Preliminary Version

Losing the Presence and Presents of Parents: How Parental Death and Disability Affects Children

Paul Gertler

Sebastian Martinez

David Levine

and

Stefano Bertozzi[1]

July 1, 2003

Abstract: *The death of a parent is one of the most severe traumas that a child can suffer. The loss of a parent causes emotional distress and deprives the orphaned child of love, nurturing, values, information and discipline. The loss of a productive household member also diminishes the financial resources available for continued investments in child health and education. This paper investigates the effect of parental death and disability on investments in child human capital using panel data sets from Indonesia and Mexico. We find that children with a deceased parent are more likely to drop out of school, are less likely to start school and are generally less healthy than non-bereaved children. Controlling for changes in household economic status (consumption) does not substantially reduce the negative effect of parental death on health and educational status. These results suggest that behavioral changes related to the loss of a parent's presence in the household are the key to explaining the reduction in children's human capital, rather than the associated loss in income from parental death. The results provide strong support for the important role of parental presence in the household for raising healthy and well-educated children.*

[1] Contact information: Paul Gertler, Haas School of Business, University of California, Berkeley California 94720; gertler@haas.berkeley.edu . Sebastian Martinez, Department of Economics, University of California, Berkeley California 94720; martinez@econ.berkeley.edu. David Levine, Haas School of Business, University of California, Berkeley California 94720; levine@haas.berkeley.edu. Stefano Bertozzi, Instituto Nacional de Salud Publica, Mexico; sbertozzi@correo.insp.mx.

1. Introduction

The death of a parent early in life is one of the most traumatic events a child can experience. The loss of a parent causes emotional distress and deprives the orphaned child of love, nurturing, values, information and discipline. In addition, any resulting reduction in income following the death of a parent could limit the household's ability to provide for their children. Both the lack of parental presence and reduction in income could reduce a child's human capital accumulation. In this case, the loss of a parent can have long-lasting implications for the bereaved child's future quality of life and livelihood.

In this paper, we investigate what happens to children after parents die or become disabled. The study uses panel data from the first and second waves of the Indonesian Family Life Survey (IFLS) and six waves of the Mexican evaluation surveys for the *Progresa* welfare program (ENCEL) to analyze the effects of parental death and disability on investments in health and education of surviving offspring. We estimate the effects of parental death on various indicators of a child's educational and health status including dropping out of school, age of first enrollment, mortality, height and weight. We find that the loss of a mother predicts lower human capital accumulation for younger children, while loss of a father causes a large reduction for older children. Results from the IFLS show that the death of a father doubles the dropout rate, while the loss of a mother lowers the probability of school enrollment, doubles the probability of child death, and increases the probability of being malnourished.

We also investigate the two principal mechanisms through which parental death may affect child outcomes: (1) reduction in household economic resources and (2) removal of parental presence that causes grief and removes love and guidance. We find that the reduction in economic resources measured by the change in household consumption explains only a small portion of the effect of parental death on children's human capital investments. We thus conclude that the loss of parental *presence* and the resulting behavioral changes play an important role in explaining the decline in investments in child human capital.

These results have important public policy implications. A significant proportion of school-aged children in less industrialized nations have always lost parents to accidents, childbirth, and illness. Unfortunately, in much of the world the scourge of HIV/AIDS has greatly increased death rates of young adults and, thus, increased the importance of understanding how parental loss affects investments in children. For example, one in ten African children under the age of 15 has lost one or both parents (Hunter and Williamson 2000).

The international community has become increasingly concerned about the effect of adult mortality on children's schooling (Copson, 2000; World Bank, 1999). Many programs, especially in Africa, have been launched or proposed to support the school fees, uniforms and other schooling related costs of orphaned children (Hunter and Williamson, 2000; Reid, 1993). However, the school scholarship policy assumes that the reason children dropout of school after a parent dies is monetary. If the reason is instead behavioral changes due to the loss of parental presence, then programs that focus exclusively on school scholarships may be less effective in keeping bereaved children in school than expected.

The following section briefly reviews some theoretical arguments to help understand how parental death may affect investments in children's human capital. Section 3 describes the data set and estimation strategies. In section 4 we look into the effects of the death of a prime aged adult on household consumption using a larger sample of households. Sections 5 and 6 estimate the effect of parental death on investments in child education and health, respectively. Section 7 presents conclusions and potential policy implications.

2. Theoretical Framework

There are a number of pathways through which parental death will affect human capital investments in children. In this section we briefly discuss the main theoretical arguments that have been put forward in the literature, but do not propose a new theoretical framework.

Becker and Tomes (1979) present a baseline model of investment in child human capital, based on intergenerational altruism. They assume (1) perfect capital markets, so that parents are not liquidity constrained and may borrow against children's future earnings; (2) schooling is valued solely for its contributions to future income; (3) neither investments of parental time nor the process of bereavement affect the value of schooling; (4) the opportunity cost of the children's time is not affected by the death of a parent; (5) parents care equally about each child and pay for education based solely on education's effects on future productivity.

The familiar result derived from their analysis is that a family's optimal investment is that which equates the marginal returns to education to the marginal costs.

Under the strong assumptions noted above, when parents can freely borrow against the future earnings of their children, investments in children are unaffected by shocks to a family's current income such as loss of a parent. Intuitively, parents undertake investments with positive present values, and current income does not affect the payoff from the investment.

In a follow up paper, Becker and Tomes (1986) consider the case of parental investments in children in the presence of imperfect capital markets, such that families cannot borrow against future higher earnings that educated children would receive. In this case, investments in children remain unaffected after a negative income shock for families with sufficient assets (precautionary savings), but investments decline for families facing liquidity constraints.

A complementary set of theories based on insurance posit that even liquidity constrained families may still maintain investments in children's human capital. For example, in many industrialized nations, the purchase of life insurance helps smooth the living standards and investments in children following the death of a parent. While this mechanism is not as widely used in less developed countries, informal insurance from neighbors and the extended family can be important factors in maintaining investments in children (Townsend, 1995). When informal insurance is maintained through the expectation of future reciprocity, however, a permanent shock such as the death of a parent makes reciprocity less likely to occur; thus, informal insurance mechanisms may break down (Townsend, 1994; Sullivan, 1994).

Even when a family has access to well-working insurance mechanisms, and has no borrowing constraints, the loss of one parent can reduce investments in children's human capital if there are changes in preferences and the child's education production function. First, if education is partly a parental consumption good, enrollment many decline following a decline in family income. Second, if the surviving parent has different preferences for education than the deceased parent had, investments in children will change. There is some evidence that mothers put more emphasis on health, education and other investments in children than do fathers (Thomas, 1990).

Third, if parental time is an argument of the education production function, there will potentially be changes in the level of investments in child schooling. If parental time and schooling are complementary, the loss of a parent and subsequent reduction in total parental time available for school-related activities will reduce investments in education. If, in contrast, parental time is a substitute for schooling, the amount of schooling may rise following the loss of a parent. This situation is likely if school provides supervision for children who would otherwise require adult supervision at home.

In addition, the loss of a parent is an extremely traumatic event, and may affect the bereaved child's emotional status and values. The trauma of bereavement may make it difficult for children to concentrate on schoolwork, leading to temporary or permanent withdrawal from school. Furthermore, a deceased parent will no longer be able to pass on his or her norms and values, and children may no longer have the motivation to continue their education. In this case, purely economic measures such as scholarships may not suffice to remedy the effects of parental death on investments in children's human capital, and other policy measures will be needed.

Given the mixed predictions of theory, it is perhaps unsurprising that the evidence on the effects of parental mortality does not paint a consistent picture. For example, Lloyd and Blanc (1996) use population surveys with limited socio-economic controls from 7 African countries and find mixed results. Ainsworth et al. (2000) analyze a well-designed panel survey of 757 households from Northwestern Tanzania and find that adult mortality delays school entry, but otherwise does not affect enrollment.

In contrast, Gertler, Ames and Levine (2002) find parental mortality roughly doubles school dropout rates in Indonesia. Their study has the strength of a very large sample. At the same time, they examine only short-run (1-12 months) effects of parental loss. The medium-term effects over the next few years following a death may be much larger than the short-term effects (for example, if savings are quickly exhausted) or much smaller (as families adjust to the shock). Thus, an important contribution of this paper is to look at these medium-term effects. We also, unlike previous analyses, are able to examine how loss of a parent affects a child's health (as measured by their weight for age, for example).

3. Data and Measurement

The first data set we analyze is the Indonesian Family Life Survey waves 1 and 2 (IFLS, further described in Frankenberg and Thomas 2000). The IFLS is a nationally representative survey carried out in 1993 and followed up in 1997, and covers over 7200 households. These households were chosen to be representative of the population in 13 Indonesian provinces; these provinces encompass 83% of the country's population. The surveys include detailed information on children's enrollment status and schooling history, as well as detailed anthropometric data and a host of household and community level variables, including the status in 1997 (deceased or alive) of each individual surveyed in 1993, household consumption in both periods, and parental characteristics.

The sample used for the evaluation of the effect of parental death on investments in the human capital of children consists of all children between the ages of 0 and 10 years in 1993 with two identifiable living parents in 1993. Children with parents who exit the household for any reason other than death (for example, divorce) were excluded from the sample. Only parents between the ages of 18 to 60 in 1993 were included in the sample, and 85% of these individuals were between the ages of 25 and 50. We are thus quite confident that parents were correctly matched to surviving children, and that any mislabeled grandparents were eliminated from the sample.

A detailed headcount of bereaved and non-bereaved children in the IFLS is presented in table 1A. The final sample contains 6185 children in 3378 households. For the period between 1993 and 1997 there are a total of 100 parental deaths, 67 paternal and 33 maternal, leaving 163 bereaved children. Only one family lost both a mother and father between the two periods.

The second data set used in the analysis is the Encuesta de Evaluacion de Hogares, or Household Evaluation Survey (ENCEL) from the *Progresa* (now *Oportunidades*) social welfare program in Mexico. The ENCEL surveys were conducted biannually between 1998 and 2000, with over 24,000 households. The ENCEL data were gathered in 506 poor rural localities, and are not nationally representative. The survey includes information on the child's current enrollment status and schooling history, detailed information for child and parents characteristics, and income and consumption data. Households in the ENCEL surveys could be matched to the Encuesta de

Caracteristicas Socoioeconomicas de los Hogares, or Household Socioeconomic Characteristics Survey (ENCASE) conducted by *Progresa* in 1997. The complete data set thus spans approximately three years. The 1997 ENCASE, May 1998 ENCEL and May 2000 ENCEL lack a detailed consumption and expenditures module, so analysis incorporating the key controls for consumption in the Mexican analysis include only four rounds of the ENCEL survey, with the October 1998 round as baseline.

