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SOCIOECONOMIC CORRELATES OF MORTALITY IN PAKISTAN

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INTRODUCTION

Although quantification of changes in mortality is precluded by lack of a proper data set, various sources of information suggest that there has been a significant decline in mortality in Pakistan. Researchers seem to agree that mortality reductions have been mostly confined to the pre-1965 period, and that no significant progress has been made since then. On the basis of the reproductive history data obtained from the Pakistan Fertility Survey (PFS) 1975, Alam and Cleland have concluded:

> "The most important finding to have emerged from this analysis of the PFS mortality is that infant and child mortality appears to have stabilized around 1960 at a high level. Between 1960 and 1975 the infant mortality has been a little under 150 deaths per thousand"[1].

To the extent that these findings are not statistical artifacts, they underscore the need to identify the factors responsible for this arrest in mortality decline. It may be that the causes of mortality - the disease pattern - have changed or that the health services have not yet reached the poverty-stricken and underprivileged groups of society; whatever the causes of the arrest, they have to be investigated in order to plan for the earlier decline to resume. Admittedly it is difficult to unravel the complicated interaction between the individual's capacity to obtain health care and the government's efforts to improve health through effective policy measures. However, there is little doubt that widespread social and economic inequalities, including unequal access to health care, play a major role.

This paper discusses socioeconomic mortality differentials in Pakistan on the basis of data collected in 1979 from a nationally representative sample of over 10,000 households in a survey carried out for the Population, Labour

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Force and Migration (PLM) project of Pakistan Institute of Development Economics/International Labour Organization. In addition to the questionnaire on fertility, three questionnaires - Income and Expenditure, Labour Force, and Migration - were administered to each household. This data-set not only affords a comparison with PFS 1975 but also permits a study of the relation between income, land holding, tenurial status, and the mortality experience of households. The mortality data obtained from the PLM survey are discussed briefly in the first section of the paper. Mortality differentials by characteristics of the child, mother, household and village are discussed in the second section. Wherever possible, the findings of the PLM 1979 survey are compared with those of PFS 1975.

INFANT MORTALITY—LEVELS AND TRENDS

Infant mortality rates obtained from PLM data for the period 1950-79 are juxtaposed with those of PFS in *Table 1*. A comparison of the two surveys suggests that deaths have been under-enumerated in the PLM since the PFS is unlikely to have over-estimated the number of deaths. However, much more investigation is needed before a firm conclusion can be reached. In both surveys many of the dates for births and deaths of children have been estimated by the use of a Date Edit Imputation and Recode programme. How far the levels of mortality yielded by the two surveys are sensitive to such estimations is not known. To complicate the problem, some researchers have noticed misreporting of age upwards due to a tendency to advance the age to the next higher digit. In addition, PFS estimates are much higher than alternative sources of information such as Population Growth Survey (1968-71 and 1976). Admittedly the PGS data can hardly be said to be free of error; their comparison with PFS data reflects the margin of uncertainty associated with level of infant mortality reported by any single survey such as PLM or PFS.

While it is difficult to determine which of the two surveys is the more accurate, the trend appears to be similar. For the five years immediately preceding the surveys, both the PFS and the PLM indicate an apparently spurious rise in these rates, which is presumably the converse of the same phenomenon which generates a decline in fertility for the same period. This highlights the hazards involved in depending upon a single source for a set of mortality data. If this statistical illusion is disregarded for the remaining periods, neither the neonatal nor the postneonatal mortality rate has declined significantly since the 1960-65 period. The earlier conclusion based on PFS "that infant and child mortality appears to have stabilized around 1960" is substantiated by PLM data. What has yet to be settled is the level[a] of mortality, which has so far shown no response to health measures. This paper is concerned

[a]The official figures are over 100. The data base of this figure is not fully known however.

