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(A Cohort Analysis for Rural Bangladesh)

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May 1981

Scientific Report No. 46

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PREFACE

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ABSTRACT

The differentials of early neonatal, late neonatal and post-neonatal mortality were examined in this paper. A cohort of nearly 20,000 births occurring in a rural area of Bangladesh were prospectively followed for one year. The analysis of the data showed that:

(a) Among all infant deaths, the rate of neonatal deaths was higher than that usually found in developing countries;

(b) Birth order has a distinct U-shaped pattern for early neonatal mortality and post-neonatal mortality;

(c) Female children have lower mortality in the neonatal period, whereas male children have lower mortality in the post-neonatal period;

(d) Previous child mortality experience of the mother is directly related to the probability of death of subsequent births at any period of infancy;

(e) Only when the previous child survives at least one year is the birth interval inversely related to the probability of dying in infancy. This is especially true for the post-neonatal period;

(f) A variation in infant mortality with socio-economic status was not observed. This may be explained by the homogeneity of sanitation, environment and living conditions, food consumption patterns, and absence of medical and health facilities.

INTRODUCTION

This article utilizes data compiled in the late 1960s from a rural area of Bangladesh to estimate the neonatal and post-neonatal mortality rate differentials by family formation patterns and other social variables.

The literature on neonatal and post-neonatal mortality reveals that the main causes of neonatal deaths in developed countries are immaturity, congenital defects and birth injuries. For post-neonatal deaths, infectious disease is the main cause. For developing countries, the major causes of neonatal deaths, include infections such as tetanus in addition to congenital defects and birth injuries. For post-neonatal deaths, malnutrition is important as well as infectious. In developed countries it has also documented that "family formation variables" such as mother's age and parity are more related to neonatal mortality than "social variables" such as father's occupation, social class, life style for family, etc. However, the reverse is true for post-neonatal mortality (Morris JN *et al.* 1955). However these correlations in countries which have undergone the transition from high to very low mortality, may not hold true for developing countries today.

Mortality levels in less developed countries varies from that noted in developed areas because of differences in the overall level of food production, public health development or availability of medical facilities. Intracountry variation in neonatal and post-neonatal mortality has also been attributed to inequitable accessibility to such development programmes. The social stratification of infant and child mortality would therefore reflect the differential accessibility to such facilities rather than differentials in parents' knowledge, attitude and practice in child care. In a society which is homogeneous in respect to sanitation, environment, access to medical and health facilities, and food consumption, the occurrence socio-economic differentials in infant deaths may be less likely.

In a rural area of Bangladesh, where conditions are similar to those described above, the differentials in infant deaths by socio-economic status is not reflected as in other populations (Omran 1976). During the famine period of 1974-75, however, one study showed evidence of an association between socio-economic status and infant deaths (McCord 1980). This may accrue from changes in the food consumption patterns of the lower socio-economic stratum during famine that produce malnutrition of infants and mothers which, in turn exacerbate differentials in infant mortality for that period. As soon as the famine was over in the study area the differentials by socio-economic status diminished.

The purpose of the current study is to assess the influence of demographic and social factors in neonatal and post-neonatal mortality. Differentials in demographic characteristics SES translate into differentials in diet, amenities, and health behaviour that affect mortality in general and infant mortality in particular. It was expected that based on the magnitude of differentials, the high risk groups in rural Bangladesh could be identified. Such information is relevant to the Bangladesh primary health care development policy in rural areas. There is a clear need for a bench mark estimate of infant mortality, information on the distribution pattern of its components, and descriptive material on neonatal and post-neonatal mortality levels and differentials. This information is vital for the formulation of health policies to accelerate the decline in infant mortality.

METHODS

Infant mortality rate (IMR) has three components - (i) early neonatal mortality; (ii) late neonatal mortality and (iii) post-neonatal mortality. The age breakdown of infant deaths may imply distinct patterns when their differentials are studied.

Early neonatal mortality here is designated as $q(0)_1$ which is the probability of dying in the first week of life (0 to 6 days). The late neonatal mortality $q(0)_2$ is the probability of dying between the 7th and the 28th day of life. The $q(0)_3$ is the probability of dying between the 29th day of life and the 364th day of life. The values of $q(0)_1$, $q(0)_2$, and $q(0)_3$ were calculated for birth cohorts.

