

## Maternal Education and Child Mortality: Exploring the Pathways of Influence

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Although correlations between parental education and child health have been observed to be moderate to strong in diverse parts of the world, the causal pathways remain far from clear. The paper seeks to examine the possible pathways that mediate the impact of maternal education on neonatal, infant and child mortality. We argue that acquisition of education leads to better human, social and cultural capitals among the mothers, which should be associated with increased child survival. Additionally, we seek to test whether higher education of the mother is associated with greater physical and decision-making autonomy for her within the household, which may lead to better health outcomes for the child. We use the India Human Development Survey 2005 a nationally representative survey rich in detailed measures of each pathway included in the study.

## Maternal Education and Child Mortality

The relationship between maternal education and child health outcomes in developing countries has attracted considerable attention in demography and public health research. A large body of research suggests that a causal relationship exists between maternal education and childhood health and mortality. While, causally prior variables like socio-economic status and area of residence explain to a large extent the association between maternal education and child health outcomes, they do not explain all of the advantage that maternal education accrues to child health outcomes (Desai and Alva 1998). This paper seeks to shed some light on the possible pathways that mediate the relationship between maternal education and childhood mortality. We seek to explore the hypothesis that acquisition of education leads to better human, social and cultural capital among mothers, which is associated with improved child survival. Additionally, we test whether higher education of the mother is associated with greater physical and decision-making autonomy for her within the household, which may lead to better health outcomes for the child.

**The Causality Debate:** The well-known relationship between maternal education and child mortality has often been understood as causal (e.g. Caldwell 1979; Cleland and Van Ginnekin 1988; Bicego and Boerma 1993). Initial studies exploring the linkages between maternal education and child health outcomes highlighted a strong relationship, although in the presence of weaker controls and under-developed measures. Using data from the Changing African Family Survey I and II, Caldwell (1979) emphasized that maternal education played an important role in determining child survival, after controlling for certain socioeconomic characteristics including father's and mother's occupation and area of residence. Using data from ten developing countries, Caldwell and McDonald (1982) confirmed the importance of maternal education but also highlighted the importance of father's education. They estimated the impact of parental education to be greater than the combined impact of income and accessibility to health services. Cleland and Van Ginneken (1988) showed that the economic advantage of education accounts for only half of the relationship between maternal education and child mortality.

Recent research shows that the positive impact of maternal education on child health outcomes reduces significantly in the presence of individual and community level controls (Desai and Alva 1998). The education coefficients, although reduced in size, were statistically significant for infant mortality in ten countries (of twenty two) and were in the expected direction. They argue that the impact of education does translate into health seeking behavior (such as immunization) but its impact on health outcomes remains weak due to contextual factors that may limit the advantage that education provides to women. This may also be the case in sub-Saharan African countries where limited infrastructure or extreme hardships may prevent more educated women to use their capital to better the health of their children (e.g. Hobcraft, 1993; Macassa, Ghilagaber, Bernhardt, Diderichsen, Burstro 2003).

On the other hand, the link between education and child mortality remains strong in India (Caldwell Reddy and Caldwell 1983; Basu and Stephenson, 2005). Using qualitative methods in south India, Caldwell et al (1983) find that educated mothers were more likely to take their child to modern facilities for treatment. They also suggested that educated mothers were more autonomous with respect to decisions about their children's health. Basu and Stephenson (2005) find particularly strong evidence for the protective role of education for many a mortality and

mortality-determinant outcomes<sup>1</sup> even after controlling for relevant demographic, socioeconomic and health behavior factors. Even low levels of education (incomplete primary education) were found significant in reducing the odds of mortality in 1 to 24 month old children. However, completed primary education was significantly associated with lowered odds of neonatal mortality. They suggest that “little learning” in primary schools in India is beneficial because mothers learn to accord teachers with great authority and therefore bestow similar authority to doctors and nurses and follow without question their prescribed guidelines for treatment. Kravdal (2004) shows that individual (mother’s education) and estimates of average levels of women’s education in the community are significant factors associated with child survival in India.

Speculations are often made about pathways through which education provides a protective effect, as surveys usually do not have detailed measures of potential linkages. The India Human Development survey (IHDS) provides measures of several pathways that can mediate the impact of education on child survival.

**Human Capital:** Education research in developing countries has often studied only literacy or years of schooling. However, in societies where school quality varies widely across regions and types of schools, as has been demonstrated for India (World Bank 1997; Probe Report 1999), years of schooling or grade completed do not provide good measures of education (Fuller and Heyneman 1989). Schools are often closed due to teacher absence, students may be absent due to labor force demands and many skills (particularly literacy) atrophy quickly when not used regularly.

