PRINT: ISSN 0970-9274 ONLINE: 2456-6608
J. Hum. Ecol., 13 (1-2): 113-140 (2002)
DOI: 10.31901/24566608.2002/13.1-2.03

A Demographic Profile of the People of Jammu and Kashmir 3. Estimates, Trends and Differentials in Mortality

M.K. Bhasin and Shampa Nag

Mortality is a continuous force of attrition, tending to reduce populations - a major negative forece in the balance of vital processes. It is a biological phenomenon and an inexorable force (as except mortality, all other populaiton components involve human decisions to a great extent; and whereas it can be postponed, it cannot be prevented altogether) inducing population and social change. The levels of mortality define fitness, survival and growth of a population. It is the other intrinsic component of the demographic transition theory. Mortality is also an excellent indicator of economic, social status and well being of peoples of a region (in the absence or incompleteness of morbidity data, mortality statistics denoting total absence of well being are very useful), or to be precise, a pointer of development.

Unlike fertility, man's attmept to regulate this component has been relatively successful almost everywhere. Whereas industrialized countries reduced their death rate since 1650, the developing countries had done so from 1920 onwards (Dorn, 1972). But, as a consequence, the population pressure has increased rapidly, particularly in developing countries due to untamed fertility, creating a situation of disequilibrium. This does not imply that mortality must remain unchecked and left to take its own course and unnecessary and premature deaths may not be prevented, but that fertility must be curbed side by side. Besides, mortality levels are still quite high in many regions of the world, particularly in the developing world, inspite of various preventive efforts and earlier fast decline.

Mortality is also an event that occurs over time. Thus, the levels, differentials, and trends of mortality in a population (at a specified time/ period) are of vital importance. Several 'current' (period) measures of mortality provide such understanding and in the present paper, some of the measures have been studied. Further, of all types of mortalities causing persistent concern, infant and early childhood mortality (all under-5 mortalities) are considered very significant, since these form a major chunk of all deaths and also influence the fertility and fertility control behaviour of parents. Besides, expectation of life at birth is greatly reduced by high levels of infant mortality and age-sex pattern of infant mortality greatly affects the age-sex composition of a population.

Recently, the UNICEF (1992) is promulgating under - 5 mortality, instead of only under - 1 year mortality (infant deaths) as the principal indicator of human and economic progress and of the state of nation's children, as this measures the 'input' as well as end results of several developmental processes. In addition to the role developmental measures play, the under-5 mortalities too, like fertility, are affected by a host of demographic, economic, socio-cultural, physical environmental determinants as well as attitude, behaviour of parents related to sex composition of children and family size. Therefore, an exploratory (investigative) child morality analysis has also been undertaken in the present paper. Under this, attempts have been made to study: i) certain (cumulative) child (offspring) mortality - related variables, viz., child loss ratio (the proportion of children dead among children ever born to woman); and child survival ratio (the proportion of survivors among children ever born to woman, which is exactly the opposite of child loss ratio); and ii) the possibility of any relationship between child loss and a set of independent determinants.

MATERIAL AND METHODS

The study sample was collected from four districts of Jammu and Kashmir state; and comprised of Buddhist and Muslim (Bodhs, Baltis, Brokpas, Arghuns) from Ladakh region; Kashmiri (Pandits and Muslims) from Srinagar region Dogra (Brahmans, Rajputs and Scheduled Castes) and Muslim (Gujjars) from Jammu region. The households were selected after an extensive field visit to the various districts of the state and identifying the villages predominantly inhabited by these population groups. A nuclear family ultimately was taken as the unit of the study. The data were collected using structured schedules and through genealogies. The collected information was also cross-checked from elderly members of the households. For details see Bhasin and Nag (2002).

As already mentioned, all child mortality and survival related data as well as pregnancy wastage data have been obtained from the complete

pregnancy / birth history of ever-married respondents, which includes the survival status of all births, the age at death (if the child died) etc. The data regarding crude and age-specific death rates, cause specific death rates have been gathered and cross-checked from the household level queries as well.

RESULTS AND DISCUSSION

Measures of Mortality

Crude Death Rate

The death rate or the crude death rate is the most common and widely used measure of mortality, describing the frequency with which deaths occur in a population at a specified time/ period.

It is well known that in this century mortality has declined globally chiefly due to the control of epidemic diseases, famine, war and advancement of medical technology. And presently, while the death rates (in 1990-95) in more developed and less developed countries are almost comparable (10 and 9 per thousand population Table 1), the birth rates and fertility rates appear markedly dissimlar. This has not only created a

Table 1: Crude Death Rates, Under-5 Mortality Rates, Infant Mortality Rates, Neonatal Mortality Rates, Post-neonatal Mortality Rates, Perinatal Mortality Rates for population groups of Ladakh, Kashmir, Jammu regions, Jammu and Kashmir; and for Kerala; India; South Asian countries[a]

Region/Population group/ State/Country	*Crude Death Rate*	*Under - 5 Mortality Rate*	*Infant Mortality Rate*	*Neonatal Mortality Rate*	*Post-neonatal Mortality Rate*	*Perinatal Mortality Rate*
Ladaakh Region (Study Area)						
Buddhists						
Bodhs	14.3	195.1	97.6	24.4	73.2	69.8
Muslims						
Baltis	16.8	244.9	163.3	81.6	81.6	96.2
Brokpas	21.7	300.0	200.0	100.0	100.0	90.9
Arghuns	13.2	153.9	76.9	-	76.9	71.4
Muslims (Pooled)	16.4	236.1	152.0	69.4	83.3	90.9
Ladakh (Pooled)	15.7	221.2	132.8	53.1	79.7	83.3
Kashmir Region						
Hindus						
Kashmiri Pandits	15.5	333.3	333.3	-	333.3	-
Muslims						
Kashmiri Muslims	19.5	666.7	-	-	-	-
Jammu Region						
Hindus						
Dogra Brahmans	18.4	235.3	117.7	58.8	58.8	-
Dogra Rajputs	14.0	76.9	-	-	-	71.4
Dogra Scheduled Castes	20.8	277.8	166.7	-	166.7	52.6
Dogra Hindus (Pooled)	17.6	166.7	104.2	20.8	83.3	40.0
Muslims						
Gujjars	26.4	625.0	250.0	-	250.0	-
Jammu and Kashmir	7.6 (7.9)[b]	-	66.2 (70)[b]	42.6[b]	23.6[b]	42.6[b]
Kerala	6.3[c]	-	17[c]	10.9[c]	6.1[c]	18.9[c]
India	10.1[c]	126[g]	79[c]	50.0[c]	29.0[c]	47.5[c]
Nepal	13[d]	147[g]	98[d]	-	-	-
Bhutan	16[d]	205[g]	126[d]	-	-	-
Sri Lanka	6[e]	21[g]	24[d]	-	-	-
Pakistan	11[d]	134[g]	91[f]	-	-	-
Bangladesh	14[e]	133[g]	90[e]	-	-	-
Maldives	8[d]	-	53[d]	-	-	-
Developing Countries	9[g]	101[g]	67[g]	-	-	-
Least Developed Countries	16[g]	180[g]	115[g]	-	-	-
Developed Countries	10[g]	17[g]	13[g]	-	-	-

a. Neonatal, Poat-neonatal, perinatal mortality rates not available for South Asian countries
b. Estimates for 1989 (1990) (*Source*: SRS., 1989, 1990; Office of the Registrar General, India)
c. Estimates for 1992 (rate for India excludes Jammu and Kashmir) (*Source*: Sample Registration System, 1992; Office of the Registrar General, India)
d. Estimates for 1992
e. Estimates for 1990. *Source*: UN Demographic Year Book, 1992
f. Estimates for 1991. *Source*: Ministry of Health and Family Welfare, 1997
g. Estimates for 1991. *Source*: UNICEF, 1993

situation of demographic polarization, but also unwanted population proliferation, especially in the developing countries, such as India. However, the broad groupings mask the fact that, in many countries of the world, death rates are still relatively high.

In India too, the death rate has shown a progressive decline from 36.3 in 1921-30 [the years 1921 being the year of the great divide in so far as mortality is concerned (Jain, 1982)] to 10.1 in 1992 (SRS, 1992). That is, the efforts to curb mortality have been a greater success than the efforts to curb fertility. Interestingly, this rate is not much different from the death rates (in 1991) for certain developed countries as Denmark (12) ,Germany (11), United Kingdom (11), Austria (11), Norway (11), and Sweden (11). On the other hand, in many developing and least developed countries, particularly in Africa and South Asia, the death rates (in 1991) have been noticed higher than the rate in India (Afghanistan-22; Uganda-21,; Angola - 20; Ethiopia - 19; Somalia - 19; Bhutan - 16; Sudan - 15; Tanzania - 15; Nepal - 14; Bangaladesh - 14) [UNICEF, 1991; UN, 1992]. However, within India too, large variations are noticed. In 1992, among the major states the death rate varied from 12.9 in Madhya Pradesh to 6.3 in Kerala. The state of Jammu and Kashmir has shown a crude death rate of 7.6 in 1989.

In the present study population, the crude death rate has been estimated as 15.7. And, as in case of crude birth rate, inter-population variations exist. The Brokpas has shown the highest rate (21.7) , followed by Baltis (16.8), Bodhs (14.3) and Arghuns (13.2). The Muslims on the whole, seem to have a higher crude death rate of 16.4 when compared with the Buddhist Bodhs (Table 1). All these estimates however appear higher than the macro-level estimates for India,

Table 2: Crude death rates among various population groups of Ladakh region in Jammu and Kashmir, India; by place of residence

Population group	*Place of residence*	*Crude Death Rate*		
		Male	*Female*	*Person*
Buddhists				
Bodhs	Rural	20.70	8.48	14.78
	Urban	17.47	8.73	13.10
	Combined	19.84	8.55	14.32
Muslims				
Batlis	Rural	18.62	16.01	17.33
	Urban	19.34	12.05	15.85
	Combined	18.87	14.72	16.84
Brokpas[1]	Rural (Combined)	21.16	22.35	21.74
Arghuns	Rural	26.18	5.88	16.62
	Urban	10.64	11.15	10.89
	Combined	16.91	9.11	13.16
Muslims	Rural	20.41	15.44	17.98
(Pooled)	Urban	15.53	11.65	13.65
	Combined	18.58	14.05	16.37
Ladakh	Rural	20.52	12.92	16.81
(Pooled)	Urban	16.04	10.84	13.51
	Combined	19.00	12.21	15.69

1. The sample for Brokpas has been drawn from rural areas only

Table 3: Measures of mortality among various population groups of Ladakh region in Jammu and Kashmir, India; by place of residence

Population group	*Place of residence*	*Measures of mortality*				
		Under - 5 Mortality Rate	*Infant Mortality Rate*	*Neonatal Mortality Rate*	*Post-neonatal Mortality Rate*	*Perinatal Mortality Rate*
Buddhists						
Bodhs	Rural	233.33	133.33	33.33	100.00	93.75
	Urban	90.91	-	-	-	-
Muslims						
Batlis	Rural	256.41	179.48	102.56	76.92	97.56
	Urban	200.00	100.00	-	100.00	90.91
Brokpas[1]	Rural	300.00	200.00	100.00	100.00	90.91
Arghuns	Rural	500.00	-	-	-	-
	Urban	90.91	90.91	-	90.91	83.33
Muslims	Rural	274.51	176.47	98.04	78.43	92.59
(Pooled)	Urban	142.86	95.24	-	95.24	86.96
Ladakh	Rural	259.26	160.49	74.07	86.42	93.03
(Pooled)	Urban	125.00	62.50	-	62.50	58.82

1. The sample for Brokpas has been drawn from rural areas only

Kerala, and Jammu and Kashmir.

Further, in the SRS, 1992, it has been noticed that the estimated death rate for Indian males (10.0) is almost same as that for females (10.2). Nearly same trend has been seen in case of Jammu and Kashmir state in 1989 (8.1, 8.7, respectively) as well. But in the state of Kerala, higher male than female death rate (7.5, 5.2, respectively) has been observed. In the present study population too, higher male (19.0) than female death rate (12.2) has been noticed. At the individual population level also, the crude death rates have been observed higher for males than for females among Bodhs (19.8, 8.6), Baltis (18.9, 14.7) and Arghuns (16.9, 9.1); although the reverse seems true among Brokpas (21.2, 22.4, respectively). The higher female than male death rates among Brokpas, unlike other population groups can be broadly attributed to the relatively unsatisfactory position of women and girl children, gap in health condition between males and females, frequent child-bearing coupled with unskillled midwifery etc., as well as to the inadequate infrastructure facilities available, relatively low literacy rate amongst them. However, Muslims on the whole, have registered the same trend as Buddhist Bodhs.

The rural-urban differentials in crdue death rates in India, in the SRS, 1992, has recorded that the rate is higher in rural areas (10.9) than in urban areas (7.0). The state of Jammu and Kashmir has also registered the same (9.1, 6.0 per thousand population, respectively). But in Kerala, the rural death rate seems only marginally lower than the urban one in the SRS, 1992, (6.3, 6.5 respectively). In fact, Kerala is the only state, where such a scenario exists. In case of the study population also, the same pattern as noticed at the national level has been observed i.e., the rural death rate (16.8) is higher than the urban death rate (13.5). The same trend has been found in case of Bodhs, Baltis, and Arghuns, as well as Muslims on the whole Table 2, 3. These differentials may be attributed to better educational, medical, communication facilities, greater acceptance of modern medical care, better housing condition, better educational characteristics of men and women, lower fertility level etc. in the urban than in the rural sector.