The sample used for analysis of the impact of parental death on children's human capital consists of all children between the ages of 0 to 14 in any given wave, with two identifiable parents in the household at baseline. As with the IFLS, children whose parents exit the household for any reason other than death were excluded from the sample, and only parents between the ages of 18 to 60 were included.

The complete ENCEL sample consists of 53,006 children in 17,104 households. The sub-sample of households with complete consumption information for the October 1998 round, both 1999 rounds and the November 2000 round consists of 46,761 children in 15,826 households. Over the three year period there are 180 paternal deaths and 68 maternal deaths, leaving a total of 655 bereaved children in the sample.

The samples for the ENCEL and IFLS data sets were drawn from 506 and 312 separate communities, respectively. Thus, to estimate the effect of parental death we include community-level random or fixed effects. Fixed effects control for unobserved time-invariant community characteristics which might affect child educational or health outcomes, such as village distance to a school or health clinic, or school and clinic quality. The use of fixed effects models for discrete dependent variables, however, results in a reduced sample size by excluding in some cases over two thirds of communities with no variation in outcome; thus, precision declines compared with the random effects specifications. Because the results of fixed effects and random effect regressions will turn out to be similar, we will argue the random effects estimates are not suffering from community level omitted variables biases.

All regressions include controls for baseline household consumption (or baseline household assets for some analyses using the ENCASE baseline round of the *Progresa* data) to control for differences in economic conditions of bereaved and non-bereaved households prior to the death of a prime-aged parent. A second set of models incorporates an additional term for change in household consumption between two periods. This term allows us to control for the purely economic effects of the loss of a productive family member. Furthermore, all regressions control for child age and gender, number of household members, number of children in the household under the age of 10, and parental age and education. In the Indonesian analysis we are able to include the additional controls for baseline parental health, as measured by body mass index and height.

An additional measure of parental health status in the IFLS is an index of an individual's self-reported ability to physically perform activities of daily living (ADLs) such as walk five kilometers. These physical functioning measures are based on individuals' self-ratings of ability to engage in specific activities, not based on general assessments of illness symptoms. These self-reported physical functioning measures have been tested extensively for reliability (consistency between tests and interviewers) and validity (consistency between individual assessments of different skills). In the United States and South East Asia, they have been found to be reliable and valid selfassessments with a high degree of internal consistency (Andrews et al., 1986; Guralnik et al., 1989; Ju and Jones, 1989; Strauss et al., 1993; Ware, Davies-Avery, and Brook, 1980). They are routinely used in studies of labor supply in the United States (e.g., Bound,1991; Bound et al., 1995; Stern, 1989). In addition, in contrast to self-reported illness symptoms, these measures tend to be negatively correlated with income and education in both U.S. and low-income samples (e.g., Strauss et al., 1993; Smith and Kington, 1997; Gertler and Zeitlin, 2001).

The specific ADL questions in the IFLS survey were adapted from standard U.S. measures after extensive testing and modification to ensure that questions fit the local cultural context. To minimize measurement error, every adult in the household was interviewed directly and proxy responses were not accepted. The IFLS ADL questions consisted of ability to carry a heavy load for 20 meters; sweep the floor or yard; walk for 5 kilometers; take water from a well; and bend, kneel, or stoop. The responses to these questions on the survey were coded either as can do it easily (a value of 1), can do it with difficulty (3), and unable to do it (5). We sum the scores across the five ADLs and then normalize the ADL index so that it takes the value of 1 if the individual can perform all ADLs without difficulty and zero if the individual cannot perform any ADLs.

4. Death and Consumption

In this section we present estimates of how death of a prime aged adult affects household consumption. For this purpose we use a larger sub-sample of households and include deaths of all adults ages 18 to 60. The IFLS sample used in the analysis contains 5008 households with complete information for 1993 and 1997. Using the 1997 household roster we documented a total of 213 deaths of prime age adults in 209 households between 1993 and 1997. There are 128 deceased males and 85 deceased females in the sample. The average age of deceased individuals is 44.4 years at the time of death, compared to an average age of 38.6 for all other prime aged individuals in the sample. Table 1B presents summary statistics for IFLS bereaved and non-bereaved households[2]. Soon to be bereaved households were poorer than non-bereaved households in 1993, with a difference of almost 10,000 rupia between the average monthly consumption per capita of the two groups (about $5 per person per month, or 20 percent of mean per capita consumption). Non-bereaved households have a larger increase in household consumption but a smaller change in per capita consumption between 1993 and 1997 given the necessary drop in household size amongst bereaved households, although the differences are not significant at the 5% level.

The complete sample of Mexican households consists of 24,625 households over four waves. There are a total of 341 prime aged adult deaths, of which 207 deaths were prime aged adult males. The mean age of deceased individuals was higher than surviving individuals. Total household consumption is lower in bereaved households (Table 2)[3], and per-capita consumption is not significantly different for the two groups. As in the IFLS, change in per capita consumption is larger amongst bereaved households given the necessary decline in household size following the death of a member (not significant at the 5% level).

---

[2] Summary statistics in Table 1B are for the sub-sample of households with children ages 10 and under. Summary statistics for the entire sample are available upon request.
[3] Summary statistics in Table 2 are for the sub-sample of household with children ages 14 and under in any given wave. Summary statistics for the entire sample are available upon request.

Deaths of prime aged adults appear to be unexpected and idiosyncratic events in these two samples. To verify this claim in the IFLS we are able to measure the level of health for all individuals in 1993 according to the Activity of Daily Living index (ADL), and compared the ADL of soon-to-be deceased individuals with the ADL index of surviving prime aged adults in the sample. For all individuals 18 through 60, soon-to-be deceased individuals are less healthy on average, with mean ADL of 0.93 compared with a mean ADL for all other prime aged adults of 0.975 (significantly different at the 5% level). However, a large part of this difference can be attributed to a disproportionate amount of older individuals in the deceased sample. In fact, only soon-to-be deceased individuals in the age category of 50 to 60 years old have a significantly lower mean ADL than surviving 50 to 60 year olds. All other age cohorts have insignificantly different mean ADLs. Thus, soon-to-be deceased individuals were for the most part equally healthy in 1993 as surviving individuals of the same age cohort, as measured by the ADL index.

Soon-to-be deceased individuals are also less educated on average, with a mean of 3.9 years of education for deceased individuals compared to 5.4 years for surviving individuals. Breaking the sample into cohorts of roughly 10 years, soon-to-be deceased young adults (18 to 30) and older adults (50 to 60) have comparable educational levels to their surviving cohorts, while middle aged adults (30 to 50) had significantly fewer years of education on average.

To estimate the effects of a prime aged adult death on household consumption we employ a difference in difference fixed effects linear regression with community level fixed effects. Community level fixed effects allow us to control for unobserved time invariant characteristics at the community level, such as the distance to health clinics, the availability of sanitation services or weather. The model to be estimated is:

$$\Delta \ln(C_{ij}) = \alpha_j + \lambda D_{ij} + \sum_k \beta_k X_{ijk} + \eta_j + \varepsilon_{ij} \qquad (1)$$

This model estimates the effect of the death of a prime aged adult in household i and community j on the change in log household consumption per capita between two periods. D_{ij} is a binary variable that takes on the value of one if a prime aged adult died in household ij between the two periods. X_{ijk} includes a series of *k* controls for the age and education of the head of household and spouse, changes in the demographic composition of the household and change in the (log) number of household members.

IFLS results are reported in Table 3. The baseline specification indicates that the death of a prime aged household member results in a 10.2% reduction in consumption per capita for bereaved households. In model 2 we estimate the effect of prime aged adult death disaggregated by gender. The effect of the death of a male is large and significant, with a 27% decline in consumption per capita for the death of prime aged male. On the other hand, there is no significant effect for the death of a prime aged female on household consumption.

In a final specification of the model (col. 3) we evaluate deaths of healthy prime aged adults, as measured by baseline ADL. Individuals with an ADL of 1 in 1993 were able to perform all activities of daily living with ease. The inclusion of these terms yields no evidence that the death of a healthy adult has a different effect on household consumption.

Results for the effect of prime aged adult death on household consumption in the Mexican ENCEL data are given in Table 4. Given the shorter time spans between waves in the ENCEL, we are able to estimate the effect of prime aged adult death on consumption in 6 month intervals since the death occurred. We observe in model 1 that the death of a prime aged adult reduces household per capita consumption by 7.7% 7 to 12 months from the time of death. Controls for further periods following death indicate that consumption does not recover. Model 2 includes interactions for the death of a prime aged adult male. In contrast to the clear differences between male and female deaths in the IFLS, there appears to be no differences between the deaths of males and females in the Mexican data.

5. Effect of Parental Death on Children's Education

Tables 1B and 2 compare demographic and socioeconomic characteristics of bereaved and non-bereaved children in Indonesia and Mexico. Bereaved children are on average older than non-bereaved children, which is consistent with the fact that deceased parents are also, on average, older than surviving parents. Parents of bereaved children had fewer years of education compared to parents of non-bereaved children. Bereaved families are also disadvantaged at baseline compared to non-bereaved families, as demonstrated by lower per capita and household consumption at baseline. Comparing changes in household consumption we find that on average, bereaved families remained poorer than non-bereaved families (difference not significant at 5% level in Indonesia). The change in per-capita consumption in bereaved households and non-bereaved households is not significantly different, although this change is always greater in bereaved households given the necessary reduction in household size.

To test if bereaved and non-bereaved households are different at baseline we estimate the effect of a future parental death on baseline school enrollment. Enrollment at baseline is uncorrelated with future parental death (results available on request). This orthogonality of child enrollment status at baseline helps us confirm that there are no differences between bereaved and non-bereaved households that would lead to different educational outcomes in the absence of a parental death.

In the next section we estimate the effect of parental death on measures of investments in child health and education. We estimate the effects of paternal and maternal deaths separately, first controlling for baseline household consumption and then including an additional term for the change in household resources following the death of a parent.

Parental Death and School Dropout

School dropout is constructed by observing the child's enrollment status in period t and comparing it with enrollment status in period t-1. For example, in the IFLS if the child was enrolled in 1993 and is no longer enrolled in 1997 we identify the child as having dropped out (at least temporarily) of school. Given a four year time span between waves in the IFLS we will fail to capture children who dropped out of school following the death of a parent, and then re-enrolled prior to the follow up survey. In contrast, the ENCEL data offers us the advantage of six month time spans between waves whereby we can more accurately capture short term effects of parental death on child enrollment status.

