H. B. Chanana

A Study of Infant Mortality in Rural Delhi

MORTALITY takes a heavy toll in the first year of life. Pichat [1], observed in his studies that all deaths in the first year of life could not be attributed to the same cause. A part of them occurring in the neo-natal period, i.e., within four weeks of life after birth, are due to endogenic or biological causes, and the rest, occurring in the post-neo-natal period from the beginning of the fifth week to the completion of the first year of life are due lo exogenic or environmental factors such as malnutrition, lack of adequate medical care, etc. *It* has been further observed in various >tudies in different countries that 60 percent of infant deaths in the low mortality areas are due to endogenic causes, whereas in high mortality areas the corresponding figure is only 20 percent. These findings indicate that infant deaths from exogenic/environmental causes have been reduced significantly in low mortality or developed countries. This also reveals that infant deaths due to endogenic causes are independent of the degree of improvement in social and environmental conditions. In the light of these findings the present paper seeks to examine differentials in infant mortality rate and its variation over the years.

Materials and Methods

The data were obtained through the Standard Fertility Survey *[2]*=a longitudinal survey, in which data were collected from a panel of 2100 households *for* the base year 1963-64 as well as for the six successive years. The data concerning

the first five years are utilized in the present study. The survey was conducted in the Mehrauli Block of the Union Territory of Delhi, which comprises 34 villages.

Infant mortality rates, calculated on the basis of survey data, are somewhat different; they are birth-cohort mortality rates rather than the conventional infant mortality rates. This is defined as the proportion of infants who died before the completion of their first year of life, out of the total live births that had occurred in the reference year. Similar definitions also apply to the neo-natal and post neo-natal mortality rates.

Results and Comments

Neo-natal and Post mo-natal Deaths. Table I* shows that percent of deaths in the neo-natal period are comparatively much lower than those in the post-neo-natal period in all cohorts of births in the study, it varied from 33.7 in the cohort of birth in the first year to 45.3 and 45.0 in the cohorts of births in the third and fifth years, respectively.

Infant, Neo-natal and Post neo-natal, Mortality Rates. In Table 2, we give infant, neo-natal and post-neo-natal mortality rates as well as the relative shares of the neo-natal and post-neo-natal deaths in the total infant deaths for each of the five years. It shows that there has been no consistent trend in the rates in the course of the five year period. The IMR increased in the second, decreased rather sharply in the third and increased even more sharply in fourth year; in the final year there followed a decrease to bring it down very close to its initial level. Neo-natal mortality rate fluctuated from 49.1 in the first to 6"4.1 in the fourth year. These rates, in common with those in many other under developed countries, are much lower than the post-neo-natal mortality rates in all the years. Evidently, a major proportion of deaths among the infants in the area are due to exogenic or environmental causes. It is notable that the neo-natal rate after showing a consistent increase in the first four years dropped down in the fifth to a level somewhat higher than its initial position. As neo-natal mortality depends on endogenic/biological causes, it is not quite responsive to introduction of various measures.

Post-neo-natal mortality rate showed erratic variations from year to year; it

*AU tables are placed at the end of the article.

increased in the second, fell sharply in the third and rose equally sharply in the fourth; in the final year it recorded a much sharper reduction to a level, which was nearly 34 points lower than its initial position. The sharp decrease in the final year is attributable to the increased provision of medical facilities by various government and semi-government agencies. The fact, however, remains that post neo-natal mortality rates were consistently higher than the neo-natal mortality rates. This is an indication that sanitary conditions, nutritional status and medical facilities needed further improvement in the area.

Relation of Infant Mortality to Age of Mother. Table 3 gives the infant, neo-natal and post-neo-natal mortality rates for different years by age of the mother. The mother's age here has been taken as on the first day of the reference year. Pooled rates for the whole period November 1, 1963 to October 31, 1968 are given in the last column of the table. While studying the infant mortality of different survey years by age of mother, it was found that the mothers in the youngest and oldest age-groups, i.e. 15 to 19 and 35 to 44 years, had generally highest infant mortality rates as compared to mothers in the intermediate age-group, i.e., 20 to 34 years.