The regional variations in crude death rates in Jammu and Kashmir are also not available. But in the present study, it has been found that the Gujjars have the highest death rate (26.4), followed by Brokpas (21.7), Dogra Scheduled Castes (20.8) and others, while Arghuns have the lowest one (13.2) [Table 1].

Age Specific Death Rate

The mortality risks faced by human beings vary sharply with age. Hence, to understand the overall death rates, age specific death rates are also studied, as these can separate the component of mortality from the effect of age composition of a population. As can be seen in table 4, the child death rate in India in ages 0-4 years is 26.5 in the SRS, 1992, while the death rate for persons aged 50 years and above is 33. Among

Table 4: Age-specific Death Rates for population groups of Ladakh region, States of Jammu and Kashmir and Kerala; and India

Region/Population group/	*Age Specific Death Rate*				
State/Country	*0 -4*	*5 - 14*	*15 - 34*	*35 - 49*	*50+*
Ladakh Region (Study Area)					
Buddhists					
Bodhs	39.6	7.3	1.7	11.5	42.1
Muslims					
Baltis	37.0	3.5	9.8	10.2	64.0
Brokpas	54.6	21.3	7.1	25.0	26.3
Arghuns	23.5	4.8	8.3	6.4	49.0
Muslims (Pooled)	36.6	5.7	9.0	10.2	54.5
Ladakh (Pooled)	37.5	6.2	6.6	10.6	49.4
Jammu and Kashmir[a]	25.0	1.0	1.9	4.0	31.0
Kerala[b]	3.9	0.7	1.2	3.4	30.2
India[b]	26.5	2.2	2.7	5.3	33.4

a. Rates for 1988 (*Source:* Sample Registration System, 1988; Office of the Registrar General, India)
b. Rates for 1992 (Rate for India excludes Jammu and Kashmir)
Source: Sample Registration System, 1988; Office of the Registrar General, India

the major states, the child death rate varies from 3.9 in Kerala to 38.5 in Madhya Pradesh. In the state of Jammu and Kashmir, the estimated death rate for children aged 0-4 years in the SRS, 1988 has been given in 25.0.

In the present study population, the child death rate in ages 0-4 years, has been observed relatively high at 37.5. The inter-population comparison has also shown that in these ages, the death rates are relatively high and vary from 24 (among Arghuns) to 55 (among Brokpas). The Muslims on the whole have registered a child death rate of 36.6 which is lower than the rate shown by Buddhist Bodhs (Table 4)

It may be mentioned here that the age pattern of the mortality risks, in general, does not vary greatly with the level of mortality. Mortality risks are high in the period immediately after birth, and they decline, often rapidly, to a minimum between ages 10 and 15 years, then rise gradually to about age 40 years, after which they rise steeply to high levels in old age. And as in many developing counties/ regions, in India and the state of Jammu and Kashmir as well, the curve of age-specific death rates is usually U-shaped, representing high mortality in childhood and old age. On the other hand, in the developed countries, where mortality has declined in the past, the cuve appears to be J-shaped, since the mortality has reduced to a greater extent at the infancy and early childhood ages. Incidentally, the state of Kerala in India seems to portray such scenario.

In case of the present study populations, the curve for age specific death rates has been of served more or less U-shaped, typical of developing regions. However, certain variations have been noticed at the individual population level. Whereas the age-specific death rate curves for Bodhs, Baltis seem roughly U-shaped with relatively high mortality among the young and the old, the death rate curve for Arghuns appears slightly J-shaped, with comparatively low mortality in the young ages. The age-specific death rate curve in case of Brokpas, on the other hand, seems roughly inverted J-shaped indicating relatively very high mortality in the young than in the old ages. The death rate curve for the Muslims on the whole, however, has revealed a nearly U-shaped pattern, as also noticed in Buddhists Bodhs.

Further, in the SRS, 1990, the death rate for girl children aged 0-4 years in India has been estimated higher at 28 than the corresponding male death rate at 25. But, in case of Kerala (SRS, 1992), and in Jammu and Kashmir (SRS, 1989), the reverse has been noticed. In most parts of the world, life expectancy at birth too is higher for females than males, and when deaths are traced to specific causes, females tend to survive all forms of diseases better than males. The differential is generally attributed to the differences in psychological stresses, living habits, physiological and genetic factors, where females are believed to be more at an advantage (Fisher, 1930; Conrad, 1962; Madigan, 1968; Nayeye et al., 1971; Gee and Beavers, 1983). However, India appears to be an exception in this respect, as also certain other developing countries. This is mostly due to various economic, socio-cultural reasons, including preference for sons over daughters, early marriage of girls, early and frequent child bearing coupled with unskilled midwifery etc. (Natarajan 1971; Dandekar, 1975; Ware, 1981; Jain, 1982; Rosenweig and Schultz, 1982; Simmons et al., 1982; Lopez and Ruzicka, 1983; Ghosh, 1987; Dasgupta, 1990; Preston, 1990; UNICEF, 1990; among others).

In the present study population as a whole also, as in India, higher death rate for girl children in ages 0-4 years (49) than for boys (26) has been observed. The individual study population groups also show the same trend. Even though larger sample sizes may bring out a definitive picutre, in general, it appears that the state of the girl children may not be entirely satisfactory in study areas, and probably many people discriminate between boys and girls, if not overtly, leading to a gap in health conditions between them.

Under 5-Mortality Rate

In human populations, almost all deaths in childhood occur before the age of 5 years. Hence, the under-5 mortality rate is another important measure of mortality, which is recently being promoted as the main pointer of the state of children, as well as human and economic progress in a region (UNICEF, 1991). More so, because in low-mortality populaitons, mortality risks between age 1 and 5 years are also low, that the infant mortality rate can be used as a reasonable single index of child mortality, but in populations with higher mortality, relatively high

proportions of deaths occur between age 1 and 5 years as well, and so the under-5 mortality rate is a more important index of overall child mortality, although the infant mortality rate also remains a crucial measure (UN, 1992).

The under-5 mortality rate for the developed countries as a whole in 1991 has been estimated as only 17; but those for the developing and least developed countries have been observed much higher at 101 and 180, respectively (UNICEF, 1993). South Asia as a whole also has returned a relatively high rate of 131, whereas India' s under 5-mortality rate of 126 seems only slightly lower. The under-5 mortality rates in the neighbouring Nepal, Pakistan, Bangladesh, at 147, 134, 133 also appears rather high. However Sri Lanka, and the most populous country in the world, China, have registered quite low under 5-mortality rates of 21 and 27, respectively in 1991.

In contrast to these estimates, the present study population as a whole seems to show a high under 5-mortality rate of 221 (Table 1). The under 5-mortality rates for individual populations too, appear rather high, with the highest rate shown by Brokpas (300), followed by Baltis (245), Bodhs (195), and Arghuns (154). The Muslims on the whole, have also registered a high rate (236) [Table 1], largely on account of Baltis and Brokpas. Most of the under-5 mortalities in the study population groups have been found to be due to the 'diseases of respiratory system' and 'infectious diseases' (chiefly, whooping cough, measles and pneumonia).

Even though larger sample size may bring out a clearer picutre, in general, it appears that the state of children and socio-economic development in study areas may not be entirely satisfactory. But, it has also been observed that whereas the contribution of under-5 years deaths to total deaths is 31.6 per cent in the study population, in the Jammu and Kashmir state, it has been 38.5 per cent (in 1988). The inter-population comparison has shown that the contribution of under-5 years death to total deaths is the lowest in Arghuns (17 per cent), whereas the percentages are higher in Bodhs (33) and Baltis (34) and still higher in Brokpas (38 per cent). At the national level, the percentage of deaths in ages 0-4 years, was about 35 per cent of the total deaths (SRS, 1992). But as expected, Kerala has registered a much lower per cent share of 6 per cent.

Further, the differentials in under 5-mortality rates by place of residence (Table 3) have shown that the rates are higher in rural than in urban areas, as per expectation. The Pooled Ladakh data have registered the under 5-mortality rates of 259 and 125 for rural and urban population respectively.

The comparison of under 5-mortality rates across the major population groups of Jammu and Kashmir state (Table 1) has revealed substantial variations. The Kashmiri Muslims (667) and Gujjars (625) have shown the highest and second highest rates respectively, while Dogra Rajputs (77) and Arghuns (154) have recorded the lowest and second lowest rates respectively. However, larger samples are needed for definitive differetials.

Infant Mortality Rate

The infant mortality rate is of considerable importance and concern everywhere. This is because, the infant deaths account for a large chunk of all deaths; and affect the attitude, behaviour of parents towards family size and structure. The infant mortality rate is also an excellent indicator of the state of medical and public health facilities in an area, and together with literacy rate and life expectancy, it indicates the quality of development and human well being in a region. In India, even though the infant mortality rate has also fallen dramatically from 219 per thousand births during 1916-1920 to 79 in 1992, the rate of decline seems slower than that noticed in case of the overall death rate. And, the present estimate still appears somewhat high, when seen against the rate for the developed countries as a whole (13, in 1991). The national average also masks wide variations. In 1992 in India, Orissa (115) and Kerala (17) returned the highest and lowest infant mortality rates, respectively. The states of Madhya Pradesh (109) and Uttar Pradesh (102) also seem to have high rates. The infant mortality rate for the Jammu and Kashmir state has been observed 66.2 in 1989.

In the present study population, the infant mortality rate has been observed 132.8. Individually, the Brokpas have the highest infant mortality rate (200), followed by Baltis (163.3), Bodhs (97.6), and Arghuns (76.9) [Table 1]. The Muslims on the whole have shown higher rate (153) than Buddhists (Bodhs) mainly on account of the high rates in Baltis and Brokpas. The rank-

ing of the population groups hence appears comparable to that noticed in case of death rates, under 5-mortality rates. [Most of these infant deaths seems to be due to exogenous causes (whooping cough, measles, pneumonia)]. It may be mentioned that the estimated infant mortality rates for the study population as a whole, as well as for Bodhs, Baltis and Brokpas, seem higher, while the estimate for Arghuns seem not much different, when compared with the national average. But, when compared with the rates for Jammu and Kashmir and Kerala, the present study estimates appear higher.

Further, the infant mortality rates have been observed higher in rural than in urban areas at the national level (85 and 53, respectively, SRS 1992); as well as in Jammu and Kashmir state (75 and 53, respectively - SRS, 1988); and even in Kerala (17 and 13, respectively - SRS, 1992). In the present study too, the infant mortality rate is higher in rural (161) than in urban population on the whole (63) [Table 3]. This difference may also be explained in terms of rural disadvantage regarding the availability, effectiveness, and acceptability of medical and public health and other facilities, housing conditions, literacy level, particularly among women, etc. Tawaiah's study (1981) in Ghana, Africa too, has suggested that the rural urban differentials in infant death rates is probably more the result of a lack of medical care or the non-availability and non-usage of health service facilities in rural areas than economic conditions, and also educational differences among rural and urban women.

The comparison of the infant mortality rates across the major population groups of Jammu and Kashmir state (Table 1) has revealed substantial variations, but most probably due to the limited sample sizes. Kashmiri Pandits (333) and Gujjars (250) show the highest and the second highest rates, respectively, whereas the lowest rate is recorded by Arghuns (77).

The infant mortality rate is extremely sensitive to socio-economic differences on an international level, i.e., the more developed the country, the lower its infant mortality rate (Hauser, 1959). And, it has been seen that the infant mortality rates for the developed countries, developing countries, and least developed countries as a whole are 13, 67, and 115 per thousand population, respectively, (UNICEF, 1991). In South Asia, in Bhutan, Nepal, and Pakistan as well, the infant mortality rates have been observed relatively high at 133, 102, 101 and 94, respectively. However, the infant mortality rates for Sri Lanka appears much lower at 24. India seems to occupy an intermediate position between these extremes. The present study population on the whole has also recorded a high infant mortality rate (133) [although when considered individually, the estimates for Bodhs and Arghuns appear relatively low than others].

Neonatal Mortality Rate and Post-Neonatal Mortality Rate

A special feature of intant mortality is that its causes and intensity vary markedly from very early to the latter part of the first year of life. For this reason, the infant mortality rate is divided into two parts: i) neonatal mortality (infant deaths upto 28 days of life, and ii) post -neonatal mortality (infant deaths from 1 month to 1 year of life). In general, the neonatal mortality is attributed to endogenous or antenatal causes, whereas the post- neonatal mortality is attributed to exogenous or environmental causes. The latter group of causes are mostly the function of unhygienic and faulty care or neglect of the infant, unhygienic weaning practices, and several other factors, including economic, educational characteristics of parents. And, hence, the post-neonatal mortality is more amenable to control by medical, nutritional and child-care improvements and also overall developmental measures. In fact, most of the developed societies/religions, where medical care has achieved low death rates, it is post- neonatal deaths that have been reduced the most, with the result that a majority of all infant deaths are neonatal. And, by and large, in the developing countries, the post-neonatal deaths account for most of the infant deaths. But, in India, and in most of the states within India, neonatal deaths are either slightly higher or nearly similar to the post-neonatal deaths, because the exogenous causes account for significant proportion of neonatal deaths as well.

Neonatal Mortality Rate

The SRS, 1992 has returned a neonatal mortality rate of 50.0 for India (excluding Jammu and Kashmir). Among the major states, Orissa (73) and Kerala (11) returned the highest and lowest rates, respectively. The neonatal mortal-

ity rate for Jammu and Kashmir in 1989 was observed 42.6 (SRS, 1989). In the present study population, this rate is estimated as 53, which appears slightly lower than the national average, but higher than the state average (Table 1). Individually, the Brokpas have shown the highest neonatal mortality rate (100), followed by Baltis (82) and Bodhs (25). The absence of any neonatal death among Arghuns is most probably a chance occurrence. The Muslims on the whole, has recorded a higher neonatal mortality rate (69) than Buddhists (Bodhs).