Data from the intensive vital registration project of International Centre for Diarrhoeal Disease Research, Bangladesh formerly Cholera Research Laboratory (Mosley W.H. *et al.* 1970). There were a total of 19,534 births between May 1966 and April 1970 in the rural area under study, 2,329 infant deaths occurred between these dates of which 1,427 were neonatal deaths. The IMR was therefore 119 per 1,000 live births and 60 percent of all infant deaths occurred during the first month of life. This proportion is unusually high for even a developing country, but not a typical of Bangladesh (Seltzer 1970).

RESULTS

Age of Mother

Table 1 shows the relationship between mother's age at the time of birth and neonatal and post-neonatal mortality for the period (1966-1970). The early neonatal deaths $q(0)_1$ is .049 when the mother's age is below 20; it declines to .039 when the mother's age is between 20-24, and declines further up to age 30-34. It then rises again: at age 40 and above the $q(0)_1$ reaches .064.

The distribution of $q(0)_2$ is different from $q(0)_1$, in that it is relatively invariant across age groups and lower than $q(0)_1$ at all ages except 30-34. The post-neonatal mortality shows a parallel pattern to early neonatal mortality. The $q(0)_3$ is .056 for children of women below age 20 and declines prececipitously with increase in age until age 25-29, thereafter it rises to a maximum of .093 at the age group 40 and above. Both $q(0)_1$ and $q(0)_3$ exhibit a "U" shaped pattern with age although minima differ. $q(0)_1$ is minimum for the age group (30-34), while the minimum of $q(0)_3$ is at age group (20-24). The infant mortality rate (IMR) being a composite index of the $q(0)_1$ also show a U-shaped pattern with its highest value in the oldest maternal age group.

Parity

Parity is defined as the number of live births occurring to the mother prior to the current birth. The estimates of $q(0)_1$ $q(0)_2$ and $q(0)_3$ by parity are presented in Table 2. Both $q(0)_1$ and $q(0)_3$ shows a U-shaped distribution with parity. The $q(0)_1$ is .059 at zero parity and then decreases to .029 in

TABLE 1

PROBABILITY OF DYING IN EARLY NEONATAL, LATE NEONATAL AND POST-NEONATAL PERIOD BY AGE OF MOTHER

Age of Mother at the Time of Birth	Probability of Dying: Early Neonatal 0-6 days	Late Neonatal 7-28 days	Post-neonatal 29-364 days	Infant Mortality Rate/1000	No. of Births
	$q(0)_1$	$q(0)_2$	$q(0)_3$	IMR	n
Below 20	.049	.038	.056	136	3,739
20 - 24	.038	.036	.039	108	5,526
25 - 29	.035	.031	.052	114	5,356
30 - 34	.029	.039	.051	115	3,156
35 - 39	.045	.040	.058	137	1,303
40 +	.064	.032	.093	178	448

TABLE 2

PROBABILITY OF DYING IN EARLY NEONATAL, LATE NEONATAL AND POST-NEONATAL PERIOD BY PARITY OF MOTHER

Previous Parity of the Mother	Probability of Dying			Infant Mortality Rate/1000	No. of Births
	Early Neonatal 0-6 days	Late Neonatal 7-28 days	Post-Neonatal 29-364 days		
	$q(0)_1$	$q(0)_2$	$q(0)_3$	IMR	n
0	.059	.044	.061	155	2,664
1	.035	.034	.047	113	2,902
2	.037	.034	.032	100	2,717
3	.032	.030	.042	101	2,458
4	.029	.035	.045	106	2,240
5	.034	.028	.046	104	1,999
6	.032	.0441	.049	120	1,649
7	.043	.033	.066	136	1,197
8+	.047	.040	.075	153	1,698

the fourth parity. From the fifth parity $q(O)_1$ rises to a maximum of .047 at parity 8 and above. For $q(O)_3$ begins with .061 at parity zero and the minimum value of $q(O)_3$ is .032 at parity two. The maximum value of $q(O)_3$ is at parity 8 + is double value at parity 2 which is the minimum. The difference between the patterns of $q(O)_1$ and $q(O)_3$ by parity are that minima are at different points and although the maxima are at the extreme parities. The pattern of $q(O)_2$ however, does not show any distinct usual U-shape relationship with parity. The highest risk of death of infants is at zero parity and lowest risk of parity 2 and 3 and then it increases as parity increases.

Infant mortality in relation to age and parity in this population also reflected the classic U-shape pattern as observed in other populations (Shapiro, 1968). The reported effects by age and parity are likely to be confounded since age and parity are so closely correlated.

