

Socioeconomic and Health Implications of Adult Deaths in Families of Rural Bangladesh

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Abstract

The study examined the effects of adult deaths on subsequent health and socioeconomic well-being of families in rural Bangladesh. Data from the longitudinal Sample Registration System (SRS) in two rural areas of the MCH-FP Extension Project (Rural) of ICDDR,B were used for this study. A total of 327 adult deaths of married persons, aged 15-59 years, occurred during January 1983-December 1987 in the sample area, were included in the study. The families of the deceased were followed for five years following the death. Factors, such as survival status of children, educational status of children aged 6-12 years, and out-migration status among adolescents aged 12-20 years in those families were observed and recorded. A control group of 3,350 families, which did not experience any adult deaths, were also followed for five years. The status of the children in both the groups five years after the adult death was compared.

The findings of the study showed that the negative impact was more pronounced among the children from poor families and when parents were not educated. Female children were most severely affected by an adult death in the household. Death of a father or a mother in a family was associated with a higher rate of out-migration (especially marriage) of adolescent daughters. An adult death in a household was associated with a significantly higher mortality risk of children in the household during the five years following the adult death. These child-mortality risks were significantly higher when an adult female died and when the index child was a female and/or aged less than five years at the time of adult death. The children, aged 6-12 years, in families where a parent had died, were significantly more likely to be uneducated and out of school after the death of the father or the mother compared to the children in families where neither of the parents had died, even after controlling for the educational status of the parents who died and of those who did not die.

Because of the limited number of independent variables used in this study and also because of the need to understand the specific reasons why such significant differences occurred, it is recommended to conduct a more in-depth qualitative study to understand more clearly the nature and mechanisms of socioeconomic and health impacts of adult deaths on families and the society.

Introduction

Much has been written about infant and child mortality in both developed and developing countries. During the past two decades, infant and child mortality rates have been reduced worldwide, and improvements in reproductive health and some reduction in maternal mortality have also been achieved. But little academic attention has been given to the level and determinants of overall adult mortality in developing countries. Moreover, little information is available on the consequences of adult mortality (either male or female), particularly with regard to its socioeconomic and health impacts on the family.

A substantial difference (2.8 vs 3.4 per thousand) was observed between male and female adult death rates at Matlab, Bangladesh. Of the women of reproductive age who die prematurely, approximately one-fifth die due to maternity-related complications [1]. The results of studies showed that, after controlling for maternity-related deaths, the adult female death rate had reduced from 3.4 to 2.5 per thousand which is still lower than the adult male death [1,2]. The study by Chen et al. also showed that only 12 percent of infants whose mothers died during delivery survived for two months, and only five percent survived for one year [1]. The results of other studies in Matlab indicate an enormous gap between the one-year survival rates of infants whose mothers had died (25%) during delivery or within 42 days after delivery, and those whose mothers had survived (91%) [3,4].

Death of an adult member in a family creates many problems for the surviving members, whereas premature death of the principal income-earner often inflicts serious financial hardship to the family. It is the male who provides the bulk of financial support to a traditional family, and his premature death generally results in the discontinuation of this essential source of income. The situation is particularly serious for young widows, since they often have dependent children to care. In many cases, the woman has never worked, and has a low level of education or none at all, which limits her opportunities for higher-paying jobs. Nevertheless, widows are generally compelled to seek employment at the expense of their child-rearing responsibilities. If the children are young, it is often difficult to provide care to them during working hours. Family conflicts may arise as a consequence of unrealistic expectations of other surviving family members under the new circumstances. Such conflicts may result in decreased family solidarity [5].

While women entering widowhood at an older age are not likely to have young dependent children, they are often faced with problems of self-support. Since their chances of re-marriage are quite unlikely, they are often required to become economically dependent on their relatives or grown-up children, if they have any.

Cultural gender differences particularly become apparent when a spouse dies. Although there is no stigma attached to a man whose wife dies, the position of a woman whose husband has died is markedly different [6].

