Preliminary Version

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

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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 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 reduce the negative effect of parental death on children's health and educational status. Our results suggest that bereaved households may be able to insure investments in children's human capital against the purely economic impact of parental loss, but are unable to insure these investments against behavioral factors related to the presence of a parent in the household. These results highlight the need for emotional based support for orphans to go hand in hand with monetary aid.*

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1. Introduction

The death of a parent early in a child's 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 the 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.

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 (ENCASEH and ENCEL) to analyze the effects of parental death and disability on investments in health and education of surviving offspring. Indicators of health and educational investments include dropping out of school, enrolling in school, child mortality, and a child's medium and long term health status given by height and weight.

We find that the loss of a mother consistently predicts lower human capital accumulation across a majority of the human capital measurements employed, while the loss of a father causes a reduction in education for older children. Results from Indonesia indicate that the death of a father doubles the dropout rate, while the loss of a mother lowers the probability of school enrollment, increases the probability of child death, and increases the probability of being malnourished. Results from Mexico show a higher probability of school dropout and child mortality for children with a deceased mother.

We also investigate the two principal mechanisms through which parental death could affect children's outcomes: (1) reduction in household economic resources, and (2) removal of parental *presence* that causes grief and removes love and guidance. Our results show that higher baseline resources (consumption) predict higher investments in children's human capital, highlighting the importance of economic resources, or *presents*.

If investments in children's human capital were driven exclusively by economic resources, then equivalent outcomes would be expected for children in households where income drops because of parental death as in households where income drops for reasons unassociated with parental death. In this case, changes in economic resources would explain all variation in investments in children's human capital, and the absence of a parent because of death would have no effect. However, when we control for changes in economic resources, the effect of parental death on investments in children's human capital remains largely unchanged. 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 children's human capital.

The international community has become increasingly concerned about the effect of adult mortality on children's schooling and health (Copson, 2000; World Bank, 1999), and a better understanding of how parental loss affects investments in children may have important policy implications. Tragically, the scourge of HIV/AIDS has greatly increased death rates of young adults in many parts of the world, resulting in a large increase in the number of orphaned children. For example, one in ten African children under the age of 15 has lost one or both parents (Hunter and Williamson 2000). Many programs, especially in Africa, have been launched or proposed to support the school fees, uniforms and other schooling related costs of these children (Hunter and Williamson, 2000; Reid, 1993). The scholarship policy assumes that the principal reason children drop out of school after a parent dies is monetary. If instead the reason is behavioral changes due to the loss of parental *presence*, then programs that focus exclusively on school scholarships may be less effective than expected.

Indonesia and Mexico, the two countries studied here, have low HIV prevalence rates[2]. In these countries, deaths of adults between the ages of 18 and 60 are largely unexpected occurrences due to acute illnesses or accidents. For example, the leading causes of death in Mexico (2001) include diabetes (11.3%), heart disease (10.3%), cirrhosis and liver disease (5.8%), tumors (5.8%), pulmonary infections (3.6%), traffic accidents (3.1%) and homicide (2.3%) (CMMS, 2003). If our analysis had been conducted instead on a panel data set drawn from a high HIV/AIDS prevalence country, we would expect to find a much higher proportion of prime aged adult death and of orphaned children. However, it would be problematic to argue that adult deaths in this context are exogenous events. Reductions in a child's health and education would likely occur prior to parental death, as economic resources and parental time and energy are diminished by the disease, introducing bias into estimates of the loss of parental presence and presents.

On the other hand, prime aged adult death is a rare event in healthy (low HIV prevalence) populations. In the absence of very large panel data sets, the small number of parental deaths could result in low statistical power when estimating the relationships between parental death and investments in children's human capital. Even with the data

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[2] For example, the World Bank reports an HIV prevalence rate in the adult population of 0.4% in Mexico and 0.05% in Indonesia for December 1994. http://www.worldbank.org/aids-econ/confront/appendix/apdxtbl1a.htm

sets used here, with twenty four thousand households over a three year period in Mexico and seven thousand households over four years in Indonesia, results are sometimes driven by a small number of bereaved households. Furthermore, a majority of the orphans in our sample are single-parent orphans, with one parent deceased and the other still living in the household. In the case of double orphans (both parents deceased, as with many AIDS orphans), the negative effects of parental death on investments in children's human capital may be larger than those found here for single-parent orphans.

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 when imperfect capital markets exist, 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. If the primary promoter of good health and educational norms and values dies, and the surviving parent does not adequately fill this role, surviving children may lose the motivation to attend school and implement good health and nutritional practices. In the case of very young children, they may simply be unable to perform these tasks unassisted, and to assimilate the good norms and values over time. 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 not surprising that empirical evidence on the effects of parental mortality on children's education does not paint a consistent picture. In related studies, 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. A recent study by Case, Paxson and Ableidinger (2003) looks at the effect of orphan-hood on the living arrangements and school enrollment of children in 10 African countries. Their findings show that an orphan's enrollment rate is related to the degree of relatedness with foster parents, where children living with more distant relatives or non-relatives have inferior educational outcomes.

In a related study using a much larger dataset from Indonesia, Gertler, Ames and Levine (2002) find that parental mortality roughly doubles school dropout rates. However, the nature of the data used for this study only allows for the analysis of short-run (1-12 months) effects of parental loss. The medium-term effects over the next few years following a death may be larger (for example, if savings are quickly exhausted) or smaller (as families adjust to the shock) than the short-term effects.

The present study thus makes a number of significant contributions to existing literature. First, we are able to examine the medium-term effects of parental death on investments in children. Second, unlike most other studies which focus only on education[3], the rich set of health and anthropometric measurements in the IFLS allows us to examine both how parental death affects children's health, and also to analyze the effects of parental disability on child outcomes. And finally, to our knowledge, this is the first attempt to disentangle the roles of parental *presence* and *presents,* the behavioral and economic factors that influence investments in children's human capital.

3. Data and Measurement

The first data set analyzed 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 thirteen Indonesian provinces, encompassing 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.