Education leads to acquisition of capacities such as accurate knowledge about health and health behaviors. The inclusion of direct human capital measures is a substantial improvement over simple educational levels such as grade completion. Independent measurement of health knowledge is particularly important because health specific knowledge may be gained informally as well and may vary from region to region. Improved health-related knowledge has been associated with better child health outcomes (e.g. Glewwe 1999). Health knowledge and beliefs are influenced by factors other than formal education and therefore including health-specific knowledge in a model with formal education will also help explain the extent to which such knowledge can be gained through other sources. IHDS asked the mother specific questions related to child health (1) if it was harmful to drink 1-2 glasses of milk every day during pregnancy, (2) if colostrum was beneficial for the child (3) if smoke is harmful for health and (4) if the child needs to be given more than usual water to drink during diarrhea. We hypothesize that the higher the education, the greater the acquisition of human capital among the mothers as measured through health knowledge which shall be associated with increased child survival (H1).

**Social Capital:** Communities have strong interdependencies and are affected by factors such as cohesiveness, presence of networks and civic associations in the community. Attitudes towards health care are also affected by community norms and knowledge of health and medical care is shared among networks. Educated parents have social networks that provide them with

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<sup>1</sup> Using Mosley and Chen’s framework the authors define the proximate determinants of child mortality: attitudes and practices that define the environment of birth, the physical and nutritional environment of child rearing (preventive measures), and the handling of actual episodes of ill-health (curative behavior).

knowledge, advice, and contacts that enhance their ability to recognize the severity of disease, seek treatment, and find good care. In addition to personal networks, educated individuals are far more likely to participate in local governance and in non-governmental organizations that increase their contacts with medical services and result in higher quality of care for their family members. As Putnam (2000) explains for social capital, "a well-connected individual in a poorly connected society is not as productive as a well-connected individual in a well-connected society." This public-goods aspect of social capital makes it well suited to study how households can benefit from interpersonal networks and civic associations. Kravdal (2004) has shown that average education of women in the community has a significant association with child mortality giving credence to the argument that the benefits of education are shared in a community. We have direct measures of social capital for the household, which include the number of contacts in hospitals and clinics, schools and other government offices along with information on memberships in development and traditional (religious and caste based) organizations for all members of the household.

**Cultural Capital:** "Educated" individuals do not only have increased knowledge and skills but carry a position of privilege that commands respect from health care providers and enables families to manipulate the health system better (Gittelsohn et al. 1994). Language and communication styles are important components of cultural capital. Command over English as well as certain communication styles identify individuals as belonging to upper social strata and elicit respectful communication from service providers. These skills, which Bourdieu (1977) has introduced into social science research as cultural capital, have become common elements of education research (e.g., DiMaggio 1982; Farkas et al. 1990), but have not been incorporated sufficiently into health research. Educated women are accorded a higher status in their families and thus greater decision-making autonomy (Caldwell et al 1983). Education of the mother has been associated with greater uptake of health services for children (e.g. Govindaswamy and Ramesh 1997) and cultural capital maybe a pathway through which education influences interaction with health systems. Greater education of the mother may imbue her with greater confidence, greater facility with language and a greater ability to interact with the health system. The IHDS contains an evaluation of respondent's ability to answer questions on the survey and includes an assessment of her confidence, understanding of the survey questions and clarity of responses. We hypothesize that this measure is a reflection of the cultural capital of the mother and reflects her ability to navigate the bureaucratic health systems (H3). We also measure her fluency in the English language, which gives great privilege in the Indian context with respect to finding jobs (Desai and Noon, ASA presentation, 2009).

**Gender Empowerment:** While education may have a number of different effects on gender relations in the household, its impact on women's physical mobility and autonomy is particularly noteworthy. Past research has shown that education leads to higher autonomy (Jejeebhoy and Sathar 2001) and that women's physical mobility is associated with their use of antenatal care (Bloom, Wypij and Das Gupta 2001) and seeking treatment for a sick child (Das Gupta 1990). This also suggests that at least part of the education effect on health seeking behavior may be mediated via gender relations in the household. Jejeebhoy and Sathar (2001) find that while even primary education increases women's autonomy in South India, an area of less gender inequality than Uttar Pradesh and Pakistani Punjab. In these more patriarchal areas, secondary education is necessary before any positive effects are observed. Kravdal (2004) found that women's physical

autonomy was important both at individual- and community-levels in increasing child survival in India as well as decision-making autonomy at the individual level.

IHDS has sought direct measures of gender relations of women and includes questions on various dimensions of autonomy. We hypothesize that greater education will lead to greater decision making and physical autonomy of the mother (measured as autonomy in decision making regarding child health and visiting health centre) which will be associated with improved survival of the child (H4).