As regards neo-natal mortality rates, except for the first and the last year, they were significantly higher for the mothers in the age-group of 15 to 19 for all the years. Since the mortality in the neo-natal period is due to endogenic/ biological causes, it is affected by the circumstances of birth and also these mothers being new entrants into reproduction they are mostly immature, inexperienced etc. in this regard.

No uniform trend, however, was found in the post-neo-natal mortality rates either over time or as between different age-groups of mothers in a given year. But these rates, except in age-groups of 15 to 19, were found to be higher than the neo-natal mortality rates for all age groups of mothers in all survey years.

Relation of Infant Mortality to Party. As evident from Table 4, with respect to parity the infant, neo-natal and post-neo-natal mortality rates for different years did not reveal any uniform trend over time. However, a general trend of decrease with increase in parity was overved in the neo-natal mortaliy rate in almost all the years. Neo-natal mortality rate was generally the highest for 'O' parity women.

The mortality rates for the period November 1, 1963 to October 31, 1968, which are given in the last column of the table, show a decreasing trend upto

the sixth parity in the neo-natal and infant mortality rates. The IMR is 159.4 for *O' parity; it decrease to 97.2 for the 5th parity women and NMR correspondingly decreases from 91.1 to 25.1. It is also notable that the proportion of neo-natal deaths is the highest for '0' parity women; it decreased from its level of 57 percent for 'O' parity to 36 percent for the second parity and further, after increasing to 41 percent for the third parity to as low as 26 percent for the fifth parity.

Relation of Infant Mortality to Sex. Table 5 shows that female infants had greater risk of mortality than the male infants. The infant mortality rates for females were observed to be consistently higher than the males for all the years. Excess female infant mortality varied from 10 to 57 percent over the survey years. This high mortality in females may be presumed to reflect a general indifference towards female children. Further analysis reveals that there were more deaths amongst female infants in comparison to the male infants in the post-neo-natal period for all the years. Since the deaths in this period are due to exogenic or environmental reasons, i.e. malnutrition, neglect of medical care etc., this lends support to the above contention.

Male infants had higher mortality rates in the neo-natal period in comparison to female infants in almost all the years.

Comparison with Similar Studies, A comparison of the present with studies conducted at national and local levels by the various agencies is presented in Table 6. This reveals that lower infant and neo-natal mortality rates revealed by the present study are consistently lower than those shown by other studies. As compared to the finding of the present study the proportion of infant deaths in the neo-natal period is higher in all the studies. This gives the impression that there were less infant deaths due to exogenic or environmental causes in the areas covered by these studies. This does not seem to be true, perhaps this comparative position arises because the other studies have covered rural areas with insanitary conditions and poor medical facilities.

Acknowledgement

The author is grateful to Dr. S. D. Kapoor, Senior Research Officer for his keen interest and helpful suggestions in writing this paper.

References

1. **Pichat, J. B., 1952,** Analysis **of infant** mortality, *United Nations Population* ***Bulletin, 2,*** **New York, 1-2.**
2. **National Institute of Family Planning, 1975,** *Standard Fertility Survey,* **Final Report, Mehraull, New Delhi.**
3. **Mehta, D. C. and Shah, M. H.** 1972, Measurement **of** mortality in rural **Gujarat under Sample registration** scheme. In : *Studies in Mortality in India* (ed.) by **K. E. Vaidyanathan, Gandhigram,** Madurai.
4. **Registrar General of India, 1972,** Measures of fertility and mortality in India, ***S. R.S, Analytical Series 2,*** **New Delhi.**
5. **National Sample Survey,** *Vital* ***Rates in*** *India,* No. 204, **19th Round.**
6. **United Nations, 1953,** Determinants and consequences of population trends, ***Population Studies,*** **17, New York.**

TABLE 1—PERCENT DISTRIBUTION OF INFANT DEATHS BY NEO-NATAL AND POST NEO-NATAL PERIODS BY COHORT OF BIRTH

Birth Cohort	*Percent of*		*Total*
	Neo-natal deaths	*Post neo-natal deaths*	
1.11.63—31.10.64	33.7 (31)	66.3 (61)	100.0 (92)
1.11.64—31.10.65	37.0 (37)	63.0 (63)	100.0 (100)
1.11.65—31.10.66	45.3 (39)	54.7 (47)	100.0 (86)
1.11.66—31.10.67	39.5 (47)	60.5 (72)	100.0 (119)
1.11.67—31.10.68	45.0 (36)	55.0 (44)	100.0 (80)

Figures in parenthesis indicate the number of deaths.