<u>Child Surviving Status</u>

Parity and living children together tell the child mortality or child surviving experienced by a mother. Table 3 gives the estimates of $q(O)_1$, $q(O)_2$ and $q(O)_3$ by parity and number of living children. All the $q(O)_1$'s and the IMR are lower for women who have a higher number of surviving children, throughout all parity groups. If the group "all the children living" is considered, it is found that parity had no effect on $q(O)_1$ and $q(O)_2$. However, the value of $q(O)_3$, with all children living, are .058, 044, and ,037 for parity groups 7 +. (5-6) and (3-4) respectively. In the "all children living" group, only very large families put some pressure on infant health and which is only in post-neonatal period.

It appears that low child mortality experiences even in combination with high parity does reduce $q(O)_1$ $q(O)_2$ and $q(O)_3$.

Figure 1 shows early neonatal, late neonatal and post-neonatal mortality by previous parities of mother as well as her child mortality experience, which clearly indicated that previous child mortality experience was very crucial in determining the mortality of subsequent children. It was also seen that pressure of a big family (size 7+) on infant mortality exists only in post-neonatal period, and, found to be true for both low as well as high child mortality experience groups. However, there is no effect of family size on neonatal mortality.

TABLE 3

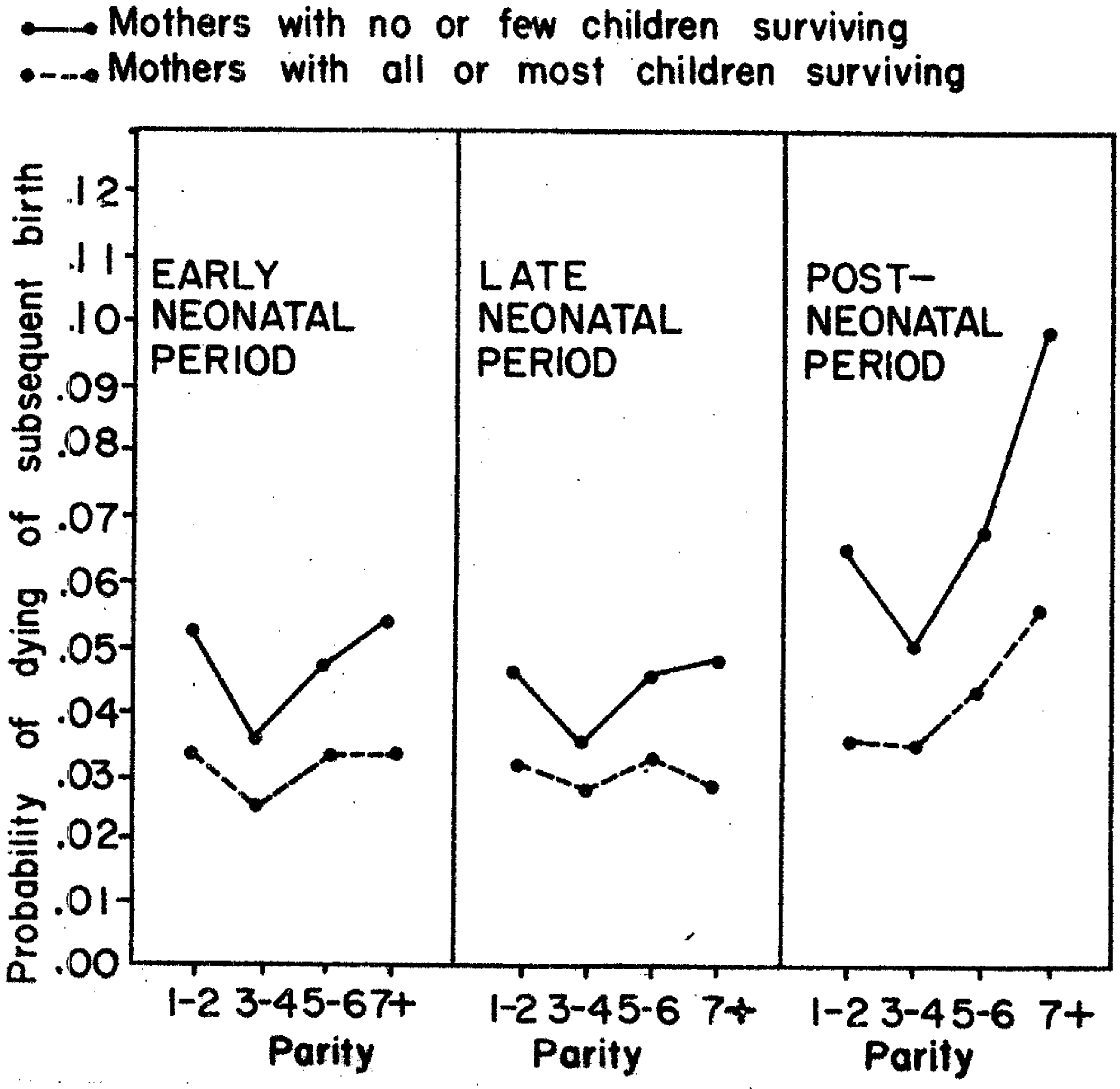
PROBABILITY OF DYING IN EARLY NEONATAL, LATE NEONATAL AND POST-NEONATAL PERIOD BY PARITY AND LIVING CHILDREN