Post - Neonatal Mortality Rate

The SRS, 1992 has registered a post-neonatal mortality rate of 29 for India (excluding Jammu and Kashmir). For the state of Kerala, this rate has been estimated as 6 per thousand live births (SRS, 1992), while for Jammu and Kashmir, it seems rather high at 24 (SRS, 1989). In contrast to these estimates, the present study population has shonw a relatively high post-neonatal mortality rate of 80 (Table 1). Individually too, the rates appear high, and seem to vary from 100 among Brokpas to 73 among Bodhs. The Muslims on the whole hence, recorded higher post-neonatal mortality rate (83) than Buddhist (Bodhs).

Perinatal Mortality Rate

Early neonatal deaths (deaths of infants within first week of life), late fetal deaths (after 28 weeks of gestation), and stillbirths together constitute perinatal mortality.

Perinatal mortality rate is also a sensitive index reflecting standards of mother and child health care prior to and during pregnancy and child birth and during the first week after birth (Devi, 1979); as well as the availability and effectiveness of other social development measures. The perinatal mortality rate for India in the SRS, 1992 has been 47.5. Among the major states, in 1992, Orissa (68.8) and Kerala (18.9) returned the highest and lowest perinatal mortality rates, respectively. The perinatal mortality rate for the state of Jammu and Kashmir has been observed as 42.6 in 1989.

In the present study, the total population as a whole has registered a relatively high perinatal mortality rate of 83.3. Inter-population comparison shows that the rate varies from 96.2 among Baltis to 69.8 among Bodhs (Table 1) . The Muslims on the whole have recorded a rate of 91, which is higher than the rate for Buddhists (Bodhs) All these rates are however, comparatively high than the macro-level estimates. Even though larger sample sizes are needed for a conclusive picture, the findings in general, reflect relatively unsatisfactory mother and child health care services, personal hygiene, as well as traditional and unscientific delivery attendance in majority of births, lack of health education etc. in study areas. Besides, antenatal and postnatal care seem to be provided at home in majority of the cases, and women generally tend to visit the doctor or institution only when complications arise. These circumstance are also conducive to perinatal mortality.

At the All-India level, the perimatal mortality rate was found higher for rural areas (50.3) than for the urban areas (30.0 in 1992 (SRS, 1992). The state of Jammu and Kashmir also registered higher rural (62.4) than urban (38.8) perinatal mortality rate in 1988. While in Kerala too, similar pattern was noticed in the SRS, 1992, the rural urban differential was not so great (19.5, 16.2, respectively). In the present study as well, the rural population has a higher perinatal mortality rate (93) than the urban population (59) [Table 3].

The mortality measures discussed above broadly indicate that the 'current' (recent) mortality level, including the infant and child mortality levels in the present study population may be relatively high. The mortality estimate for the total study population appears higher than not only the estimate for the demographically advanced state of Kerala, but also the state of Jammu and Kashmir, and India as a whole. Hence, the overall human and social development and the state of children may not be entirely satisfactory in the Ladakh region. It appears in general, that the continuing efforts towards improving the overall health status, through the improvement in infrastructure, like, modern medical care and public health, communication, and educational facilities, may not have succeeded yet in bringing down the mortality levels effectively, although according to the authorities, it is on the decline from the earlier very high level.

It has been noticed that the availability and

effectiveness of material and child health services particularly, are neither entirely satisfactory, nor its utilization and acceptability universal. Regular antenatal, post-natal check-ups of mother and child are not strictly followed, and unscientific delivery attendance are common. Most of the deliveries take place at home, where birth attendants are mostly relatives and neighbours, or untrained traditional attendants. Post-delivery care is also provided at home by them. Only in cases of severe complications, the trained professionals are called at home or the women/children are taken to the medical centres, if feasible.

Even though the immmunization programme has also been started in the Ladakh region, as elsewhere in India, with the objectives of reducing morbidity, mortality and disabilities due to the six serious but preventable diseases, namely, tuberculosis, diptheria, pertussis, tetanus, poliomyelitis and measles, it seems rather inadequate, and has not as yet covered all. That is, many infants/children do not seem to have received vaccination at all or, received incomplete vaccination, rendering them vulnerable to the risk of dying. This appears to be due not only to the unsatisfactory service, but also to scepticism about immunization, which in turn, seems to be due to ignorance and lack of health education. All these circumstances may be responsible for the relatively high mortality level.

In addition, over-dependence on traditional systems of treatment by 'Amchis' (mostly unregistered) and 'Akhoons', lack of health and sanitary awareness, lack of personal hygiene, as well as harsh climatic conditions, and prolonged winter etc., also seem to contribute to the morbid conditions, eventually raising the mortality level. It also appears that the ongoing process of socio-economic transformation in the Ladakh region, including improvements in educational, economic characteristics of women, has faltered in overcoming the life situations conducive to high mortality successfully, and hence, the mortality levels may have remained high. However, the possible involvement of the chance factor, due to small sample size cannot also be ruled out completely, for the observed levels of 'current' mortality.

Further, inter-population variations exist in case of 'current' mortality levels, with the Brokpas registering the highest estimates, followed by Baltis, Bodhs, and Arghuns. Thus, the overall ranking appear similar as noticed in case of fertility measures, except that the differentials in mortality levels among Bodhs and Baltis appear quite clearcut, with the former showing lower estimates than the latter. In fact, the high levels of mortality noticed in the present study population as a whole, seems to be largely due to the relatively high mortality estimates among Borkpas and Baltis. This also appears to be the main reason behind the comparatively high mortality estimates among Ladakh Muslims on the whole, than among Buddhists (Bodhs).

It may be mentioned that the adverse circumstances elaborated above, which seem to be responsible for the high mortality level, are more precipitated in all rural, remoter areas in general, but those in the Kargil district in particular, where most of the Baltis and all Brokpas are residing. This may be a reason for the higher mortality levels among them. Besides, several other attributes of these two population groups as compared to Bodhs and Arghuns may also be contributing to the rise in mortality levels.

Causes of Deaths (Cause-Specific Death Rate)

The mortality component cannot be fully understood independently of diseases or conditions 'causes'. Hence, understanding of major causes of deaths (if specifications are not available) is of considerable importance. In the present paper therefore, the cause-specific death rates have also been studied (despite certain inherent limitations). It may be mantined that since the specific causes have not always been supported by proper documents; the deaths have been attributed to a non-medical list of major cause goups. Individually, they comprise a number of specific diseases or symptoms and conditions. The cause-specific death rate has been estimated as the ratio of deaths during a specific time / period attibutable to a major cause-group to the total populaition (it has been expressed per 100,000 populations). It may be mentioned that, although the cause specific death rates presented here have provided useful information, it is possible that the results understate certain causes/conditions, because of response errors, despite the best efforts to overcome the same. Besides, the sample sizes have been rather limited for a conclusive assessment of the causes of deaths.

The causes of deaths too, like mortality lev-

els, reflect the overall state of development and health status of people of a region. It is generally acknowledged that with the decline in mortality and change in life expectancy, the pattern of causes of deaths also undergoes changes (UN, 1963).

In fact, the rapid decline in mortality witnessed around the world have come primarily due to the fall in infectious, parasitic, and respiratory diseases, through improved public health and medical care, industrialization, extension of transportation and roads into remoter areas, rise in level of living, improved housing and water supply, waste disposal, lessening of crowding in households, improved nutritional levels, rising literacy and health education, personal and household cleanliness (Bogue, 1969). Today, it is clear that there are major differences between the developed and developing countries in the major causes of deaths. A study by the UN (1982) in 23 developed countries found that there has been a shift over time in the proportions of death from particular causes. Whereas cardiovascular diseases and neoplasms (cancer) have increased, the infectious diseases have declined markedly. This is also due to a shift in the age structure of the population to the older ages, apart from other factors. But in developing countries, infectious and parasitic diseases are very prominent causes of death.

In present study population as well, it has been observed that the 'infectious diseases' and 'coughs-diseases of respiratory system' (includes such diseases as, pneumonia/bronchopneumonia, bronchitis, asthma, tuberculosis, whooping cough, diptheria, tetanus, typhoid, infective hepatitis, measles), account for the single largest number of deaths (576 per 100,000 population) [Table 5]. This finding also corroborates that the mortality level is relatively high and the age structure of the study population on the whole, is relatively young. Among each of the individual population group too, this major cause-group seems to be responsible for a large number of deaths (the cause specific death rates have been found varying from 439 among Arghuns to 815 deaths among Brokpas per 100,000 population). Among Muslims on the whole, these diseases seem to account for 625 deaths per 100,000 population, unlike the 477 deaths noticed in Buddhists (Bodhs). Hence, the control of these diseases may reduce the mortality levels substantially.

The high incidence of deaths due to these diseases can be attributed to the unsatisfactory state of medical and public health facilities and other support system, lack of health educaiton and personal hygiene etc. The survey of causes of deaths (rural) conducted by the Office of the Registrar General, India, in 1992 has also returned relatively high percentage of deaths (27 per cent) due to coughts (disorders of the respiratory systems) and fevers (tuberculosis, bronchitis and asthma, pneumonia, whooping cough, malaria, typhoid, influenza, etc.) than due to other causes.

In the study population, other major cause

Table 5: Cause - specific death rates among various population groups of Ladakh region in Jammu and Kashmir, India

Major cause - group[1]	*Cause-specific death rate*					
	Buddhists	*Muslims*				*Ladakh*
	Bodhs	*Baltis*	*Brokpas*	*Arghuns*	*(Pooled)*	*(Pooled)*
Infectious diseases / coughs diseases of respiratory system	477	673	815	439	625	576
Benign / Malignant cancer (neoplasms)	-	-	-	110	30	20
Diseases of endocrine system / metabolic, nutritional diseases	60	48	-	-	30	40
Diseases of circulatory system	179	192	-	219	179	179
Diseases of digestive system	119	192	272	219	208	179
Diseases of genito - urinary system	60	48	-	-	30	40
Maternal diseases	-	48	272	-	60	40
Diseases peculiar to infancy	60	96	272	110	119	99
Clear symptoms / and others[2]	477	385	543	219	357	397
All causes	1432	1684	2174	1316	1637	1569

1. The major cause - groups have been elaborated in the text
2. Senility; accidents and injuries; symptoms, and ill-defined conditions

groups of deaths (per 100,000 population), in descending order of cause specific death rates are 'others' (includes senility, accidents and injuries and such symptoms and ill defined conditions as, sudden death, high fever, eye or ear infection, severe abdominal pain, over-exposure to cold, excessive cyring) [397], 'diseases of circulatory system' [179]; 'diseases of digestive system' [179]; 'diseases peculiar to infancy' [99]; 'maternal diseases' [40]; 'diseases of endocrine system/metabolic and nutritional diseases' [40], 'diseases of genito-urinary system' [40]; and 'benign/malignant cancer (neoplasm)' [40].

It may also be mentioned that whereas among each study population group the diseases peculiar to infancy (prematutiry, birth injury, respiratory infection/diarrhoea of new born, cord infection, convulsion etc.) have also returned relatively high cause-specific deaths rates [60 (among Bodhs) to 272 (among Brokpas)], maternal diseases have been found responsible for deaths among Baltis and Brokpas only [48 and 272 deaths per 100,000, respectively]. The maternal diseases included such conditions related to childbirth and pregnancy, as severe anaemia, hypertension, bleeding during pregnancy, toxaemia and puerperal sepsis.

Exploratory Child Mortality Analysis Differentials in Child Mortality-Related Variables

Child Loss and Survival

In India, according to the NFHS, 1992-93 of the 3.1 children ever born to currently married, women, 2.7 are found surviving, thereby registering an average child loss of 0.5 per women, i.e., a loss rate of about 15 per cent. And, whereas high fertility and high mortality have combined to make the average child loss quite high in Uttar Pradesh, 0.7 per woman, the reverse seems true in case of Kerala, showing an average child loss of 0.2 per woman. The proportion of child loss in these two states seem to vary from 0.194 to 0.080.

In the present study, the Pooled Ladakh data have shown that of the 4.0 children ever born on average, to ever-married women, only 3.1 children are surviving. Thus an average of 0.9 children per woman seems to have died by the time of the survey. In terms of the proportion of child loss, it is 23 per cent (Table 6). Reversely, the proportion of surviving children among children ever born seems to be 0.772. Individually, the Brokpas have registered the highest proportion of child loss of 0.334, followed by Baltis, Arghuns and Bodhs (0.137). The proportion of child loss hence, appears higher in Muslims as a whole (0.268), than in Buddhists (Bodhs). [The opposite is true in case of differentials in proportion of surviving children]. The ranking in case of diffentials in child loss seem more or less similar to that noticed in case of 'current' measures of mortality, except that the proportion of child loss is found the lowest in Bodhs, instead of Arghuns. This may be due to the fact that, this estimate reflects cumulative rather than 'current' infant and child mortality, which have occurred over a long span, and in different backgrounds.