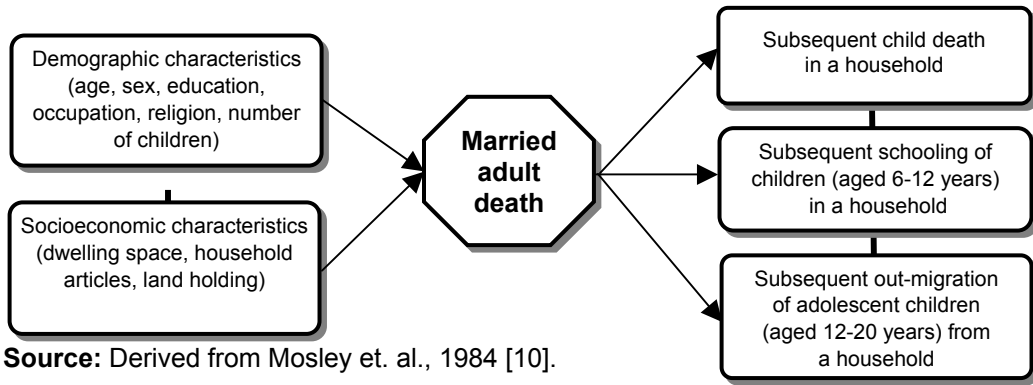
The consequences of an adult death on child health and child mortality depend largely on the general economic conditions of the household. For poor families, a mother's outside work or her death may result in child neglect or care by other family members, while a wealthy family may hire a skilled and attentive nursemaid [7,8].

In rural Bangladesh, adult males comprise the majority of the labour force, and are usually the main income-earners for the family. When the income-earner dies, the substantial decrease in earnings places the household at risk of hunger, poor healthcare, malnourishment, and more limited educational opportunities. The relative risk of a severely malnourished child coming from a household with an incapacitated earner is 2.5 times greater than that in a household without an incapacitated earner. The relative risk is even higher in families where a household earner dies [9].

Parental educational level can affect child survival by influencing their choices and increasing skills in healthcare practices relating to contraception, nutrition, hygiene, preventive care, and disease treatment [10]. When a father or a head of a household dies, it often becomes impossible for children to continue their education. The family is likely to accept employment or even migrate to an urban area in search of jobs. This may even involve relinquishing the village home. These disruptions play a big role in child truancy.

Conceptual framework

The following conceptual framework shows the effects of both demographic and socioeconomic factors on a married adult death in a family and its consequences on subsequent child well-being in that family.



Source: Derived from Mosley et. al., 1984 [10].

Objectives

The main objective of the study was to examine the impacts of an adult death (male or female) on the socioeconomic and health status of his or her family.

The specific objectives of the study were to: (a) examine the current demographic and socioeconomic characteristics of the families which have experienced any adult death(s) during the study period; and (b) assess the subsequent changes in child mortality, child education, and out-migration of the adolescent children of those families during a five-year period following any adult death (compared to families which have not experienced any adult death).

Materials and Methods

Data for this study were collected from the Sample Registration System (SRS), a longitudinal data-collection mechanism. It is a collaborative effort between the Ministry of Health and Family Welfare, Government of Bangladesh and the ICDDR,B: Centre for Health and Population Research. The SRS has been operating in two rural upazilas (formerly known as thanas) of Sirajganj and Abhoynagar in Sirajganj and Jessore districts respectively since 1982.

The SRS information was derived from interviews conducted in a sample of households identified through scientific sampling methods from the two upazilas. The SRS collects data on vital events; births, deaths, migrations, and marriages; socioeconomic characteristics; and health-seeking behaviour in the project areas. The SRS represents a high level of thoroughness and accuracy, which is unprecedented in a society characterized by poor socioeconomic conditions. Each household in the SRS is visited once every two months by a fieldworker who records any changes that occurred since the previous visit. These data are then computerized in mini computers in Dhaka [11]. The resulting database is used for the investigation of fertility, mortality, nutrition, and other health and family planning-related issues.

During January 1983-December 1992, data on all married adults, aged 15-59 years, from the two upazilas, were extracted from the SRS longitudinal database files maintained in Dhaka. The study analyzed data on all reported cases of married adult deaths (n=327) that occurred during January 1983-December 1987. For each adult death, information on age, sex, marital status, education level, date and place of death, and treatment sought before death was collected.

The families of each deceased were followed for five years following the date of death. Children were also either followed for five years from the date of death of the adult family member, or were otherwise earmarked using an appropriate exit status indicator, indicating whether the child had died or had migrated out. A total of 750 surviving children of the deceased families were identified, and information on the date of birth, sex, and educational achievement of these children was collected.