To estimate the effect of parental death on school dropout in Indonesia, we use a sub-sample of 2631 children aged 5 to 10 enrolled in school in 1993. Table 1A shows that for all children enrolled in school in 1993, 15% of bereaved children drop out of school, compared to 7% of non-bereaved children. Summary statistics for the ENCEL (Table 2) provide a similar picture, with 20% of bereaved children dropping out at some point over the sample period compared to 14.8% of non-bereaved children. Bereaved school-aged children in Mexico also have a lower mean number of years of education, with almost 0.4 fewer years compared to non-bereaved children. These descriptive statistics for Mexico and Indonesia provide some initial evidence for the detrimental effect of parental death on normal school progression.

To estimate the effect of parental death on child dropout rates we use logistic regressions with community fixed or random effects. The basic model to be estimated is as follows:

$$P(Dropout = 1) = \frac{\exp(X_{ij}\beta)}{1 + \exp(X_{ij}\beta)} \qquad (2)$$

Where *Dropout* =1 if the child dropped out of school between 1993 and 1997, and X_{ij} is a vector of household characteristics for household i in community j, including the death of a parent between the two periods and household consumption per capita in 1993.

Results are presented in Tables 5 and 6 for the IFLS and ENCEL. The IFLS baseline regression in model 1 indicates that the death of a father increases the likelihood of dropping out of school by 10.3 percentage points (significant at the 5% level). Because 7.5% of the entire sample drops out of school between the two periods, paternally orphaned children are more than twice as likely to drop out of school compared to a similar non-bereaved child. Maternally orphaned children, on the other hand, are no more likely to drop out of school than non-bereaved children.

The coefficients on the control variables in the IFLS analysis indicate that children in households with higher baseline consumption are less likely to drop out, as are children with more educated parents. Children from families with many siblings and older children have a higher likelihood of dropping out. All the controls for baseline parental health are insignificant, with the exception that taller mothers are associated with lower dropout rates.

Models 1 and 2 are estimated using community fixed effects (F.E.). Comparing the fixed effects specification in model 1 with the random effects (R.E.) model 3, we can confirm that the results obtained in model 1 are not attributable to unobserved community characteristics.

In models 2 and 4 we control for change in household consumption between the two periods. If the decision to drop out of school were based primarily on a bereaved family being unable to finance the schooling of their children, we would expect that the control for change in consumption would pick up much of the effect of parental death operating through a reduction in consumption. The negative estimated coefficients for change in household consumption are consistent with the expected result that children in households with worsening economic conditions are more likely to drop out of school. However, these coefficients are not significantly different from zero. The incorporation of this term for change in consumption fails to change the estimated coefficient on parental death variables. The statistical significance of paternal death is preserved, while the change in the coefficient on paternal death when controlling for consumption is not statistically significant (comparing columns 1 and 2 or 3 and 4). This result suggests that other, non-economic, factors may play an important role in keeping children enrolled in school following the death of a parent.

Models 5 and 6 of Table 5 are included in an attempt address the potential measurement error present in the consumption. We estimate instrumental variables random effects regressions using wages (measured at the community level), wages interacted with parental death, and baseline household assets as instruments for consumption. In the case of school dropout, we observe that coefficients are no longer significant, although the magnitude of the effect is similar.

Table 6 presents estimates of the effect of parental death on school dropout in Mexico. Only children between the ages of 6 and 12 enrolled in school at one point in time were included in the sub-sample. Model 1 includes all waves of the ENCEL. As the initial wave does not include a consumption module, we include measures of household assets in 1997 to control for baseline socioeconomic status. A mother's death has a large and immediate effect on dropout rates, with bereaved children more than twice as likely to dropout of school as a non-bereaved child in the period following a mother's death. Paternal death in model 1 also appears to have a significant effect on increasing the likelihood of school dropout, although this effect disappears in subsequent models.

Models 2 through 7 use the sub-sample of waves containing consumption data, and include a control for baseline consumption in 1998. Including an additional control for change in consumption in models 3 and 4 we observe that the coefficient on maternal death remains unchanged. Models 6 and 7 use income and baseline assets as instruments for baseline consumption, with no apparent effect on the estimated coefficients for maternal death.

Parental Death and School Entry

A second channel by which the death of a parent may lower investments in surviving children's education is school entry; that is, that the children of deceased parents may be less likely to start school compared to non-bereaved counterparts. For the IFLS we use a sub-sample of children ages 1 to 7 in 1993, who were not enrolled in school in 1993. 71% of bereaved children become enrolled in school during this period, while 74% of all non-bereaved children become enrolled. However, only 42% of children with a deceased mother start school between 1993 and 1997. We estimate the likelihood of starting school between 1993 and 1997 given various child, parent and household characteristics, including again the death of a parent and baseline household consumption in 1993. The models to be estimated are again fixed and random effects logistic regressions.

Paternal deaths have no effect on the probability of a child enrolling in school (Table 7). Maternal deaths, however, have a large and significant negative effect on the enrollment of bereaved children. Maternally orphaned children are 32.6 percentage points less likely to start school compared to non-bereaved and paternally-orphaned children. Given an enrollment rate of 73 percent in the sub-sample as a whole, maternally orphaned children are approximately 45% less likely to become enrolled in school. Reviewing other controls in the model we find that children in households with higher baseline consumption are more likely to start school, as are older children and children with educated and healthy mothers (as measured by BMI).

Models 2 and 4 include an additional term for change in consumption between 1993 and 1997. The estimated coefficient on this term is positive and significant, indicating that children in households with improved economic conditions are also more likely to start school. The inclusion of this additional term does not reduce the estimated coefficient on maternal, again suggesting that other factors beyond the economic consequences of the death of a parent play an important role in explaining reduced investments in education for bereaved children. Models 5 and 6 are included with instrumentation for consumption variables, and the large impact of maternal death on delayed enrollment is preserved.

The analysis for delayed school entry in Mexico is a bit more problematic given that enrollment status is known only for children ages 6 and older, and many of the children in the sample enroll in school before age 6. We estimate the effect of parental death on the probability of starting school on the subsample of 6 and 7 year olds and find a consistently negative impact of parental death on child enrollment for both mothers and fathers, although no coefficients are statistically significant (results not shown).

6. Effect of Parental Death on Children's Health

In the following sections we estimate the effect of parental death on several measures of children's health: mortality, height for age z-score, weight for age z-score, weight for height z-score, body mass index, stunting and wasting.

Parental Death and Child Mortality

Child mortality is the most extreme measurement of a severe decline in health. To estimate the relationship between parental death and child mortality using the IFLS we use the complete sample of 6185 children, 162 of who lost a parent between 1993 and 1997. There are 4 bereaved children who subsequently died during this period, making up 2.5% of all bereaved children. In comparison, only 0.6% of non-bereaved children passed away. However, all bereaved children who passed away lost a mother, such that 6% of maternally orphaned children subsequently died. According to records of dates of deaths, none of the deaths of children and mothers occurred in the same year, as would happen, for example, during an accident or contagious illness. Also, children who died while their mothers were in childbirth are not recorded as births. Thus, these effects are plausibly results of the mother's death, not due to a common health shock.

We estimate the effect of parental death on child mortality by estimating equation (2) with a discrete dependent variable for child death. Our results for Indonesia, presented in Table 8, show that paternal deaths have no effect on the mortality of surviving children. Maternal mortality, however, has a large and significant effect on child mortality, with 1.7 percentage point higher probability of death for maternally-orphaned children. Given that the child mortality rate within the sample as a whole is approximately 0.7%, maternally orphaned children are more than four times as likely to pass away compared to similar non-bereaved children. This result should be interpreted with caution, however, given the small numbers of child deaths in this sample.

Baseline household consumption has a negative but insignificant effect on child death. The inclusion of the additional control for change in household consumption in models 2 and 4 is also unimportant, and does not affect the coefficient on maternal death. A review of the other controls in the model shows that young children and particularly infants from 0 to 1 have a higher likelihood of dying.

All models include an additional term for change in parental health status. While no indicator for mother's baseline health status is important, the inclusion of a term for change in maternal ADL yields a large and significant impact, where mothers with worsening health status increase the likelihood of child death. For example, a mother with a baseline ADL of 1 in 1993 and 0 in 1997 (indicating a drastic worsening in health status) increases the probability of child mortality by 3 percentage points. On the other hand, good baseline paternal health predicts lower child mortality, but changes in paternal ADL have no effect.

The impact of parental death on child mortality in Mexico yields a similar picture as the Indonesian case. Of the complete sample of children ages 0 to 14 over the sample period, 2.3% of orphans die, compared to 0.3% of non-orphans. Regression results are presented in Table 9, with the death of a mother increasing the probability of child mortality by 1.5 percentage points. Paternal death also has a negative and significant effect on child mortality in Mexico, with 0.7 percentage point increase in the probability of child mortality for paternally orphaned children. Baseline consumption in Mexico appears to have a negative effect on child mortality, with decreased probability of child mortality in wealthier households, and change in household consumption has no effect.

Unlike Indonesia where the dates of death for each individual are available, in Mexico we have no information on the exact date of death. We therefore cannot distinguish between parental and child deaths that could have occurred simultaneously, for example in the case of an accident, with child deaths that occur following the death of a parent. The implied causal relationship between parental and child death suggested by the Indonesian results may not apply in the Mexican case. Results for the two countries taken together, however, provide convincing evidence for the negative effect of parental death on child survival.

Parental Death and Child Anthropometric Measurements

In this section we estimate the effect of parental death on a number of measurements for a child's nutritional and health status. Only the IFLS includes child anthropometric measurements.

A z-score describes a child's nutritional and health status by the number of standard deviations of the child's weight and or height from the median of a reference population of healthy children in the United States. We test the effect of parental death and disability on a child's height for age, weight for age and weight for height z-scores. A fourth measurement employed is a child's body mass index (BMI, defined as weight in kilograms divided by squared height in meters.).

Observing the same child's z-score and BMI in 1993 and again in 1997 allows us to use individual child level fixed effects, to better control for unobserved time-invariant child characteristics. All models control for changes in household consumption. We include the entire sample of children ages 0 to 10 with complete anthropometric records (results are similar with a sub-sample of children ages 0 to 5 except for lower power on parental death coefficients). Results are presented in tables 10 and 11.