Table 6: Child loss ratios[a], Child survival ratios[b] among population groups of Ladakh, Kashmir, Jammu regions, Jammu and Kashmir, and in Kerala; India

Region/Population group/State/Country	*Child loss ratio*	*Child survival ratio*
Ladakh Region (Study Area)		
Buddhists		
Bodhs	0.137	0.863
Muslims		
Baltis	0.295	0.705
Brokpas	0.334	0.666
Arghuns	0.170	0.830
Muslims (Pooled)	0.268	0.732
Ladakh (Pooled)	0.228	0.772
Kashmir Region		
Hindus		
Kashmiri Pandits	0.039	0.961
Muslims		
Kashmiri Muslims	0.099	0.901
Jammu Region		
Hindus		
Dogra Brahmans	0.156	0.844
Dogra Rajpus	0.057	0.943
Dogra Scheduled Castes	0.136	0.864
Dogra Hindus (Pooled)	0.118	0.882
Muslims		
Gujjars	0.118	0.882
Kerala	0.080[c]	0.920[c]
India	0.148[c]	0.852[c]

a. Child loss ration (proportion of children dead among children, ever born to woman)
b. Child survival ratio (proportion of survivors among children ever born to woman)
c. Calculations based on data regarding children ever born and surviving per currently married woman for the period `1992-93 , in the National Health Survey, India - 1992-93 (*Source:* International Institute of Population Sciences, 1995).

However, it seems that there may be a polarization, with the Bodhs and Arghuns at the one end, and Baltis and Brokpas on the other. This can be attributed to the lower number of conceptions and children ever born in the first place, as well as better educational characteristics of women; lesser number of children desired, i.e., more favourable attitude towards relatively small family size and greater contraception usage among Bodhs and Arghuns than among the other two. Moreover, relatively better educational, communication facilities present near the residence of more Bodhs and Arghuns (as they are largely concentrated in the comparatively better developed Leh district than Kargil district), seem to enhance the chances of educational and employment opportunities, utilization of modern medical care and mobility, which are usually conducive to low mortality. It may be mentioned here that the proportion of child loss too, seems higher in the present study population than in the demographically advanced state of Kerala, as well as India as a whole, as also seen in case of 'current' measures of infant and child mortality.

Further, an attempt has also been made to study the mean numbers of infant as well as under five years child mortalities per woman. The Brokpas again showed the highest estimates, followed by Baltis, Arghuns, and Bodhs (Table 7). For the Ladakh (Pooled) group, the mean numbers of infant and under - 5 mortalities per woman worked out to 0.55 and 0.81, respectively. Hence, among all the study population groups, out of total child (offspring) deaths experienced by woman (respondent), the percentage of infant deaths appeared the highest [range-55.3 (among Bodhs) to 63.5 per cent (among Arghuns)]. The percentages of early childhood deaths (1-4 years) were also observed high, so that the percentages of under-5 years deaths (out of the total offspring deaths) were observed very high, ranging from 81.0 (among Arghuns) to 91.0 (among Brokpas). On the other hand, the proportions of offspring reported dead at the ages 5-14 years and at the older ages seemed very low. Thus, a vast majority of offspring deaths experienced by woman appeared to have occurred before 5 years of age amongst all the study population groups. In case of the Pooled Ladakh data hence, similar pattern and 0.81, respectively. Hence, among all the study population groups, out of total child (offspring) deaths experienced by woman, the percentage

Table 7: Child mortality differentials[1] among various population groups of Ladakh region in Jammu and Kashmir, India; by place of residence

	Buddhists	*Muslims*				*Ladakh*
Child mortality related variables[1]	*Bodhs*	*Baltis*	*Brokpas[2]*	*Arghuns*	*(Pooled)*	*(Pooled)*
		(Rural)				
Mean number of child deaths[3]	0.51	1.45	1.67	0.98	1.41	1.07
Mean number of under-5 child deaths[3]	0.43	1.30	1.52	0.81	1.25	0.94
Mean number of infant deaths[3]	0.30	0.91	0.96	0.61	0.87	0.65
Child loss ratio[4]	0.140	0.310	0.334	0.240	0.305	0.252
Child survival ratio[5]	0.860	0.690	0.666	0.760	0.695	0.748
		(Urban)				
Mean number of child deaths[3]	0.38	1.15	-	0.42	0.79	0.67
Mean number under-5 of child deaths[3]	0.32	1.02	-	0.34	0.69	0.57
Mean number of infant deaths[3]	0.17	0.61	-	0.28	0.45	0.36
Child loss ratio[4]	0.126	0.263	-	0.121	0.201	0.184
Child survival ratio[5]	0.874	0.737	-	0.879	0.799	0.816
		(Combined)				
Mean number of child deaths[3]	0.47	1.35	1.67	0.63	1.17	0.92
Mean number under-5 of child deaths[3]	0.40	1.21	1.52	0.51	1.04	0.81
Mean number of infant deaths[3]	0.26	0.81	0.96	0.40	0.71	0.55
Child loss ratio[4]	0.137	0.295	0.334	0.170	0.268	0.228
Child survival ratio[5]	0.863	0.705	0.666	0.830	0.732	0.772

1. Differentials in child (offspring) mortality experience-related variables for woman (respondent)
2. The sample for Brokpas has been drawn rural areas only
3. Infant / child deaths experienced by woman (respondent)
4. Ratio between children dead and children ever born to woman / proportion of children dead among children ever born (for woman)
5. Ratio between children surviving and children ever born to woman / proportion of survivors among children ever born (for woman)

of infant deaths appeared the highest [range 55.3 (among Bodhs) to 63.5 per cent (among Arghuns)]. The percentages of early childhood deaths (1-4 years) were also observed high, so that the percentages of under-5 years deaths (out of the total offspring deaths) were observed very high, ranging from 81.0 (among Arghuns) to 91.0 (among Brokpas). On the other hand, the proportions of offspring reported dead at the ages 5-14 years and at the older ages seemed very low. Thus, a vast majority of offspring deaths experienced by woman appeared to have occurred before 5 years of age amongst all the study population groups. In case of the Pooled Ladakh data hence, similar pattern regarding the experience of offspring deaths was apparent, i.e. out of all child deaths experienced by woman, 59.8 and 88.1 per cent appeared to be infant and under-5 years deaths, respectively. The 'current' (recent) age patterns of mortality discussed earlier, as well as data from various secondary sources too portrayed more or less similar pattern.

Differentials in Child Loss and Survival by (Present) Age of Woman

In each of the study population group except Brokpas, the overall tendency was that of increase in child loss ratio or the proportion of child loss, with the advancement of age of woman; although the increase was not exactly monotonous. Among Brokpas, on the contrary, the child loss differentials showed a rather varying pattern. However, in Muslims on the whole, the general trend was similar to that found in Buddhist Bodhs, barring minor discrepancies. [The discrepancies may be attributed to the limited sample sizes; possible of infant and childhood mortality amongst all]. The Pooled Ladakh data hence, also showed the same picture. And, women in the age groups of 15-19 and 45+ years recorded the lowest and highest proportions of child loss respectively (Table 8). The reverse was noticed when the proportions of survivors (child survival ratios) by age of woman were studied.

Child Loss/Survival and Economic Characteristics/Occupation

It is often pointed out that the relationship between the economic characteristics/occupation of woman (mother) and the health and well-being of their children is not straight forward. This is because, the attitudes towards women's work, the nature of that work and the condition under which the work is conducted vary greatly both among and within societies (UN, 1985; Behm, 1991). According to Da Vanzo and Lee (1978), a mother's activity status reflects the ma-

Table 8: Child mortality differentials (child loss and survival ratios)[1] among various population groups of Ladakh region in Jammu and Kashmir, India; by (present) age of woman[2]

(Present) Age of woman3	*Buddhists*	*Muslims*				*Ladakh*
	Bodhs	*Baltis*	*Brokpas*	*Arghuns*	*(Pooled)*	*(Pooled)*
			(Child loss ratio)[3]			
15 - 19	0.000[a]	0.340[a]	0.000[a]	0.000[a]	0.148	0.107
20 - 24	0.075	0.226	0.367	0.048	0.211	0.162
25 - 29	0.097	0.183	0.278[a]	0.000	0.164	0.143
30 - 34	0.153	0.218	0.364	0.086	0.205	0.189
35 - 39	0.087	0.271	0.262[a]	0.161	0.242	0.203
40 - 44	0.133	0.300	0.278[a]	0.252	0.285	0.229
45 +	0.180	0.403	0.353	0.228	0.345	0.297
			(Child survival ratio)[4]			
15 - 19	1.000[a]	0.600[a]	1.000[a]	1.000[a]	0.852	0.893
20 - 24	0.925	0.774	0.633	0.952	0.789	0.838
25 - 29	0.903	0.817	0.722[a]	1.000	0.836	0.857
30 - 34	0.847	0.782	0.636	0.914	0.795	0.811
35 - 39	0.913	0.729	0.738[a]	0.839	0.758	0.797
40 - 44	0.867	0.700	0.722[a]	0.748	0.715	0.771
45 +	0.820	0.597	0.647	0.772	0.655	0.703

1. Differentials in child mortality experience-related variables for woman (respondent)
2. (Present) age of woman (respodent) in years
3. Proportion of children dead among children ever born
4. Proportion of survivor ("currently" living children) among children ever born
a. Calculation based on less than 10 cases

ternal time alloted to child rearing. And, reductions in maternal time devoted to childcare may be directly related to infant and child mortality (adversely). Large negative effects of labour force participation by mothers were found in a study based on early twentieth century census data from U.S.A., U.K. northern Ireland (Preston et al., 1981).

In more recent times, a study in Sudan by Farah and Preston (1981) has observed that children of working women had higher mortality rates than children of housewives. A major study by the UN (1985) too, corroborated the same, for 10 of the 14 African, Latin American, and Asian countries studied, on the basis of multivariate results, even though the lines of causation appeared unclear, and the univariate results revealed a regional pattern.

In the present study, on the other hand, the proportion of child loss appear slightly lower among the economically active than among the economically inactive women (Table 9). Such pattern has been seen in Peru, in the large scale study by the UN (1985). It seems that in general, the benefits that emplouyment may produce through increased income (like, consumption of better goods and services) may be counteracting the disadvantages of the mother being outside the home. Individually, however, the pattern of influence of economic activity of women appear to be differing. That is, while Baltis and Brokpas, register the pattern noticed in the aggregate, the reverse is seen in Bodhs and Arghuns (which has been found in many countries). And, in Muslims on the whole, the proportions of child loss appear nearly same, irrespective of economic characteristics of women. These discrepancies can be attributed to the pervasive effect of infant and child mortality, as well as possible involvement of effects of sev-

Table 9: Child mortality differentials (child loss and survival ratios)[1] among various population groups of Ladakh region in Jammu and Kashmir, India; by economic characteristics/occupation of woman/husband[2]

Economic characteristics/ occupation[2]	*Buddhists*	*Muslims*				*Ladakh*
	Bodhs	*Baltis*	*Brokpas*	*Arghuns*	*(Pooled)*	*(Pooled)*
			(Child loss ratio)[3]			
Woman						
Economically Inactive[5]	0.132	0.298	0.339	0.150	0.268	0.229
Economically Active	0.154	0.259	0.263[a]	0.280	0.269	0.217
Cultivation/agriculture, unskilled labour	0.158	0.278	0.250[a]	0.346[a]	0.292	0.235
Trade / commerce	0.177	0.500[a]	0.000[a]	0.500[a]	0.471	0.287
Service	0.115	0.068	1.000[a]	0.167	0.136	0.130
Husband						
Economically Inactive[5]	0.213	0.520[a]	0.467[a]	0.157	0.349	0.308
Economically Active	0.133	0.294	0.304	0.169	0.263	0.223
Cultivation/agriculture, unskilled labour	0.153	0.340	0.298	0.270	0.328	0.280
Trade / commerce	0.177	0.300	0.308[a]	0.146	0.245	0.236
Service	0.111	0.228	0.309	0.155	0.213	0.174
			(Child survival ratio)[4]			
Woman						
Economically Inactive[5]	0.868	0.702	0.661	0.850	0.732	0.771
Economically Inactive	0.846	0.741	0.737[a]	0.720	0.731	0.783
Cultivation/agriculture, unskilled labour	0.842	0.722	0.750[a]	0.654[a]	0.708	0.765
Trade / commerce	0.823	0.500[a]	1.000[a]	0.500[a]	0.529	0.713
Service	0.885	0.932	0.000[a]	0.833	0.864	0.870
Husband						
Economically Inactive[5]	0.787	0.480[a]	0.553[a]	0.843	0.651	0.692
Economically Inactive	0.867	0.706	0.696	0.831	0.737	0.777
Cultivation/agriculture, unskilled labour	0.847	0.660	0.702	0.730	0.672	0.720
Trade / commerce	0.823	0.700	0.692[a]	0.854	0.755	0.764
Service	0.889	0.772	0.691	0.845	0.787	0.826

1. Differentials in child mortality experience-related variables for woman (respondent)
2. Refers to main occupation of woman/husband
3. Proportion of children dead among children ever born
4. Proportion of survivor ("currently" living children) among children ever born
5. Household duties/unemployed/retired

a. Calculation based on less than 10 cases

eral other factors on child mortality, including the economic characteristics of husband and (household) income.

But when the occupation of woman is taken into consideration, the proportion of child loss seems the lowest, when women are in the service sector (working as, white-collar workers, teachers, paramedics like nurse, etc.) than in the agricultural sector or trade/commerce. In the United Nations study (1985) also, the professional and white collar workers appear to have the lowest mortality usually well below the national average, although there seems to be no clear pattern indicating which occupations are worse for mortality. In a more recent study in Thailand as well, among the mother's occupational groups, the lowest mortality risks are found for children of professional, administrative and clerical workers, while the children of agricultural and manual workers have much higher mortality levels (Pejaranonda and Santipaporn, 1991). However, in a major study by Hobcraft et al. (1984) the effects of mother's work status seemed rarely significant in multivariate models.