Parity	Living Children	Probability of Dyring: Early Neonatal 0-6 days	Late Neonatal 7-28 days	Post-neonatal 29-364 days	Infant Mortality Rate/1000	No. of Births
		$q(0)_1$	$q(0)_2$	$q(0)_3$	IMR	n
0	0	.059	.044	.061	155	2,664
1-2	0	.052	.047	.066	156	657
	1-2	.034	.032	.037	100	4,962
3-4	0	*	*	*	195	43
	1-2	.036	.036	.051	119	1,783
	3-4	.028	.029	.037	91	2,872
5-6	0	*	*	*	*	19
	1-2	.047	.047	.066	152	349
	3-4	.031	.034	.047	108	2,116
	5-6	.033	.033	.044	106	1,174
7+	0	-	-	-	-	-
	1-2	*	*	*	267	87
	3-4	.054	.049	.096	187	752
	5-6	.044	.031	.063	132	1,382
	7+	.033	.030	.058	116	673

* Numerators are too small for estimates.

\- No event.

FIG. 1.


Mothers with no or few children surviving
Mothers with all or most children surviving
Probability of dying of subsequent birth
.12
.11
.10
.09
.08
.07
.06
.05
.04
.03
.02
.01
.00
EARLY NEONATAL PERIOD
LATE NEONATAL PERIOD
POST-NEONATAL PERIOD
1-2 3-4 5-6 7+
Parity
1-2 3-4 5-6 7+
Parity
1-2 3-4 5-6 7+
Parity

Sex of the Birth

Table 4 gives the estimates of $q(0)_1$, $q(0)_2$, and $q(0)_3$ by sex of the child and parity; $q(0)_1$ and $q(0)_2$ are always higher for males than females. This probably reflects the basic biological phenomenon seen in all populations. $q(0)_3$ is lower for males than females in all parities, except parity 7+. This differs from the $q(0)_1$ and $q(0)_2$ pattern and may be attributable to extra care extended to male children in this society. It can also be observed from same table that the higher mortality rate of females over males in post-neonatal period $q(0)_3$ decreases as parity increases. A plausible hypothesis is that families who have achieved their desired number of sons do not extend special care to male offspring as they do in smaller families.

Birth Interval

The birth interval is defined as the elapsed months between one live birth and the next live birth irrespective of an intervening foetal loss. The closed birth intervals were calculated for mothers who had two or more live births during this period. There were 5,002 closed birth intervals that could be calculated from the 19,534 births recorded between 1966 and 1970, with observation available only through 48 months.

In Table 5 birth intervals are classified in two groups; short -26 months or less; and long -27 months and over. Table 5 gives the values of mortality rates for the second birth interval and parity of mother at this birth. Overall, $q(0)_1$ and $q(0)_2$ are slightly higher for shorter birth intervals. The post-neonatal mortality $q(0)_3$ for the short interval group are double that of the higher birth interval group. This is true for each parity. For $q(0)_1$ and $q(0)_2$ the differences between short and long birth intervals are smaller than that of $q(0)_3$. It would appear that the pressure of short birth interval on mortality is very high in post-neonatal period. Again this may be the artifact of previous infant deaths which also shortened post-partum amenorrhea thereby shortening birth intervals.

