

## ANALYSIS OF DEMOGRAPHIC CHARACTERISTICS OF THE DEATHS AND LIFE EXPECTANCY IN RURAL HOSPITAL BALLABGARH, DISTRICT OF HARYANA, INDIA

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**Abstract:** - The present study deals that the population served by the All-India Institute of Medical Sciences, Ballabgarh and other Hospitals of the state (Haryana) has a better health profile than most populations in the country. This is a clear and positive indicator that the life expectancy at birth for the males, females and both was 66.2, 66.0 and 66.0 years respectively during the year 2006. This is much higher than the national life expectancy and higher than the targeted life expectancy at birth of 70 years for both sexes, by A.D 2020. To raise the standard of life of people at large in terms of higher expectation of life at birth, lower infant mortality rate etc. different emphasis should be put up on the enhancement of socio-cultural factors of life of the people with different socio-cultural, economic or other factors to their own profession.

**Keywords:** *Crude Death Rate, Crude Birth Rate, Infant Death Rate and Neonatal Death Rate*

**Introduction:** - The present study deals with the demographic characteristics of deaths and life expectancy in rural hospital Ballabgarh, Haryana India. The most successful efforts of demographic measurements have been made in the study of mortality. Mortality is traditionally represented by the life table. The life table is a life history of a hypothetical group, or cohort, of people, as it is diminished gradually by deaths. The record begins at the birth of each member, and continues until all have died. It is possible to construct a life table beginning at any age, and not just at birth. Most life tables, however, follow the cohort from birth to the death of all its members. Life table technique has been extensively used to analyses demographic data relating to waiting time for birth, marriage, migration, mortality etc. In the years (Cox and Oakes, 1984; Elandt Johnson and Johnson 1980; Espenshade. 1983; Pathak and Ram, 1989; Rodriguez and Hobcraft, 1980; Rogers and Willekens, 1986). The working group of the Planning Commission on population policy in India (1980) recommended that efforts should be directed at reducing the crude death rate to 9 per 1,000 populations, and to increase the life expectancy at birth of both sexes to 64 years, by A.D. 2000. Ballabgarh block in Haryana has 99 villages with a population of 1.4 lakhs (1986). The area of the block is 370 sq km (south-east and south-west). The town of Ballabgarh is 35 km from New Delhi on the Delhi- Agra highway. The Comprehensive Rural Health Services Project of the All India Institute of Medical Sciences caters to the health needs of 30 villages in this block, covering a total population of 56,500 (1980) i.e. 43.5 percent of the total block population. The area covered by the project is 160 square kilometers [south-east and south-west). The project was started in 1966 with the collaboration of Haryana state and the Rocke Feller Foundation. In 1966, the crude birth rate and the crude death rate of this block was 52.9 and 16.1 per 1.000 population, respectively. The All India Institute of Medical Sciences established a 53-

bed hospital at Ballabgarh town. This hospital serves as a referral institution for three- primary health centers and 14 extension health centers (sub-centers) in this area. The present study was undertaken to evaluate the changes in the health profile after 20 years of existence of the project. The project has two primary health centers (PHCs) in the block for the 30 villages at Dayalpur and Chhainsa. There are six extension health centers, each covering a population of 5,000-9,000 and including 3-5 villages. One male and one female multipurpose worker have been posted at each of these centers. Each household in the area is visited once monthly by the male and female workers, in accordance with the bet programme set in advance for the entire year. The for sale worker renders all services related to maternal and child health while the mate worker to responsible for activities the detection and recording of vital events (births, deaths, migration), control of communicable diseases, family welfare, Immunization, etc. He also records the morbidity pattern of the family since his last visit. Both the workers are supervised by a Field Supervisor and a Lady Health Visitor, who are in turn supervised by the Medical officers at the PHC and the project headquarters.

In the project area, all the households have been identified on the basis of 'Chulhas (cooking) i.e. all the persons living together and eating from a common kitchen are classified as members of the same household. Details of the families, such as caste, names of the members, relation to the head of the household, age, literacy status, sex, occupation etc. are recorded on the family demographic record. A yearly census check is also carried out, and the information is updated in relation to births, deaths, occupational changes, educational changes etc. Births and deaths are also entered in the respective registers and the birth and death cards. All the cards are subsequently verified by the Field Supervisor and the doctors. The annual census check provides the denominators for the calculation of some of the important health indicators, i.e., crude birth rate, crude death rate, neonatal mortality rate, Infant mortality rate, maternal mortality rate, general fertility rate, net reproduction rate and proportional mortality rate etc.