TABLE 1

Infant and Child Mortality Rate derived from the Population Labour Force and Migration (PLM)[a] Survey 1950-1979 and the Pakistan Fertility Survey (PFS)[b]

Birth Cohort	Infant-Child Mortality Rate										
	1950-55		1955-60		1960-65		1965-70		1970-74		1975-79
	PLM	PFS	PLM	PFS	PLM	PFS	PLM	PFS	PLM	PFS	PLM
$_1q_0$	160	178	137	157	125	141	116	136	115	145	124
NNR	93	94	84	85	72	81	70	78	69	84	83
PNNR	67	84	53	72	53	60	46	58	46	61	41
$_5q_0$	273	305	237	258	197	205	176	200	157	207	168

$_1q_0$ = Infant mortality rate
NNR = Neonatal rate
PNNR = Postneonatal rate
$_5q_0$ = Mortality up to age 5.

Source: [a]PLM Survey 1979.
[b]Alam and Cleland. Infant and Child Mortality Trends and Determinants.

mainly with the assessment of mortality differentials by socioeconomic characteristics, and not with the determination of levels and trends. The examination of differentials permits the identification of measures to reduce them and thereby to reduce the overall mortality levels in the country.

MORTALITY DIFFERENTIALS

This section examines mortality differentials by demographic correlates, to be followed by correlates of socioeconomic and macro-level policy intervention. Such demographic variables as mother's age at birth, order of birth, and preceding birth interval constitute some of the important associates of infant mortality. The association between infant mortality and mother's age at birth as shown in *Table 2* indicates a U-shaped relationship. The risk of death is higher at younger and older ages than in the middle-age groups. The trend is more sharp for neonatal mortality rates than for postneonatal rates. The PLM results are at variance with those of PFS in that the latter did not suggest lower survival probability at older maternal ages. The PLM results are consistent with those of studies on other countries[2] and this suggests that neonatal mortality may not be the sole factor involved in higher risks of death at younger ages.[1]

TABLE 2

Infant Death by Mother's Age at Birth: PLM 1979

Mother's Age	Years Prior to Survey		
	0-4	5-9	10-14
Less than 20 years			
Neonatal mortality rate	103.0	118.6	105.4
Postneonatal mortality rate	51.0	58.1	46.7
Infant mortality rate	154.0	176.7	152.0
20 to 29 years			
Neonatal mortality rate	68.6	63.4	66.9
Postneonatal mortality rate	41.6	43.2	50.0
Infant mortality rate	110.2	106.7	116.9
30 to 39 years			
Neonatal mortality rate	83.8	58.4	62.1
Postneonatal mortality rate	46.6	44.9	32.4
Infant mortality rate	130.3	103.3	94.5
40 or more years			
Neonatal mortality rate	112.5	77.4	
Postneonatal mortality rate	62.6	56.7	
Infant mortality rate	175.1	134.1	

Source: PLM Survey 1979.

The relation between birth order and the probability of survival of a child generally mirrors that of the association between mother's age and infant mortality. As shown in *Table 3,* according to PLM there is an inverse association between risk of death and birth order up to the fourth child, thereby reversing the direction of association that suggests a lower probability of survival at higher-order births. By contrast, the PFS data fail to exhibit any systematic association between birth order and infant mortality rate beyond the second-order birth. Both surveys, however, show that first births are at highest risk of death.

The influence of preceding birth interval on the infant mortality rate in Pakistan is well documented. The negative association of the length of the preceding interval with mortality of the index child was found to persist despite controls for age, education and residence of mother, birth order and survival status of the preceding child.[3] *Table 4* shows the association between length of previous birth interval and the infant mortality rate, controlling for the survival status of the older sibling. For a specific survival status there is a negative association between infant mortality rate and length of the preceding birth interval. However, holding constant the preceding birth interval, there appears to be a positive association with survival probabilities of siblings, but

TABLE 3

Infant and Child Mortality by Birth Order

Birth Order	PLM (0-15 years before survey)[a]		PFS (0-15 years before survey)[b]	
	IMR	NNR	IMR	NNR
1	142	96	175	110
2	109	70	146	86
3	102	63	123	70
4	99	61	128	74
5	104	61	129	67
6	118	74	136	76
7+	136	83	129	71

Source: a. Sathar, Z.A. Infant and Child Mortality in Pakistan - Some trends and differentials.
b. Alam and Cleland. Infant and Child Mortality: Trends and Differentials.