Data are presented in Table 6 controlling such biases. Estimates of $q(0)_1$, $q(0)_2$ and $q(0)_3$ by birth interval and survival status of previous births show that if previous birth survived at least one year the $q(0)_1$, $q(0)_2$ and

TABLE 4

PROBABILITY OF DYING IN EARLY NEONATAL, LATE NEONATAL AND POST-NEONATAL PERIOD BY PARITY OF MOTHER AND BIRTH OF CHILD

Parity of Mother	Sex of Child	Probability of Dying: Early Neonatal 0-6 days	Late Neonatal 7-28 days	Post-neonatal 29-364 days	Infant Mortality Rate/1000	No. of Births
		$q(0)_1$	$q(0)_2$	$q(0)_3$	IMR	n
0	M	.069	.047	.052	159	1,380
	F	.049	.040	.071	152	1,280
1-2	M	.042	.039	.034	111	1,893
	F	.030	.028	.047	102	2,725
3-4	M	.032	.041	.043	112	2,378
	F	.030	.024	.044	95	2,316
5-6	M	.035	.036	.044	111	1,892
	F	.032	.034	.051	112	1,814
7+	M	.056	.041	.082	168	1,477
	F	.034	.033	.063	125	1,413

Sex ratio at birth = 104.

TABLE 5

PROBABILITY OF DYING IN EARLY NEONATAL, LATE NEONATAL AND POST-NEONATAL PERIOD BY PARITY AND BIRTH INTERVAL

		Probability of Dying				
		Early Neonatal 0-6 days	Late Neonatal 7-28 days	Post-neonatal 29-364 days	Infant Mortality Rate/1000	No. of Birth
Parity	Birth Interval	$q(0)_1$	$q(0)_2$	$q(0)_3$	IMR	n
1-2	26 months or less	.044	.042	.040	121	809
	27 months & above	.036	.034	.020	87	826
3-4	26 months or less	.036	.058	.054	141	667
	27 months & above	.040	.030	.025	92	721
5-6	26 months or less	.044	.049	.046	133	497
	27 months & above	.033	.057	.022	108	573
7+	26 months or less	.048	.050	.081	169	482
	27 months & above	.041	.038	.042	116	432

TABLE 6

PROBABILITY OF DYING IN EARLY NEONATAL, LATE NEONATAL AND POST-NEONATAL PERIOD BY SURVIVING STATUS OF PREVIOUS BIRTH AND BIRTH INTERVAL

Whether Previous Live Birth Survived One Year	Birth Interval	Probability of Dying: Early Neonatal 0-6 days	Late Neonatal 7-28 days	Post-neonatal 29-364 days	Infant Mortality Rate/1000	No. of Birth
		$q(0)_1$	$q(0)_2$	$q(0)_3$	IMR	n
Yes	26 months or less	.036	.042	.047	120	1,691
	27 months & above	.035	.038	.024	94	2,461
	All Intervals	.036	.040	.033	105	4,152
No	26 months or less	.056	.066	.068	178	764
	27 months & above	*	*	*	209	91
	All Intervals	.059	.065	.069	181	855

* Numerators are too small for estimates.

$q(0)_3$ are much lower if the previous child dies during infancy. The distribution pattern of birth intervals also changes with previous child death. If the previous child dies, the proportion of births having a short interval is 90 per-cent versus 40 percent when the child survives. This is because of the short period of post-partum amenorrhea among short interval mothers. If the previous child survives, $q(0)_1$ and $q(0)_2$ for the shorter birth interval are close to $q(0)_1$ and $q(0)_2$ for the longer birth interval. But the $q(0)_3$ for shorter birth interval is double than that of $q(0)_3$ for longer birth interval. However, in the previous infant death group, when looked at by birth interval, the pattern is quite different. Although the number of births following a long birth interval is small (n=91), the infant mortality rate in the longer birth interval is noted to be higher than in the shorter birth interval. The impact of an extended birth interval is limited when there has been previous child mortality, since with such a condition, even a longer birth interval is unable to affect subsequent infant mortality.

Socio-economic Status

It was hypothesised previously that socio-economic status is not a sensitive index for differentiating the infant deaths in Bangladesh because of the homogeneity in respect of health, sanitation and environment. It is observed in this paper also elsewhere (Omran, 1976) that parity is the important factor which effects neonatal and post-neonatal mortality, and the distribution of parity may differ from one social group to another for differential fertility. Hence we proceed in this analysis to test the hypothesis with controls introduced for parity. Only two social factors, education of father and land possessed will be discussed in this paper.

Education of Father

In Table 7 education of the father is grouped into three categories; no formal education; one to six years of schooling and 7 years or more of schooling. As there were only a few mothers who have had some formal education they were not considered for analysis, instead their husbands' education only were considered. Table 7 gives the estimates of $q(0)_1$, $q(0)_2$ and $q(0)_3$ by the education of the father and parity. Except in the 7+ parity groups, the IMR is slightly higher in the lower education groups than in the highest education group.