The households having only married adults who survived (n=6,700) and did not migrate out during the reference period served as the comparison group. In total, 14,366 children of these adults, children who were with their families, and had survived by December 1987, were followed from January 1988 to December 1992. Children who were born within this period were also included and followed. Information about the children of the comparison group was collected exactly in the same manner as it was for the study group.

Special socioeconomic survey (SES) data from the same families were consulted to determine the socioeconomic history of the families for both the groups. For the purpose of this study, ownership of the arable land and household space was used as proxies for the economic status.

Rural families without any land and owning less than one acre of arable land were considered poor, whereas the rural families with one to three acres and those with three acres or more arable land were considered medium- and high-economic groups respectively. Families with <170 sq.ft. of household space were termed as having small and those with 170 sq.ft. to <350 sq.ft., and 350 sq.ft or more were termed as having medium- and high-household space respectively. There is a process for continuous updating of the educational status of the children in the sample area each year. Thus, educational information was extracted from the file updated in 1993. In this study, both bivariate and multivariate logistic regression analyses were performed to determine the effects of adult mortality on the family.

For the multivariate analysis, child mortality, child (aged 6-12 years) education, and adolescent child (aged 12-20 years) emigration were treated as dependent variables. Survival status and sex of the adult were the main independent variables in the analysis. Other variables, such as education of the deceased, number of living children, age and sex of child, household area, and cultivable land owned by the family, were also treated as independent variables.

Results

Characteristics of adult deaths

Table 1 shows the distribution of the adult population in both study and comparison groups according to their various demographic and socioeconomic characteristics. The number of female adult deaths that occurred during January 1983-December 1987 was higher than that for males. Moreover, 45 percent of the male adult deaths occurred between the age 50 and 59 years, whereas it was 27 percent in case of female adults. About two-fifths (38%) of all female adult deaths occurred during the early reproductive age (15-29 years), whereas it was 16 percent in case of male adults.

Of the study population, 88 percent were Muslims and 12 percent were from other religions, which was comparable with the national statistics. The educational status was lower among the deceased group than the non-deceased group, for both males and females. Twenty-nine percent of the married female adults who died had no living children. Women who died at the time of their first pregnancy outcome fall into this group. Only three percent of the married adults of the families where there were no adult deaths had no living children.

Most people in the study area (also fairly representative of rural Bangladesh in general) were poor. Only 16 and 22 percent of the male and female deaths occurred in families who owned four or more items of articles in their possession; this figure was 30 percent in the families without any adult death. Male adult deaths took place more than female adult deaths in families that were either landless or had only one acre of land. The situation was reversed in case of the groups that had larger pieces of land.

Table 1. Percentage distribution of married adult population by demographic and socioeconomic characteristics

| Demographic characteristics | Adult death cases | | No adult death | |
|-----------------------------|-------------------|-------------------|-------------------|---------------------|
| | Male (n=147) | Female (n=180) | Male (n=3,331) | Female (n=3,369) |
| Age of adults (years) | | | | |
| 15-19 | 0.7 | 10.0 | 0.2 | 0.9 |
| 20-29 | 15.6 | 27.8 | 9.2 | 38.6 |
| 30-39 | 9.5 | 17.2 | 35.2 | 33.2 |
| 40-49 | 29.3 | 17.8 | 27.0 | 19.6 |
| 50-59 | 44.9 | 27.2 | 28.4 | 7.7 |
| Education | | | | |
| No education | 68.0 | 83.3 | 53.0 | 75.5 |
| Primary | 18.4 | 12.8 | 24.7 | 19.3 |
| Secondary or more | 13.6 | 3.9 | 22.3 | 5.2 |
| Occupation/employment | | | | |
| Housewife | 0.0 | 88.4 | 0.0 | 99.0 |
| Farmer | 31.3 | 0.0 | 44.0 | 0.0 |
| Labourer | 41.5 | 2.2 | 29.2 | 0.4 |
| Businessman | 11.6 | 1.1 | 17.9 | 0.5 |
| Disabled | 5.4 | 6.1 | 0.6 | 0.0 |
| Professional | 4.8 | 0.0 | 7.2 | 0.2 |
| Others | 5.4 | 2.2 | 1.1 | 0.0 |

Table 1 (contd.)