Note: IMR = Infant mortality rate
NNR = Neonatal mortality rate

TABLE 4

Infant Mortality Rates by Length of Preceding Interval by Survival Status of Previous Child (10 Years before Survey)

Length of Previous Interval (years)	Survival Status of Previous Child	
	Survived 2 years	Did not Survive 2 years
	Infant mortality	
under 2	112	316
2-3	78	220
3-4	56	216
4+	51	112
	Neonatal rates	
under 2	66	217
2-3	47	135
3-4	30	153
4+	32	77
	Postneonatal rates	
under 2	47	98
2-3	31	85
3-4	27	62
4+	18	34

Source: Sathar, Z.A. Infant and Child Mortality in Pakistan - Some trends and differentials.

it is difficult to determine whether this correlation is due to genetic factors or to selectivity arising from the distribution of privilege and economic opportunities.

SOCIOECONOMIC CORRELATES OF MORTALITY

Parental characteristics such as education and social status in the community influence the survival probabilities and health status of household members. How socioeconomic factors affect mortality is not very obvious, however. To clarify the effects of socioeconomic differentials on mortality, a closer scrutiny is needed of the nature of the interaction between an individual's capacity to derive benefits from health services and the existence and delivery of these services. To the extent that resources are allocated for purposes of development, the distribution of health facilities reflects the influence of certain communities, classes and regional power groups. A disproportionate allocation to urban areas in the developing world, therefore, may reflect an urban-biased development strategy, which results in higher infant mortality in rural areas.

Within a community the availability of a service designed to reduce the public's exposure to disease may have a differential impact even if the service is free and available to all. Differential participation may be explained either by differences in individual behaviour such as risk-taking or by discrimination or neglect on the part of government officials responsible for the delivery of these services. In a village, landlords or the well-to-do will receive better services than the labourer, whose goodwill government servants least need. These services, being free, with no cost to the consumer other than travelling time, are often regarded as having an impact separate from that of household behaviour.[4] In the cultural setting, where the human agent takes account of socioeconomic status in the administration of these services, the association between benefitting from the services and household socioeconomic status cannot be ruled out, even though this association may emanate from the supply side.

Equally it is very difficult to identify whether a facility is truly free. To the extent that the chances of being admitted to hospital or to a bed in a ward depend upon the patient's visit to a doctor's private clinic, it can hardly be considered free access. In addition to these "free" services, the subsidized services are expected to be demanded differentially by people with different abilities and attitudes. Differentials in mortality and morbidity are therefore, products of a variety of factors on both the supply and the demand side.

Systematic variation in mortality across socioeconomic groups is Pakistan has been the subject of earlier studies. In a suburb of Lahore, family income was found to be the only independent variable besides duration of marriage that acquired statistical significance in the explanation of the dependent

variable - child mortality.[5] In a recent study of a low-income area of Karachi, family income and duration of breast-feeding were found to be the significant explanatory variables of child mortality.[6] In addition to these small-area studies, the mortality determinants were assessed on the basis of national[a] data by Ali Khan and Sirageldin.[7] In the framework of a simultaneous equation estimation, births, deaths, income, and participation of females in the labour force were endogenously explained. Time taken to reach a medical facility was the only significant variable in the rural area mortality equations. In the case of urban areas, time, female age, age at marriage and family structure (nuclear or extended) emerged as significant. It was interesting that parental education failed to qualify as a significant explanatory variable of child mortality in the above-mentioned analyses of infant and child mortality. However, the studies based on PFS 1975 data found educational level of both mother and father to be an important factor influencing infant mortality. Bivariate relationships between a few socioeconomic variables and infant mortality as shown by PLM data are briefly discussed below.