### **Materials and Methods:-**

Four hundred thirty-one deaths recorded in 2006, in the project area were studied as also the total deaths since the inception of the project. Age, sex, Caste, seasonal variation of births and deaths and vital events recorded by the village choukidar, the cause of death and the life expectancy at birth of all ages, in the different age groups (by abridged method for both sexes separately), were analyzed. This analysis enabled us to highlight the areas requiring further attention. In other words, the mortality experience would serve to reorient the service programme and also helps in the teaching activities. The objective of this research is to present a short description of life table methodology to analyses the data. Statistical data are the raw materials of demography. They show how many people or events were found at a certain date of period. This is an actual or "absolute" number. This paper describes the uses that are made of relative numbers and explain some of the reasons why certain data are combined with certain others. It also describes here to compare a few conventional kinds of measurement. The definitions and details of these calculations are as follows.

**Crude Death Rate** is a ratio of the total registered deaths of some specified year to the total population, multiplied by 1.000. It is computed as follows:-

$$\frac{D}{P} K$$

Where, D is the number of deaths registered during the calendar year (January 1<sup>st</sup> to December 31<sup>st</sup>), P is the total population at the middle of the year (as on 1<sup>st</sup> July), and K is 1,000.

The **Crude Birth Rate** is a ratio of total registered live births to the total population, also in some specified year, also multiplied by 1000. It is computed as follows:-

$$\frac{B}{P} K$$

Where, B is the total number of births registered during the calendar year, P is the total population at the middle of the year (as on 1<sup>st</sup> July), and K is 1,000.

**Infant Death Rate:-** Infants are defined in demography as an exact age group, namely age "zero" or those children is the first year of life, who have not yet reached age one. The Infant Death Rate is a ratio of registered deaths of infants during a year to the live births registered during the same year.

$$\frac{d_0}{P} K$$

Where,  $d_0$  is the number of deaths below age one registered during the year. B is the number of live birth, registered during the same year. K is 1,000.

**Neonatal Death Rate:-** Neonatal are defined in demography as an exact age group, namely Age 70-28 days or those children in the first month of life, who have not yet completed one month of age. The Neonatal Death Rate to a ratio of registered deaths of neonatal period during a year to the live births registered during the same year:

$$\frac{d_0 (0-28 \text{ days})}{B} K$$

Where,  $d (0-28)$  is the number of deaths below one month registered during the year, B is the number of live births registered during the same year, K is 1,000.

The span of human life in any society has greatly increased over the last few decades. This striking gain of additional years of life is undoubtedly a clear indication of steady Improvement of quality of human life.

#### **Assumptions in Life Table:-**

1. It starts with a Cohort of 100.000 births called a Radix. This choice of number is only by convention, one can start with any size of Cohort.

2. Only change in this number over the years is by death at different ages. It is closed to migration.
3. Since the life table works with a fixed size Cohort which starts from age 0 and all members of Cohort die during the process of passing from one age to the other, this model is called stationary model.
4. The number of deaths in an age group is assumed to be uniform over the period except the ages 1 and 2.

**The Entire Life Table:-**The life table represents very clearly the effects of mortality by age on the size of a cohort. "Age of death is no longer regarded as an event that has to be accepted as in the lap of the Gods or in the grip of fate. The major effect of scientific discovery in the field of health and disease has revealed that age of death is an outcome of a combination of genetic and environmental factors which can be modified" (Hetzal, 1986). Mortality data have been used extensively for planning and decision making on priorities for health services in the past and are likely to continue to make a major contribution in the future (Charlton, 1986). Keeping this in mind, in the present study an attempt has been made to construct life expectancy in Rural Health Project Ballabgarh (Haryana) by using the Abridged life table method.

**Life Table Columns:** - The basic column in life table is  $q_x$  (probability of death between ages X and X+1) or  $p_x = 1 - q_x$ , (probability of survival between ages X and X+1). In the case of "Abridged Life Table", these terms are defined as

$${}_nq_x = \text{Probability of death between ages X and X+n.}$$

$${}_np_x = 1 - {}_nq_x = \text{Probability of survival between age X and X+n.}$$

Once this column of  $q_x$ , or  ${}_nq_x$  is available, rest of the column can be computed by starting with a Radix of 100,000 births.

The Radix column is denoted by  $l_x$ , and the column corresponding to survival function is  ${}_np_x$  or  ${}_nq_x$ . The other columns are  ${}_nL_x$ ,  $T_x$  and  $e_x$ .

When the life table is a complete life table, the columns are  $l_x$ ,  $q_x$ ,  $L_x$ ,  $T_x$  and  $e_x$ . In case of "Abridged Life Table, these columns became  $l_x$ ,  ${}_nq_x$ ,  ${}_nL_x$ ,  $T_x$  and  $e_x$ . That is  ${}_nq_x$  and  ${}_nL_x$ , refer to the age interval and  $l_x$ ,  $T_x$  and  $e_x$ , refer to exact age x.