Paternal death has no effect on child anthropometric measurements (coefficients are actually positive, but not significant). On the other hand, maternal death has a large and significant impact on child health, especially for measurements related to weight. Specifically, maternal deaths reduce a child's weight for age z-score by 0.7 standard deviations, weight for height z-score by 0.9 standard deviations, and BMI by 0.84 points. Using wages and assets as instruments for consumption in an attempt to address potential measurement error (models 2, 4 and 6 of Table 12 and model 2 of Table 13) does not alter the results.

Parental Death and Child Wasting

Another indicator of a child's health and nutritional status is a child's classification as "wasted", given by his or her weight for height z-score. The median baseline weight for height z-score of -0.5 in our Indonesian sub-sample indicates that these children are somewhat thinner at each height than the reference population. We take the widely used cutoff point of two standard deviations and classify a child as wasted if his or her weight for height z-score is below -2 SD. Thus, a child becomes wasted if his or her weight for height z-score was above or equal to -2 in 1993, but falls below -2 in 1997. The sub-sample used here includes all children ages five years and less with complete information for height and weight in both periods, for a total of 2176 children. According to the definitions above, there are a total of 108 children who become wasted between the two periods.

Table 12 presents the results for the estimation of the impact of parental death on child wasting. While the coefficient on paternal death is insignificant, the estimated coefficient on maternal death is large and significant, with a 14.4 percentage point increase in the probability of become wasted for maternally orphaned children. Coefficients for baseline household consumption as well as changes in economic status are insignificant. Of all parental controls, only baseline maternal BMI is negatively associated with child wasting. This result helps to confirm the results obtained in section 6.2 that maternal death has a large and significant impact on child health, at least in the short run.

Parental Death and Child Stunting

A second measurement of children's health and nutritional status is a child's height for age z-score. A child is considered stunted if he or she has a z-score more than two standard deviations below the median of this reference population. Our sample of Indonesian children, however, has a mean baseline z-score of approximately -1.6, indicating that these children are substantially shorter at each age compared to children in the reference U.S. population.

Our sub-sample for the analysis of stunting includes all children five years and less with complete information for height and weight in both periods, for a total of 2159 children. A child is counted as stunted if he or she was not stunted in 1993 (height for age z-score above -2), but became stunted by 1997 (height for age z-score below -2). There are 175 children who become stunted during this period.

Table 13 presents the results of the fixed and random effects models for child stunting. The coefficients on both mother and father death are positive but insignificant. Baseline consumption is important in this case, with children from homes with higher household consumption being less likely to become stunted. Furthermore, models 2 and 4 include the additional term for change in economic conditions which is small and insignificant. Finally children with healthy and tall parents at baseline are less likely to become stunted (as measure by maternal BMI and maternal and paternal height).

Taken as a whole, these results provide evidence that maternal death reduces a child's short-term health status as proxied by weight for age, weight for height and BMI. There is no discernable effect of parental death on child height.

7. Conclusions

It is a tragedy, but an expected one, for an adult to lose his or her parents. It is an unexpected tragedy for a child to lose a parent. The latter tragedy can have important long-term effects if it impedes efficient investments in children's education or health. At the same time a number of mechanisms may exist to help protect children. Examples range from formal life insurance and informal insurance of altruism from neighbors or relatives to self-insurance from savings and multi-generational consumption smoothing that relies on capital markets to finance efficient investments.

It is crucial to determine whether and when parental loss diminishes investments in children. As HIV/AIDS multiplies the number of orphans, policy toward them is increasingly important. Targeting orphans is appealing in part because it avoids the moral hazard problems that afflict most anti-poverty programs: we do not expect parents to commit suicide to make their children eligible for more health and education benefits. At the same time, if safety nets already in place work well, it may not be important to target aid to orphans.

The results in this analysis suggest that parental loss does, in fact, reduce children's health and education. This general result holds true in both Indonesia and rural Mexico. Paternal death in Indonesia increases the dropout rate of bereaved children. Maternal deaths, on the other hand, delay school entry and worsen several measures of a child's health and nutritional status. Although the results are less conclusive in Mexico, paternal death appears to contribute towards delayed school entry and increased child mortality. Maternal death in Mexico significantly increases on children dropping out of school, and may contribute towards delayed school entry and increased child mortality.

Importantly, in both the contexts of Indonesia and Mexico, only a minority of the disadvantages attached to losing a parent appears due to the lower consumption expenditures in households that have lost a productive member. It is likely that the other channels related to a parent's presence, ranging from role models to monitoring to assisting, play a role in increasing investments in children's health and education.

These results suggest an affirmative role for policy targeted to children who have lost one or both parents. The results also are consistent with the possibility that programs that provide emotional support, tutoring, and other services may complement scholarships and financial aid for disadvantaged orphans.

References

Ainsworth, Martha, Kathleen Beegle and Godlike Koda. 2000. "The Impact of Adult Mortality on Primary School Enrollment in Northwestern Tanzania," *UNAIDS Africa Development Forum Paper.* The World Bank, Washington, DC.

Alderman, H., and P. Gertler. 1997. "Family Resources and Gender Differences in Human Capital Investments: The Demand for Children's Medical Care in Pakistan," in L. Haddad, J. Hoddinott and H. Alderman (eds.), *Intrahousehold Resource Allocation in Developing Countries.* Baltimore, MD: The Johns Hopkins University Press.

Andrews, Gary, Adrian Esterman, Annette Braunack-Mayer, and Cam Rungie. 1986. *Aging in the Western Pacific* Manila: World Health Organization.

Astone, Nan Marie and Sara S. McLanahan. 1991. "Family Structure, Parental Practices and High School Completion," *American Sociological Review* 56:309-320.

Becker, Gary and Nigel Tomes. 1979. "An Equilibrium Theory of the Distribution of Income and Intergenerational Mobility," *Journal of Political Economy* 87(6): 1153-8.

Becker, Gary and Nigel Tomes. 1986. "Human Capital and the Rise and Fall of Families," *Journal of Labor Economics* 4(3): S1-39.

Bound J., (1991). "Self-Reported versus Objective Measures of Health in Retirment Models," Journal of Human Resources, 26, 106-38.

Bound J., M. Schoenbaum, and T. Waidman (1995). "Race and Education Differences in Disability Status and Labor Force Participation," Journal of Human Resources 30, S227-S267.

Cameron, L. A., and C. Worswick. 2001. "Education Expenditure Responses to Crop Loss in Indonesia: A Gender Bias." *Economic Development and Cultural Change* 49(2): 351-363.

Chamberlain, Gary. 1980. "Analysis of Covariance with Qualitative Data," *The Review of Economic Studies* 47(1):225-238.

Copson, Raymond W. 2002. "AIDS in Africa," *CRS Issue Brief for Congress, IB10050* Congressional Research Service, Library of Congress: Washington, D.C. Updated April 9, 2002.

Datcher-Loury, Linda. 1988. "Effects of Mother's Home Time on Children's Schooling," *The Review of Economics and Statistics* 70:367-373.

Downey, Douglas B. 1994. "The school performance of children from single-mother and single-father families" *Journal of Family Issues* 5(1):129-147.

Drèze, Jean, and Amartya Sen. 1989. *Hunger and Public Action*. Oxford England: Clarendon Press.

Frankenberg, E. and D. Thomas. "The Indonesia Family Life Survey (IFLS): Study Design and Results from Waves 1 and 2." March 2000. RAND, Santa Monica, CA. DRU-2238/1-NIA/NICHD.

Garg, Ashish and Jonathan Morduch. 1998. "Sibling Rivalry and the Gender Gap: Evidence from Child Health Outcomes in Ghana," *Journal-of-Population-Economics* 11(4):471-93.

Geertz, Hildred. 1961. *The Javanese Family: A Study of Kinship and Socialization.* New York: Free Press of Glencoe.

Geertz, Hildred. 1963. *Indonesian cultures and communities.* New Haven: HRAF Press.

Gertler, Paul, David I. Levine and Minnie Ames, “Schooling and Parental Death,” forthcoming, *Review of Economics and Statistics*, 2003.

Government of Indonesia, Ministry of Education and Culture. 1996. *Education Development in Indonesia: A Country Report.* Jakarta.

Guralnik, J., L. Branch, S. Cummings and J. Curb. 1989. “Physical Performance Measures in Aging Research,” *Journal of Gerontology* 44:141-46.

Haddad, L. and J. Hoddinott. 1994. “Women’s Income and Boy-Girl Anthropometric Status in the Côte d’Ivoire,” *World Development* 22 (4): 543-553.

Haddad, Lawrence, John Hoddinott and Harold Alderman (eds). 1997. *Intrahousehold Resource Allocation in Developing Countries.* Baltimore, MD: The Johns Hopkins University Press.

Haveman, Robert H. and Barbara L. Wolfe. 1995 "The Determinants of Children's Attainments: A Review of Methods and Findings," *Journal of Economic Literature* 33:1829-1878.

Heckman, James J., Hidehiko Ichimura and Petra E. Todd. 1997. “Matching as an Econometric Evaluation Estimator: Evidence from Evaluating a Job Training Programme,” *The Review of Economic Studies* 64(4):605-654.

Hetherington, E.M., K.A. Camara, and D.L. Featherman. 1983. "Achievement and Intellectual Functioning of Children in One-Parent Households," in J.T. Spence (ed), *Achievement and Achievement Motives: Psychological and Sociological Approaches,* San Francisco: Freeman.

Hill, Martha and Greg Duncan. 1987. “Parental Family Income and the Socioeconomic Attainment of Children,” *Social Science Research* 16:39-73.

Hunter, Susan and John Williamson. 2000. *Children on the Brink 2000: Updated Estimates and Recommendations for Intervention* Executive summary. USAID/The Synergy Project: Washington, D.C.

Jellinek, Lea 1991. *The Wheel of Fortune: The History of a Poor Community in Jakarta.* Honolulu: University of Hawaii Press.

Ju, Chen A. and Gavin Jones. 1989. *Aging in ASEAN and its Socio-economic Consequences*. Singapore: Institute of Southeast Asian Studies.

Kevane, Michael, and David I. Levine. 2002. “The Changing Status of Daughters in Indonesia,” mimeo, University of California, Berkeley CA, 2001.

Krein, Sheila F. and Andrea H. Beller. 1988. "Educational Attainment of Children From Single-Parent Families: Differences by Exposure, Gender, and Race," *Demography* 25:221-234

Leibowitz, Arleen. 1974. "Home Investments in Children," *The Journal of Political Economy* 82:S111-S131.