[3] One notable exception is Ainsworth and Semali. 2001. "The Impact of Adult Deaths on Children's Health in Northwestern Tanzania".

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 whose parents exit the household for any reason other than death (for example divorce or migration) were excluded from the sample. Only prime aged adult parents between the ages of 18 to 60 were included in the sample (99% of mothers and 93% of fathers are under age 50). We are thus confident that parents were correctly matched to surviving children, and that most mislabeled grandparents were eliminated from the sample.

A detailed headcount of bereaved and non-bereaved children in the IFLS is presented in table 1. The final sample contains 6084 children in 3294 households. For the period between 1993 and 1997 there are a total of 90 parental deaths, 60 paternal and 30 maternal, leaving 148 bereaved orphaned children.

The second data set used here is the *Encuesta de Evaluacion de Hogares* (ENCEL), or Household Evaluation Survey 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. 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 parent characteristics, and income and consumption data. Households in the ENCEL surveys could be matched to the *Encuesta de Caracteristicas Socioeconomicas de los Hogares*, or Household Socioeconomic Characteristics Survey (ENCASEH), a baseline survey conducted by *Progresa* in 1997. The complete data set thus spans approximately three years. The 1997 ENCASEH, 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 in Mexico 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 (table 2). 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 regression techniques allow us to 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. Because the results of fixed effects and random effect regressions will turn out to be similar, we argue the random effects estimates are not suffering from community level omitted variables biases.

All regressions include controls for baseline per capita household consumption to capture the effect of baseline economic conditions on insuring investments in children's human capital in both bereaved and non-bereaved households. A second set of models incorporates the key variable for change in consumption between two periods. This term allows us to control for the purely economic effects of the loss of a productive family member. In addition, all regressions control for child age and gender, number of household members, number of children in the household under the age of 10, demographic composition of the household (age-gender), and parental age, education and health.

The inclusion of parental health characteristics in the Indonesian analysis allows us to capture the effect of parental disability on investments in children's human capital. A key measure of parental health status is an index of an individual's self-reported ability to physically perform activities of daily living, or ADL. 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, and 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 self-assessments 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. 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. The rich set of anthropometric characteristics in the IFLS allows us to additionally include body mass index and height as controls for parental health. However, the change in the ADL index, is our key measurement of parental disability.

4. Death and Consumption

In order to better understand the role of parental *presents*, we estimate the effect that the death of a productive household member has on the household economy. To estimate the effect of prime aged adult death on household per capita consumption we use the entire sample of households (including households with and without children) and include deaths of all adults ages 18 to 60 (parents and all other prime aged adults).

The IFLS sample 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 the two periods. There are 128 deceased males and 85 deceased females in the sample. Descriptive statistics for bereaved and non-bereaved households are presented in table 1[4]. Bereaved households were poorer than non-bereaved households at baseline. Furthermore, deceased individuals are on average older, less educated, and come from larger households.

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 and the remainder adult females. Summary statistics are presented in Table 2[5]. As in the case of Indonesia, per-capita consumption is lower in bereaved households at baseline, and deceased individuals tend to be older.

We hypothesize that deaths of prime aged adults in countries like Indonesia and Mexico, with low HIV/AIDS prevalence rates, are largely unexpected and idiosyncratic events. Although we do not know the specific causes of death for the individuals in the IFLS and ENCEL data sets, we can compare the baseline ADL index of deceased and surviving individuals. Although mean the baseline ADL index is slightly lower (indicating worse health) for deceased individuals, this difference is not statistically significant. Comparing mean baseline ADL indexes of individuals in various age/gender ranges, we find that only individuals in the oldest category of 50 to 60 years appeared to have a lower mean ADL for deceased individuals.

[4] Summary statistics in Table 1 are for the sub-sample of households with children ages 10 and under. Summary statistics for the entire sample yield similar results, and are available upon request.
[5] 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 yield similar results, and are available upon request.

This provides some support for the claim that deceased individuals were for the most part equally healthy in 1993 as surviving individuals, and that most deaths were probably not caused by debilitating long term chronic illness.

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:

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

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. α_j is an intercept term, η_j is a community level fixed effect for community j, and ε_{ij} is the random error.

Results for Indonesia are reported in table 3. The basic specification in model 1 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 the gender of the deceased individual. The death of a male household member has a large and significant impact, with a 27% decline in consumption per capita for households that experience the death of prime aged male. On the other hand, there appears to be no significant effect for the death of a prime aged female on household consumption. In a final specification of the model (model 3) we evaluate deaths of "healthy" prime aged adults, able to perform all activities of daily living with ease in 1993. 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% in the period 7 to 12 months following a prime aged adult death. Indicator variables for more than 12 months since death show that consumption does not recover in bereaved households. Model 2 includes gender interactions for the death of a prime aged adult male. In contrast to the larger effect of male deaths in the IFLS, male and female prime age adult death in Mexico have the same negative effects on consumption.

5. Effect of Parental Death on Children's Education

In this section we estimate the effects of parental death on two indicators of investments in children's education: school dropout and school entry. In line with our hypothesis that adult deaths in these samples are idiosyncratic events, we would expect that the enrollment status at baseline of children who become orphans would be no different from children with two surviving parents. 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, controlling for child, parental and household characteristics (including baseline consumption). Our results show that school enrollment status at baseline is uncorrelated with future parental death (results available on request). This orthogonality of child enrollment status helps us confirm that children in bereaved and non-bereaved households had equal investments in schooling prior to the death of a parent. Our causal interpretation of the effect of parental death on educational outcomes is strengthened by the lack of differences between bereaved and non-bereaved households that would lead to different educational outcomes in the absence of a parental death.

Parental Death and School Dropout

School dropout is constructed by observing a 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.

The effect of parental death on school drop out in Indonesia is estimated on the sub-sample of 2513 children ages 6 to 10 who were enrolled in school at baseline.

Between 1993 and 1997, 14% of bereaved children drop out of school compared to only 7% of non-bereaved children (table 1).