TABLE 7

PROBABILITY OF DYING IN EARLY, LATE AND POST-NEONATAL PERIOD BY PARITY AND EDUCATION OF FATHER

Parity	Education of Father	Probability of Dying: Early Neonatal 0-6 days	Probability of Dying: Late Neonatal 7-28 days	Probability of Dying: Post-neonatal 29-364 days	Infant Mortality Rate/1000	No. of Births
		$q(0)_1$	$q(0)_2$	$q(0)_3$	IMR	n
0	Nil	.063	.042	.062	159	746
	1-6 yrs.	.057	.049	.061	163	575
	7 years +	.054	.036	.080	159	143
1-2	Nil	.036	.036	.042	110	2,163
	1-6 yrs.	.032	.034	.038	100	1,529
	7 years +	.038	.035	.029	100	433
3-4	Nil	.032	.035	.044	106	1,893
	1-6 yrs.	.026	.029	.042	092	1,455
	7 years +	.028	.032	.022	080	314
5-6	Nil	.034	.035	.036	101	1,549
	1-6 yrs.	.033	.040	.053	120	1,211
	7 years +	.035	.020	.038	089	255
7+	Nil	.041	.031	.073	137	1,054

All Parity	Nil	.038	.035	.048	116	7,405
	1-6 yrs.	.036	.036	.052	118	5,880
	7 years +	.041	.032	.043	113	1,405

Looking at the values of $q(O)_1$, $q(O)_2$ and $q(O)_3$ demonstrates no pattern, except in the group 7+ parity where the values of $q(O)_1$, $q(O)_2$ and $q(O)_3$ of highest education group are higher than the lower education group. This raises the question whether the births in this group (parity 7+) occurring to the families where the father has the highest education, are undesired and little care is provided for them. Overall (all parities together) the neonatal, post-neonatal and IMRs differ little across levels of education of the father.

Cultivable Land Possessed by the Household

Land possessed is defined as the amount of land the family possess from which it gets yields. The unit used here is an acre. The five categories used for analysis are: 1) no land, 2) .01-.49, 3) .50-.99, 4) 1.00-1.99 and 5) 2.00+ acres. This is probably the best socio-economic indicator for a agrarian based rural society of Bangladesh.

Table 8 presents the estimates of $q(O)_1$, $q(O)_2$ and $q(O)_3$ by parity and land possessed by the family. Overall $q(O)_1$, $q(O)_2$, $q(O)_3$ and IMR are higher in .50-.99 acre group. When looked at by parity, the same group has highest values for $q(O)_1$, $q(O)_3$ and IMR, in most of the parity groups. For other landholding groups $q(O)_1$, $q(O)_2$, $q(O)_3$ and IMR are uniformly distributed.

This unexpected pattern of infant mortality found in this population suggests that, infant mortality is not greatly affected by socio-economic status. A possible explanation is that the accessibility of medical and health care is restricted to all families, regardless of socio-economic status because of non-existence of such facility in the rural areas.