Levine, David and Gary Painter. 2000. "The Costs of Teenage Out-of-Wedlock Childbearing: Analysis with a Within-School Propensity Score Matching Estimator," forthcoming, *Review of Economics and Statistics.*

Lloyd, Cynthia and Ann K. Blanc. 1996. “Children’s Schooling in Sub-Saharan Africa,” *Population and Development Review* 22(2):265-298.

Manderson, L. (ed.). 1983. *Women’s Work and Women’s Roles: Economics and Everyday Life in Indonesia, Malaysia and Singapore.* Canberra, Australia: The Australian National University.

Mayer, Susan E. 1997. *What money can't buy: family income and children's life chances.* Cambridge, Mass: Harvard University Press.
McLanahan, Sara S. 1985. "Family Structure and the Reproduction of Poverty," *American Journal of Sociology* 90:873-901.
Reid, Elizabeth. 1993. "Children in Families Affected by the HIV Epidemic: A Strategic Approach," *UNDP HIV and Development Programme Issues Paper Number 13*: New York.
Strauss, John, Paul Gertler, Omar Rahman, and Kristin Fox. 1993. "Gender and Life-Cycle Differentials in the Patterns and Determinants of Adult Health," *Journal of Human Resources* 28:791-837.
Sullivan, Norma. 1994. *Masters and Managers: A Study of Gender Relations in Urban Java*. St. Leonards, NSW, Australia: Allen & Unwin.
Surbakti, Pajung. 1997. *Indonesia's National Socio-Economic Survey: A Continual Data Source for Analysis on Welfare Development.* Jakarta: Central Bureau of Statistics.
Thomas, Duncan. "Intra-Household Resource Allocation: An Inferential Approach." Journal of Human Resources; 25(4), Fall 1990: pages 635-64.
Thomas, Duncan. 1997. "Income, Expenditure and Health Outcomes: Evidence on Intrahousehold Resource Allocation," in L. Haddad, J. Hoddinott and H. Alderman (eds.) *Intrahousehold Resource Allocation in Developing Countries.* Baltimore, MD: The Johns Hopkins University Press.
Townsend, Robert. 1994. "Risk and Insurance in Village India," *Econometrica* 62(3):539-91.
Townsend, Robert. 1995. "Consumption Insurance: An Evaluation of Risk-Bearing Systems in Low-Income Economies," *Journal of Economic Perspectives* 9(3):83-102.
Ware, John E., Davies-Avery, Allyson. and Brook, Robert H. 1980. *Conceptualization and Measurement of Health for Adults in the Health Insurance Study: Volume IV, Analysis of Relationships Among Health Status Measures.* R-1987/6-HEW. Santa Monica, CA: RAND.
World Bank. 1999. *Confronting AIDS: Public Priorities in a Global Epidemic.* Revised edition. Oxford University Press: New York.

Table 1A: Headcount - Bereaved Children (IFLS)

Variable	**Bereaved Children**	**Non-Bereaved Children**
Number of children	163	6022
Number of households	99	3279
Number of deceased parents	100	0
Number of deceased fathers	67	0
Number of deceased mothers	33	0
Dropped out of school 1997-1993 (enrolled in 93)*	13 (15%)	184 (7%)
Started School (one to seven year olds in 93)**	46 (71%)	2118 (74%)
Children who died between 1993 and 1997. (No child the same year as a parent, and all bereaved children died after their parent.)	4 (2.5%)	40 (0.6%)
Stunted children (became stunted between 93 and 97)	12 (7%)	328 (5%)
Wasted children (became wasted between 93 and 97)	4 (2.5%)	108 (1.8%)

Notes: *IFLS: Sub-sample of enrolled children consists of 87 orphans and 2544 non-orphans. **IFLS: Sub-sample of not-enrolled children ages one to 7 consists of 64 orphans and 2850 non-orphans.

Table 1B: Descriptive Statistics – Bereaved and Non-Bereaved Children (IFLS)

Variable	Bereaved Children Mean (SE)	Non-Bereaved Children Mean (SE)	t-stat for difference in means
Household			
Household monthly consumption 1993 (Rupiah)	217992.1 (24291.65)	264410.2 (8539.18)	1.98†
Δ household log monthly consumption (1997 – 1993)	0.25 (0.09)	0.35 (0.01)	1.02
Per Capita monthly consumption 1993 (Rupiah)	39688.65 (4336.59)	50957.61 (1587.04)	2.63†
Δ log per capita monthly consumption (1997 – 1993)	0.51 (0.09)	0.35 (0.01)	1.74
Household size 1993	5.91 (0.23)	5.44 (0.05)	2.08†
Household size 1997	4.59 (0.17)	5.40 (0.05)	4.91†
Number of children 10 and younger -1993	1.77 (0.10)	1.88 (0.03)	1.02
Parents			
Father's age – 1993	41.40 (0.96)	37.09 (0.17)	4.46†
Mother's age – 1993	35.73 (0.92)	32.00 (0.15)	3.97†
Father's education (years)	5.17 (0.46)	6.18 (0.16)	2.20†
Mother's education (years)	4.34 (0.46)	5.15 (0.15)	1.78
Children			
Child age in 1993 (Sample is 0 to 10.)	5.98 (0.27)	5.13 (0.04)	3.17†
Education 1993 (years)	1.03 (0.11)	.80 (0.02)	2.03†
Years of education attained (1997-1993)	2.25 (0.15)	2.15 (0.03)	0.062
Height for age z-score – 1993	-1.79 (0.11)	-1.61 (0.03)	1.60
Weight for age z-score - 1993	-1.56 (0.09)	-1.50 (0.03)	0.66
Weight for height z-score - 1993	-0.56 (0.10)	-0.61 (0.03)	0.47
Δ height for age z-score (1997 – 1993)	-0.06 (0.09)	-0.17 (0.03)	1.27
Δ Weight for age z-score (1997 – 1993)	-0.04 (0.14)	-0.04 (0.03)	0.03
Δ Weight for height z-score (1997 – 1993)	0.23 (0.20)	0.12 (0.03)	0.51

Notes: Standard errors in parenthesis (adjusted for community level clustering). † different at 5% level. 1997 consumption deflated with CPI, base year 1993.

Table 2: Descriptive Statistics – Bereaved and Non-Bereaved Children (ENCEL)

Variable	Bereaved Children Mean	Non-Bereaved Children Mean	t-stat for difference in means
Household			
Household monthly consumption 1998 (Pesos)	599.006 (39.404)	688.071 (11.427)	2.22†
Δ household log monthly consumption (Pesos – log)	-0.028 (0.025)	0.023 (0.004)	2.00†
Per Capita monthly consumption 1998 (Pesos)	114.846 (7.478)	118.841 (2.094)	0.53
Δ log per capita monthly consumption	0.060 (0.025)	0.023 (0.004)	1.48
Household size 1998	5.781 (0.304)	6.344 (0.036)	1.85
Number of children 10 and younger	2.703 (0.201)	2.514 (0.027)	0.93
Parents			
Father's age – 1998	39.344 (0.623)	35.928 (0.124)	5.54†
Mother's age – 1998	34.813 (0.544)	32.020 (0.102)	5.14†
Father's education (years)	3.149 (0.193)	3.985 (0.070)	5.59†
Mother's education (years)	2.876 (0.184)	3.735 (0.068)	5.00†
Children			
Female	0.506 (0.020)	0.504 (0.002)	0.12
Child age at baseline (Sample is 0 to 14.)	6.748 (0.139)	6.306 (0.035)	3.18†
Education (years), children 6 and older	4.441 (0.104)	4.814 (0.037)	3.64†
Child Dropouts	0.209 (0.026)	0.148 (0.005)	2.35†
Child Enrollments – Start school (children 6 and 7)	0.250 (0.044)	0.126 (0.006)	2.84†
Child Death	0.023 (0.009)	0.003 (0.0003)	2.13†

Notes: Standard errors in parenthesis (adjusted for community level clustering). † different at 5% level. Consumption deflated with CPI, base year 1997.

Table 3: Effect of Prime Aged Adult Death on Household Consumption (IFLS)

Dependent variable is change in (log) monthly household consumption per person (1997-1993)

	Model 1	Model 2	Model 3
Death of prime aged adult	**-0.102***	0.062	0.065
	(0.048)	(0.075)	(0.099)
Death of prime aged adult male (interaction)		**-0.271****	**-0.252***
		(0.095)	(0.127)
Death of prime aged adult male with no activity limitations (1993 intermediate ADL = 1)			-0.040
			(0.115)
Death of prime aged adult female with no activity limitations (1993 intermediate ADL = 1)			-0.005
			(0.143)
Head's age (1993)	-0.022**	-0.021**	-0.021**
	(0.006)	(0.006)	(0.006)
Spouse's age (1993)	0.008	0.008	0.008
	(0.006)	(0.006)	(0.006)
Head's age squared (1993)	0.0002**	0.0002**	0.0002**
	(0.00001)	(0.00001)	(0.00001)
Spouse's age squared (1993)	-0.00007	-0.00007	-0.00007
	(0.00006)	(0.00006)	(0.00006)
Head's education - primary school (1993)	-0.018	-0.017	-0.017
	(0.031)	(0.031)	(0.031)
Head's education - jr. high (1993)	-0.008	-0.008	-0.008
	(0.042)	(0.042)	(0.042)
Head's education - high school (1993)	-0.022	-0.022	-0.022
	(0.044)	(0.044)	(0.044)
Head's education - college (1993)	0.004	0.004	0.004
	(0.049)	(0.049)	(0.049)
Spouse's education - primary school (1993)	-0.050+	-0.050+	-0.050+
	(0.027)	(0.027)	(0.027)
Spouse's education - jr. high (1993)	-0.019	-0.020	-0.020
	(0.042)	(0.042)	(0.042)
Spouse's education - high school (1993)	0.047	0.047	0.047
	(0.047)	(0.046)	(0.046)
Spouse's education - college (1993)	-0.005	-0.007	-0.007
	(0.055)	(0.055)	(0.055)
Δ in number of (log) household members (1997-1993)	-0.610**	-0.606**	-0.607**
	(0.035)	(0.035)	(0.035)
Constant	0.751**	0.740**	0.740**
	(0.112)	(0.112)	(0.112)
Observations	5008	5008	5008
Number of Community ID (1993 wave)	311	311	311
R-squared	0.09	0.09	0.09
Number of deceased individuals	213		
Number of deceased prime age males		128	
Number of deceased prime age females		85	
Number of deceased prime age males with no activity limitations (ADL =1)			65
Number of deceased prime age females with no activity limitations (ADL = 1)			37

Notes: Standard errors in parenthesis (+ significant at 10%; * significant at 5%; ** significant at 1%). Sample excludes top 1% of changes in (log) consumption. Omitted category for education is no schooling. Coefficients for change in household age-gender composition not reported (8 categories). All coefficients estimated with community fixed effects.