TABLE 2—INFANT, NEO-NATAL AND POST NEO-NATAL MORTALITY RATES AND PROPORTION OF NEO-NATAL, AND POST NEO-NATAL DEATHS BY COHORTS OF BIRTH

Birth Cohort	*IMR*	*Neo-natal mortality rate*	*Post neo-natal mortality rate*	*(4)—(3)*	*Proportion of*	
					Neo-natal deaths	*Post neo-natal deaths*
1	*2*	*3*	*4*	*5*	*6*	*7*
1.11.63—31.10.64	145.6 (632)	49.1	96.5	47.4	0.337	0.663
1.11.64—31.10.65	156.7 (638)	58.0	98.7	40.7	0.370	0.630
1.11.65—31.10.66	135.6 (634)	61.5	74.1	12.6	0.454	0.546
1.11.66—31.10.67	162.3 (733)	64.1	98.2	34.1	0.395	0.605
1.11.67—31.10.68	114.3 (700)	51.4	62.9	11.5	0.450	0.550
1.11.63—31.10.68	142.9	56.9	86.0	9.9	0.398	0.602

Figures in parenthesis indicate the number of live births.

TABLE 3—INFANT MORTALITY RATES (IMR), NEO-NATAL MORTALITY RATES (NMR), AND POST NEO-NATAL MORTALITY RATES (PNMR) FOR DIFFERENT COHORTS OF BIRTH BY AGE OF THE MOTHERS

Age of the mother (on the first day of reference year)	*1.11.63—31.10.64*			*1.11.64—31.10.65*			*1.11.65—31.10.66*		
	IMR	*NMR*	*PNMR*	*IMR*	*NMR*	*PNMR*	*IMR*	*NMR*	*PNMR*
15-19	162.5	50.0	112.5	156.6	108.4	48.2	173.4	112.2	61.2
20-24	147.0	53.2	63.8	143.7	53.9	89.8	93.4	49.4	44.0
25-29	149.1	55.9	93.2	131.4	34.3	97.1	114.9	54.0	60.9
30-34	149.1	43.8	105.3	219.5	73.2	146.3	129.7	30.5	99.2
35-39	200.0	14.3	185.7	155.2	51.8	103.4	200.0	54.5	145.5
40-44	105.3	105.3	—	129.0	32.2	96.8	350.0	200.0	150.0
Total	145.6	49.1	96.5	156.7	58.0	98.7	135.6	61.5	74.1

	1.11.66—31.10.67			*1.11.67—31.10.68*			*1.11.63—31.10.68*			*Proportion of Neo-natal deaths*
	IMR	*NMR*	*PNMR*	*IMR*	*NMR*	*PNMR*	*IMR*	*NMR*	*PNMR*	
15-19	186.0	124.0	62.0	92.0	34.5	57.5	157.2	90.1	67.1	0.573
20-24	156.7	59.9	96.8	105.9	53.1	50.8	123.2	54.5	68.7	0.442
25-29	102.2	21.5	80.6	100.6	44.0	56.6	119.4	41.0	78.4	0.343
30-34	194.6	79.6	115.0	121.4	64.3	57.1	160.8	57.9	102.9	0.360
35-39	209.0	59.8	149.2	150.0	33.3	116.7	183.9	41.9	141.9	0.228
40-44	285.7	47.6	238.1	277.8	111.1	166.7	220.2	91.7	128.5	0.416
Total	162.3	64.1	98.2	114.3	51.4	62.9	142.9	56.9	86.0	0.398

TABLE 4—INFANT MORTALITY RATES (NMR), NEO-NATAL MORTALITY RATES (NMR) AND POST NEO-NATAL MORTALITY RATES (PNMR) FOR DIFFERENT COHORTS OF BIRTH BY PARITY