Table 1 (contd.)

| Demographic characteristics | Adult death cases | | No adult death | |
|---------------------------------|-------------------|-------------------|-------------------|---------------------|
| | Male (n=147) | Female (n=180) | Male (n=3,331) | Female (n=3,369) |
| Religion* | | | | |
| Muslim | 88.4 | 86.1 | 87.8 | |
| Non-Muslim | 11.6 | 13.9 | 12.2 | |
| Number of living children* | | | | |
| None | 15.0 | 29.4 | 2.7 | |
| 1-2 | 23.1 | 41.1 | 20.3 | |
| 3-5 | 42.9 | 22.8 | 54.1 | |
| 6+ | 19.0 | 6.7 | 22.9 | |
| Dwelling space* (sq.ft.) | | | | |
| 1-169 | 46.3 | 33.3 | 35.6 | |
| 170-349 | 37.4 | 43.9 | 43.0 | |
| 350+ | 16.3 | 22.8 | 21.4 | |
| Household articles owned* | | | | |
| None | 40.2 | 32.5 | 28.0 | |
| <4 items | 44.2 | 45.0 | 42.2 | |
| 4+ items | 15.6 | 22.2 | 29.8 | |
| Land-holding status* (decimals) | | | | |
| Landless | 42.9 | 30.6 | 32.0 | |
| 1-100 | 29.9 | 26.1 | 26.2 | |
| 101-300 | 18.4 | 28.3 | 24.9 | |
| 301+ | 8.8 | 15.0 | 16.9 | |

**Household-level information*

In terms of female adult occupation, almost all of the women were housewives in the group where no adults died. In the group where an adult died, some women had businesses, and some were disabled. In the families where an adult male had died, the male adult was more likely to be a labourer than the adult males in families where no adults died. The percentage of adults who were disabled or held "other professions" was higher in the study group than that in the comparison group.

Consequences of adult deaths in families and subsequent child mortality

Table 2 shows the subsequent child mortality of the families following the death of a father or a mother and families where there was no death of a father or a mother. Data indicate that children aged less than 5 years are more vulnerable to death than children aged over 5 years. Girls are much more likely to die if their mothers die. This result is consistent with the findings from Matlab, Bangladesh [2].

Table 2. Percentage of children aged less than 5 years and over who died within five years subsequent to an adult death and no adult death in the family, by sex of child

| Age of children (years) at the time of parental death | Father died | | Mother died | | None died | | Total no. died | |
|---|-----------------|----------------|-----------------|----------------|-----------------|------------------|----------------|------------------|
| | No. of children | | No. of children | | No. of children | | | |
| | Male (n=193) | Female (n=198) | Male (n=219) | Female (n=140) | Male (n=7,599) | Female (n=6,767) | Male (n=8,011) | Female (n=7,105) |
| <5 | 5.2 | 4.0 | 5.5 | 16.4 | 6.8 | 7.9 | 17.5 | 28.3 |
| 5+ | 1.6 | 1.5 | 1.4 | 2.1 | 0.8 | 1.3 | 3.8 | 4.9 |

The impact of the death of an adult caretaker was greater on female children than on male children, except for the male adult death group. The sex differential was even more pronounced, when it was a female adult death. A significantly ($p < 0.001$) higher percentage of female children aged less than 5 years died compared to the male children of the same age. For children aged 5 years and over, the mortality rates for both boys and girls reduced while the gender differentials still existed, although it was not significant. One anomalous finding (Table 2) indicates that the male children, aged less than 5 years, survived at a higher proportion after their fathers died than if they remained alive. One possible explanation for this interesting finding could be the fact that when an adult death occurs there will be an absence of a subsequent child's birth, and the probability of the child's survival is often much higher when there are fewer children to compete for resources.

Adult deaths and subsequent educational status of children in families

Table 3 shows the educational status of children, aged 6-12 years, 5 years after an adult death in the family and without any death in the family. Of these children, 75 and 74 percent never received any education in the households where father and mother died, compared to 58 percent in the households where there was no parental death. The difference was significantly higher ($p < 0.01$) for the death of either of the parent compared to the family where neither of the parents died. In case of primary education, a significantly lower ($p < 0.02$) percentage of child's education was observed in the family where the father died, but no significant difference was observed among the children of the above primary-educated group, irrespective of their parents either survived or died.