PARENTAL EDUCATION[b]

The relation between mother's level of education and infant mortality (proportion of infants who died) yielded by PLM data is shown in *Table 5*. The proportions of infants who died appear to be inversely related to level of education, but major change is associated with mothers who have matriculation and higher education. The pattern of differential is similar for mortality based on all births and births during the 10 years prior to the survey (Panel B). The probability of survival of infants born to mothers with a higher level of education (10 classes or higher) is two and a half times the average and slightly less than double the probability of the next lower education level (1-9 years of classes). Indeed the recent mortality differential between illiterates and that of 1-9 years of mother's education is marginal. A closer focus on PLM data reveals that these differentials by educational level of mother are not only carried over to childhood mortality ($_4q_1$) but also are enhanced.

Various explanations of the effect of mother's education on infant mortality are found in the literature. Educated mothers may be more efficient in producing health capital than illiterate mothers. Female education may indicate a household's social status or it may act independently, as suggested by Caldwell.[8]

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[a]National Impact Survey (NIS) 1968.

[b]Years of education are grouped according to certificates required for entry into different cadres of jobs. Matriculation (10 classes) qualifies for entry into clerical jobs, while graduate (14 classes) confers entitlement to professional and administrative employment. Less than matriculation (1-9), however, hardly permits access to white-collar jobs, but is preferred to illiteracy because of the literacy associated with this level.

TABLE 5

Percentage of Infant Deaths by Educational Level of Mothers

Mother's Level of Education	Pakistan	Urban	Rural
	A. All Births		
No schooling	11.93	10.56	12.33
1-9 classes	9.47	8.69	10.64
10 + classes	4.63	4.63	*
	B. Births during 10 years prior to survey		
No schooling	11.64	10.42	11.70
1-9 classes	9.82	9.33	10.52
10 + classes	4.99	4.99	*
Total	11.51	9.69	12.2

*Few observations

Source: PLM Survey 1979

All these influences may have operated simultaneously in Pakistan, but it must be noted that females with matriculation and higher education, associated with substantially lower infant mortality, exhibit higher labour-force participation than average; they are employed mostly in professional and other white-collar occupations.[9] This possible linkage between female education, participation in the labour force and infant mortality merits further investigation.

Similarly, the relation between infant mortality and education of father or head of household (in the case of an extended family), shown in *Table 6,* reflects a negative association, particularly marked in the case of postgraduate education. The difference between illiterates and the educational category of '10-14 classes passed' is also substantial, but the category '1-9 classes passed' shows only a slight gain over illiterates in survival probability. Infant mortality differentials by father's educational level exhibit a similar pattern for rural and urban areas.

Educational level of head of household has often been regarded as a valid proxy of income and wealth status of household. In societies where wage employment dominates, this may be justifiable, but in developing countries like Pakistan, where more than two-thirds of national income is derived from self-employment, the relation between education and income may not be very close. Other information besides that on education of the head of household is needed to assess the effect of household economic position on infant survival probability. In the following sections, information on household income,

TABLE 6

Percentage of Infant Deaths by Educational Levels of the Head of Household

Educational Level of Head of Household	Pakistan	Urban	Rural
No schooling	12.47	10.70	12.87
1-4 classes	11.98	10.79	12.53
5-9 classes	11.10	10.10	11.64
10-14 classes	8.31	7.43	10.19
14+ classes	3.86	3.86	*

*Few observations

Source: PLM Survey 1979

land, tenurial status and occupation of the head of household available from the PLM survey is used to determine the influence of these variables on the infant mortality rate.