Parity (on the first day of the Year)	*1.11.63—31.10.64*			*1.11.64—31.10.65*			*1.11.65—31.10.66*		
	IMR	*NMR*	*PNMR*	*IMR*	*NMR*	*PNMR*	*IMR*	*NMR*	*PNMR*
0	151.5	70.7	80.8	176.5	94.1	82.4	153.9	109.9	44.0
1	116.2	58.1	58.1	123.6	78.6	44.9	149.4	114.9	34.5
2	122.4	40.8	81.6	121.6	54.0	67.6	73.5	—	73.5
3	202.7	54.1	148.6	95.2	31.7	63.5	100.0	44.4	55.6
4	123.1	30.8	92.3	176.5	47.0	129.4	136.4	60.6	75.8
5	131.2	49.2	82.0	121.2	15.2	106.1	48.4	16.1	32.3
6+	144.6	36.2	108.4	204.5	62.5	142.0	194.1	58.8	135.3

	1.11.66—31.10.67			*1.11.67—31.10.68*			*1.11.63—31.10.68*			*Proportion of Neo-natal deaths*
	IMR	*NMR*	*PNMR*	*IMR*	*NMR*	*PNMR*	*IMR*	*NMR*	*PNMR*	
	175.3	103.9	71.4	132.6	71.4	61.2	159.4	91.1	68.3	0.572
	184.2	87.7	96.5	88.2	19.6	68.6	137.3	73.0	64.3	0.532
2	157.3	33.7	123.6	103.1	72.2	30.9	119.0	42.8	76.2	0.360
3	95.9	54.8	41.1	82.4	47.1	25.3	113.4	46.4	67.0	0.409
4	93.8	31.3	62.5	41.1	13.7	27.4	116.1	36.8	79.3	0.317
5	49.2	49.2	49.2	126.8	42.2	84.5	97.2	25.1	72.1	0.258
6+	230.3	67.4	162.9	166.7	69.0	97.7	188.6	59.0	129.6	0.313

TABLE 5—INFANT MORTALITY RATE, NEO-NATAL AND POST NEO-NATAL MORTALITY RATES AND PROPORTION OF NEO-NATAL DEATHS BY SEX

Birth Cohort	*IMR*		*NMR*		*PNMR*		*Proportion Neo-natal death*	
	Male	*Female*	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
1.11.63—31.10.64	114.5	180.0	48.2	50.0	66.3	130.0	0.421	0.278
1.11.64—31.10.65	135.8	178.3	61.7	54.1	74.1	124.2	0.454	0.303
1.11.65—31.10.66	123.1	148.9	70.8	51.8	52.3	97.1	0.575	0.348
1.11.66—31.10.67	154.5	170.3	78.6	49.4	75.9	120.9	0.509	0.290
1.11.67—31.10.68	104.6	124.6	57.8	44.5	46.8	80.1	0.553	0.357

IMR — Infant Mortality Rate
NMR — Neo-natal Mortality Rate
PNMR — Post neo-natal Mortality Rate

TABLE 6—INFANT MORTALITY RATE, NEO-NATAL AND POST NEO-NATAL MORTALITY RATES AND PROPORTION OF NEO-NATAL DEATHS (RURAL)

Name of Survey	*Place of Survey*	*Year*	*IMR*	*NMR*	*PNMR*	*Proportion of Neo-natal deaths*
Sample Registration Scheme	Gujarat[3]	1965-66	163.0	80.0	83.0	0.491
—do—	—do—	1966-67	165.0	74.0	91.0	0.448
—do—	All India[1]	1968	136.8	74.0	62.8	0.541
—do—	—do—	1969	139.9	74.8	65.1	0.535
National Sample Survey	All India[5]	1964-65	114.0	63.0	51.0	0.553
Present Study	Delhi (South)	1963-64	145.6	49.1	96.5	0.337
—do—	—do—	64-65	156.7	58.0	98.7	0.370
—do—	—do—	65-66	135.6	61.5	74.1	0.454
—do—	—do—	66-67	162.3	64.1	98.2	0.395
—do—	—do—	67-68	114.3	51.4	62.9	0.450
—do—	—do—	63-68	142.9	56.9	86.0	0.398