### Computation of Different Columns:-

$l_0$  = Radix of 100,000 births = size of birth Cohort

$l_x$  = No. of persons living at exact age X

${}_nq_x$  or  ${}_np_x$  = probability of death /probability of survival from age from X to X+n

$l_{x+n} = l_{xn}$  or  $l_x(1 - {}_nq_x)$  = Number of persons living at exact age X+n

Generally  ${}_nL_x = \frac{n}{2}(l_x + l_{x+n})$  = No. of persons lived by  $l_x$  persons during the interval (X, X+n)

except,  $L_0 = 0.3l_0 + 0.7l_1$  and

$$L_1 = 0.4l_1 + 0.6l_2$$

$$L_2 = 0.5l_2 + 0.5l_3 \text{ or } \frac{1}{2}(l_2 + l_3)$$

$T_x$  = Total number of years lived from age X till end of life and is sum of all  $L_x$ , from age X till the end of life.

The mean expectation of life, ( $e$ ) is equal to the total number of years lived after age X, divided by the number of persons who survived at that age i.e.

$$e_x = \frac{T_x}{l_x} = \text{Expectation of life at age X.}$$

$$e_0 = \frac{T_0}{l_x} = \text{Expectation of life at birth.}$$

**Results and Discussion:** - Table 1 presents the age-specific deaths in the population. Annual death rates per 1.000 populations represent the deaths among the recognized residents of the 30 villages of the project. This also helps in knowing whether the death occurred in the village or outside. This residential death rate contrasts with the more usual area rate. Calculation of the age-specific death rates is facilitated by the proper maintenance of the demographic records.

Age	Male			Female			Total		
Groups in years	No. of Deaths	Pop <sup>n</sup>	D.R/100 0 Pop <sup>n</sup>	No. of Deaths	Pop <sup>n</sup>	D.R/100 0 Pop <sup>n</sup>	No. of Deaths	Pop <sup>n</sup>	D.R/100 0 Pop <sup>n</sup>
0-1	73	1065	68.5	66	871	75.8	139	1936	71.8
1-4	14	3814	3.7	30	3367	8.9	44	7181	6.1
5-14	12	8201	1.5	13	7072	1.8	25	15273	1.6
15-44	32	13140	2.4	27	11329	2.4	59	24469	2.4
45-64	42	3164	13.3	23	2798	8.2	65	5962	10.9
65+	56	1018	55.0	43	741	58.0	99	1759	56.3
Total	229	30402	7.5	202	26178	7.7	431	56580	7.6

Although the caste system was abrogated by decree, it still persists in the villages and serves as a realistic index of the social and economic status. The Jats, Brahmins, Rajputs and the Scheduled

Castes are the more important castes in these villages, excepting the Scheduled Castes. The others are mostly farmers with small land holdings. As seen in Table 2. The Jats constituted the single largest group. The service castes include the Lohars, Kumhar, Barber, Dhobi's, Bharbujas etc. Caste wise analysis showed the maximum death rates among the Scheduled Castes.

Caste	Population	No. of Deaths	(Deaths Rate/1000)Population
Jat	12698	86	6.8
Rajput	7566	53	7.0
Brahmins	8866	65	7.3
Harijans	8745	97	11.1
Scheduled Castes	9777	48	4.9
Others	8928	82	9.2
Total	56580	431	7.6

The climate in this area cannot be exactly differentiated into the conventional four seasons. A more practical demarcation is the winter months of December, January and February, the spring months of March and April, the hot-dry period of May and June, the hot-wet monsoon period of July, August and September autumn comprising October and November. The high point in the frequency of deaths is in the hot-wet season (Table 3). A high birth rate is also seen in this season. Seasonal differences in the infant mortality rate and the neonatal mortality rate follow the same pattern as the crude death rates. This is to be expected as infant deaths constitute a large proportion of the total deaths. In the present study, however, the spring season was seen to have the highest infant and neonatal mortality, which the hot-wet and autumn seasons constituted the most favorable rates of the year.