The economic characteristics/occupation of husband (father) serves as an indicator of economic circumstances of the household, which affects the consumption standards among children, quality of shelter, use of medical care etc. Hence, in general, father's occupation seems to have a significant effect on child mortality and survival, which however, often becomes insignificant, when other socio-economic variables are taken into account. Child mortality is usually found lower in such occupational groups as, professionals, technicians, white collar workers, while the risk is greater in case of those in agricultural production.

In a study in several developing countires by the UN (1985) , child mortality seemed to vary by father's occupation. The results in this study suggested that when no other variable were controlled, professional/white collar workers in 15 developing countires were associated with the lowest levels of child mortality and the agricultural and production workers seemed to be associated with the highest and/or second highest mortality levels. In a more recent study in Thailand as well, children whose fathers were agricultural workers had a risk of dying by age 5 years, more than twice as high as children whose fathers had a professional, administrative, or clerical position. Even in the multivariate analysis, agricultural occupation of fathers is associated with higher child mortality risks (Pejaranonda and Santipaporn, 1991).

In the present study, on the whole, the proportion of child loss seems lower when the husbands are economically active, than when they were inactive. And, husband's occupation in the service sector as, white collar workers, professionals, technicians etc., appear to be mainly contributing to this trend, while occupations like cultivation, agricultural labour, any unskilled work seem to pose greater risk of child loss and lesser child survival chances, as also noticed in many studies elaborated above. The proportion of child loss seem moderate, when husbands are engaged in trade/commerce.

At the individual popultion level, however, slight variations are seen (Table 9), although Buddhist Bodhs and Muslims as a whole, have shown more or less similar trend. The observed variations may be attributed to the possible involvement of simultaneous and/or overriding effects other factors on child loss and survival chances. Many studies have discussed such possibilities, based on multivariate analysis, when other socio-economic characteristics are controlled. In the United Nations study (1985), although agricultural workers generally seem to have the highest child mortality even in the multivariate analysis, the advantage observed for professional/white collar workers seem to disappear. The children of this latter group are found better off than the children with fathers in other occupations in only 6 out of 12 countries considered. Other studies (Farah and Preston, 1982; Trussell and Preston, 1982) have also reported that the significant effect of father's occupation on child mortality is eliminated, when other variables are taken into consideration.

Apart from this intricacy, it may additionally be mentioned that, at times, the same occupational group can be associated with different socio-economic status according to the individual's position in relaiton to other workers, and an occupation can also denote different socio-economic status in different groups. These may also be the reasons behind the relatively low proportion of child loss noticed when the husbands are engaged in trade/commerce,

than when they are in the service sector among Arghuns, unlike other population groups. In fact, many Arghuns are engaged in trading over the years, and their socio-economic status seem to be better than those in the service sector.

Child Loss/Survival and (Household) Income

The possible role of income in determining child death and survival is also considered complex, mainly due to the multi faceted nature of income itself. But, since income serves as an indicator of consumption of goods and services that affect the health of children, including consumption of nutritious food, presence of sanitary facilities, use of better medical care etc., higher income is expected to lower child mortality risks. Negative relationship between child mortality and economic status have been reported by Frisancho et al. (1976), Markides and Barnes (1977), Cochrane et al. (1980).

Although a study by Rosenweig and Schultz (1982) among rural Indian childrne does not focus directly on household income, it also finds that increases in wealth, in terms of land ownership, or other productive capital and asset income, are associated with greater improvements in female survival prospects which in consequence will lead to lower child mortlity levels. Anker and Knowles (1977) also found expected positive relationship between child survival and income. An UN study (1985) in several developing countries also revealed a pattern of declining child mortality with increasing income, although the decline was not always monotonic. In the multivariate relations too, except for the anomalously high mortality among those with the highest imcome, the relationship between income and child mortality was regular and as per expectation.

In the present study as well, the Pooled Ladakh data show declining proportions of child loss with increasing levels of (household) income, while the reverse is evident in case of proportion of child survivors. Individually, Bodhs, Baltis and Arghuns, as well as Muslims as a whole, too indicate more or less similar trend (Table 10). A large scale study in the Indian states of Kerala and Uttar Pradesh has also observed negative association between income and infant mortality, although in the state of Andhra Pradesh, the association appears inconsistent (Mahadevan, 1989).

Child Loss/Survival and (Household) Ownership of Land

Flinn (1986) reported that individuals with more land tend to have more reproductive success (offspring surviving to 1 year of age). Similarly in India, the finding that average family size was slightly higher among large land owners than small land owners have been explained in terms of improved material conditions increasing offspring survival by Driver (1963). However ownership of land, as analysed for Sudan, did not appear to have much impact on child mortality (UN, 1985). A recent study in India too (Das Gupta, 1990) has reported that land ownership is not significantly related to child survivorship. In the present study also, the role of land ownership in influencing the proportion of child loss/survival, does not seem to be very clear (Table 10). This can be due to the possible involvement of influences of several other factors on child loss and survival.

Child Loss/Survival and Educational Characteristics

A number of studies across the world, including India, have found inverse relationship between educational characteristics of women (mothers) and infant and child mortality (Caldwell, 1979; Behm, 1980; Cochrane et al., 1980; Farah and Preston, 1982; Jain, 1985; Mahadevan, 1989; Dasgupta, 1990; Hill, 1991; NFHS, 1992-93). In the study by Hobaraft et al., (1984) in 28 countries, maternal education is included in more than half of the models of best fit. The univariate results of the United Nations study (1985) in 15 developing countries have also indicated in general that, child mortality decreases as mother's education rises. Even the multivariate analysis have shown more or less similar results, after the effects of all other independent variables that could be controlled, have been eliminated.

The mechanisms through which education influences child survival are, the knowledge of proper utilization of modern health services as well as knowledge of health care, sanitation, personal hygiene and child nutrition (Rosenweig and Schultz, 1981, Tekce and Shorter, 1984, Jain 1985; Bourne and Walker 1991). According to Caldwell (1979) and Caldwell et al., (1983) in addition to better knowledge and practices of hy-

Table 10: Child mortality differentials (child loss and survival ratios)[1] among various population groups of Ladakh region in Jammu and Kashmir, India; by economic background

Economic background	*Buddhists*	*Muslims*				*Ladakh*
	Bodhs	*Baltis*	*Brokpas*	*Arghuns*	*(Pooled)*	*(Pooled)*
			(Child loss ratio)[2]			
Household Income (in Rupees)						
Total income[4]						
10000 and less	0.266	0.366	0.400[a]	0.220[a]	0.332	0.303
10001 - 30000	0.146	0.315	0.321	0.178	0.287	0.249
30001 - 50000	0.140	0.285	0.393	0.177	0.271	0.229
50001 and above	0.020	0.230	0.295[a]	0.144	0.206	0.170
Ownership of Land[5]						
No land	0.179	0.235	0.409[a]	0.210	0.249	0.217
Less than 10	0.116	0.268	0.368[a]	0.102	0.218	0.193
10 - 29	0.137	0.316	0.299	0.185	0.283	0.246
30 - 49	0.140	0.270	0.529[a]	0.245	0.284	0.218
50 and above	0.105	0.311	0.311[a]	0.165[a]	0.277	0.216
			(Child survival ratio)[3]			
Household Income (in Rupees)						
Total income[4]						
10000 and less	0.734	0.634	0.600[a]	0.780[a]	0.668	0.697
10001 - 30000	0.854	0.685	0.679	0.822	0.713	0.761
30001 - 50000	0.860	0.715	0.607	0.823	0.729	0.771
50001 and above	0.980	0.770	0.705[a]	0.856	0.794	0.830
Ownership of Land[5]						
No land	0.821	0.765	0.591[a]	0.790	0.751	0.783
Less than 10	0.884	0.732	0.632[a]	0.898	0.782	0.807
10 - 29	0.863	0.684	0.701	0.815	0.717	0.754
30 - 49	0.860	0.730	0.471[a]	0.755	0.716	0.782
50 and above	0.895	0.689	0.689[a]	0.835[a]	0.723	0.784

1. Differentials in child mortality experience-related variables for woman (respondent)
2. Proportion of children dead among children ever born
3. Proportion of survivor ("currently" living children) among children ever born
4. Household income per annum
5. Household ownership of cultivable land in kanals (8 kanals = approximately 1 acre).
a. Calculation based on less than 10 cases

giene and sanitation, education enhances a mother's ability to provide adequate child care by changing their traditional attitude, beliefs, as well as her role in family decision making about proper allocation of resources, food.

The results of the present study have shown that on the whole, the proportion of child loss is lower when women are literate than when they are illiterate (Table 11). Also, with the advancement of educational attainment, the proportion of child loss decreases, while the proportion of survivors increases, as reported by many authors listed above. Individually, among Bodhs, Baltis, and Arghuns too, similar patterns have been noticed. And, though Brokpas have recorded a varying pattern, most probably due to the limited sample size and number of literate women, Muslims on the whole, show similar pattern of differentials as in Buddhists (Bodhs).

It has also been observed that the proportion of child loss is lower and the proportion of surviving children is higher when husbands are literate than when they are illiterate (Table 11). Individually, all the study population groups except Borkpas, have also shown similar trend. Although the trend in Brokpas seems to differ again than the one in others, Muslims as a group have recorded the same pattern of differentials as Buddhists (Bodhs).

Further, when the educational attainments of husband (fathers) are considered, on the whole, the proportions of child loss seem lower in case of illiterate and less educated husbands than in case of those with relatively higher education. Many studies in India and elsewhere have also reported that education of father/husband is negatively associated with infant and child mortality (Singh, 1986; Mahadevan, 1989; Venkatacharya, 1991).

In a major study in 28 countries by Hobcraft et al. (1984) too, paternal education (with the

Table 11: Child mortality differentials (child loss and survival ratios)[1] among various population groups of Ladakh region in Jammu and Kashmir, India; by educational characteristics of woman / husband

Educational characteristics	*Buddhists*	*Muslims*				*Ladakh*
	Bodhs	*Baltis*	*Brokpas*	*Arghuns*	*(Pooled)*	*(Pooled)*
			(Child loss ratio)[2]			
Women						
Illiterate	0.149	0.306	0.320	0.184	0.284	0.244
Literate	0.073	0.084	0.461[a]	0.147	0.220	0.131
Primary	0.089	0.110[a]	0.272[a]	0.242	0.182	0.186
Middle	0.111	0.125	0.600[a]	0.078	0.026	0.157
Matriculation / Secondary and above	0.022	0.000[a]	-	0.036	0.158	0.013
Husband						
Illiterate	0.148	0.349	0.331	0.252	0.331	0.268
Literate	0.107	0.242	0.339	0.117	0.214	0.184
Primary	0.151	0.344	0.261[a]	0.171[a]	0.310	0.283
Middle	0.116	0.251	0.451	0.121	0.225	0.189
Matriculation / Secondary	0.105	0.175	0.299	0.109	0.168	0.152
Graduation and above	0.046[a]	0.253[a]	0.500[a]	0.116	0.194	0.130
			(Child survival ratio)[3]			
Women						
Illiterate	0.851	0.694	0.680	0.816	0.714	0.756
Literate	0.927	0.916	0.539[a]	0.853	0.842	0.869
Primary	0.911	0.890[a]	0.728[a]	0.758	0.780	0.814
Middle	0.889	0.875	0.400[a]	0.922	0.818	0.843
Matriculation / Secondary and above	0.979	1.000[a]	-	0.964	0.974	0.987
Husband						
Illiterate	0.852	0.651	0.669	0.748	0.669	0.732
Literate	0.893	0.758	0.661	0.883	0.786	0.816
Primary	0.849	0.656	0.739[a]	0.829[a]	0.690	0.717
Middle	0.884	0.749	0.549	0.879	0.775	0.811
Matriculation / Secondary	0.895	0.825	0.701	0.891	0.832	0.848
Graduation and above	0.954[a]	0.747[a]	0.500[a]	0.884	0.806	0.870

1. Differentials in child mortality experience-related variables for woman (respondent)
2. Proportion of children dead among children ever born
3. Proportion of survivors ("currently" living children) among children ever born
a. Calculation based on less than 10 cases

effects of occupation and other variables controlled) appears in half or more of the modes of best fit. Results in another major study by the UN (1985) in several developing countries also confirm that child mortality varies inversely with father's education, barring few irregularities. It may be mentioned here that in a recent study (Hill, 1991), small amount of education has been found to have little effect on child mortality risk, and not until primary school have been completed does education reduce risks appreciably. In the present study too, lower proportion of child loss is noticed only beyond primary level of education.

This broadly suggest that only adult literacy campaigns may have little effect on child survival, although it may also indicate that a little education is usually not indivative of much income increase or upward occupational mobility.

Child Loss/Survival and Age at Marriage of Woman

It has also been noticed in the present study that, the proportion of child loss decreases, and the proportion of surviving children increases, as the age at marriage of woman increases. However, this can also be a function of relatively higher educational attainment and lower fertility among women who have married late, which are not conducive to child mortality. Hill (1991) also noticed that the children of women who married before age 16 have significantly higher mortality risks than the children of women marrying at 20 or over (although in an earlier survey, in the same area, different trend has been noticed). In the individual (present) study population groups as well, more or less similar pattern has been observed (except in Brokpas) (Table 12).