HOUSEHOLD INCOME

A higher level of income is expected to be associated with a higher expenditure on food, shelter and sanitation and this can have a positive influence on survival of household members. These possible links between household income and infant mortality may be difficult to assess from cross-sectional data because of the incongruence between the temporal reference of the data on current income and mortality - a life-cycle phenomenon. Moreover, a household's income may very well partly reflect past mortality. The consequences of infant mortality on the size and structure of family, and the resultant dependency load and earning potentials at different phases of the family life-cycle, are not very well explored in the literature. In addition, income data collected by means of surveys are generally affected by measurement errors. The bivariate association between household income and infant mortality provided in *Table 7* therefore needs to be interpreted with caution. The table indicates a positive influence of household income on the survival probabilities of infants. The lowest income group has an infant mortality rate which is 75% higher than that of the highest. This differential is slightly narrowed (64%) in the case of births during the 10 years prior to the survey. It is of interest that the infant mortality differentials are sharper in urban areas than in rural areas; the relative gain associated with the two higher income groups is less visible in rural areas. Rural-urban differentials persist after controlling for income level of the household and tend to become larger for higher income groups. As regards recent mortality experience, rural/urban differentials for the two lower income groups are minimal.

TABLE 7

Percentage of Infant Deaths by Household Income

Income Group (Rs. per month)	Pakistan	Urban	Rural
	A. All Births		
1-500	16.4	11.30	17.0
501-1200	11.7	11.0	12.0
1201-2800	9.8	8.0	11.0
2800+	9.4	7.0	*
	B. Births during 10 years prior to survey		
1-500	13.4	13.55	13.37
501-1200	12.25	10.67	11.40
1201-2800	9.41	8.11	10.29
2800+	8.19	8.19	*

*Few observations

Source: PLM Survey 1979

It is difficult to explain the variation between rural and urban areas in the direction and level of the effect of household income on infant mortality. The possibly greater measurement error in income and recall error in mortality in rural than in urban areas, and the greater availability of health facilities in urban areas, may have some influence on the relation between income and mortality. In addition it may be recalled that it is the permanent, not the current income which is expected to influence household behaviour. The computation of permanent income on the basis of information on current income, age, and education of earners, as done in many research studies, is not attempted here because of the predominance of self-employment, in which the role of assets in the determination of income is of paramount importance.

OCCUPATION OF FATHERS

There is little information on assets, apart from data on area cropped by a household in a rural farming population. For urban and rural non-farming households, the occupation of fathers or heads of households is used instead as an indicator of socioeconomic status. The bivariate relation between infant mortality and father's occupation shown in *Table 8* reveals that children born to fathers in white-collar occupations enjoy a substantially higher survival probability than those of the blue-collar workers in urban areas; the latter have a mortality rate that is 32% higher than that of infants belonging to the former group. When occupation as a variable is controlled, the employment

status of fathers or heads of households appears to have some influence. Lower infant mortality is associated with employers, but a substantial difference occurs only in the case of employers in the occupational group of professionals, a very small and select group. The standard occupational classification used in the table is very aggregative in that primary school teachers are included with engineers and classified as professional despite the wide difference in their income and socioeconomic status. In the case of rural areas, where this classification would be less relevant, the classification is based on the usual occupations, which can be regarded as more suitable proxies of income and socioeconomic status in the non-farming population.

TABLE 8

Percentage of Infant Deaths to All Births by Employment Status and Occupation of Head of Household - Urban Areas

Occupational group	Employers	Selfemployed	Employees	Total
Professional/ administrative	1.8	12.44	8.69	8.69
Clerical, sales and services	11.29	10.07	10.39	10.39
Production worker and others	9.51	12.18	11.38	11.48

Source: PLM Survey 1979.

The relations between usual occupation of head of household and infant mortality in rural non-farming households, presented in *Table 9,* indicate that major differentials appear between the *kamees*[a] and handicraft workers and the remaining groups. *Kamees,* who are generally at the bottom of the status ladder in rural areas, have 20% higher infant mortality than average. The remaining three groups - shopkeepers, rentier class, and others - are indistinguishable.

[a]Kamees usually refer to artisan class such as shoemaker, tailor, potter, blacksmith in the village. This class is generally subservient to farmers and held in low esteem in the village.