Table 3. Percentage of educational status of children (aged 6-12 years) five years after their father or mother's death and those who had not experienced any death

| Educational level of children | Father died | Mother died | No one died |
|-------------------------------|------------------------|------------------------|---------------------------|
| | No. of children (n=48) | No. of children (n=38) | No. of children (n=4,165) |
| No education | 75.0 | 73.7 | 57.8 |
| Primary | 16.7 | 21.0 | 32.5 |
| Above primary | 8.3 | 5.3 | 9.7 |

Adult deaths and subsequent out-migration of adolescent children (five years after death)

Thirty-three percent of the female children, aged 12-20 years, whose parents were alive, had moved out of their parental home (some may have been fostered out, married, or working and living away from their parents' home). In contrast, 65 and 53 percent of the female children had migrated out following the death of their fathers or mothers respectively (Table 4). The reason for this difference could be that, in the absence of a father, a mother felt less capable of managing a grown-up daughter, and thus, arranged her marriage as early as possible. In cases where a mother died, domestic responsibilities often forced a widower to remarry. In anticipation of conflict between his grown-up daughter and his new wife, a father might be inclined to take the initiative of arranging marriage for his grown-up daughter. In both the cases, it is likely that the death results in an earlier marriage for the female child. In cases where both father and mother are present, more time can be afforded to ensure an appropriate match for a grown-up daughter. Similarly, if a grown-up daughter is engaged in her education (a situation that is more likely where both parents are alive and, thus more resources are available for schooling), this activity, in itself, may serve to delay the marriage. Again, the impinging responsibility brought in by the death of a father or a mother forces a female child to assume responsibilities more quickly than she would have otherwise. Thus, a parental death may make it more likely that she will seek opportunities to work away from home, (e.g. in the garments industry).

In the case of male children aged 12-20 years, the death of a parent also increased the possibility of the male child to migrate out of the parental home within five years of the death. There was a significant ($p < 0.001$) difference in the male child's out-migration between the families with adult death and the families without any adult death. However, out-migration was significantly lower among males than among females, irrespective of whether both parents died or survived. One explanation for the lower male adolescent out-migration could be that the male children marry later and attend school more frequently and for more years than the female children of the same age. Furthermore, males are generally expected, as they get older, to assume the responsibilities of their fathers, whether the father dies unexpectedly or not. An unexpected death may simply push the male child into this household responsibility at an earlier age.

Table 4. Percentage of male and female children (aged 12-20 years) who migrated out within five years after an adult death and no death in the family over the next five years

| Children who migrated out by sex | Father died | Mother died | No one died |
|----------------------------------|-------------------------|-------------------------|---------------------------|
| | No. of children (n=186) | No. of children (n=123) | No. of children (n=5,736) |
| Males | 13.4 | 15.5 | 3.6 |
| Females | 65.1 | 52.9 | 33.4 |

Logistic regression analysis

The statistically significant results of the logistic regression analysis, using child mortality, child's education, and child's out-migration as the dependent variables, are shown in Table 5-7.

The results are shown in terms of odds ratios obtained by taking the exponential function of the estimated regression coefficient.

Table 5 presents the results relating to the effects of mortality and sex of the adults who died and other demographic and socioeconomic factors on child mortality. It was observed that the odds of child death was 61 percent higher in the five years following a female adult death in a family than the family which experienced a male adult death within that period.

Table 5 also shows that, as expected, death among children aged less than 5 years was significantly higher ($p < 0.001$) in the families, which experienced an adult death than it was for children aged 5 years and over. The likelihood of mortality among the female children was 22 percent higher than it was among the male children, and this difference was also statistically significant ($p < 0.001$).

Child mortality was significantly lower ($p < 0.001$) among the adults who died and had secondary education or more compared to the children whose parents had no education and had not died. Families with three or more children had significantly lower ($p < 0.001$) child mortality within five years after the death of an adult family member. This may be explained by the fact that the family with a number of grown-up children became self-cared, and the younger children were looked after by their elders.

The likelihood of child death was significantly lower ($p < 0.01$) among the children who were from households with large-dwelling spaces than those who were from households with medium-dwelling space. The land-holding status of a family had the same scenario on child mortality, which was significantly higher ($p < 0.01$) in the landless families and in those families which had 100 decimals or less agricultural land compared to the families having 101-300 decimals of agricultural land.