Table 4: Effect of Prime Aged Adult Death on Household Consumption (ENCEL)

Dependent variable is change in (log) monthly household consumption per person

	Model 1	Model 2
Death of prime aged adult – 1 to 6 months from death	-0.012	-0.026
	(0.032)	(0.052)
Death of prime aged adult - 7 to 12 months from death	**-0.077***	-0.073
	(0.032)	(0.051)
Death of prime aged adult - 13 to 18 months from death	0.029	0.015
	(0.040)	(0.063)
Death of prime aged adult - 19 to 24 months from death	0.000	0.103
	(0.060)	(0.087)
Death of prime aged adult - 24 to 31 months from death	0.036	0.010
	(0.054)	(0.086)
Death of prime aged adult male (interaction) - 1 to 6 months from death		0.023
		(0.066)
Death of prime aged adult male (interaction) - 7 to 12 months from death		-0.008
		(0.065)
Death of prime aged adult male (interaction) - 13 to 18 months from death		0.023
		(0.081)
Death of prime aged adult male (interaction) - 19 to 24 months from death		-0.191
		(0.119)
Death of prime aged adult male (interaction) - 24 to 31 months from death		0.043
		(0.110)
Observations	64068	64068
Number of group(state muni local)	506	506
R-squared	0.07	0.07
Number of deceased individuals	341	
Number of deceased prime age males		204
Number of deceased prime age females		137

Notes: Standard errors in parenthesis (+ significant at 10%; * significant at 5%; ** significant at 1%). Sample excludes top 0.5 % of changes in (log) consumption. Omitted category for education is no schooling. Coefficients not reported for following control variables: head and spouse age and age squared, head and spouse educational categories (8 categories), household age-gender composition changes (8 categories), change in number of (log) household members, wave dummies for November 1999 and November 2000, dummy variables for missing for parental age, education and demographic controls, and constant. Dependent variable (change in log per capita consumption) includes changes in per capita consumption between October 1998 and May 1999, May 1999 and November 1999 and November 1999 and November 2000. All coefficients estimated with community fixed effects.

Table 5: Parental Death and School Dropout (IFLS)
Dependent variable: child dropped out of school between 1993 and 1997 = 1

	Model 1 F.E.	**Model 2 F.E.**	**Model 3 R.E.**	**Model 4 R.E.**	**Model 5 R.E.-IV**	**Model 6 R.E.-IV**
Father deceased between 1993 and 1997	1.454*	1.465*	1.222*	1.243*	1.104	1.044
marginal effect dy/dx	***0.103***	***0.104***	***0.087***	***0.088***	*0.078*	*0.074*
	(0.621)	(0.620)	(0.512)	(0.510)	(0.699)	(0.784)
Mother deceased between 1993 and 1997	-0.177	-0.231	0.036	-0.016	0.068	0.049
marginal effect dy/dx	*-0.013*	*-0.016*	*0.003*	*-0.001*	*0.005*	*0.003*
	(0.779)	(0.788)	(0.727)	(0.737)	(4.790)	(4.686)
Father Δ ADL (ADL 97 - ADL 93)	-0.541	-0.554	-1.635	-1.645	-1.894	-2.116
marginal effect dy/dx	*-0.038*	*-0.039*	*-0.116*	*-0.117*	*-0.134*	*-0.150*
	(1.544)	(1.544)	(1.343)	(1.330)	(1.705)	(1.743)
Mother Δ ADL (ADL 97 - ADL 93)	1.312	1.340	-0.289	-0.264	-0.308	-1.019
marginal effect dy/dx	*0.093*	*0.095*	*-0.020*	*-0.019*	*-0.022*	*-0.072*
	(1.829)	(1.841)	(1.498)	(1.500)	(1.503)	(1.569)
1993 consumption per capita (log)	-0.194	-0.277	-0.314*	-0.443*		
marginal effect dy/dx	*-0.014*	*-0.020*	***-0.022***	***-0.031***		
	(0.183)	(0.222)	(0.155)	(0.182)		
Δ log monthly per capita consumption (1997-1993)		-0.122		-0.217		
marginal effect dy/dx		*-0.009*		*-0.015*		
		(0.183)		(0.160)		
1993 Consumption (log) – predicted					-1.554*	-1.723*
marginal effect dy/dx					***-0.110***	***-0.122***
					(0.791)	(0.812)
Δ consumption – predicted						1.784+
marginal effect dy/dx						***0.126***
						(0.955)
Number of household members in 1993 (log)	-0.213	-0.203	-0.417	-0.415	-0.927+	-1.488*
	(0.445)	(0.444)	(0.384)	(0.383)	(0.545)	(0.599)
Number of children 10 and younger in 1993 (log)	0.665+	0.638+	0.827*	0.786*	0.544	0.632
	(0.367)	(0.369)	(0.323)	(0.323)	(0.460)	(0.483)
female child =1	-0.012	-0.006	-0.010	-0.004	-0.009	-0.129
	(0.196)	(0.196)	(0.180)	(0.180)	(0.240)	(0.243)
Child age = 7 (1993)	0.467	0.500	0.612	0.651	0.643	0.483
	(0.701)	(0.704)	(0.698)	(0.700)	(3.413)	(3.167)
Child age = 8 (1993)	1.689**	1.703**	1.832**	1.851**	1.895	1.801
	(0.645)	(0.646)	(0.648)	(0.649)	(3.333)	(3.079)
Child age = 9 (1993)	2.294**	2.324**	2.572**	2.614**	2.631	2.536
	(0.632)	(0.635)	(0.636)	(0.638)	(3.366)	(0.639)
Child age = 10 (1993)	3.120**	3.151**	3.147**	3.185**	3.237	3.144
	(0.635)	(0.639)	(0.636)	(0.638)	(3.351)	(3.096)
Father's education in years (1993)	-0.210**	-0.207**	-0.222**	-0.217**	-0.186**	-0.187**
	(0.044)	(0.045)	(0.038)	(0.038)	(0.062)	(.061)
Mother's education in years (1993)	-0.179**	-0.176**	-0.169**	-0.166**	-0.124**	-0.117*

	(0.050)	(0.051)	(0.043)	(0.043)	(0.058)	(0.058)
Father ADL (1993)	-1.025	-1.123	-1.632	-1.701	-1.538	-1.184
	(1.913)	(1.916)	(1.674)	(1.663)	(2.584)	(2.666)
Mother ADL (1993)	3.702	3.776	1.636	1.700	1.963	1.712
	(2.298)	(2.316)	(1.893)	(1.901)	(1.752)	(1.862)
Father BMI (1993)	-0.055	-0.053	-0.026	-0.023	0.005	0.011
	(0.051)	(0.051)	(0.042)	(0.042)	(0.051)	(0.052)
Mother BMI (1993)	-0.036	-0.035	-0.010	-0.008	0.012	0.012
	(0.035)	(0.035)	(0.030)	(0.030)	(0.036)	(0.036)
Father height 1993 (log)	-0.650	-0.577	-0.972	-0.812	0.471	0.447
	(3.127)	(3.128)	(2.629)	(2.642)	(2.988)	(2.967)
Mother height 1993 (log)	-7.339*	-7.406*	-4.478+	-4.439+	-3.265	-2.304
	(3.097)	(3.106)	(2.665)	(2.665)	(3.713)	(3.821)
Constant			27.460	27.729	26.155	23.299
			(18.093)	(18.119)	(18.341)	(18.398)
Observations	1109	1109	2581	2581	2581	2581
Number of Community ID (1993 wave)	99	99	305	305	305	305
Number of dropouts	198	198	198	198	198	198
Number of children with deceased father 1997-1993	49	49	56	56	56	56
Number of children with deceased mother 1997-1993	29	29	29	29	29	29

Notes: Standard errors in parentheses (+ significant at 10%; * significant at 5%; ** significant at 1%). Sub-sample includes all children enrolled in school in 1993. Excluded child age category is child age = 6. Marginal effect dy/dx = B*(p)*(1-p), where B= estimated coefficient, p= probability outcome variable is 1. Coefficients on dummy variables for observations with missing parental health indicators not reported. Models 1 and 2 are fixed effects (F.E.) logistic regressions with community fixed effects. Models 3 and 4 are random effects (R.E.) logistic regressions. Models 5 and 6 additionally include instrumentation for the per capita consumption variables, using imputed wages, wages interacted with death, and assets as instruments for consumption. Standard errors in models 5 and 6 were found by bootstrapping 100 iterations (seed 280503 for replication).

Table 6: Parental Death and School Dropout (ENCEL)

Dependent variable: child dropped out of school between periods = 1

	Model 1 Full Sample R.E.	Model 2 F.E.	Model 3 F.E.	Model 4 R.E.	Model 5 R.E.	Model 6 R.E.-IV	Model 7 R.E.-IV
Father deceased period 1	0.664*	-0.266	-0.265	-0.084	-0.078	0.006	-0.014
marginal effect dy/dx	***0.016***	*-0.006*	*-0.006*	*-0.002*	*-0.002*	*0.0001*	*-0.0003*
	(0.290)	(0.603)	(0.603)	(0.600)	(0.600)	(0.603)	(0.605)
Mother deceased period 1	1.391**	1.158+	1.164+	1.208+	1.213+	1.194+	1.205+
marginal effect dy/dx	***0.033***	***0.028***	***0.028***	***0.029***	***0.029***	***0.029***	***0.029***
	(0.422)	(0.644)	(0.643)	(0.638)	(0.638)	(0.645)	(0.645)
Father deceased period 2	-0.405	0.200	0.193	0.163	0.154	0.191	0.175
marginal effect dy/dx	*-0.010*	*0.005*	*0.005*	*0.004*	*0.004*	*0.005*	*0.004*
	(0.595)	(0.750)	(0.749)	(0.745)	(0.745)	(0.748)	(0.748)
Father deceased period 3	-1.011						
marginal effect dy/dx	*-0.024*						
	(1.015)						
Father deceased period 4	0.622						
marginal effect dy/dx	*0.015*						
	(0.541)						
Father deceased period 5	1.368*						
marginal effect dy/dx	***0.033***						
	(0.566)						
consumption per capita (log) basline 98°		0.017	-0.016	0.093	0.061		
marginal effect dy/dx		*0.0004*	*-0.0004*	*0.002*	*0.001*		
		(0.077)	(0.080)	(0.071)	(0.073)		
Δ log monthly consumption per capita			-0.099		-0.109+		
marginal effect dy/dx			*-0.002*		***-0.003***		
			(0.063)		(0.063)		
Consumption (log) – predicted						0.599	0.587
marginal effect dy/dx						*0.014*	*0.014*
						(0.555)	(0.555)
Δ consumption – predicted							0.330
marginal effect dy/dx							*0.008*
							(0.769)
Observations	81314	34751	34751	47908	47908	46802	46802
Number of group(state muni local)	505	310	310	505	505	505	505
Waves of ENCEL	5	3	3	3	3	3	3
Number of dropouts	1758	863	863	863	863	863	863
Number of children with deceased fathers	302	128	128	157	157	157	157
Number of children with deceased mothers	95	42	42	45	45	45	45