TABLE 9

Percentage of Infant Deaths to All Births by Usual Occupation and Employment Status of Head of Household–Rural Non-Farming Population

Usual Occupational Categories	Employers	Selfemployed	Employees	Others & not working	Total
Kamees, cottage and handicraft workers	13.6	15.11	12.80	14.05	15.00
Industrial workers and other employees	*	6.35	15.08	11.74	14.77
Shopkeepers	15.82	11.47	13.38	18.12	11.71
Landlords and other rentier class	11.74	10.98	*	13.94	12.05
Undefined categories	13.11	12.57	11.87	11.38	11.97

*Few observations

Source: PLM Survey 1979

LANDHOLDING

The relations between landholding, tenurial status and infant mortality for the farm population in rural areas presented in *Table 10* fail to reflect any substantial differential across either land-size categories or tenurial status of fathers except for the noticeably higher mortality associated with landless agricultural labour, which indicates a 25% higher infant mortality than the rest of the classes. The difference between the survival probabilities of infants of the owner operator and sharecropper is very little. However, data on land pertain to the operational holding and not to ownership. Also, the absence of systematic variation appears to be partly due to the age structure of females. For instance, a detailed examination of the data indicates that infant mortality is associated with land size of 5-10 hectares (12.6 to 25 acres), which is lower than that associated with larger farm sizes, is due to the disproportionate share of younger mothers in this group. Also, the quality of land, such as its accessibility to irrigation facilities and tractors, is not controlled. The above results suggest that the groups generally regarded as lowest in the class-ridden rural areas - agricultural landless labourers and kamees - experience around 20-25% higher infant mortality rates than average.

TABLE 10

Infant Mortality by Cropped Area and Tenurial Status of Household: Rural Areas

(All Births)

Cropped Area (hectares)	Total	Tenurial Status		
		Owner Operator	Sharecropper	Agricultural Landless Labour
Less than 5 hectares	13.07	13.53	12.09	
5–10 hectares	11.23	11.67	9.70	
10 hectares and above	12.44	12.44	*	
Total	12.92	12.84	11.37	15.46

*Few observations

Source: PLM Survey 1979

Whether the presence or absence of a medical facility in the village has an effect on the survival probabilities of the infants can be infered from *Table 11.* In the case of all births the presence of a health facility such as hospital or dispensary is not associated with a substantial lower mortality. In the case of recent births (10 years prior to survey), which also coincides with the continued existence of these health facilities, some mortality differentials appear. The gain in survival probability of an infant living in a village with a hospital or dispensary over that of an infant living in a village without these facilities is little—5% to 12%—compared with the differentials associated with education, income or occupation.

MULTIVARIATE ANALYSIS

To investigate the stability of the association between infant mortality and the foregoing variables a multivariate regression analysis was performed.[a] These exercises are discussed elsewhere in detail; their major results pertaining

[a]As the dependent variable was the proportion of children who died at up to one or two years of age, the proper estimation technique would have been logit or probit. Since the package was not available, Ordinary Least Squares was applied. The estimated model explained 12% of the variation in the dependent variable in urban areas and 22% in rural areas. Given the cross-sectional nature of the data, the results are not necessarily discouraging.

TABLE 11

Percentage of Infant Deaths by Presence/Absence of Health Facility in the Villages

	Yes	No
	A. All Births	
Hospital	12.0	12.3
Dispensary	12.0	12.4
	B. Births during 10 years prior to survey	
Hospital	11.0	11.8
Dispensary	11.8	12.5

Source : PLM Surey 1979.

to the variables of interest are presented below. Most of the bivariate associations discussed above emerged as significant in the multiple regression analysis. For instance, a demographic variable such as female age has a significant non-linear relationship, which implies that infant survival probabilities are lower at either end of the reproductive span - a result consistent with those obtained in a number of other countries[2]. Similarly, duration of breast-feeding during the last closed birth interval reflects a significantly negative association with infant mortality. It must be noted that length of breastfeeding may be picking up the influence of preceding birth interval, which is not reckoned in the estimating equations.