Months	Live Birth	No. of Neonate Deaths	NMR	No. of Infant Deaths	IMR	No. of Deaths for all ages	(Death Rate/1000) Pop <sup>n</sup>	(B.R./1000) Pop <sup>n</sup>
Winter	364	14	38.5	31	85.3	93	6.6	25.7
Dec.	127	12	94.5	18	141.7	47	10.0	26.9
Jan.	137	02	14.6	11	80.3	23	4.9	29.0
Feb.	100	-	-	02	20.0	23	4.9	21.2

Spring	165	6	36.4	21	127.3	64	6.8	17.5
March	76	2	26.3	09	118.4	33	7.0	16.1
April	89	4	44.9	12	134.8	31	6.6	18.8
Hot Dry	268	9	33.6	30	111.9	78	8.3	28.4
May	124	2	16.1	10	80.6	30	6.4	26.3
June	144	7	48.6	20	138.9	48	10.2	30.6
Hot-Wet	783	19	24.3	37	47.2	132	9.3	55.4
July	245	5	20.4	10	40.8	45	9.6	52.0
Aug.	279	9	32.3	17	60.9	54	11.4	59.2
Sep.	259	5	19.3	10	38.6	33	7.0	55.0
Autumn	396	10	25.2	20	50.5	64	6.8	42.0
Oct.	213	6	28.2	13	61.0	31	6.6	45.1
Nov.	183	4	21.9	07	38.2	33	7.0	38.8
Total	1976	58	29.3	139	70.3	431	7.6	34.9

The Haryana government appoints chowkidars in the villages to record the vital events. When these records were compared with the records of the health workers, it was seen that only 66.1 per cent of the deaths which occurred in these villages were recorded by the chowkidars. A sex-wise comparison of the deaths in the project area showed that the three commonest causes were respiratory disorders, digestive disorders and causes peculiar to infancy in the both sexes (Table 4). The three commonest causes reported in our country in the rural areas are senility, respiratory disorders and causes peculiar to infancy.

Rank Order	Diseases Groups	Male		Female		Total	
		No.	%	No.	%	No.	%
1	Cough(Disorders of reps. system)	49	21.4	45	22.3	94	21.8
2	Digestive Disorders	35	15.3	48	23.8	83	19.3
3	Causes Peculiar to Infancy	40	17.5	26	12.9	66	15.3
4	Senility	33	14.4	22	10.9	55	12.8
5	Fevers	19	8.3	26	12.9	45	10.4
6	Accidents & Injuries	24	10.5	14	6.9	38	8.8
7	Other Clear Symptoms	12	5.2	5	2.5	17	3.9
8	Others	6	2.6	5	2.5	11	2.5

9	Diseases of the circulatory system	5	2.2	5	2.5	10	2.3
10	Disorders of the central nervous system	6	2.6	2	1.0	8	1.9
11	Child Birth & Pregnancy	-	-	4	2.4	4	0.9
	Total	229	100.0	202	100.0	431	100.0

The data were also used to construct a life table by the abridged method, using the mortality data of 2006 (Table 5). The life expectancy at birth for the males, females and combined was 66.2, 66.0 and 66.0 years respectively. This is much higher than the national life expectancy and also higher than the targeted life expectancy at birth of 64 years for both sexes, by A.D. 2000. Thus it is clear that the population served by the Comprehensive Rural Health Services Project of the All India Institute of Medical Sciences has a better health profile than most populations in the country. This is a clear and positive Indicator that projects of this nature can be replicated in problem districts of the country, so as to improve the health status of the population.

Age Groups	Expectation of life in Years		
	Male	Female	Both
< 1	66.2	66.0	66.0
< 2	70.3	70.4	70.2
< 3	70.5	71.0	70.6
< 4	70.4	70.2	70.3
< 5	70.2	69.5	70.0
5-10	69.7	68.9	69.4
10-15	64.7	64.0	64.5
15-19	59.8	59.1	59.5
20-24	54.8	54.2	54.6
25-29	49.9	49.3	49.7
30-34	44.9	44.5	44.7
35-39	40.0	39.6	39.8
40-44	35.1	34.7	34.9
45-49	30.2	29.8	30.0



50-54	25.3	24.9	25.2
55-59	20.4	20.0	20.3
60-64	15.6	15.2	15.5
65-69	10.7	10.4	10.6
70-74	5.8	5.7	5.8
75+	-	-	-

### **Conclusion:**

The present study shows that the population served by the Comprehensive Rural Health Services Project (CRHSP) of the All India Institute of Medical Sciences (AIIMS), Ballabgarh (Haryana) has a better health profile than most populations in the country. This is a clear and positive indicator that the life expectancy at birth for the males, females and both was 66.2, 66.0 and 66.0 years respectively during the year 2006. This is much higher than the national life expectancy and also higher than the targeted life expectancy at birth of 70 years for both sexes, by A.D... 2020. In order to raise the standard of life of people at large in terms of higher expectation of life at birth, lower infant mortality rate etc. different emphasis should be put up on the enhancement of socio-cultural factors of life of the people with different socio-cultural, economic or other factors to their own.

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