Notes: Standard errors in parentheses (+ significant at 10%; * significant at 5%; ** significant at 1%). Sample includes all children ages 6 to 12. Marginal effect dy/dx = B*(p)*(1-p), where B= estimated coefficient, p= probability outcome variable is 1. Models 1 and 4 through 7 are random effects (R.E.) logistic regressions. Models 2 and 3 are fixed effects (F.E.) logistic regressions with community level effects. All models include controls for: number of household members, number of children 10 and younger, child gender, child age categories, parental education, parental age, and wave dummies. Model 1 includes all 5 waves of the ENCEL (October 98 through November 00) plus additional controls for baseline assets in 1997: home ownership, number of hectares of land, electricity, dirt floor and bathroom. Models 6 and 7 additionally include instrumentation for the per capita consumption variables, using income and baseline assets (farm animals, land ownership, existence of bathroom, water and dirt floors) as instruments for consumption.

Table 7: Parental Death and School Entry (IFLS)
Dependent variable: child started school between 1993 and 1997 = 1

	Model 1 F.E.	Model 2 F.E.	Model 3 R.E.	Model 4 R.E.	Model 5 R.E.-IV	Model 6 R.E.-IV
Father deceased between 1993 and 1997	0.837	0.832	0.938	0.902	0.828	0.954
marginal effect dy/dx	*0.163*	*0.162*	*0.183*	*0.176*	*0.162*	*0.186*
	(0.730)	(0.726)	(0.658)	(0.660)	(0.832)	(0.848)
Mother deceased between 1993 and 1997	-1.150	-1.173	-1.681*	-1.656*	-1.588*	-1.691*
marginal effect dy/dx	*-0.224*	*-0.229*	***-0.328***	***-0.323***	***-0.310***	***-0.330***
	(0.718)	(0.722)	(0.668)	(0.667)	(0.788)	(0.802)
Father Δ ADL (ADL 97 - ADL 93)	0.117	0.045	0.725	0.701	0.700	0.059
marginal effect dy/dx	*0.023*	*0.009*	*0.142*	*0.137*	*0.137*	*0.012*
	(1.760)	(1.768)	(1.510)	(1.523)	(1.944)	(2.097)
Mother Δ ADL (ADL 97 - ADL 93)	-0.349	-0.398	-0.176	-0.114	-0.211	-0.321
marginal effect dy/dx	*-0.068*	*-0.078*	*-0.034*	*-0.022*	*-0.041*	*-0.063*
	(1.315)	(1.312)	(1.151)	(1.155)	(1.159)	(1.199)
1993 consumption per capita (log)	0.339*	0.527**	0.389**	0.569**		
marginal effect dy/dx	***0.066***	***0.103***	***0.076***	***0.111***		
	(0.137)	(0.163)	(0.113)	(0.129)		
Δ log monthly per capita consumption (1997-1993)		0.302*		0.334*		
marginal effect dy/dx		***0.059***		***0.065***		
		(0.137)		(0.115)		
1993 Consumption (log) – predicted					0.650	0.556
marginal effect dy/dx					*0.127*	*0.109*
					(0.415)	(0.414)
Δ consumption – predicted						1.486+
marginal effect dy/dx						***0.290***
						(0.873)
Observations	2667	2667	2896	2896	2896	2896
Number of Community ID (1993 wave)	258	258	309	309	309	309
Number of children who start school	2126	2126	2126	2126	2126	2126
Number of children with deceased father 1997-1993	44	44	44	44	44	44
Number of children with deceased mother 1997-1993	19	19	19	19	19	19

Notes: Standard errors in parentheses (+ significant at 10%; * significant at 5%; ** significant at 1%). Sub-sample includes all children not enrolled in school in 1993 between the ages of 1 and 7. Enrollment found by comparing enrollment status in 1993 and 1997. Excluded child age category is child age = 1. All models include controls reported in table 5: number of household members, number of children 10 and younger, child gender, child age categories, parental education and parental health indicators. Models 1 and 2 are fixed effects (F.E.) logistic regressions with community fixed effects. Models 3 and 4 are random effects (R.E.) logistic regressions. Models 5 and 6 additionally include instrumentation for the per capita consumption variables, using imputed wages, wages interacted with death, and assets as instruments for consumption. Standard errors in models 5 and 6 were found by bootstrapping 100 iterations (seed 280503 for replication).

Table 8: Parental Death and Child Mortality (IFLS)
Dependent variable is child deceased between 1993 and 1997

	Model 1 F.E.	Model 2 F.E.	Model 3 R.E.	Model 4 R.E.	Model 5 R.E.-IV	Model 6 R.E.-IV
Father deceased between 1993 and 1997	-0.098	-0.140	-0.014	-0.035	-0.004	-0.001
marginal effect dy/dx	*-0.001*	*-0.001*	*-0.0001*	*-0.0002*	*-0.00003*	*-0.00001*
	(1.299)	(1.319)	(1.128)	(1.134)	(18.023)	(17.982)
Mother deceased between 1993 and 1997	2.114*	2.236*	2.594**	2.587**	2.599	2.606
marginal effect dy/dx	***0.015***	***0.015***	***0.018***	***0.018***	*0.018*	*0.018*
	(0.850)	(0.894)	(0.642)	(0.648)	(5.741)	(6.478)
Father Δ ADL (ADL 97 - ADL 93)	2.422	2.254	1.795	1.769	1.365	1.416
marginal effect dy/dx	*0.017*	*0.016*	*0.012*	*0.012*	*0.009*	*0.010*
	(5.013)	(4.953)	(3.844)	(3.822)	(4.888)	(4.848)
Mother Δ ADL (ADL 97 - ADL 93)	-4.368*	-4.832*	-4.948**	-4.941**	-5.022**	-4.982**
marginal effect dy/dx	***-0.030***	***-0.033***	***-0.034***	***-0.034***	***-0.035***	***-0.034***
	(2.168)	(2.193)	(1.563)	(1.558)	(1.722)	(1.676)
1993 consumption per capita (log)	-0.475	-0.058	-0.437+	-0.321		
marginal effect dy/dx	*-0.003*	*-0.0004*	***-0.003***	*-0.002*		
	(0.327)	(0.401)	(0.258)	(0.300)		
Δ log monthly per capita consumption (1997-1993)		0.616+		0.206		
marginal effect dy/dx		***0.004***		*0.001*		
		(0.349)		(0.273)		
1993 Consumption (log) – predicted					-1.591	-1.571
marginal effect dy/dx					*-0.011*	*-0.011*
					(1.001)	(1.035)
Δ consumption – predicted						-0.169
marginal effect dy/dx						*-0.001*
						(1.127)
Observations	1042	1042	6177	6177	6177	6177
Number of Community ID (1993 wave)	34	34	312	312	312	312
Number of deceased children	43	43	43	43	43	43
Number of children with deceased father	22	22	112	112	112	112
Number of children with deceased Mother	19	19	53	53	53	53

Notes: Standard errors in parentheses (+ significant at 10%; * significant at 5%; ** significant at 1%). Sample includes all children between ages of 0 and 10. Excluded child age category is child age = 10. All models include controls reported in table 5: number of household members, number of children 10 and younger, child gender, child age categories, parental education and parental health indicators. Models 1 and 2 are fixed effects (F.E.) logistic regressions with community fixed effects. Models 3 and 4 are random effects (R.E.) logistic regressions. Models 5 and 6 additionally include instrumentation for the per capita consumption variables, using imputed wages, wages interacted with death, and assets as instruments for consumption. Standard errors in models 5 and 6 were found by bootstrapping 100 iterations (seed 280503 for replication).

Table 9: Parental Death and Child Mortality (ENCEL)

Dependent variable is child deceased between two periods

	Model 1 Full Sample R.E.	**Model 2 F.E.**	**Model 3 F.E.**	**Model 4 R.E.**	**Model 5 R.E.**	**Model 6 R.E.-IV**	**Model 7 R.E.-IV**
Father deceased period 1	1.811**	0.757	0.768	1.529*	1.536*	1.197+	0.946
marginal effect dy/dx	***0.005***	*0.003*	*0.003*	***0.007***	***0.007***	***0.005***	*0.004*
	(0.446)	(0.893)	(0.895)	(0.699)	(0.699)	(0.717)	(0.731)
Mother deceased period 1	2.986**	4.383**	4.383**	3.485**	3.485**	3.504**	3.619**
marginal effect dy/dx	***0.009***	***0.019***	***0.019***	***0.015***	***0.015***	***0.015***	***0.016***
	(0.464)	(1.025)	(1.024)	(0.726)	(0.726)	(0.723)	(0.726)
Father deceased period 3	1.415	2.501*	2.515*	2.686*	2.683*	2.358*	2.790*
marginal effect dy/dx	*0.004*	***0.011***	***0.011***	***0.012***	***0.012***	***0.010***	***0.012***
	(1.036)	(1.137)	(1.137)	(1.110)	(1.109)	(1.126)	(1.160)
consumption per capita (log) basline 98°		-0.330	-0.355	-0.403*	-0.427*		
marginal effect dy/dx		*-0.001*	*-0.002*	***-0.002***	***-0.002***		
		(0.216)	(0.228)	(0.185)	(0.194)		
Δ log monthly consumption per capita			-0.063		-0.071		
marginal effect dy/dx			*-0.0003*		*-0.0003*		
			(0.183)		(0.180)		
Consumption (log) – predicted						-3.638*	-3.767*
marginal effect dy/dx						***-0.016***	***-0.016***
						(1.633)	(1.644)
Δ consumption – predicted							3.783+
marginal effect dy/dx							***0.016***
							(2.285)
Observations	181871	23382	23382	100552	100552	98109	98109
Number of group(state muni local)	505	70	70	505	505	505	505
Waves of ENCEL	5	3	3	3	3	3	3
Number of deceased children	195	102	102	102	102	102	102
Number of children with deceased fathers	504	69	69	265	265	265	265
Number of children with deceased mothers	165	16	16	80	80	80	80

Notes: Standard errors in parentheses (+ significant at 10%; * significant at 5%; ** significant at 1%). Sample includes all children ages 0 to 14. Marginal effect dy/dx = B*(p)*(1-p), where B= estimated coefficient, p= probability outcome variable is 1. Models 1 and 4 through 7 are random effects (R.E.) logistic regressions. Models 2 and 3 are fixed effects (F.E.) logistic regressions with community level effects. All models include controls for: number of household members, number of children 10 and younger, child gender, child age categories, parental education, parental age, and wave dummies. Model 1 includes all 5 waves of the ENCEL (October 98 through November 00) plus additional controls for baseline assets in 1997: home ownership, number of hectares of land, electricity, dirt floor and bathroom. Models 6 and 7 additionally include instrumentation for the per capita consumption variables, using income and baseline assets (farm animals, land ownership, existence of bathroom, water and dirt floors) as instruments for consumption.