Table 12: Child mortality differentials (child loss and survival ratios)[1] among various population groups of Ladakh region in Jammu and Kashmir, India; by age at marriage of woman[2]

Age at marriage	*Buddhists*	*Muslims*				*Ladakh*
	Bodhs	*Baltis*	*Brokpas*	*Arghuns*	*(Pooled)*	*(Pooled)*
			(Child loss ratio)[3]			
10-14 years	0.065	0.371	0.339	0.216	0.331	0.291
15-19 years	0.149	0.306	0.272	0.170	0.265	0.236
20-29 years	0.129	0.200	0.440	0.141	0.231	0.182
			(Child survival ratio)[4]			
10-14 years	0.935	0.629	0.661	0.784	0.669	0.709
15-19 years	0.851	0.694	0.728	0.830	0.735	0.764
20-29 years	0.871	0.800	0.560	0.859	0.769	0.818

1. Differentials in child mortality experience-related variables for woman (respondent)
2. Age at marriage of respondents.
3. Proportion of children dead among children ever born
4. Proportion of survivor ("currently" living children) among children ever born

Table 13: Child mortality differentials (child loss and survival ratios)[1] among various population groups of Ladakh region in Jammu and Kashmir, India; by type of marriage (consanguineous /non consanguineous

Type of marriage	*Buddhists*	*Muslims*				*Ladakh*
	Bodhs	*Baltis*	*Brokpas*	*Arghuns*	*(Pooled)*	*(Pooled)*
			(Child loss ratio)[2]			
Non-consanguineous	0.137	0.287	0.305	0.151	0.255	0.213
Consanguineous	-	0.330	0.487[a]	0.232	0.314	0.314
			(Child survival ratio)[3]			
Non-consanguineous	0.863	0.713	0.695	0.849	0.745	0.787
Consanguineous	-	0.670	0.513[a]	0.768	0.686	0.686

1. Differentials in child mortality experience-related variables for woman (respondent)
2. Proportion of children dead among children ever born
3. Proportion of survivors ("currently" living children) among children ever born
4. Calculation based on less than 10 cases.

Child Loss/Survival and Type of Marriage of Woman (Consanguineous / Non-consangui-neous)

In general, consanguinity is believed to in crease offspring mortality. And, many studies from across the world have reported elevated mortality rates in the offsprings of consanguineous marriages as compared those of non-consanguineous ones (Bemiss, 1858; Sutter and Tabah, 1953; Schull et al., 1970; Hussein, 1971; Seemanova, 1971; Shami et al., 1990; among others). In India too, a host of studies have observed the same trend (Stevenson et al., 1966; Kumar et al., 1967; Chakravartti et al., 1971; Basu, 1975, 1978; Reddy, 1979; Saheb et al., 1981; Sirajuddin and Basu, 1984; among others). In the present study too, the proportion of child loss appears higher, and surviving children lower, in consanguineous than in non-consanguineous marriages, as seen in many other regions (Table 13).

But, on the other hand, some studies have also reported that parental consanguinity does not contribute to increased offspring mortality or decreased proportion of survivors (Cook and Hanslip, 1966; John and Jayabal, 1971; Bittles et al., 1985).

Child Loss/Survival and Religion

Variations in child mortality by religion have also been explored across the world, but it seems no generalization can be made due to the involvement of effects of several other factors. According to the UN (1973), such variations are usually due to the difference in socio-economic factors, accessibility to health facilities, rather that to innate difference among the groups themselves. The recent UN study (1985) in several developing African and Asian countries have shown varying patterns in child mortality among Muslims, Hindus and Christians.

Even in India, the differentials in infant and

child mortality by religion seem to differ across states and regions due to the involvement of several factors. For example, Ruzicka and Kanitakar (1973) found that, in Greater Bombay, Christian woman had the lowest, and the Muslim women had the highest mortality, but probably due to difference in education. In a more recent study by Mahadevan (1989), a comparison of the incidence of infant mortality across three states reveals a rather differing pattern, in that, it is the highest for the Scheduled Caste/ Scheduled Tribe in Uttar Pradesh and Kerala, and for Muslims in Andhra Pradesh. It is the lowest for Muslims in the first state, and for the forward castes in the other two. But the differentials in socio-economic status, social change and cultural variations of these communities may be responsible for the difference in mortality levels.

In the present study, the proportion of child loss seems higher and proportion of surviving children lower among Muslims than among Buddhists (Table). But this differentials is more on account of Muslim Baltis and Brokpas, who have registered certain characteristics including, relatively lower female literacy, which are usually not conducive to child survival, rather than on account of Muslims Arghuns. The 'current' measures of mortality discussed earlier have also revealed similar pattern of differentials.

Child Loss and Survival and Family Structure

Studies on effects of family structure on infant and child mortality are few and show varying observations. Farah and Preston (1982) have reported high mortality in couples living in extended families in Sudan, but probably due to traditionalism in child care practices, which often has deleterious effects on child health. On the other hand, Butz et al. (1982) in Malaysia found that an increase in the number of grand parents and other relatives in the household substantially reduced infant mortality, because of the possibility of getting child care aid from them, in case of mother's inability to provide the same. In India as well, due to the similar reasons, infant mortality has been noticed lower in joint families, than in nuclear families in Uttar Pradesh, Andhra Pradesh and Kerala (Mahadevan, 1989).

In the present study too, on the whole, the proportion of child loss seems lower, and the proportion of survivors higher in joint family set ups that in nuclear families (Table 14) . That is , the absence of additional kin seems to be detrimental to childcare, which becomes the sole responsibility of the mother in a nuclear family, in addition to other household and/or outside work load. However, at the individual population level, the effects of family structure on child loss/survival seem to show slightly varying pattern, although in Buddhist Bodhs and Muslims as a whole, the observed patterns are similar to the one mentioned above. The discrepancy noticed in Brokpas can be due to the possible involvement of effects of several other factors on child mortality and/or limited sample size. It may be mentioned that in a study in rural communities of Punjab and Haryana (Singh, 1986) as well, inconsistent patterns have been observed.

Child Loss/Survival and (Offspring) Gender Preference

In the present study, it has also been noticed that when there is no offspring gender preference, the proportion of child loss is higher than when there is an expressed preference for son (Table 15). Often when there is a son preference, preferential treatment is bestowed on sons and

Table 14: Child mortality differentials (child loss and survival ratios)[1] among various population groups of Ladakh region in Jammu and Kashmir, India; by family structure

Family structure	*Buddhists*	*Muslims*				*Ladakh*
	Bodhs	*Baltis*	*Brokpas*	*Arghuns*	*(Pooled)*	*(Pooled)*
			(Child loss ratio)[2]			
Joint family	0.132	0.290	0.334	0.124	0.252	0.209
Nuclear Family	0.147	0.299	0.334	0.207	0.279	0.251
			(Child survival ratio)[3]			
Joint family	0.868	0.709	0.666	0.876	0.748	0.791
Nuclear Family	0.853	0.701	0.666	0.793	0.721	0.749

1. Differentials in child mortality experience-related variables for woman (respondent)
2. Proportion of children dead among children ever born
3. Proportion of survivors ("currently" living children) among children ever born

Table 15: Child mortality differentials (child loss and survival ratios)[1] among various population groups of Ladakh region in Jammu and Kashmir, India; by attitude related to sex composition of children

Gender preference[4] (Offspring)	*Buddhists*	*Muslims*				*Ladakh*
	Bodhs	*Baltis*	*Brokpas*	*Arghuns*	*(Pooled)*	*(Pooled)*
				(Child loss ratio)[2]		
Preference for son	0.131	0.234	0.346	0.140	0.229	0.198
No gender preference	0.137	0.317	0.328	0.177	0.281	0.240
				(Child survival ratio)[3]		
Preference for son	0.869	0.766	0.654	0.860	0.771	0.802
No gender preference	0.863	0.683	0.672	0.823	0.719	0.760

1. Differentials in child mortality experience-related variables for woman (respondent)
2. Proportion of children dead among children ever born
3. Proportion of survivors ("currently" living children) among children ever born
4. Preference of respondents.

there is an element of daughter neglect in respect of food, medicare etc., which are not conducive to their health and survival prospects. These selective discrimination may lead to increased mortality of girl children (as has been pointed out by Miller, 1981; Das Gupta, 1990). But, when the proportion of child loss as a whole, is taken into consideration (irrespective of sex) as in the present study, probably simultaneous and/or overriding effects of several other factors are involved on child mortality, so that even when there is no (expressed) son preference, the chances of child survival appear relatively low (or not much different) than, when there exists clear preference for son(s). However, more specific focus on child loss/survival vis-a-vis offspring gender preference may bring out a definitive picture.

Child Loss/Survival and Place of Residence

A fundamental distinction in many societies, particularly in the developing ones, is whether one lives in a rural or in an urban area. Place of residence, as already elaborated, in these societies, usually determines people's life-style, their perceptions of the world and of others, their economic, socio-cultural characteristics, services available to them, and most importantly how long they live. Research on mortality in developing countries has frequently shown that mortality is lower in the urban areas (cities) than in rural areas (Ekanem and Farooq, 1976; Behm and Vallin, 1982). It is however, suggested that such urban advantages as, availability and accessibility to health care and availability of recent medical advances are responsible for the differential (Puffer and Serrano, 1973; UN, 1973; Tawaiah, 1979; Rosenweig and Schultz, 1982; Trussell and Hammerslough, 1983).

Other studies have suggested that observed disparities in mortality merely reflect the very different socio-economic factors that exist between the countryside and the city in less developed countries and when these are controlled, the gap is considerably reduced (Behm and Vallin, 1982; Gilbert and Gugler, 1982). A major study by the UN (1985) in several developing countries, have also recorded that an urban advantage exists in child mortality differentials, in the form of higher socio-economic status (in the urban than in the rural population), but the specificity of the health sector is not that important.

In the present study area too, as in other developing regions, there seems to exist an urban advantage in terms of relatively better infrastructure including medical facilities, as well as, better socio-economic characteristics of populace (despite the low level of urbanization in the two towns), which may be favourable to child survival. And so, the proportion of child loss is lower and the proportion of survivors higher in urban than in rural women.

Child Loss/Survival and Infrastructural Facilities Available

The infrastructural facilities available (particularly medical, communication, and education facilities) have certain bearing on infant and child mortality levels in region. In the past, the decline in mortality has been attributed to advances and propagation of medical technology and services. Even today, all moralities, including child mortality/survival are often linked to the availability of health care services (Gwatkin and Brandel, 1981; Mosley, 1985). And, access to

modern medical facilities throughout a mother's pregnancy, at delivery and during infancy, childhood is thought to be particularly important in reducing mortality.

Data from Nigeria and Peru have shown that both access to medical care facilities and utilisation of health care services have been positively related to the survival chance of children (UN, 1985), although in Colombia, public health care programmes were found to be weakly related to survival in rural area (Rosenweig and Schultz, 1982). In India too, studies by Nair (1980), Jain (1985), Mahadevan (1989) highlight the positive the role of health care facilities in lowering the infant mortality levels.

However, this view has been challenged by Gwatkin (1980) and Palloni (1981), because of the apparent reduction in the pace of mortality decline after a period of rapid progress. According to them, too much emphasis is being placed on organized health interventions and modern medical care, at the expense of socio-economic development, which is not appropriate, particularly in case of developing countries. It appears that educational characteristics, (of parents and/ or mass education) play an important role in proper utilization of health care facilities (Ratcliffe, 1978; Ware, 1981; UN, 1985; Caldwell, 1986); thereby influencing the mortality levels.

Apart from these, availability of such communication facilities, as, approach by surfaced (Pucca) road, bus service, post/telegraph services, radio/television/newspapers available nearby also affect the mortality levels. In India, Nag (1983) attributed the demographically advanced picture of Kerala (especially the low mortality rates) to the development of all social services, including education, transport and health, and less importantly to favourable environment and hygienic conditions.

In the present study, on the whole, it seems that relatively better infrastructural facilities available near residence, may be contributing to the decline in infant and child mortality. For instance, the proportion of child loss appears lower, and the proportion of survivors higher, when higher secondary schools, hospitals/tuberculosis centres etc. are present in the vicinity of the residence.

At the individual population level too, (excepting Brokpas,), the same pattern in seen (Table 16). However, these trends can also be urban/rural differences, since these facilities are available only in urban areas. And, other urban advantages in terms of socio-economic transformation may also be involved in the interplay.

Table 16: Child mortality differentials (child loss ratios)[1] among various population groups of Ladakh region in Jammu and Kashmir, India; by some background characteristics

Background characteristics	*Buddhists*	*Muslims*				*Ladakh*
	Bodhs	*Baltis*	*Brokpas*	*Arghuns*	*(Pooled)*	*(Pooled)*
Type of Educational Facilities Available[2]						
Primary/middle school	0.130	0.309	0.375	0.200	0.312	0.235
Primary/middle/high school	0.157	0.310	0.304	0.250	0.297	0.263
Primary/middle/high/higher sec. school	0.126	0.263	-	0.121	0.201	0.184
Type of Communication Facilities Available						
Communication Facilities Index[2]						
Poor	0.171	0.310	-	0.286[a]	0.308	0.265
Good	0.131	0.290	0.334	0.163	0.260	0.221
Type of Medical Facilities Available[2]						
Not available	0.000[a]	0.256	-	-	0.256	0.250
Medical sub-centre/Aid centre/ Dispensary	0.154	0.323	0.404	0.229	0.313	0.239
Primary health centre	0.146	0.331	0.232	0.417[a]	0.305	0.275
Hospital /Allopathic dispensary/Tuberculosis clinic/Family planning centre	0.126	0.264	-	0.121	0.209	0.190
Type of Medical Facilities Availed						
Folk and Modern[3]	0.141	0.343	0.324	0.174	0.311	0.263
Modern[3]	0.125	0.207	0.383[a]	0.168	0.201	0.180
Hosing Attributes and Condition						
Housing Condition Index[2]						
Poor	0.146	0.306	0.396	0.347	0.324	0.265
Fair	0.155	0.312	0.326	0.248	0.288	0.248
Good	0.095	0.251	0.292[a]	0.171	0.205	0.171

1. Differentials in proportion of children dead among children ever born for woman (Respondent)
2. Facilities not available/ available within 5 km of house (residence)
3. From both government and private sources

More so, because, the presence of various modern medical facilities in rural areas appear to be having varying effects on child loss/survival within and across the study population groups. But, it may be mentioned that, in rural Drass area, where the Brokpas are residing, the presence of high schools, and primary Health Centre appear to be conducive to the chances of child survival. Further, it has also been observed that when communication facilities are good, the proportion of child loss is lower, and the proportion of survivors higher, than when such facilities are poor (Table 17).