Complete regression analysis results for Indonesia are presented in table 5. All models are estimated with conditional logistic regressions with random or fixed effects at the community level. Marginal effects are presented in bold italics underneath the estimated coefficients. Models 1 and 2 exclude parental controls for age, education and health. Results indicate that the death of a father increases the likelihood of dropping out of school by 6.7 percentage points. Controlling for parental characteristics in Models 3 and 4, the marginal effect increases to 9.5 percentage points. With a mean dropout rate of 7.2%, paternally orphaned children are approximately twice as likely to drop out of school compared to similar non-bereaved children. Maternally orphaned children, on the other hand, are no more likely to drop out of school.

Models 5 and 6 are estimated using community fixed effects (F.E.). Comparing the fixed effects specification with the various random effects (R.E.) models, we can confirm that the results obtained in models 1 though 4 are not over estimates of the effect of parental death due to unobserved community characteristics (as would be the case if the coefficient on parental death were picking up bad local infrastructure or weather). In fact, the random effects coefficients are slightly larger than those from the fixed effects specifications.

The key variable for socioeconomic status in our models is household consumption per capita. Although both the IFLS and ENCEL surveys include detailed consumption modules, there exists a possibility that this variable is not always accurately measured. Models 7 and 8 address potential measurement error in 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. Standard errors are corrected by bootstrapping. These models indicate that paternal death increases the likelihood of school dropout by 8.4 percentage points, and predicted baseline consumption from the first stage yields a negative and significant coefficient larger in magnitude than the coefficients on baseline consumption in other models.

Coefficients on control variables in table 5 indicate that children in households with higher baseline consumption have a lower likelihood of dropping out of school. Baseline household socioeconomic status is thus important for insuring continued investments in children's education. It is also worth noting that children with higher educated parents are less likely to drop out, perhaps as a consequence of the norms and values passed from parents to children. Parental disability, given by the change in parental ADL index, has no significant effect on school drop out rates.

In models 2, 4, 6 and 8 we control for the change in household consumption between 1993 and 1997. If the decision to drop out of school were based primarily on a bereaved family's inability to finance the children's schooling, we would expect that change in consumption would explain a majority of the increase in the likelihood of dropping out of school for bereaved children, yielding a coefficient of zero on the indicator variables for maternal and paternal death. The negative estimated coefficients for this variable are consistent with the expected result that children in households with worsening economic conditions are more likely to drop out of school. However, the incorporation change in consumption does not alter the estimated coefficient on parental death variables (coefficients increase slightly in half the specifications). The statistical significance and magnitude of paternal death is preserved, suggesting that bereaved households are unable to insure continued school enrollment against the non-economic factors related to the *presence* of a father in the household.

A similar set of analysis is conducted for school drop out in Mexico. Summary statistics in table 2 show that 20% of bereaved children drop out of school at some point over the sample period compared to 14.8% of non-bereaved children. Regression analysis is conducted on the sub-sample of children between the ages of 6 and 12, enrolled in school during at least one wave over the sample period, and results are presented in table 6.

Model 1 includes all five waves of the ENCEL plus the baseline ENCASEH surveys. Since two of these six waves do not include a consumption module, we include various measurements of baseline wealth in the form of household assets to control for baseline socioeconomic status. Results show that a maternal death has a significant and immediate effect on dropout rates. 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 9 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, 5, 7 and 9 we observe that the coefficient on maternal death remains unchanged. Use of fixed effects in models 6 and 7, and use of income and baseline assets as instruments for baseline consumption in models 8 and 9 do not change 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. 70% of bereaved children become enrolled in school during this period, while 74% of all non-bereaved children become enrolled. However, only 41% of children with a deceased mother start school between 1993 and 1997. We estimate the likelihood of starting school between 1993 and 1997 using the same set of controls as in the analysis of school dropout.

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 have a 30 percentage point lower probability of starting school compared to non-bereaved children. Given an enrollment rate of 73 percent in the sub-sample as a whole, maternally orphaned children are approximately 50% less likely to become enrolled in school. The importance of baseline socioeconomic status is again highlighted by the positive and significant effect of baseline consumption. We also note that older children and children with higher educated and healthy mothers (as measured by BMI) are more likely to enroll in school.

Model 2 includes the additional control 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. This 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.

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 sub sample of 6 and 7 year olds and find a negative and significant impact of paternal death on child enrollment (table 8). The drop in school enrollment appears to be immediate, occurring in the first six months following a father's death. The coefficient on maternal death is also negative albeit not statistically significant.

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. As in the case of education, we are able to test for differences in children's anthropometric measurements at baseline for bereaved and non-bereaved households. Again the orthogonality condition holds; we find no relationship between baseline health and future parental death, indicating that children in households with and without the loss of a parent were very similar in terms of health status prior to the loss of a parent.

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 6084 children, 150 of whom lost a parent between 1993 and 1997. There are 4 bereaved children who subsequently died during this period, making up 2.7% of all bereaved children. In comparison, only 0.6% of non-bereaved children died during this period. 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, a causal link between parental death and subsequent child death is plausible.

Our results for Indonesia, presented in table 9, 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 1.8 percentage point higher probability of death for maternally-orphaned children. Given that the child mortality rate within the sample as a whole is approximately 0.6%, maternally orphaned children are four times as likely to pass away compared to similar non-bereaved children. Given the small number of both child and maternal deaths in the sample, we interpret this result should be interpreted with caution.

Baseline household consumption has a negative effect on child death, but becomes insignificant when controlling for parental characteristics. The inclusion of the additional control for change in household consumption is insignificant. 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.

Models 3 through 8 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. Mothers with worsening health status contribute towards increased 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.

The impact of parental death on child mortality in Mexico yields a picture similar to 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 10, 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. Households with higher baseline consumption have a decreased probability of child mortality, however the 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. Therefore, we 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. Anthropometric measurements are available only for the Indonesian data.