All levels of parental education have an expected negative association with infant mortality. However, the conventional significance is acquired by the binary variable denoting the higher educational level of matriculation and above (10 classes or more). These results pertain to rural as well as urban areas, and also to both total and recent mortality. They also hold for both the dependent variables - proportion of infants (0-11 months) and proportion of children (0-23 months) who died. The partial regression coefficients of mother's as well as father's education is shown in *Table 12.*

Table 12 suggests a greater responsiveness of infant survival probability to the mother's education than to the father's. Similarly, a large effect appears to be associated with mothers residing in rural areas.

Since household income and demographic characteristics of mothers were controlled in the regression equation, the explanation of the significant association of parental education (10 or more classes) may be that these highly

TABLE 12

Partial Regression Coefficient of Mother and Father Education (10 classes or more)

Dependent Variables Proportion Infant Died	All Births		Births during 10 Years Prior to Survey	
	Mother	Father	Mother	Father
Urban Areas	—.06*	—.03*	—.06*	—.02*
Rural Areas	—.08*	—.02**	—.08*	—.03*

* Significant at 5%
**Significant at 10%

educated parents are more efficient in the production of health capital or that they make more use of the free and subsidized medical services than the less educated. Moreover, as already mentioned, this level of education (10 classes or more) qualifies for entry into white-collar occupations. The possible links between job structure, education (credentialism), and infant mortality is not very well explored and needs further investigation. The effect of wage level could not be separated from that of education to assess the importance of participation in the labour market, particularly by females, because the preponderance of self-employment does not permit the computation of wages for females as well as males.

HOUSEHOLD INCOME

Household income emerged as a significant negative association with infant mortality. Elasticities of infant and child mortality with respect to household income are shown in *Table 13*.

On the whole, the probability of infant survival does not reflect very high responsiveness to household income. For instance, doubling of average household income in urban areas results in a lowering of the infant mortality rate from 100 to 80. Given that there is a lower limit to the mortality rate, even this change in mortality rate can hardly be regarded as insignificant. In addition, it must be noted that current income used in the estimating equations is not an adequate explanatory variable; permanent income should be used instead. The significance of the income variable has been reported to be substantially improved for Colombia when permanent rather than current income was used as an explanatory variable.[4]

TABLE 13

Elasticity of Infant and Child Mortality with Respect to Household Income

Dependent Variables Proportion Died	All Births		Births during 10 Years Prior to Survey	
	0—11 Months	0—23 Months	0—11 Months	0—23 Months
Urban Areas	—0.20*	—0.22*	—0.18*	—0.19*
Rural Areas	—0.14*	—0.14*	—0.12*	—0.12*

*Significant at 5%

Whether the social status of head of household - when household income, parental education and demographic variables are held constant - has any influence of infant mortality is ascertained by incorporating a binary variable for kamees and landless labour. Both variables indicate a positive association, but with acquired statistical significance at the margin (10%). This suggests discrimination on the supply side of the delivery mechanism, but more refined studies are needed to arrive at a conclusive finding.

The effects of the above-mentioned parental and household characteristics on survival probability of infants and children were assessed with some control for environmental variables. In the case of urban areas the only developmental or environmental variable studied was location of household in the metropolitan cities of Karachi and Lahore. Infant mortality was found to be significantly lower in these large cities than in the other urban areas. Obviously, general development, which includes also housing, sanitation, water availability, and private and public health facilities, explains the lower mortality rates of the metropolitan centres.

In the case of rural areas, the influence of the presence of public health facilities in the village was assessed. It is of interest that the variable, hospital or dispensary in the village, showed no significant association with infant mortality. The failure of the presence of health facilities to emerge a significant explanatory variable in the multivariate analysis needs to be interpreted with care. The presence of a hospital and a dispensary in a village is hardly evidence that the residents of that village make more use of them than those of the next village. In this respect also it appears that the distribution and location of private and informal health services such as medical doctors, hakims, homoeopaths and aids are more important than the presence of a hospital and a dispensary. The non-significance of the binary variable denoting the existence of health facilities in the village suggests that these facilities fail to have a

significantly different effect on infant mortality from the effect of the traditional and private facilities. Even this result may be regarded as only tentative until the use of these facilities is investigated in more depth.