Table 5. Odds ratio from logistic regression of effects of adult deaths and other different covariates on the likelihood of child mortality within five years

| Covariates | Odds | 95% C.I |
|--|---------|-----------|
| Female adult survival status | | |
| Survived (RC)† | 1.00 | |
| Died | 1.61* | 1.0-2.6 |
| Adult died when child's age was <5 years | | |
| 5+years (RC) | 1.00 | |
| <5 years | 21.5*** | 12.7-36.3 |
| Child's sex | | |
| Male (RC) | 1.00 | |
| Female | 1.22*** | 1.1-1.4 |
| Adult education | | |
| No education (RC) | 1.00 | |
| Primary | 0.89 | 0.8-1.1 |
| Secondary+ | 0.49*** | 0.3-0.7 |
| Adult died and number of living children | | |
| <3 children (RC) | 1.00 | |
| 3+ children | 0.52*** | 0.3-0.8 |
| Dwelling space (sq.ft.) | | |
| <170 | 1.47*** | 1.3-1.7 |
| 170-349 (RC) | 1.00 | |
| 350+ | 0.73** | 0.6-0.9 |

Table 5 (contd.)

Table 5 (contd.)

| Covariates | Odds | 95% C.I |
|--------------------------------|----------|---------|
| Land-holding status (decimals) | | |
| Landless | 1.33*** | 1.1-1.6 |
| 1-100 | 1.25** | 1.1-1.5 |
| 101-300 (RC) | 1.00 | |
| 301+ | 0.97 | 0.8-1.2 |
| Constant | -3.27*** | |
| -2log Likelihood | 8351 | |
| N | 15116 | |
| df | 11 | |

†RC Reference category; *p<0.05; ** p<0.01; *** p<0.001

Table 6 presents the effects of adult mortality and the different demographic and socioeconomic characteristics on the education of children, aged 6-12 years, five years after adult death in a family. The likelihood of children receiving at least some education was 42 percent lower in the families that had experienced an adult female death than the families that had experienced a male adult death. Parents' education was a significant factor ($p<0.001$), and was positively associated with the child's educational status. Children from families with three or more living children were significantly ($p<0.05$) less educated compared to the families with two or fewer number of children.

The likelihood of child's education was found to be significantly lower ($p<0.001$) in the households with a small-dwelling space compared to the families with a medium-dwelling space. In contrast, children of the households with larger-dwelling space were 5.5 times more likely to have some education than the children of the families having a medium-sized dwelling space. A similar pattern existed in the land-holding status of the family. The families with some or no arable land were significantly less ($p<0.01$) and ($p<0.001$) likely to have educated children than the families which owned medium-sized tracts of land. The families owing larger tracts of land corresponded with significantly higher ($p<0.01$) likelihood of children having some education than those families which owned medium-sized tracts of land.

Table 6. Odds ratio from logistic regression of effects of adult deaths and other covariates on children's (aged 6-12 years) likelihood of having some schooling within five years

| Covariates | Odds | 95% C.I |
|--|---------|---------|
| Female adult's survival status | | |
| Survived (RC)† | 1.00 | |
| Died | 0.58 | 0.3-1.3 |
| Child's sex | | |
| Male | (RC) | 1.00 |
| Female | 0.92 | 0.8-1.1 |
| Adult education | | |
| No education (RC) | 1.00 | |
| Primary | 2.11*** | 1.8-2.5 |
| Secondary+ | 3.27*** | 2.3-4.6 |
| Adult died and number of living children | | |
| <3 children (RC) | 1.00 | |
| 3+ children | 0.40* | 0.2-0.9 |
| Dwelling space (sq.ft.) | | |
| <170 | 0.28*** | 0.2-0.3 |
| 170-349 (RC) | 1.00 | |
| 350+ | 5.53*** | 4.2-7.3 |
| Land-holding status (decimals) | | |
| Landless | 0.69*** | 0.6-0.8 |
| 1-100 | 0.81** | 0.7-0.9 |
| 101-300 (RC) | 1.00 | |
| 301+ | 1.38** | 1.1-1.8 |
| Constant | -0.17 | |
| -2log Likelihood | 4831 | |
| N | 4251 | |
| df | 10 | |