A z-score describes a child's nutritional and health status by the number of standard deviations of the child's weight and 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 with complete anthropometric records. Results are presented in tables 11 and 12.

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 children's short term health, as shown by coefficients on the weight related measurements. 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 0.75 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), we obtain slightly larger effects.

Another indicator of a child's health and nutritional status is a child's classification as "wasted" and "stunted", determined by his or her weight for height and height for age z-score, respectively. 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 13 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 15 percentage point increase in the probability of becoming 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.

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). For parental death and child stunting, estimated coefficients on both mother and father death are positive but insignificant (results available upon request). Taken as a whole, these results provide evidence that maternal death reduces a child's short-term health status, measured by weight for age and weight for height. On the other hand, there is no discernable effect of parental death on a child's long-term health status measured by height.

Given these results, one question that arises is whether the bundle of consumption goods intended for children changes following the death of a parent. Although we don't know the specific proportion of consumption consumed by each household member, we can identify expenditures on "child goods" (diary products and cacao) and "adult goods" (alcohol and tobacco). In households where a male dies, the proportion of household consumption on child goods was lower than in non-bereaved households at baseline. In the period following a male death, however, the proportion of child goods consumed is significantly higher, and the proportion of adult goods significantly lower. On the other hand, in households where a female household member dies, there are no differences in the proportion of adult and child goods consumed at baseline compared to non-bereaved households. However, following the death of a female the proportion of consumption dedicated to child goods drops significantly (results available upon request).

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. In Mexico, paternal death appears to contribute towards delayed school entry and increased child mortality. Maternal death in Mexico significantly increases the probability of children dropping out of school, and contributes towards 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 maintaining 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.

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<u>Tables</u>

Table 1: Descriptive Statistics – Indonesia

Head Count	**Bereaved Children Headcount**	**Non-Bereaved Headcount**	
Number of children	148	5936	
Number of households	90	3204	
Number of deceased fathers	60	0	
Number of deceased mothers	30	0	
Dropped out of school 1997-1993 (enrolled in 93)*	11 (14.1%)	172 (7%)	
Started School (one to seven year olds in 93)**	39 (70%)	2077 (74%)	
Started School (one to seven year olds in 93)** - Deceased Mother	7 (41%)		
Children who died between 1993 and 1997. (No child the same year as a parent, and all bereaved children died after their parent.)	4 (2.7%)	37 (0.6%)	
Wasted children (became wasted between 93 and 97) ***	3 (9%)	102 (5%)	
Variable	**Bereaved Children Mean (SE)**	**Non-Bereaved Children Mean (SE)**	**t-stat for difference in means**
Household			
Log monthly consumption per capita (1993)	10.231 (0.089)	10.516 (0.026)	3.25†
Δ log monthly per capita consumption (1997-1993)	0.483 (0.081)	0.354 (0.015)	1.58
Log monthly household consumption (1993)	11.946 (0.082)	12.158 (0.028)	2.63†
Δ log monthly household consumption (1997-1993)	0.227 (0.089)	0.350 (0.015)	1.38
Household size (1993)	5.944 (0.243)	5.477 (0.049)	1.95
Household size (1997)	4.600 (0.167)	5.411 (0.046)	4.98†
Number of children 10 and younger (1993)	1.778 (0.109)	1.890 (0.027)	1.03
Parents			
Father's age – 1993	42.856 (1.187)	36.998 (0.174)	4.93†
Mother's age – 1993	37.044 (1.058)	31.963 (0.159)	4.75†
Father's education (years)	5.483 (0.469)	6.519 (0.152)	2.27†
Mother's education (years)	4.306 (0.423)	5.528 (0.141)	2.95†

Father's ADL – 1993	0.977 (0.007)	0.987 (0.002)	1.48
Mother's ADL – 1993	0.969 (0.008)	0.977 (0.002)	0.98
Children			
Child age in 1993 (Sample is 0 to 10.)	5.946 (0.288)	5.103 (0.042)	2.93†
Education 1993 (years)	1.010 (0.119)	0.793 (0.019)	1.82
Dropped out of school 1997-1993 (enrolled in 93)*			
Started School (one to seven year olds in 93)**			
Deceased between 1993 and 1997. (Children deceased after death of parent.)			
Baseline Comparison			
Dropped out of school at baseline – parent not yet deceased (children ages 6 to 10)	0.056 (0.032)	0.076 (0.007)	0.63
Enrolled in school at baseline – parent not yet deceased (children ages 6 to 10)	0.876 (0.039)	0.878 (0.008)	0.04
Height for age z-score – 1993	-1.801 (0.121)	-1.617 (0.032)	1.51
Weight for age z-score - 1993	-1.562 (0.101)	-1.505 (0.025)	0.56
Weight for height z-score - 1993	-0.570 (0.109)	-0.611 (0.026)	0.37

Notes: Standard errors in parenthesis (adjusted for community level clustering). † different at 5% level. 1997 consumption deflated with CPI, base year 1993. *Sub-sample of enrolled children consists of 78 orphans and 2435 non-orphans. **Sub-sample of not-enrolled children ages one to seven (1993) consists of 55 orphans (17 maternal) and 2826 non-orphans. *** Sub-sample of children five and younger with weight for height z-score above -2 consists of 34 orphans and 1899 non-orphans.

Table 2: Descriptive Statistics – Mexico

Head Count	**Bereaved Children Headcount**	**Non-Bereaved Headcount**	
Number of children			
Number of households			
Number of deceased fathers			
Number of deceased mothers			
Dropped out of school			
Started School			
Deceased children.			

