words,

$$\text{Infant Mortality Rate} = \frac{\text{No. of deaths among infants}}{\text{No. of births}} \times 1000$$

If the number of registered deaths among infants in a specified year is 5800 and the number of registered births in the same year is 72000, then

$$\text{Infant Mortality Rate} = \frac{5,800}{72,000} \times 1000 = 80.5.$$

This indicates that 80.5 infants per 1000 newly born babies died in that particular year.

The problem in measuring the infant mortality rate in underdeveloped countries is that people normally do not report infant deaths, still births and abortions. Another problem is that an infant born in the previous year might have died in the computing year. This measure does not take into account such problems.

However, the above method can also be used to calculate maternal death rate.

Causes of Infant Mortality. Many factors are responsible for infant mortality. They are endogenous and exogenous factors. The former relate to biological and the latter to socio-economic, cultural and environmental factors. We discuss them briefly as under:

(1) **Endogenous Factors.** These are biological factors relating to the age of the mother, the order of pregnancy or birth, period of spacing between two births, pre-mature birth, weight of infant at birth, etc. These factors lead to deaths of infants who do not complete 4 weeks of life. Since they are related to the formation of foetus in the womb, they are called *neo-natal mortality rates*. Neo-natal deaths occur if the mother is of low age, the baby is born prematurely, the weight of the baby is very low, the spacing between two babies is hardly one year, etc.

(2) **Exogenous Factors.** These factors relate to *post-neo-natal deaths* of those infants who die between 28 days and one year of life. They are caused by diseases of respiratory, circulatory and digestive systems; lack of medical facilities; malnutrition; insanitary conditions, illegitimacy, etc.

Standardised Death Rate (SDR)

The standardised death rate is computed to compare the death rates of two different populations. According to Thomson and Lewis, "The standardised death rate, based on age specific death rates, supplies a simple and accurate basis for comparing the death rates of different populations."

Standardised death rates are of two types: direct and indirect.

Direct Standardised Death Rate. In the case of direct standardisation death rates, there are two types of procedures for computing them. One is to apply different age specific rates to standard population. The second method is to take

the population distribution of any locality as the standard population and to multiply it with the age specific death rates. The following formula is applied:

$$\text{Standardised Death Rate} = \frac{P_S \times D_L}{P_S}$$

where,

P_S = Standard population of a locality

D_L = age specific death rate of local population

To take an example. Suppose there are two towns A and B with the following data on population and age specific death rates:

Age Group (years)	Town A		Town B	
	Population	Death Rate	Population	Death Rate
0-5	10,000	30	11,000	25
6-15	20,000	25	24,000	24
16-50	60,000	20	40,000	30
Above 50	30,000	15	35,000	20
	1,20,000		1,10,000	

As per the above formula, the standardised death rate of town A is

$$\begin{aligned} \text{SDR} &= \frac{(10,000 \times 30) + (20,000 \times 25) + (60,000 \times 20) + (30,000 \times 15)}{10,000 + 20,000 + 60,000 + 30,000} \\ &= \frac{3,00,000 + 5,00,000 + 12,00,000 + 4,50,000}{1,20,000} \\ &= \frac{24,50,000}{1,20,000} = 20.42 \end{aligned}$$

The standardised death rate of town B is

$$\begin{aligned} \text{SDR} &= \frac{(11,000 \times 25) + (24,000 \times 24) + (40,000 \times 30) + (35,000 \times 20)}{11,000 + 24,000 + 40,000 + 35,000} \\ &= \frac{2,75,000 + 5,76,000 + 12,00,000 + 7,00,000}{1,10,000} \\ &= \frac{27,51,000}{1,10,000} = 25.1 \end{aligned}$$

On the basis of these standardised death rates, it can be concluded that the death rate in town B is higher than in town A.