†RC Reference category; * p<0.05; ** p<0.01; *** p<0.001

Table 7 shows the effects of several covariates on the likelihood of adolescents (aged 12-20 years) to migrate out of the household within five years after the death of an adult family member(father/mother). The likelihood of adolescent's out-migration was

significantly ($p < 0.05$) higher in the families that experienced female adult death. The odds of female adolescent's out-migration were 17 times higher than for male adolescent's out-migration. Adolescent's out-migration was 33 percent and 41 percent lower respectively among the families with parents who died having primary and secondary education or above, than the families that experienced the death of non-educated parents. These differences were highly significant ($p < 0.001$). The likelihood of out-migration was significantly higher ($p < 0.001$) among the families with three or more children and had an death compared to the families where there were no adult death and had a fewer number of (<3) children. Significantly higher ($p < 0.001$) out-migration of the adolescents were observed in the families with a higher-dwelling space ($p < 0.001$), compared to those with a medium-dwelling space. Very little or no effect was observed in the land-holding status of the family on adolescent out-migration.

Table 7. Odds ratio from logistic regression of effects of adult deaths and other covariates on likelihood of childhood (aged 12-20 years) out-migration within five years

| Covariates | Odds | 95% C.I |
|--|----------|-----------|
| Female adult's survival status | | |
| Survived (RC)† | 1.00 | |
| Died | 1.84* | 1.1-3.1 |
| Child's sex | | |
| Male (RC) | 1.00 | |
| Female | 17.30*** | 14.8-20.0 |
| Adult education | | |
| No education (RC) | 1.00 | |
| Primary | 0.67*** | 0.6-0.8 |
| Secondary+ | 0.59*** | 0.4-0.8 |
| Adult died and number of living children | | |
| <3 children (RC) | 1.00 | |
| 3+ children | 7.41*** | 4.9-11.2 |
| Dwelling space (sq.ft.) | | |
| <170 | 0.88 | 0.8-1.0 |
| 170-349 (RC) | 1.00 | |
| 350+ | 1.68*** | 1.4-2.0 |

Table 7. (contd.)

Table 7. (contd.)

| Covariates | Odds | 95% C.I |
|--------------------------------|----------|---------|
| Land-holding Status (decimals) | | |
| Landless | 0.98 | 0.8-1.2 |
| 1-100 | 1.14 | 0.9-1.4 |
| 100-300 (RC) | 1.00 | |
| 301+ | 0.87 | 0.7-1.1 |
| Constant | -2.35*** | |
| -2 log Likelihood | 5928 | |
| N | 6045 | |
| df | 10 | |

†RC Reference category; * p<0.05; ** p<0.01; *** p<.001

Discussion and Conclusion

During the past two decades, the determinants of mortality in the developing countries have been studied with some frequency, with emphasis on examining the covariates of infant, child and maternal mortality. However, the micro-consequences of adult mortality on the well-being of families experiencing these deaths have been virtually ignored in mortality-related studies in the developing-country settings.

In this study, an attempt was made to examine the consequences of the deaths of married adult members, subsequent mortality risk, and school attendance of children, and likelihood of out-migration of their children from the household at an early age, i.e. during their teen-age.

The findings of the study suggest that there are significant negative health and socioeconomic consequences for the children in the families experiencing an adult death compared to the families which did not experience any death of a parent in the household.

Children aged less than 5 years were significantly more likely to die within five years after the death of an adult member in the family compared to the children of the families where no parents died. This relationship was even more pronounced when the mother died.

Another important finding was that children, aged 6-12 years, who experienced the death of a parent were significantly less likely to have received any schooling in five years following the death event compared to the children of the same age who did not experience the death of a parent.

And finally, in the households where a married adult died, children, aged 12-20 years, were significantly more likely to have migrated out of the households compared to the teen-aged children (12-20 years) of the households who did not experience the death of a parent.

The significant negative impacts of an adult death on mortality risks and socioeconomic well-being of children hold even after other important demographic and socioeconomic independent variables are controlled in the multivariate regression analyses.