Variable	**Bereaved Children Mean**	**Non-Bereaved Children Mean**	**t-stat for difference in means**
Household			
Log monthly consumption per capita 1998			
Δ log monthly consumption per capita	-0.028 (0.025)	0.023 (0.004)	2.00†
Log monthly household consumption 1998	114.846 (7.478)	118.841 (2.094)	0.53
Δ log monthly household 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 (Indonesia)

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 (Mexico)

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,

Table 5: Parental Death and School Dropout (Indonesia)

Dependent variable: child dropped out of school between 1993 and 1997 = 1 (mean = 0.072)

	Model 1 R.E.	**Model 2 R.E.**	**Model 3 R.E.**	**Model 4 R.E.**	**Model 5 F.E.**	**Model 6 F.E.**	**Model 7 R.E.-IV**	**Model 8 R.E.-IV**
Father deceased between 1993 and 1997	0.990+	0.963+	1.401**	1.395**	1.893**	1.949**	1.239*	1.276*
marginal effect dy/dx	***0.067***	***0.065***	***0.095***	***0.094***	***0.128***	***0.132***	***0.084***	***0.086***
	(0.524)	(0.527)	(0.542)	(0.541)	(0.695)	(0.701)	(0.553)	(0.562)
Mother deceased between 1993 and 1997	0.331	0.417	0.027	0.096	0.203	0.160	-0.024	-0.170
marginal effect dy/dx	*0.022*	*0.028*	*0.002*	*0.006*	*0.014*	*0.011*	*-0.002*	*-0.011*
	(0.800)	(0.827)	(0.825)	(0.840)	(0.969)	(0.992)	(0.821)	(0.895)
1993 consumption per capita (log)	-0.883**	-1.246**	-0.301+	-0.564**	-0.082	-0.378		
marginal effect dy/dx	***-0.060***	***-0.084***	***-0.020***	***-0.038***	*-0.006*	*-0.026*		
	(0.154)	(0.180)	(0.174)	(0.202)	(0.211)	(0.251)		
Δ log monthly per capita consumption (1997-1993)		-0.793**		-0.475**		-0.465*		
marginal effect dy/dx		***-0.054***		***-0.032***		***-0.031***		
		(0.176)		(0.184)		(0.214)		
1993 Consumption (log) – predicted							-1.846**	-1.861**
marginal effect dy/dx							***-0.125***	***-0.126***
							(0.598)	(0.600)
Δ consumption – predicted								0.440
marginal effect dy/dx								*0.030*
								(1.058)
Father Δ ADL (ADL 97 - ADL 93)			-1.583	-1.671	-0.578	-0.623	-1.876	-1.858
marginal effect dy/dx			*-0.106*	*-0.112*	*-0.039*	*-0.042*	*-0.125*	*-0.124*
			(1.362)	(1.344)	(1.570)	(1.573)	(1.375)	(1.377)
Mother Δ ADL (ADL 97 - ADL 93)			-0.394	-0.224	1.214	1.541	-0.364	-0.523
marginal effect dy/dx			*-0.026*	*-0.015*	*0.081*	*0.103*	*-0.024*	*-0.035*
			(1.530)	(1.557)	(1.862)	(1.920)	(1.576)	(1.622)
Number of household members in 1993 (log)	-0.690+	-0.647+	-0.523	-0.495	-0.203	-0.164	-1.093*	-1.217*
	(0.370)	(0.375)	(0.394)	(0.396)	(0.463)	(0.461)	(0.452)	(0.543)
Number of children 10 and younger in 1993 (log)	0.521+	0.407	0.700*	0.618+	0.571	0.462	0.357	0.386
	(0.310)	(0.313)	(0.332)	(0.332)	(0.380)	(0.383)	(0.355)	(0.362)
female child =1	-0.059	-0.024	0.012	0.020	0.029	0.049	-0.004	-0.030
	(0.181)	(0.183)	(0.188)	(0.189)	(0.206)	(0.207)	(0.190)	(0.200)
Child age = 7 (1993)	1.766+	1.851+	1.746	1.823+	1.619	1.743	1.806+	1.770
	(1.064)	(1.068)	(1.075)	(1.078)	(1.078)	(1.083)	(1.081)	(1.084)

Child age = 8 (1993)	2.923**	2.958**	2.819**	2.854**	2.644*	2.702**	2.935**	2.917**
	(1.036)	(1.039)	(1.045)	(1.048)	(1.045)	(1.048)	(1.051)	(1.052)
Child age = 9 (1993)	3.580**	3.680**	3.599**	3.676**	3.320**	3.425**	3.696**	3.678**
	(1.026)	(1.030)	(1.036)	(1.040)	(1.036)	(1.041)	(1.043)	(1.044)
Child age = 10 (1993)	4.193**	4.295**	4.214**	4.285**	4.174**	4.280**	4.367**	4.358**
	(1.025)	(1.029)	(1.037)	(1.041)	(1.037)	(1.042)	(1.045)	(1.045)
Father's education in years (1993)			-0.227**	-0.218**	-0.214**	-0.204**	-0.184**	-0.185**
			(0.039)	(0.040)	(0.046)	(0.047)	(0.043)	(0.043)
Mother's education in years (1993)			-0.186**	-0.181**	-0.197**	-0.190**	-0.132**	-0.132**
			(0.045)	(0.045)	(0.053)	(0.053)	(0.049)	(0.049)
Father ADL (1993)			-1.533	-1.743	0.631	0.331	-1.378	-1.223
			(1.717)	(1.700)	(2.272)	(2.260)	(1.722)	(1.765)
Mother ADL (1993)			1.637	1.887	3.660	4.084+	1.969	1.908
			(1.943)	(1.980)	(2.364)	(2.434)	(1.991)	(2.002)
Father BMI (1993)			-0.023	-0.019	-0.065	-0.058	0.020	0.023
			(0.044)	(0.044)	(0.053)	(0.054)	(0.047)	(0.047)
Mother BMI (1993)			-0.016	-0.011	-0.036	-0.032	0.009	0.008
			(0.032)	(0.032)	(0.037)	(0.038)	(0.034)	(0.034)
Father height 1993 (log)			-0.983	-0.659	-1.694	-1.376	0.816	0.816
			(2.722)	(2.762)	(3.346)	(3.370)	(2.870)	(2.868)
Mother height 1993 (log)			-3.990	-4.023	-7.355*	-7.569*	-2.860	-2.758
			(2.799)	(2.814)	(3.243)	(3.285)	(2.856)	(2.868)
Constant	3.216	7.197**	24.177	25.251			24.308	23.891
	(2.071)	(2.292)	(18.865)	(19.049)			(19.250)	(19.286)
Observations	2513	2513	2513	2513	1023	1023	2513	2513
Number of Community ID (1993 wave)	305	305	305	305	94	94	305	305
Number of dropouts	183	183	183	183	183	183	183	183
Number of children with deceased father 1997-1993	52	52	52	52	44	44	52	52
Number of children with deceased mother 1997-1993	27	27	27	27	24	24	27	27