CONCLUSION

That infant and child mortality appears to have stabilized around an inordinately high level presents a challenge both to policy makers and to researchers in Pakistan. Apparently either the disease pattern has changed or the delivery mechanism of health facilities has yet to make inroads into underprivileged sections of society. By examining the infant mortality differentials across various socioeconomic groups in urban and rural areas of Pakistan, this paper provides some explanations of the complicated interaction between the individuals's capacity to derive benefits and the existence of public facilities.

The analysis of infant mortality differentials is extended beyond demographic variables to include such factors as household income and usual occupation of head of household. Consistent with earlier studies on Pakistan and other developing countries, demographic variables such as mother's age, preceding birth interval, and birth order have been found to be important correlates of infant mortality. Parental education, however, reflects a negative association with mortality; the bivariate finding holds only for the higher level of education (10 classes or more) in multiple regression. This calls for a deeper investigation of the association between education, labour-market participation, and mortality experience of the household.

Household income and survival probability of infants appear to be ~~negatively~~ positively associated. The results hold for both rural and urban areas, and total as well as recent mortality. This result shows the importance of higher food expenditure associated with higher level of income, and presumably difference in the behaviour of households with regard to investment in health capital. It is of interest that when household income, parental education, and demographic variables are held constant, the social status of the head of the household, as indicated by occupation, tends to be related with infant mortality. *Kamees* and landless labourers, who are generally ranked lowest in order of prestige in rural societies, are associated with lower probability of survival of infants and children. This clearly highlights the relevance of the ways in which health care is provided in a class-ridden village, where the lower classes may suffer discrimination at the hands of those involved in the actual delivery of the services. This supply-side discrimination merits distinct treatment in research into the demand side of health capital. In general, the results reflect substantial differentials across the various groups differentiated by socioeconomic status.

REFERENCES

1. Alam, I. and Cleland, J. Infant and Child Mortality: Trends and Determinants. In: I. Alam and B. Denison (eds.), *Fertility in Pakistan, a Review of Findings from the Pakistan Fertility Survey.* International Statistical Institute, WFS Netherlands 1984.

2. Stoeckel, J. and Chowdhury, A.K.M. Neonatal and Post Neonatal Mortality in Rural Areas of Bangladesh, *Population Studies,* March 1972.

3. Sathar, Z.A. *Mortality and Health in Pakistan: Selected Issues and Areas of Concern:* Paper presented at Seminar on Population in Pakistan Islamabad, sponsored by Population Division, Government of Pakistan, July 1984.

4. Schultz, T. *Interpretations of Relations Among Mortality Economics of the Household and Health Environment.* Paper presented at the meeting on Socio-Economic Determinants and Consequences of Mortality, Mexico City, sponsored by World Health Organization, June 1984.

5. Mohammad, A. Khan, Z. and Choudhry, N.A. Age at Marriage, Fertility and Infant Mortality in a Lahore Suburb (Part II). *The Pakistan Development Review.* Summer 1976.

6. Knowles, J.G. The Determinants of Mortality in a Low Income Area of Karachi. *Pakistan Journal of Applied Economics,* Summer 1982.

7. Khan, M. and Sirageldin, I. Education, Income and Fertility in Pakistan, *Economic Development and Cultural Change,* April 1979.

8. Caldwell, J.C. Education as a Factor in Mortality Decline: An Examination of Nigerian Data. *Population Studies,* November 1979.

9. Irfan, M. The Determinants of Female Labour Force Participation in Pakistan. *PIDE Research Report,* Islamabad, September 1983.

10. Irfan, M. Class Structure, Poverty and Household Demographic Behaviour. Mimeo., Pakistan Institute of Development Economics, Islamabad, September 1984.