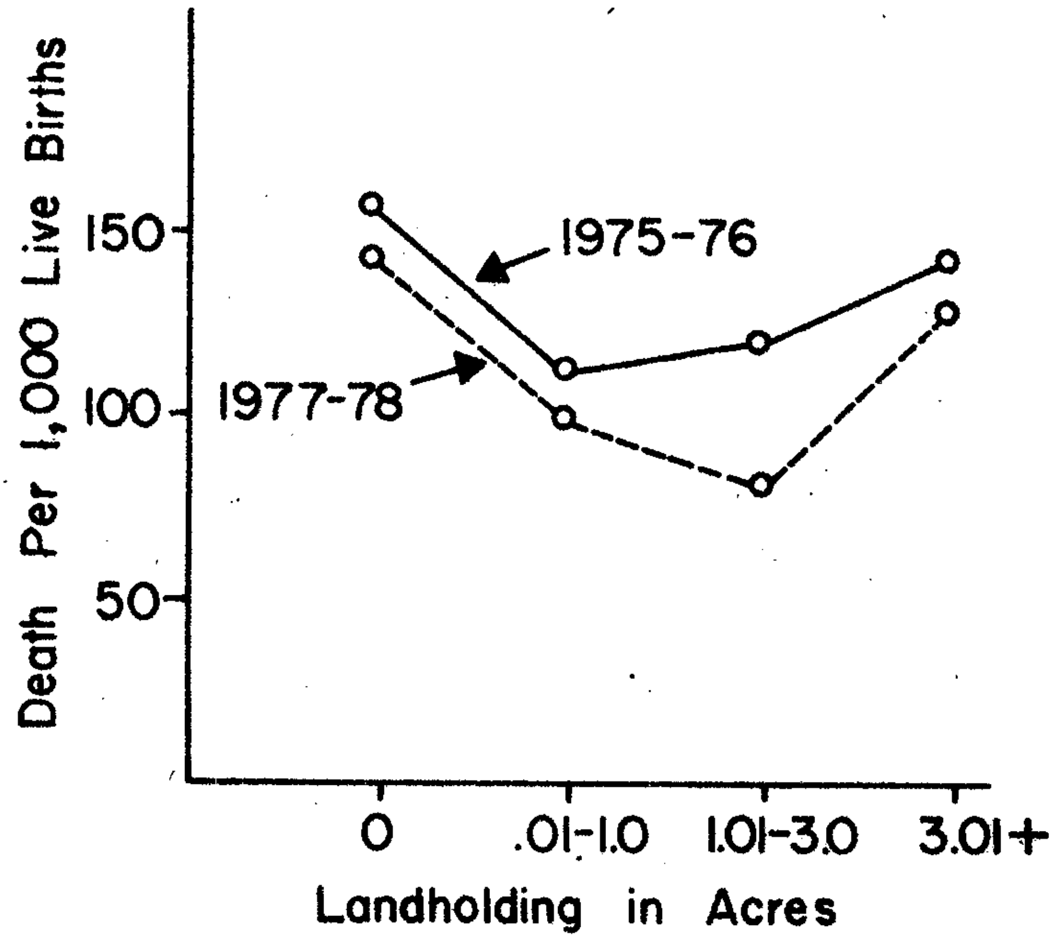
In a separate study (McCord 1980) showed a similar unexpected pattern of little relationship between landholding of the household and infant mortality. Figure 2, which is quoted from the article shows how minimal the correlation between socio-economic status and infant death is in another rural area of Bangladesh. They also found that neonatal tetanus, prematurity birth injury and neonatal asphyxia deaths are highest among highest landholdings group.

TABLE 8

PROBABILITY OF DYING IN EARLY, LATE AND POST-NEONATAL PERIOD BY PARITY AND LAND POSSESSED BY THE FAMILY

Parity	Land Possessed (in acres)	Probability of Dying: Early Neonatal 0-6 days	Late Neonatal 7-28 days	Post-neonatal 29-364 days	Infant Mortality Rate/1000	No. of Births
		$q(0)_1$	$q(0)_2$	$q(0)_3$	IMR	n
0	Nil	.051	.041	.071	153	283
	.01-.49	.059	.034	.051	139	337
	.50-.99	.078	.044	.084	194	297
	1.00-1.99	.052	.061	.074	175	275
	2.00 +	.059	.054	.039	146	263
1-2	Nil	.031	.034	.058	116	774
	.01-.49	.042	.029	.031	100	1,044
	.50-.99	.035	.032	.047	109	779
	1.00-1.99	.027	.041	.029	095	822
	2.00 +	.037	.044	.035	112	685
3-4	Nil	.026	.043	.032	97	667
	.01-.49	.027	.034	.046	102	880
	.50-.99	.037	.032	.047	110	751
	1.00-1.99	.029	.024	.038	88	723
	2.00 +	.027	.028	.040	91	619
5-6	Nil	.033	.033	.049	109	538
	.01-.49	.038	.027	.038	100	800
	.50-.99	.036	.041	.046	117	554
	1.00-1.99	.026	.045	.045	110	587
	2.00 +	.030	.039	.041	104	517
7+	Nil	.045	.017	.081	135	364
	.01-.49	.048	.022	.086	147	524
	.50-.99	.077	.056	.110	224	445
	1.00-1.99	.031	.040	.053	117	534
	2.00 +	.029	.035	.062	117	542
All Parity	Nil	.034	.035	.054	109	2,626
	.01-.49	.040	.029	.046	111	3,585
	.50-.99	.047	.039	.060	138	2,826
	1.00-1.99	.030	.039	.043	107	3,941
	2.00 +	.034	.038	.043	110	2,626

FIG. 2. INFANT MORTALITY



DISCUSSION

The ratio of neonatal deaths to post-neonatal deaths in this population was uncommonly high for a developing country. It was also observed that age and parity show the usual U-shaped pattern for early neonatal deaths as well as for post-neonatal deaths.