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 random effects (R.E.) logistic regressions with community level effects, excluding controls for parental characteristics. Models 3 and 4 are R.E. logistic regressions including all parental controls. Models 5 and 6 are fixed effects (F.E.) logistic regressions. Models 7 and 8 are R.E. logistic regressions with instrumentation for the per capita consumption variables, using imputed wages, wages interacted with death, and assets as instruments for consumption (standard errors corrected by bootstrapping 100 iterations (seed 280503 for replication)).

Table 6: Parental Death and School Dropout (Mexico)
Dependent variable: child dropped out of school between periods = 1

	Model 1 - R.E.	Model 2 - R.E.	Model 3 - R.E.	Model 4 - R.E.	Model 5 - R.E.	Model 6 - F.E.	Model 7 - F.E.	Model 8 R.E.-IV	Model 9 R.E.-IV
Father deceased period 1	0.757**	0.516	0.515	0.419	0.421	0.169	0.170	0.530	0.528
marginal effect dy/dx	***0.013***	*0.009*	*0.009*	*0.007*	*0.007*	*0.003*	*0.003*	*0.009*	*0.009*
	(0.282)	(0.480)	(0.481)	(0.480)	(0.480)	(0.487)	(0.487)	(0.486)	(0.487)
Mother deceased period 1	1.410**	1.505*	1.521*	1.274*	1.285*	1.251+	1.267+	1.259+	1.256+
marginal effect dy/dx	***0.025***	***0.026***	***0.027***	***0.022***	***0.023***	***0.022***	***0.022***	***0.022***	***0.022***
	(0.430)	(0.653)	(0.652)	(0.646)	(0.645)	(0.658)	(0.657)	(0.653)	(0.655)
Father deceased period 2	-0.329	0.347	0.347	0.222	0.222	0.222	0.220	0.301	0.299
marginal effect dy/dx	*-0.006*	*0.006*	*0.006*	*0.004*	*0.004*	*0.004*	*0.004*	*0.005*	*0.005*
	(0.596)	(0.746)	(0.746)	(0.747)	(0.747)	(0.753)	(0.753)	(0.753)	(0.754)
Father deceased period 5	1.475**								
marginal effect dy/dx	0.026								
	(0.567)								
consumption per capita (log) basline 98o		-0.077	-0.107	0.021	-0.008	-0.094	-0.123		
marginal effect dy/dx		*-0.001*	*-0.002*	*0.0004*	*-0.0001*	*-0.002*	*-0.002*		
		(0.086)	(0.089)	(0.086)	(0.089)	(0.094)	(0.097)		
delta log monthly consumption per capita			-0.099		-0.096		-0.089		
marginal effect dy/dx			*-0.002*		*-0.002*		*-0.002*		
			(0.071)		(0.070)		(0.071)		
consumption per capita (log) basline 98o – predicted								0.824	0.818
marginal effect dy/dx								*0.014*	*0.014*
								(0.753)	(0.762)
delta log monthly consumption per capita – predicted								0.824	0.038
marginal effect dy/dx								*0.014*	*0.001*
								(0.753)	(0.753)
Number of household members (log)	-0.137	0.210	0.179	-0.218	-0.253	-0.300	-0.338+	0.289	0.292
	(0.133)	(0.183)	(0.184)	(0.194)	(0.196)	(0.202)	(0.204)	(0.472)	(0.474)
Number of children 10 and younger (log)	0.224**	0.084	0.084	0.358**	0.361**	0.312**	0.317**	0.389**	0.386**
	(0.075)	(0.093)	(0.093)	(0.107)	(0.107)	(0.111)	(0.111)	(0.135)	(0.144)
Female child	0.048	0.017	0.018	0.014	0.014	0.015	0.016	-0.012	-0.012
	(0.050)	(0.072)	(0.072)	(0.072)	(0.072)	(0.073)	(0.073)	(0.073)	(0.073)
Child age = 6		-0.364+			-0.341		-0.312	-0.393+	-0.393+
		(0.208)			(0.208)		(0.208)	(0.211)	(0.211)
Child age = 7	0.561**		0.364+	0.341		0.313			
	(0.172)		(0.208)	(0.208)		(0.208)			
Child age = 8	0.652**	-0.434*	-0.069	-0.117	-0.458*	-0.151	-0.462*	-0.487*	-0.487*
	(0.158)	(0.202)	(0.214)	(0.214)	(0.202)	(0.215)	(0.202)	(0.203)	(0.203)
Child age = 9	0.659**	-0.215	0.151	0.093	-0.246	0.062	-0.250	-0.316+	-0.317+
	(0.157)	(0.187)	(0.200)	(0.201)	(0.187)	(0.201)	(0.188)	(0.190)	(0.190)
Child age = 10	0.729**	-0.036	0.330+	0.238	-0.102	0.206	-0.105	-0.170	-0.170
	(0.155)	(0.179)	(0.193)	(0.193)	(0.180)	(0.194)	(0.180)	(0.181)	(0.182)
Child age = 11	1.359**	0.785**	1.152**	1.100**	0.761**	1.084**	0.774**	0.680**	0.679**
	(0.150)	(0.165)	(0.179)	(0.179)	(0.165)	(0.180)	(0.165)	(0.166)	(0.167)
Child age = 12	2.196**	1.683**	2.050**	1.965**	1.626**	1.945**	1.635**	1.579**	1.578**
	(0.145)	(0.152)	(0.168)	(0.169)	(0.153)	(0.169)	(0.153)	(0.153)	(0.154)
Father's education in years	-0.046**			-0.080**	-0.080**	-0.057**	-0.056**	-0.093**	-0.093**
	(0.012)			(0.018)	(0.018)	(0.019)	(0.019)	(0.021)	(0.021)
Mother's education in years	-0.055**			-0.068**	-0.068**	-0.053**	-0.052**	-0.085**	-0.085**
	(0.013)			(0.018)	(0.018)	(0.019)	(0.019)	(0.020)	(0.020)