Table 10: Parental Death and Child Anthropometric Measurements (z-scores) (IFLS)

Dependent variable is child z-score

	Model 1 Height for Age z-score	**Model 2 Height for Age z-score - IV**	**Model 3 Weight for Age z-score**	**Model 4 Weight for Age z-score - IV**	**Model 5 Weight for Height z-score**	**Model 6 Weight for Height z-score - IV**
Father deceased by 1997 = 1	0.208	0.251	0.217	0.303	0.257	0.311
	(0.153)	(0.160)	(0.201)	(0.210)	(0.216)	(0.228)
Mother deceased by 1997 = 1	-0.025	-0.047	**-0.707+**	**-0.703+**	**-0.913***	**-0.942***
	(0.241)	(0.244)	(0.415)	(0.417)	(0.447)	(0.453)
Household consumption (log)	-0.037	0.141	-0.052	0.075	0.006	0.324
	(0.030)	(0.205)	(0.038)	(0.267)	(0.041)	(0.290)
Number of household members (log)	-0.090	-0.057	-0.083	-0.111	-0.099	0.035
	(0.087)	(0.168)	(0.113)	(0.219)	(0.121)	(0.237)
Number of children 10 and younger (log)	-0.167**	-0.144*	-0.325**	-0.278**	-0.333**	-0.253*
	(0.061)	(0.063)	(0.097)	(0.104)	(0.104)	(0.113)
Father's ADL	-0.104	-0.104	0.438	0.432	0.757**	0.735*
	(0.209)	(0.214)	(0.272)	(0.276)	(0.293)	(0.299)
Mother's ADL	-0.280	-0.320+	-0.348	-0.374	-0.301	-0.391
	(0.174)	(0.177)	(0.219)	(0.227)	(0.236)	(0.247)
Year dummy 1997 =1	-0.228**	-0.282**	-0.090*	-0.126	0.056	-0.042
	(0.031)	(0.078)	(0.035)	(0.104)	(0.038)	(0.113)
Constant	-0.446	-2.419	-0.449	-1.842	-0.632	-4.149
	(0.450)	(2.341)	(0.577)	(3.033)	(0.621)	(3.297)
Number of Child Fixed Effects	5989	5960	5320	5294	5320	5294
Observations	10375	10261	7856	7784	7858	7786
R-squared	0.02		0.01		0.02	5294
Number of children with deceased father	99	99	53	53	53	53
Number of children with deceased Mother	37	37	13	13	13	13

Notes: Standard errors in parentheses (+ significant at 10%; * significant at 5%; ** significant at 1%). Sample includes all children between ages of 0 and 10. Coefficients on dummy variables for observations with missing parental ADL not reported. All models are linear regressions with child fixed effects. Models 2, 4 and 6 additionally include instrumentation for the per capita consumption variables, using imputed wages, wages interacted with death, and assets as instruments for consumption.

Table 11: Parental Death and Child BMI (IFLS)
Dependent variable is child BMI

	Model 1 **Body Mass Index**	**Model2** **Body Mass Index - IV**
Father deceased by 1997 = 1	0.319	0.295
	(0.308)	(0.319)
Mother deceased by 1997 = 1	**-0.843+**	**-0.856+**
	(0.494)	(0.499)
Household consumption (log)	0.028	0.184
	(0.060)	(0.427)
Number of household members (log)	-0.353*	0.041
	(0.173)	(0.320)
Number of children 10 and younger (log)	-2.425**	-2.604**
	(0.122)	(0.133)
Father's ADL	-0.161	-0.087
	(0.432)	(0.448)
Mother's ADL	-0.434	-0.554
	(0.350)	(0.361)
Year dummy 1997 =1	-0.170**	-0.304+
	(0.062)	(0.157)
Constant	18.820**	16.811**
	(0.900)	(4.800)
Number of Child Fixed Effects	6177	6171
Observations	11726	11609
R-squared	0.12	
Number of children with deceased father	99	99
Number of children with deceased Mother	37	37

Notes: Standard errors in parentheses (+ significant at 10%; * significant at 5%; ** significant at 1%). Sample includes all children between ages of 0 and 10. Coefficients on dummy variables for observations with missing parental ADL not reported. All models are linear regressions with child fixed effects. Model 2 additionally includes instrumentation for the per capita consumption variables, using imputed wages, wages interacted with death, and assets as instruments for consumption.

Table 12: Parental Death and Child Wasting (IFLS)
Dependent variable – child became wasted between 1993 and 1997 =1
(weight for height z-score 93 >= -2 & weight for height z-score 97 < -2)

	Model 1 F.E.	**Model 2 F.E.**	**Model 3 R.E.**	**Model 4 R.E.**
Father deceased between 1993 and 1997	-0.240	-0.209	-0.384	-0.355
marginal effect dy/dx	*-0.011*	*-0.010*	*-0.018*	*-0.016*
	(1.087)	(1.092)	(1.054)	(1.055)
Mother deceased between 1993 and 1997	3.098*	3.111*	2.961**	2.972**
marginal effect dy/dx	***0.144***	***0.144***	***0.138***	***0.138***
	(1.234)	(1.237)	(0.911)	(0.910)
Father Δ ADL (ADL 97 - ADL 93)	-1.363	-1.328	-2.161	-2.149
marginal effect dy/dx	*-0.063*	*-0.062*	*-0.100*	*-0.100*
	(1.830)	(1.834)	(1.777)	(1.782)
Mother Δ ADL (ADL 97 - ADL 93)	0.418	0.407	-0.273	-0.247
	0.019	*0.019*	*-0.013*	*-0.011*
	(2.427)	(2.425)	(1.865)	(1.866)
1993 consumption per capita (log)	0.228	0.163	0.151	0.077
marginal effect dy/dx	*0.011*	*0.008*	*0.007*	*0.004*
	(0.208)	(0.243)	(0.176)	(0.205)
Δ log monthly per capita consumption (1997-1993)		-0.114		-0.136
marginal effect dy/dx		*-0.005*		*-0.006*
		(0.218)		(0.192)
Observations	753	753	2171	2171
Number of Community ID (1993 wave)	80	80	299	299
Number of wasted children	106	106	106	106
Number of children with deceased father	11	11	33	33
Number of children with deceased Mother	7	7	9	9

Notes: Standard errors in parentheses (+ significant at 10%; * significant at 5%; ** significant at 1%). Sample includes all children between ages of 0 and 5 with non-missing weight for height z-score. Excluded child age category is child age = 0. All models include controls reported in table 5: number of household members, number of children 10 and younger, child gender, child age categories, parental education and parental health indicators. Models 1 and 2 are fixed effects (F.E.) logistic regressions with community fixed effects. Models 3 and 4 are random effects (R.E.) logistic regressions.

Table 13: Parental Death and Child Stunting (IFLS)
Dependent variable = child became stunted between 1993 and 1997
(that is, height for age z-score 93 >= -2 & height for age z-score 97 < -2)

	Model 1 F.E.	**Model 2 F.E.**	**Model 3 R.E.**	**Model 4 R.E.**
Father deceased between 1993 and 1997	0.762	0.745	0.586	0.579
marginal effect dy/dx	*0.108*	*0.106*	*0.083*	*0.082*
	(0.547)	(0.549)	(0.448)	(0.449)
Mother deceased between 1993 and 1997	-1.191	-1.176	-1.172	-1.174
marginal effect dy/dx	*-0.169*	*-0.167*	*-0.166*	*-0.167*
	(1.126)	(1.125)	(1.106)	(1.106)
Father Δ ADL (ADL 97 - ADL 93)	-0.601	-0.613	-0.334	-0.343
marginal effect dy/dx	*-0.085*	*-0.087*	*-0.047*	*-0.049*
	(1.436)	(1.433)	(1.286)	(1.285)
Mother Δ ADL (ADL 97 - ADL 93)	-1.411	-1.401	-1.172	-1.174
marginal effect dy/dx	*-0.200*	*-0.199*	*-0.166*	*-0.167*
	(1.203)	(1.205)	(0.968)	(0.968)
1993 consumption per capita (log)	-0.240+	-0.206	-0.301**	-0.287*
marginal effect dy/dx	***-0.034***	*-0.029*	***-0.043***	***-0.041***
	(0.129)	(0.150)	(0.098)	(0.112)
Δ log monthly per capita consumption (1997-1993)		0.056		0.025
marginal effect dy/dx		*0.008*		*0.004*
		(0.127)		(0.103)
Observations	1605	1605	2156	2156
Number of Community ID (1993 wave)	182	182	299	299
Number of stunted children	175	175	175	175
Number of children with deceased father	22	22	33	33
Number of children with deceased Mother	7	7	9	9

Notes: Standard errors in parentheses (+ significant at 10%; * significant at 5%; ** significant at 1%). Sample includes all children between ages of 0 and 5 with non-missing height for age z-score. Excluded child age category is child age = 0. All models include controls reported in table 5: number of household members, number of children 10 and younger, child gender, child age categories, parental education and parental health indicators.. Models 1 and 2 are fixed effects (F.E.) logistic regressions with community fixed effects. Models 3 and 4 are random effects (R.E.) logistic regressions.