The longitudinal data from the SRS provide a unique opportunity to assess adult mortality impacts on a family in the rural area of Bangladesh. Nevertheless, several potential limitations of the present study should be noted. Firstly, causes of death, duration of illness before death, and expenses, if any, incurred for the treatment of the deceased were not explored. Secondly, since we considered the adult deaths occurred during 1983-1987, the observation period after the death varied, with some ending in 1988 and others ending as late as 1993. More specific durations of exposure after death were not considered in this analysis. Finally, death of an unmarried adult in a family may also have a negative impact in terms of their income and family support, but these deaths were also not addressed in this study. Due to limitations of data, the study did not explore the school attendance of children immediately after the death of an adult member in a family. Instead, we used the educational status of the children five years after the death of either of the parents.

Adult death, particularly female death, was found to be associated with a higher level of children aged less than 5 years. This may be explained in several ways. One explanation could be that, in some cases, before dying due to a communicable disease, the adult transmits it to other family members, with fatal consequences, e.g. tuberculosis, human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS), meningitis, etc. This is especially relevant in the case of infants. In the case of maternal deaths, the infant often dies at birth or within the first two months following the maternal death. The loss of a mother to infants who are still breast-feeding is likely to have significant negative repercussions on the health and nutritional status of these young children. Of great importance is the fact that, with the loss of an adult family member, there is usually a decrease in childcare capacity within the family and a loss of economic resources necessary to ensure the proper safety, nutrition, education, and healthcare for the children. Policies, then, that are designed to protect the health of adults would also protect children to the extent that adult mortality, directly or indirectly, leads to a higher risk of illness or death among infants and children.

Although life insurance, social welfare support, extended family systems, child fostering, and adoption may provide some security to the children who lose an adult family member in such settings in the rural areas of Bangladesh included in this study, it appears that life becomes exceedingly difficult for the children of the deceased parent in the years following the death event.

In conclusion, this study suggests that the death of an adult parent has dire consequences on the rural households of the study area, especially among younger children, often leading to a higher risk of death, particularly when the mother dies. Among older children, the negative consequences include disruption of education and an increased geographic mobility at an early age. Adolescent girls are compelled to marry early or seek employment to support the family. However, more in-depth, qualitative research is needed to complement these quantitative findings and to examine more thoroughly the economic, social and health circumstances and implications of an adult death on the family in this cultural context.

For countries, such as Bangladesh, where maternal mortality is still unacceptably high and where in the future it is likely to increase the mortality of parents in their reproductive age due to HIV/AIDS, it is paramount that research efforts to examine the consequences of adult mortality are intensified. This is necessary to design and implement effective policies and programmes to prevent, or at least reduce, the devastating effects of adult deaths on families.

References

1. Chen LC, Gesche MC, Shamsa A, Chowdhury AI, Mosley WH. Maternal mortality in rural Bangladesh. *Stud Fam Plann* 1974;5:334-41.
2. Strong MA. The health of adults in the developing world: the view from Bangladesh. *Health Trans Rev* 1992;2:215-24.
3. Koenig MA, Fauveau V, Chowdhury AI, Chakraborty J, Khan MA. Maternal mortality in Matlab, Bangladesh 1976-85. *Stud Fam Plann* 1988;19:69-80.
4. Phillips MA, Feachem RGA, Koplan JP. The emerging agenda for adult health, (chapter 6): The health of adults in the developing world. Washington, D.C.: Oxford University Press, 1992:261-94.
5. Sarma RSS. The effect of declining mortality on the incidence of widowhood and its social consequences. *In: Studies on mortality in India*. Gandhigram: Gandhigram Institute of Rural Health and Family Planning, 1972:321-35. (Monograph series no. 5).
6. Aziz AKM, Maloney C. Life stages, gender and fertility in Bangladesh. Dhaka: International Centre for Diarrhoeal Disease Research, Bangladesh, 1985:50-90.
7. Popkin, BM. Time allocation of the mother and children nutriture. *Ecol Food Stat Nutr* 1980;9:1-14.
8. Kumar SK. Composition of economic constraints in child nutrition: impact of maternal incomes and employment in low income households in India. Cornell University, 1977, (PhD dissertation).
9. Pryer J. When breadwinners fall ill: preliminary findings from case study in Bangladesh. *IDS Bull* 1989;20: 49-57.
10. Mosley WH, Chen LC. An analytical framework for the study of child survival in developing countries. *Pop Dev Rev* 1984;10(suppl):25-45.
11. Mozumder KA, Koenig MA, Phillips JF, Murad S. The sample registration system: an innovative system for monitoring demographic dynamics. *Asia-Pacific Pop J* 1990;5:63-72.