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. Model 1 is a random effects (R.E.) logistic with community level effects. 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 2 and 3 are R.E. logistic regressions excluding parental controls. Models 4 and 5 are R.E. logistic regressions and models 6 and 7 are F.E. logistic regressions. Models 8 and 9 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. Periods since parental death with no variation are dropped. Wave dummies and dummies for missing baseline assets not reported.

Table 7: Parental Death and School Entry (Indonesia)
Dependent variable: child started school between 1993 and 1997 = 1 (mean = 0.734)

	Model 1 R.E.	**Model 2 R.E.**
Father deceased between 1993 and 1997 ***marginal effect dy/dx***	0.918 *0.179*	0.881 *0.172*
	(0.668)	(0.669)
Mother deceased between 1993 and 1997 ***marginal effect dy/dx***	-1.535* ***-0.299***	-1.545* ***-0.301***
	(0.728)	(0.734)
1993 consumption per capita (log) ***marginal effect dy/dx***	0.342** ***0.067***	0.505** ***0.098***
	(0.122)	(0.138)
Δ log monthly per capita consumption (1997-1993) ***marginal effect dy/dx***		0.317* ***0.062***
		(0.124)
1993 Consumption (log) – predicted ***marginal effect dy/dx***		
Δ consumption – predicted ***marginal effect dy/dx***		
Father Δ ADL (ADL 97 - ADL 93) ***marginal effect dy/dx***	0.618 *0.121*	0.555 *0.108*
	(1.541)	(1.556)
Mother Δ ADL (ADL 97 - ADL 93) ***marginal effect dy/dx***	0.102 *0.020*	0.116 *0.023*
	(1.146)	(1.150)
Observations	2881	2881
Number of Community ID (1993 wave)	309	309
Number of children who start school	2116	2116
Number of children with deceased father 1997-1993	39	39
Number of children with deceased mother 1997-1993	17	17

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. 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 random effects (R.E.) logistic regressions with community level effects including all parental controls.

Table 8: Parental Death and School Entry (Mexico)
Dependent variable: child started school between periods = 1

	Model 1 R.E.	**Model 2 R.E.**
Father deceased period 1 ***marginal effect dy/dx***	-1.441* ***-0.330***	-1.438* ***-0.330***
	(0.715)	(0.715)
Mother deceased period 1 ***marginal effect dy/dx***	-0.635 *-0.146*	-0.633 *-0.145*
	(0.819)	(0.819)
Father deceased period 2 ***marginal effect dy/dx***	1.061 *0.243*	1.077 *0.247*
	(1.080)	(1.071)
Mother deceased period 2 ***marginal effect dy/dx***	-0.571 *-0.131*	-0.560 *-0.128*
	(1.214)	(1.214)
Mother deceased period 3 ***marginal effect dy/dx***		
Father deceased period 4 ***marginal effect dy/dx***	-0.696 *-0.160*	-0.691 *-0.158*
	(1.599)	(1.604)
consumption per capita (log) basline 98o ***marginal effect dy/dx***	0.060 *0.014*	0.082 *0.019*
	(0.056)	(0.059)
delta log monthly consumption per capita ***marginal effect dy/dx***		0.067 *0.015*
		(0.053)
consumption per capita (log) basline 98o – predicted ***marginal effect dy/dx***		
delta log monthly consumption per capita – predicted ***marginal effect dy/dx***		
Constant	-3.152**	-3.285**
	(0.434)	(0.446)
Observations	11161	11161
Number of group(state muni local)	502	502

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. Model 1 is a random effects (R.E.) logistic with community level effects.. Models 1 and 2 are R.E. logistic regressions with the same set of controls as table 6: number of household members, number of children 10 and younger, child gender, child age categories, parental education, parental age, and wave dummies.

Table 9: Parental Death and Child Mortality (Indonesia)

Dependent variable: child deceased between 1993 and 1997 = 1 (mean = 0.0067)

	Model 1 **R.E.**	**Model 2** **R.E.**
Father deceased between 1993 and 1997 ***marginal effect dy/dx***	0.002 *0.00001*	0.001 *0.00001*
	(1.139)	(1.147)
Mother deceased between 1993 and 1997 ***marginal effect dy/dx***	2.677** ***0.018***	2.656** ***0.018***
	(0.653)	(0.657)
1993 consumption per capita (log) ***marginal effect dy/dx***	-0.404 *-0.003*	-0.310 *-0.002*
	(0.283)	(0.324)
Δ log monthly per capita consumption (1997-1993) ***marginal effect dy/dx***		0.180 *0.001*
		(0.301)
Father Δ ADL (ADL 97 - ADL 93) ***marginal effect dy/dx***	1.139 *0.008*	1.128 *0.008*
	(3.603)	(3.576)
Mother Δ ADL (ADL 97 - ADL 93) ***marginal effect dy/dx***	-4.961** *-0.033*	-4.948** *-0.033*
	(1.578)	(1.572)
Constant	28.309	28.580
	(28.272)	(28.327)
Observations	6084	6084
Number of Community ID (1993 wave)	312	312
Number of deceased children	41	41
Number of children with deceased father	101	101
Number of children with deceased Mother	49	49

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. 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 random effects (R.E.) logistic regressions with community level effects including all parental controls.