Indirect Standardised Death Rate. In the case of indirect standardised death

rate, the age specific death rate of a locality is taken as the standard for computation and the following formula is applied

$$\text{Indirect Standardised Death Rate} = \frac{P_L \times D_S}{P_L}$$

where,

P_L = Population of the locality

D_S = Standardised age specific death rate

Death Rate by Cause or Cause Specific Death Rate

Deaths may be caused by malaria, AIDS, typhoid, accident, etc. Such cause specific deaths can be computed with the following formula

$$\text{Cause Specific Death Rate} = \frac{D_C}{P} \times K$$

where,

D_C = Number of deaths due to a particular cause in a year

P = Mid-year population in that year

K = 1000

On the basis of the death rate due to a particular cause, the authorities can compare the death rates of different places and take remedial measures.

FACTORS AFFECTING MORTALITY

Mortality or death is affected by a variety of factors. They may be biological, physiological, environmental, etc. From the demographic view point, mortality is related to the age and sex of an individual. There is infant mortality, mortality of woman at the time of delivery, mortality of man due to cancer of the prostate, etc. In its *Manual on the International Statistical Classification of Causes of Death*, the World Health Organisation (WHO) places them under the following five categories:

1. Infectious, parasitic and respiratory diseases
2. Cancer
3. Diseases of the circulatory system
4. Violence and accidents
5. All other causes such as diseases of the digestive system.

With the exception of category 4 when deaths occur due to violence and accidents, deaths in the remaining categories are being reduced with the advancement of medical science in both developed and developing countries.

In the past, the mortality rate was high because of food shortages and famines, spread of epidemics, insanitary conditions, and long and recurrent wars.

After the Second World War, the mortality rates have declined so much in developed countries along with birth rates that the problem of extremely small growth rate of population has arisen in a number of countries like France, Germany, Japan, etc. This has been due to rapid advancement in medical sciences

in controlling all types of diseases through life saving drugs and surgery.

Other factors responsible for low mortality rates in developed countries have been cleanliness of person and home, hygienic surroundings, pollution control, social security measures, balanced food, health consciousness, etc.

Causes of Decline in Mortality Rates in Developing Countries

Mortality rates have declined considerably in developing countries in recent years due to the following reasons:

(1) **Disease Control Medicines.** By importing drugs from developed countries, the developing countries have been able to control such mass killers as typhoid, malaria, small pox, pneumonia, plague, etc. The World Health Organisation, in particular, has been helpful in eradicating malaria, small pox, polio, TB, etc. to a considerable extent.

(2) **Public Health Programmes.** Developing countries with the assistance of WHO have been adopting public health programmes for keeping the environment clean and free of pollution. Governments have been following strict pollution control measures. Consequently, deaths due to respiratory diseases have declined.

(3) **Medical Facilities.** Medical facilities have not only increased but also improved in such countries. The number of doctors and trained nurses has increased considerably. Besides the spread of government hospitals in urban centres and primary health centres in rural areas, private hospitals and nursing homes are fast coming up which provide the best of medical facilities comparable to those in advanced countries. As a result, the number of deaths are on the decline.

(4) **Spread of Education.** With the spread of education, people are becoming rational. They are giving up superstitious and fatalist attitude towards life. They have started taking keen interest in their own health and that of their children. They have become health conscious. They take nutritive and balanced diet, do exercise, go for a walk and even to a gym. All these have brought down the death rate.

(5) **Status of Women.** In almost all the developing countries, the status of women in society has increased with spread of literacy among them. Women now understand the importance of cleanliness and hygiene and take better care of their children's health. Consequently, the infant mortality rate is on the decline. Early marriage of girls has been banned in the majority of developing countries, thereby reducing the death rate at the time of the first child.

(6) **Food Supply.** With the increase in food supply in the majority of developing countries and through imports of foodgrains from developed countries like the USA and Australia, famines have been controlled. This has resulted in reduction of death rates in such countries.

(7) **Life Expectancy.** Over the years, life expectancy has increased in developing countries due to increase in economic growth rates, rise in per capita incomes, improved health, medical, sanitation facilities, etc. Consequently, the