Child Loss/ Survival and Type of Medical Facilities Availed

The type of medical facilities availed is also believed to influence child mortality. In the present study, the proportion of child loss is lower, and the proportion of survivors higher, when only modern medical care is availed than when both folk and modern medical care is availed (Table 16, 17). It may be mentioned here that, in the latter case, modern medical care is sought, only when all types of folk treatments fail, and the children are in a critical stage, when it is often difficult to save them.

Child Loss/Survival and Housing Conditions and Attributes

The characteristics of the dwelling place also have long been recognized as an important influence on mortality, particularly infant and child mortality. The housing conditions and attributes, actually an aggregate of determinants constitutes the immediate physical environment of human beings and affects mortality mainly through the elements of exposure. It may be noted that housing characteristics are also roughly indicative of the level of living (thereby reflecting the socio-economic status of the residents); which are in turn, influenced by a number of factors. Benjamin (1965) called attention to the difficulty of separating the effects of housing characteristics from other determinants of child mortality, with which they were highly correlated, social class, social status, income, unemployment, and place of residence.

Many authors (Preston, 1975, 1980; Potts and Selman, 1979; Tabah, 1980) have reported that changes in environmental factors such as, quantity and quality of water, housing conditions, sanitary facilities explained the reduction in mortality or lead to a decline in mortality caused by certain diseases, or decreased incidence of

Table 17: Child mortality differentials (child survival ratios)[1] among various population groups of Ladakh region in Jammu and Kashmir, India; by some background characteristics

Background characteristics	*Buddhists*	*Muslims*				*Ladakh*
	Bodhs	*Baltis*	*Brokpas*	*Arghuns*	*(Pooled)*	*(Pooled)*
Type of Educational Facilities Available[2]						
Primary/middle school	0.870	0.691	0.625	0.800	0.688	0.765
Primary/middle/high school	0.843	0.690	0.696	0.750	0.703	0.737
Primary/middle/high/higher sec. school	0.874	0.737	-	0.879	0.799	0.816
Type of Communication Facilities Available						
Communication Facilities Index[2]						
Poor	0.829	0.690	-	0.714[a]	0.692	0.735
Good	0.869	0.710	0.666	0.837	0.740	0.779
Type of Medical Facilities Available[2]						
Not available	1.000[a]	0.744	-	-	0.744	0.750
Medical sub-centrs/Aid centre/ Dispensary	0.846	0.677	0.596	0.771	0.687	0.761
Primary health centre	0.854	0.669	0.768	0.583[a]	0.695	0.725
Hospital /allopathic dispensary/ Tuberculosis clinic/Family planning centre	0.874	0.736	-	0.879	0.791	0.810
Type of Medical Facilities Availed						
Folk and modern[3]	0.859	0.657	0.676	0.826	0.689	0.737
Modern[3]	0.875	0.793	0.817[a]	0.832	0.799	0.820
Hosing Attributes and Condition						
Housing Condition Index[2]						
Poor	0.854	0.694	0.604	0.653	0.676	0.735
Fair	0.845	0.688	0.674	0.752	0.712	0.752
Good	0.905	0.749	0.708[a]	0.829	0.795	0.829

1. Differentials in proportion of survival (living children) among children ever born for woman (Respondent)
2. Facilities not available/ available with in 5 km of house (residence)
3. From both government and private sources

many serious diseases. In an ecological study in Sri Lanka too (Patel, 1981) the type of dwelling variables (supply of well water, presence of latrine, presence of asbestos or tiled roofs) explained 76 per cent of the regional variation in infant mortality, even though it was mentioned that some of these variables were acting as proxies for income. Whereas another study in Sri Lanka (Meegama, 1980) , recorded that the lowest infant mortality was associated with the relatively costly and more hygienic lavatory type-water seal system, or flush lavatory and the highest with the absence of any system, in Sudan it was seen that (Farah and Preston, 1982) living in house made from mud arises child mortality significantly. Others (Tekce and Shorter, 1984; Schkolnik, 1991) also corroborated the negative impact of deficient housing conditions on infant and child mortality.

In India, the UN (1961) too, reported high infant mortality rate for families in poor class housing, which dropped when the same improved. Chandrasekher (1972) also pointed out family variations in magnitude of the infant mortality rate according to type of dwelling. Many recent studies have also shown negative associations between type of house, house sanitation index, level of living, and infant and child mortality in different parts of India (Jain , 1985; Singh,. 1986; Mahadevan , 1989). In the present study as well, the proportion of child loss is found to decrease, and the proportions of survivors seems to increase with the betterment of housing conditions (Table 16, 17).

Child Loss/Survival and Altitude

The effects of high-altitude stresses (mainly hypoxia) on infant and child mortality seem neither uniform nor universal across various high-altitude regions of the world. Grahn and Kratchman (1963) first observed that neonatal mortality was positively associated with altitude in the United States. Mazess (1965) too, observed the same in Peru. And, it was suggested that the higher infant mortality was the result of hypoxia. However, Frisancho and Cossman (1970) observed that the association disappeared in the United States as medical care improved. In the Andean region, according to Baker (1978), the association probably persisted, because, medical care tend to be poorer in the high altitude region. Increased infant and child mortality at high altitude than at low altitudes have also been reported by Harrison et al. (1969), Dutt (1980); although Kashiwazaki et al. (1988) have not seen such differentials.

In the Himalayan region too, Goldstein (1981) observed relatively high infant mortality (infant mortality acccounted for 40 per cent of total deaths). But, contrary to the expectation generated by animal experiments, as well as above mentioned studies, the infant mortality rate did not seem to differ significantly between the high altitude Sherpas of Upper Khumbu (Nepal) and low altitude Kalimpong (West Bengal, India) [Basu et al., 1985]. Gupta et al. (1987), while discussing this trend have commented that - 'hypoxia and such other high altitude stresses, which are generally belived to adversely affect normal growth and development, and consequently survival at pre-and post natal stages, did not operate with any perceptible magnitude, or alternatively, similar magnitudes of socio-cultural stresses at high altitude overrode their affects to render the two samples homogenous'.

Basu et al. (1985) also mentioned that in Lachen and Lachung in Sikkim, India, infant mortality rates are determined by the physical environmental stresses associated with the temporary habitats at higher and low altitudes, as well as the socio-cultural factor of differential transhumance pattern. And, since these factors are inextricably intertwined, distinguishing their individual effect appears meaningless.

In the present study as well, marked intra and inter population difference, rural urban differences indicate the possible involvement of effects of economic, socio-cultural, psychological, physical environmental factors (other than altitude) on infant and child mortality. The exploratory analysis has also shown the same. However, the possible effects of high altitude stresses in the study areas cannot also be ruled out completely, as the infant and child mortality levels appear rather high.

KEY WORDS Mortality Measures. Survival Ratios. Tribals. Caste Groups. Jammu and Kashmir.

ABSTRACT Mortality measures and determinants have been presented for the caste and tribal groups of Jammu and Kashmir. The various population groups reveal differential mortality particularly infant, child and under five mortality which are indicators of the groups environment and development. The major environmental, biological and socio-economic determinants found to influence the child survival.

REFERENCES

Anker, R. and Knowles, J.C.: *An Empirical Analysis of*

Mortality Differentials in Kenya at the Macro and Micro Levels. Population and Employment Working Paper No. 60. International Labour Organization, Geneva (1977).

Baker, P.T.: The adaptive fitness of high-altitude populations. p. 317. In: *The Biology of High Altitude Peoples.* P.T. Baker (Ed.). Cambridge University Press, Cambridge (1978).

Basu, A., Gupta, R., Bharati, P., Mukhopadhyay, B. and Roy, S.K.: Physical environmental, sociocultural and ethnic correlates of human biology in some populations of West Bengal, India and neighbouring regions: Mortality differentials. p. 345. In: *Diseases of Complex Etilogy in Small Populations: Ethnic Differences and Research Approaches.* R. Chakraborty and E. J. E. Szathmary (Eds.). Alan R. Liss Inc., New York (1985).

Basu, S.K.: Effects of consanguinity among north Indian Muslims. *J. Pop. Res.*, **2:** 57 (1975).

Basu, S.K.: Effects of consanguinity among Muslim group of India. p. 173. In: *Medical Genetics in India*. Vol. 2. I.C. Verma (Ed.). Auroma Enterprises, Pondicherry (1978).

Behm, H.: Socio-economic determinants of mortality in Latin America. *Pop. Bull. UN*, **13:** 1 (1980).

Behm, H.: An analytical framework. p. 7. In: *Child Mortality in Developing Countries: Socio-Economic Differentials Trends and Implications.* Department of International Economic and Social Affairs, United Nations, New York (1991).

Behm, H. and Vallin, N.: Mortality differentials among human groups. In: *Biological and Social Aspects of Mortality and the Lenght of Life.* S. H. Preston (Ed.). Ordina Editins, Liege (1982).

Bemiss, S.M.:Report on the influence of marriage of consanguinity upon offspring. *Trans. Am. Med. Assoc.*, **11:** 319 (1858).

Benjamin, B.: *Social and Economic Factors Affecting Mortality.* Marton, Paris (1965).

Bhasin, M.K. and Nag, Shampa: A demographic profile of the people of Jammu and Kashmir. 1. Population structure. *J. Hum. Ecol.*, **13:** 1-55 (2002).

Bittles, A. H., Radha Rama Devi, A., Savithri, H.S., Rajeshwari, S. and Rao, N. A.: Inbreeding and postnatal mortality in south India: Effect on the gene pool. *J. Genet.*, **64:** 135 (1985).

Bogue, D.J.: *Principles of Demography.* John Wiley and Sons, New York (1969).

Bourne, K.L. and Walker, G.M.: The differential effect of mother's education on mortality of boys and girls in India. *Population Studies,* **45:** 203 (1991).

Butz, W. P., Da Vanzo, J. and Habicht, J.P.: Biological and behavioural influences on the mortality of Malaysian Infants (1982). [Cited from: UN: *Socio Economic Differentials in Child Mortality in Developing Countries*. Department of International Economic and Social Affairs, United Nations, New York (1985)].

Caldwell, J.C.: Education as a factor in mortality decline: An examination of Nigerian data. *Population Studies,* **33:** 395 (1979).

Caldwell, J.C.: Routes to low moratlity in poor countries. *Pop. Dev. Rev.,* **12:** 171 (1986).

Caldwell, J.C., Reddy, P.H. and Caldwell, P.: The social component of mortality decline: An investigation in South India employing alternative methodologies. *Population Studies,* **37:** 185 (1983).

Chandrasekhar, S.: *Infant Mortality Population Growth and Family Planning in India.* George Allen and Unwin Ltd., London (1972).

Chaudhury, R.H.: *Social Aspects of Fertility: With Special Reference to Developing Countries*. Vikas Publsihing House Pvt. Ltd., New Delhi (1982).

Cochrane, S.H., O'Hara, D.J. and Leslie, J.: *The Effects of Education on Health*. World Bank Working Papers No. 405. Washington D.C. (1980).

Conrad: Sex roles as factors in longivity. *Sociology and Social Research,* **7:** 195 (1962).

Dandekar, K.: Why has the proportion of women in India's population been declining? *Eco. Pol. Weekly,* **10:** 18 (1975).

Das Gupta, M.: Death clustering, mothers education and the determinants of children mortality in rural Punjab, India. *Populaiton Studies,* **44:** 489 (1990).

Da Vanzo, J. and Lee, D.L.P.: The comparability of child care with labour force participation and nonmarket activities: Preliminary evidence from Malaysian Time Budget Data. Rand Paper, P. 6126 (1978) [Cited from: United Nations: *Socio-Economic Differentials in Child Mortality in Developing Countries.* Dept. of International Economic and Social Affairs. United Nations, New York (1985)].

Devi, P.K.: Perinatal mortality and antipartum haemorrhage. *ICMR Bull.*, **9:** 1 (1979).

Dorn, H.F.: Mortality P. 437. In: *The Study of Populaiton: An Inventory and Appraisal.* P.M. Hauser and O.D. Duncan (Eds.). University of Chicago Press, Chicago, (1972).

Driver, E.D.: *Fertility Differentials in Central India.* Princeton University Press, Princeton (1963)

Dutt, J.S.: Altitude and fertility: The confounding effect of childhood mortality-A Bolivian example. *Soc. Biol.*, **27:** 101 (1980).

Ekanem, I. and Farooq, G.M.: The dynamics of population changes in southern Nigeria. *The Nigerian Journal of Economic and Social Studies,* **18:** 51 (1976).

Farah, A. and Preston, S.H.: Child mortality differntials in Sudan. *Pop. Dev. Rev.,* **8:** 365 (1982).

Fisher, R.A.: *The Genetical Theory of Natural Selection.* Oxford University Press, London (1930).