Table 10: Parental Death and Child Mortality (ENCEL)
Dependent variable is child deceased between two periods

	Model 1 **R.E.**	**Model 2** **R.E.**
Father deceased period 1 ***marginal effect dy/dx***	1.529* ***0.007***	1.536* ***0.007***
	(0.699)	(0.699)
Mother deceased period 1 ***marginal effect dy/dx***	3.485** ***0.015***	3.485** ***0.015***
	(0.726)	(0.726)
Father deceased period 3 ***marginal effect dy/dx***	2.686* ***0.012***	2.683* ***0.012***
	(1.110)	(1.109)
consumption per capita (log) basline 98° ***marginal effect dy/dx***	-0.403* ***-0.002***	-0.427* ***-0.002***
	(0.185)	(0.194)
Δ log monthly consumption per capita ***marginal effect dy/dx***		-0.071 *-0.0003*
		(0.180)
Consumption (log) – predicted ***marginal effect dy/dx***		
Δ consumption – predicted ***marginal effect dy/dx***		
Observations	100552	100552
Number of group(state muni local)	505	505
Waves of ENCEL	3	3
Number of deceased children	102	102
Number of children with deceased fathers	265	265
Number of children with deceased mothers	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 2 are random effects (R.E.) logistic regressions and include all controls listed in table 6: number of household members, number of children 10 and younger, child gender, child age categories, parental education, parental age, and wave dummies.

Table 11: 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	0.253	0.286+	0.342	0.359	0.361	0.417+
	(0.163)	(0.168)	(0.215)	(0.221)	(0.233)	(0.242)
Mother deceased by 1997 = 1	0.015	-0.038	-0.688+	-0.708+	-0.939*	-1.002*
	(0.245)	(0.253)	(0.416)	(0.420)	(0.450)	(0.460)
Household consumption (log)	-0.036	0.185	-0.044	0.069	0.004	0.369
	(0.033)	(0.246)	(0.041)	(0.319)	(0.044)	(0.350)
Number of household members (log)	-0.110	0.015	-0.148	-0.086	-0.151	0.051
	(0.089)	(0.165)	(0.109)	(0.206)	(0.118)	(0.225)
Number of children 10 and younger (log)	-0.174**	-0.172**	-0.352**	-0.355**	-0.347**	-0.356**
	(0.059)	(0.060)	(0.094)	(0.095)	(0.102)	(0.104)
Father's ADL	-0.095	-0.136	0.460+	0.442	0.789**	0.728*
	(0.209)	(0.215)	(0.272)	(0.277)	(0.294)	(0.303)
Mother's ADL	-0.274	-0.303+	-0.354	-0.374	-0.331	-0.397
	(0.175)	(0.179)	(0.220)	(0.228)	(0.239)	(0.250)
Year dummy 1997 =1	-0.234**	-0.311**	-0.106**	-0.147	0.048	-0.084
	(0.031)	(0.091)	(0.036)	(0.120)	(0.038)	(0.131)
Constant	-0.495	-2.963	-0.491	-1.736	-0.529	-4.548
	(0.470)	(2.759)	(0.594)	(3.535)	(0.643)	(3.875)
Number of Child Fixed Effects	8616	8616	5024	5024	5028	5028
Observations	4308	4308	2512	2512	2514	2514
R-squared	0.02		0.01		0.02	
Number of children with deceased father	69	69	36	36	36	36
Number of children with deceased Mother	30	30	9	9	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 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. Dummy for missing parental ADL not reported.

Table 12: 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	0.258	0.267
	(0.326)	(0.332)
Mother deceased by 1997 = 1	-0.741	-0.752
	(0.514)	(0.520)
Household consumption (log)	0.060	0.129
	(0.066)	(0.502)
Number of household members (log)	-0.330+	-0.294
	(0.175)	(0.316)
Number of children 10 and younger (log)	-2.310**	-2.308**
	(0.120)	(0.121)
Father's ADL	-0.167	-0.183
	(0.438)	(0.452)
Mother's ADL	-0.438	-0.450
	(0.358)	(0.369)
Year dummy 1997 =1	-0.147*	-0.171
	(0.063)	(0.184)
Constant	18.389**	17.631**
	(0.950)	(5.553)
Number of Child Fixed Effects	10948	10948
Observations	5474	5474
R-squared	0.11	
Number of children with deceased father	90	90
Number of children with deceased Mother	35	35

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 13: Parental Death and Child Wasting (IFLS)
Dependent variable: child wasted between 1993 and 1997 =1 (mean = 0.048)
(weight for height z-score 93 >= -2 & weight for height z-score 97 < -2)

	Model 1 R.E.	**Model 2 R.E.**
Mother deceased between 1993 and 1997 ***marginal effect dy/dx***	3.194** ***0.164***	3.199** ***0.164***
	(0.926)	(0.926)
1993 consumption per capita (log) ***marginal effect dy/dx***	0.203 *0.010*	0.173 *0.009*
	(0.189)	(0.217)
Δ log monthly per capita consumption (1997-1993) ***marginal effect dy/dx***		-0.058 *-0.003*
		(0.205)
1993 Consumption (log) – predicted ***marginal effect dy/dx***		
Δ consumption – predicted ***marginal effect dy/dx***		
Father Δ ADL (ADL 97 - ADL 93) ***marginal effect dy/dx***	-2.101 *-0.096*	-2.093 *-0.096*
	(1.821)	(1.823)
Mother Δ ADL (ADL 97 - ADL 93) ***marginal effect dy/dx***	-0.820 *-0.037*	-0.804 *-0.037*
	(1.802)	(1.804)
Observations	1933	1933
Number of Community ID (1993 wave)	294	294
Number of wasted children	105	105
Number of children with deceased father	26	26
Number of children with deceased Mother	8	8

Notes: Standard errors in parentheses (+ significant at 10%; * significant at 5%; ** significant at 1%). Sample includes all children between the ages of 0 and 5 with baseline weight for height z-score above -2. Excluded child age category is child age = 0. Models 1 and 2 are random effects (R.E.) logistic regressions and 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 indicator.