In rural Bangladesh where variations in sanitation and environmental conditions are minimal, Public Health and Medical facilities negligible, food consumption patterns are homogeneous, and maternal nutrition is uniform, there is no mechanism for generating variations in infant mortality. Therefore socio-economic status differentials are inconsequential.

The crucial factor in determining infant deaths is previous child mortality experiences of mother. Even the long birth spacing which contributes to infant survival has no effect if a previous child death has occurred.

This study however, may elucidate the implications of two major national programmes: (1) Primary health and (2) fertility control in respect to change in infant mortality. If the primary health care is available selectively to any particular social strata of the rural population, it may produce a differential infant mortality in the future while reducing overall infant mortality. A child health programme with a view to bringing a change in infant mortality, should be oriented towards high risk groups instead of a particular social strata. Moreover, the unexpectedly high proportion of neonatal deaths in this population may limit the success of programmes that deal only with child health, with little or no emphasis on maternal health. Underlying causes of neonatal deaths are mostly related with maternal health at conception and during pregnancy and the delivery practice, which have little to do with birth spacing or child health after delivery. Hence, in any child health programme under these circumstances (where neonatal deaths are high) maternal health is equally important. As found in this paper, the first birth is most crucial because not only is the rate of infant deaths in this group very high, but also the survival status of this birth determines the fate of the next birth, initiating a cycle of increased probables of child death.

Preliminary findings indicate this may be happening in parts of Bangladesh. The implication of poor child survival, is that it may act as a barrier to contraceptive practice. Mothers experiencing infant deaths will not control their subsequent births which are of high risk because of the experience of poor child survival. On the contrary mothers experiencing low child mortality will be limiting their subsequent births which are expected to be of lower risk. This will increase overall infant mortality rate because of the artifact of the relative increase in the proportion of high risk births in the population. An example is after three years of implementation of an extensive fertility control programme along with a package of maternal and child health (Bhatia 1980) in a rural Bangladesh, no reduction in infant mortality was observed, although fertility of the area declined by 25 percent during that period of time. Table 9 presents the proportionate distribution of those births by child survival status in the area after three years of intervention and its comparison with the non-intervention area. In the high child survival group there were proportionately fewer births in fertility control areas. The difference is more prominent in the higher parities, although such changes in birth pattern is unfavourable for overall survival of infants. This table shows that women with low child survival contribute a greater proportion of the overall births in the fertility control area irrespective of parity (ICDDR,B). There is nevertheless statistical interaction with parity: the child survival effect on fertility control increases with parity.

Lastly, mothers already with no or less child death experience, probably cared their children better and with the acceptance of fertility control measures these women will probably be more motivated towards child care. This may develop both programmes (Child Health as well as Fertility Control) proportionately more accessible to them. This kind of selective accessibility to both the programmes plus exceeding high proportion of neonatal deaths (which is less effected by longer birth spacing) will produce a limitation in reducing infant mortality in future.

TABLE 9

DIFFERENTIALS IN BIRTHS BY CHILD SURVIVAL STATUS AND PARITY, FOR FAMILY PLANNING AND COMPARISON AREAS, MATLAB, 1979

Previous Parity*	Previous Child Survival Status (Number of Surviving Children)	Proportion of Total Births	
		Family Planning Area	Comparison Area
All (1+)	Low	26.4 %	22.1 %
	High	73.6 %	77.9 %
		100.0 %	100.0 %
	(n)	(2453)	(3319)
1-2	Low (0)	17.7%	16.2 %
	High (1-2)	82.3%	83.8 %
		100.0 %	100.0 %
	(n)	(932)	(1187)
3-4	Low (0-2)	42.9 %	38.2 %
	High (3-4)	57.1 %	61.8 %
		100.0 %	100.0 %
	(n)	(739)	(915)
5-6	Low (0-2)	13.4 %	8.3 %
	High (3-6)	86.6 %	91.7 %
		100.0 %	100.0 %
	(n)	(426)	(651)
7+	Low (0-4)	31.4 %	21.4 %
	High (5+)	68.6 %	78.6 %
		100.0 %	100.0 %
	(n)	(299)	(566)

* Parity zero excluded because of non-applicability of Child Survival Status.

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