Flinn, M.V.: Corelates of reproductive success in a Carribean village *Hum. Eco.,* **14:** 225(1986).

Frisancho, A.R. and Cossman, J.: Secular trend in neonatal mortality in the mountain states. *Am. J. Phys. Anthrop.,* **33:** 103 (1970).

Frisancho, A.R. Klayman , J.E. and Matos, J.: Symbiotic relationship of high fertility, high childhood mortality and socio-economic status in an urban Peruvian populations. *Hum. Biol.,* **48:** 101 (1976).

Gee, E.M. and Beavers, J.E.: Accelerating sex differentials in mortality: An analysis of contributing factors. *Soc. Biol.,* **30:** 75 (1983).

Ghosh, S.: The female child in India: A struggle for survial. *Bulletin of the Nutrition Foundaiton of India,* **8:** 4 (1987).

Gilbert, A. and Gugler, J.: *Cities, Poverty and Development: Urbanization in the IIIrd World*. Oxford University Press, Oxford (1982).

Goldstein, M.C.: High Altitude Tibetan populations in the remote Himalayas: Social transformation and its demographic economic and ecological consequences. *Mountain Research and Development,* **1:** 5 (1981).

Grahn, D. and Kratchman, J.: Variation in neonatal death rate and birth rate in the United States and possible relations to envionmental radiation, geology and altitude. *Am. J. Hum. Genet.,* **15:** 329 (1963).

Gupta, R., Basu, A., Pawson, I.G., Bharati, P., Mukhopadhyay, B., Mukhopadhyaya, S., Roy, S.K. Majumder, P.P., Bhattacharya, S.K., Bhattarcharya, K.K. and Das, J.K.: Altitude and human biology: A comparative study of Himalayan, Andean and Ethiopian data. *J. Indian Anthrop. Soc.,* **22:** 101 (1987).

Gwatkin, D.R.: Indication of change in developing countries mortality trends: The end of an era? *Pop. Dev. Rev.,* **6:** 615 (1980).

Gwatkin, D.R. and Brandel, S.K.: Reducing infant and child mortality in the developing world 1980-2000. *Overseas Development Council Working Paper No. 2* (1981).

Harrison, G.A.: Population genetics - gene frequency changes. p.208. In: *An Introduction to Human Evolution, Variation, Growth and Adaptability.* G.A. Harrison, J.M. Tanner, D.R. Pilbeam, P.T. Baker. Oxford Univeristy Press, Oxford (1990).

Hill, K.: Jorden P. 93. In.: *Child Mortality in Developing Countries: Socio-Economic Differentials, Trends and Implications.* Deptt. of International Economic and Social Affairs, United Nations, New York (1991).

Hobcraft, J.N., McDonald, J.W., Rustein, S.O.: Socioeconomic factors in infant and child mortality: A cross national comparision. *Population Studies,* **38:** 193 (1984).

Hussein, F. H. : Endogamy in Egyptian Nubia. *J. Biosoc. Sci.,* **3:** 251 (1971).

Jain, A.K.: Determinants of regional variation in infant mortality in rural India. *Population Studies,* **39:** 407 (1985).

Jain, S.P.: Mortality trends and differentials. p. 135. In: *Population of India.* Country Monograph Series No. 10.a United Nations, New York (1982).

John, J.T. and Jayabal, P.: Foetal and child loss in relation to consanguinity in Southern India. *Ind. J. Med. Res.,* **59:** 1050 (1971).

Kashiwazaki, H., Suzuki, T. and Takemoto, T.: Altitude and reproduction of the Japanese in Bolivia. *Hum. Biol.,* **16:** 831 (1988).

Kumar, S. K., Pai, R.A. and Swaminathan, M.S.: Consanguineous marriage and genetic load due to lethal genes in Kerala. *Ann. Hum. Genet.,* **52:** 141(1967).

Lopez, D. and Ruzicka, L.T. : *Sex Differentials in Mortality. Trends, Determinants and Consequences.* Department of Demography, The Australian National University, Canberra (1983).

Madigan, F.: Are sex mortality differentials biologically caused? In: *Population and Society.* C. Nam (Ed.). Houghton Miffin Co., Boston (1968).

Mahadevan, K.: *Population Dynamics in Indian States: Fertility and Family Formation and Mortality and Life Affecting Variables.* Mittal Publications, New Delhi (1989).

Markides, K.S. and Barnes, D.: A methodological note on the relationship between infant mortality and socioeconomic status with evidence from San Antonio, Texas. *Soc. Biol.,* **24:** 38 (1977).

Mazess, R.B.: Neonatal mortality and altitude in Peru. *Am J. Phys. Anthrop.,* **23:** 209 (1965).

Meegama, S.A.: *Socio-Economic Determinants of Infant and Child Mortality in Sri Lanka. An Analysis of Post-war Experience.* WFS Scientific Report No. 8, International Statistical Institute, Voorburg (1980).

Miller, B.D.: *The Endangered Sex: Neglect of Female Children in Rural North India.* Cornell University Press, Ithaca, New York (1981)

Mosley, W.H.: Will primary health care reduce infant and child mortality? In: *Health Policy, Social Policy and Mortality Prospects.* J. Vallin and A.D. Lopez (Eds.). Ordina Editions, Liege (1985).

Nag, M.: Impact of social and economic development on mortality: A comparative study of Kerala and West Bengal. *Econ. Pol. Weekly,* **18:** 877 (1983).

Nair, P.R.G.: Decline in birth rate in Kerala. A hypothesis about the interrelationship between demographic variables, health services and education. *Eco. Pol. Weekly,* **9:** 323 (1974).

Natrajan, D.: Changes in Sex Ratio, p. 42, *Census of India, 1971. Census Centenary Monograph No. 6.* Office of the Registrar General, New Delhi (1971).

National Family Health Survey, India, 1992-93. Intenational Institute for Population Sciences, Bombay (1995).

Nayeye et al.: Neonatal mortality, the male disadvantage. *Pediatrics,* **48:** 902 (1971).

Office of the Registrar General, India. *Sample Registration System, 1970-75,* Ministry of Home Affairs, New Delhi (1982).

Office of the Registrar General, India. *Sample Registration System, 1981* Ministry of Home Affairs, New Delhi (1985).

Office of the Registrar General, India. *Sample Registration System, 1988,* Ministry of Home Affairs, New Delhi (1991).

Office of the Registrar General, India. *Sample Registration System, 1991,* Ministry of Home Affairs, New Delhi (1992).

Office of the Registrar General, India. *Sample Registration System: Fertility and Mortality Indicators, 1990, 1991, 1992,* Ministry of Home Affairs, New Delhi (1993-94).

Office of the Registrar General India: *Survey of Causes of Death (Rural) India, Annual Reports. 1989, 1992 Series 3 No. 22, 25.* Ministry of Home Affairs, New Delhi (1989, 1992).

Palloni, A: Mortality in Latin America: Emerging Patterns. *Pop. Dev. Rev.,* **7:** 623 (1981).

Patel, M.: Modelling determinants of health. *Int. J. Epidemiol.,* **10** (1981).

Pejaranonda, C. and Santipaporn, S.: Thailand, p. 112. In: *Child Mortality in Developing Countries: Socio-economic Differentials. Trends and Implications*. Department of International Economics and Social Affairs, United Nations, New York (1991).

Potts, M. and Selman, P.: *Society and Fertility* Macdonald and Evans Ltd., London (1979).

Preston, S.H. : Introduction. *Proceedings of the Seminar on Infant Mortality in Relation to the Level of Fertility, Bangkok, 1975*. Committee for International Co-operation of National Research on Demography (1975).

Preston, S.H.: Causes and consequences of mortality declines in less developed countries during the twentieth century p. 294. In: *Population and Economic Change in Developing Countries*. R.A. Easterlin (Ed.). University of Chicago Press, Chicago (1980).

Preston, S.H.: Mortality in India. p.81. In: *International Population Conference. New Delhi 1989.* Vol. 4 IUSSP, Liege (1990).

Preston, S.H., Haines, M.R. and Pamuk, E.: Effects of industrialization and urbanization on mortality in developed countries. *Proceedings of the International Population Conference*, IUSSP, Manila, 1981, Vol. 3, Ordina Editions, Liege (1981).

Puffer, R.,R. and Serrano, C.V.: *Potterns of Mortality in Childhood: Report of the Inter American Investigation of Mortality in Childhood*. Scientific Publication No. 262. Pan American Health Organization, Washington D.C. (1973).

Ratcliffe, J.: Social justice and the demographic transition: Lesson from India's Kerala State. *Int. J. Health Services*, **8:** 23 (1978).

Reddy, B.M.: Marriage distance and inbreeding in Vadabalija: A marine fisherfolk of Puri. *Man in India*, **59:** 120 (1979).

Rosenweig, M.R. and Schultz, T.P.: *Child Mortality and Fertility in Colombia: Individual and Community Effects.* Centre Discusion Paper No. 380. Economic Growth Centre, Yale University, New Haven (1981).

Rosenweig, M.R. and Schultz T.P.: Market opportunities, genetic endowment and intrafamily resource distribution: Child Survival in rural India. *American Economic Review*, **72:** 803 (1982).

Ruzicka, L.T. and Kanitkar, T.: Infant mortality in Greater Bombay. *Demo. India*, **2:** 41 (1973).

Saheb, S.Y., Sirujuddin, S.M., Raju, C.M., Sastry, D.B. and Gulati, R.K.: Consanguinity and its effect on fertility and mortality in Kodava populations of Kodagu district, Karnataka. *Ind. Anthrop.*, **11:** 101 (1981)

Schkolnik, S.: Parguay: Urban areas. p.74. In: *Child Mortality in Developing Countries: Socio-economic Differentials Trends and Implications*. Deptt. of International Economic and Social Affaris. United Nations, New York (1991).

Schull, W. J., Furusho, T., Yamamoto, M., Nagano, H. and Komatsu, L.: The effects of parental consanguinety and inbreeding in Hirado, Japan. *Hum. Genet.*, **9:** 294 (1970).

Seemanova, E.: A study of children of incestuous matings. *Hum. Hered.*, **21:** 108 (1978).

Shami, S.A., Schmitt, L.H. and Bittles, A.H.: Consanguinity, spousal age at marriage and fertility in seven Pakistani Punjab cities. *Ann. Hum. Biol.*, **17:** 97 (1990).

Simmons, G.B., Smucker, C., Bernstein, S. and Jenson, E.: Post-Neonatal mortality in rural India: Implications of an economic model. *Demography*, **19:** 371 (1982).

Singh, K.P.: *Correlates of Fertility Behaviour.* Concept Publishing Co. New Delhi (1986).

Sirajuddin, S,M. and Basu, A.: Population structure, consanguinity and its effect on fertility and mortality among Chencnu of Andhra Pradesh, *Hum. Sci.*, **33:** 179 (1984).

Stevension, A.C., Johnston, H.A., Stewart, M.J.P. and Golding, D.R.I.: Consanguinity. *Bull. WHO (Supp to Vol. 34)*, **34:** 88 (1966).

Sutter, J. and Tabah, L.: Structure de La mortalite dans les familes consanguines, *Population*, **8:** 511 (1953).

Tabah, L.: World population trends: A stocktaking. *Pop. Dev. Rev.*, **6:** 355 (1980).

Tawiah, E.O.: Some demographic and social differentials in infant and early childhood mortality in Ghana.p.464. In: *Population Dynamics: Fertility and Mortality in Africa.* Proc. Expert Group Meeting on Fertility and Mortality Levels and Trends in Africa and their Policy Implications, Monrovia, Liberia, 1979, UNECA (1981).

Tekce, B. and Shorter, F.C.: Determinants of child mortality: A study of squatter settlements in Jorden. In: *Child Survival: Strategies for Research.* W.H. Mosley and L. Chen (Eds.). *Pop. Dev. Rev.*, **10 (Supplement):** 257 (1984).

Trussell, J. and Preston, S.H.: Estimating the covariates of childhood mortality from retrospective reports of mother. *Health Policy and Education*, **3:** 1 (1982).

Trussell, J. and Hammerslough, C.: A hazard model analysis of the covariates of infant mortality in Sri Lanka. *Demography*, **20:** 1 (1983).

United Nations: *The Mysore Population Study* Population Studies No. 34, United Nations, New York (1961).

United Nations: *The Situation and Recent Trend of Mortality in the World.* Population Bulletin No. 6, United Nations, New York (1963).

United Nations: *The Determinants and Consequences of Population Trend.* Vol. 1. Population Studies No. 50, United Nations, New York (1973).

United Nations: *Levels and Trends of Mortality Since 1950.* Population Studies No. 74, United Nations, New York (1982).

United Nations: *Socio economic Differentials in Child Mortality in Developing Countries.* Department of International Economic and Social Affairs. United Nations, New York (1985).

United Nations: *United Nations Demographic Yearbook 1992*, United Nations, New York (1992).

UNICEF: *The State of the World's Children, 1990, 1991, 1992, 1993.* United Nations Children Fund, New Delhi (1990-1993).

UNICEF: *Children and Women in India: A Situation Analysis, 1990*. United Nations Children Fund, New Delhi (1991).

Venkatacharya, K.: Kenya. P. 29. In: *Child Mortality in Developing Countries: Socio-economic Differentials, Trends and Implications.* United Nations, New York (1991).

Ware, H.: *Women, Demography and Development*. Development Studies Centre, Australian Naitonal University, Canberra (1981).

Authors' Address: **Dr. M.K. Bhasin** *Professor and Head,* and **Dr. Shampa Nag,** Department of Anthropology, University of Delhi, Delhi 110 007, India