**Background and Significance:** As the Millennium Development Goals rally resources and support for action around the globe, key indicators pertaining to maternal and child health in India remain among the worst in the world, even worse than sub-Saharan Africa (Bhutta 2000). The infant mortality rate (IMR) in India is currently estimated at 57 deaths (NFHS 3) lower than 68 at the time of NFHS-2. The situation is worse for rural areas where IMR still stands at 62.2 however even rural areas have seen a significant decrease in IMR. More than 1 in 18 children continue to die within the first year of life; 1 in 13 before reaching age five (NFHS 3). The issue of child health and development is therefore of immense importance and a thorough sociological understanding of the potential pathways to change needs to be developed.

**Data:** The India Human Development Survey 2005 (IHDS) is a nationally representative sample of households in which 33,480 ever-married women between the ages of 15 to 49 were interviewed about their fertility history and utilization of health care for themselves and their children. The sample of 41,554 households is spread across 383 districts, 1503 villages and 971 urban blocks of India. In addition to substantial health information such as antenatal and postnatal care, the IHDS has also collected information on health knowledge, household's economic capital including income, occupation, and standard of living, household measures of social capital and lastly an assessment of cultural capital of the women. Birth histories collected from the eligible women during the survey provide the data for the dependent variables – neonatal, infant and child mortality. For children who had died, age at death was also collected.

**The Dependent Variable:** Three dependent variables will be constructed for the purpose of this study.

Neonatal mortality: The probability of dying in the first month of life.

Infant mortality: The probability of dying before the first birthday.

Child mortality: The probability of dying between the first and fifth birthdays.

Our sample consists of children in the age group of 1 to 5 years for whom we have birth history data (n=11908). These are the last-born children of eligible women in reproductive age group of 15 to 49 who were included in the sample. We intend to carry out survival analysis on all the three dependent variables because causes of death differ substantially at different ages. Factors are expected to be different or operate in a different fashion for children at different ages. IHDS estimates of neonatal mortality are 36 deaths/1000 births; IMR is 52 and under-five mortality is at 69<sup>2</sup>. In the final analysis, we may include next to last births as well to increase the number of dead children in the sample.

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<sup>2</sup> Using data on live births occurring in the ten-year period preceding the survey.

In each hazard regression analysis, we would control for standard of living (to reflect the long term economic status of the household), maximum male educational attainment in the household (or husband's education), parity, age and sex of the child, caste and religion, place of residence (urban/rural and state controls). The four hypotheses would be tested separately to explore the impact of each mediating pathway.

We expect to find a significant association between maternal education and infant and child mortality to persist even when other socioeconomic factors are taken into account. Education, and associated human, social and cultural capital, will improve health-seeking behavior, which will be reflected in greater survival rates. We expect that maternal education will be significantly correlated with empowerment and expect it to have a significant impact on survival.

Table of weighted means and standard deviations:

| Determinants  | Observations | Mean  | Standard Deviation | Minimum | Maximum |
|---|--------------|-------|--------------------|---------|---------|
| Mother's Education                                    |              |       |                    |         |         |
| Illiterate  | 4962         | 0.46  | 0.50               | 0       | 1       |
| Any Primary education                                 | 1801         | 0.15  | 0.36               | 0       | 1       |
| Any Upper Primary education                           | 1636         | 0.13  | 0.34               | 0       | 1       |
| Any Secondary education                               | 1866         | 0.14  | 0.34               | 0       | 1       |
| Any Senior secondary education                        | 710          | 0.05  | 0.22               | 0       | 1       |
| Any College education                                 | 752          | 0.05  | 0.22               | 0       | 1       |
| Urban   | 11899        | 0.26  | 0.44               | 0       | 1       |
| Religion  |              |       |                    |         |         |
| Hindu   | 9387         | 0.81  | 0.40               | 0       | 1       |
| Muslim  | 1711         | 0.14  | 0.35               | 0       | 1       |
| Christian   | 307          | 0.02  | 0.14               | 0       | 1       |
| Sikh  | 247          | 0.01  | 0.10               | 0       | 1       |
| Other Religions                                       | 246          | 0.02  | 0.15               | 0       | 1       |
| Caste   |              |       |                    |         |         |
| Brahmin   | 545          | 0.04  | 0.20               | 0       | 1       |
| Forward Castes  | 2858         | 0.21  | 0.40               | 0       | 1       |
| Other Backward Castes                                 | 4831         | 0.42  | 0.49               | 0       | 1       |
| Dalit (Lowest Caste)                                  | 2601         | 0.23  | 0.42               | 0       | 1       |
| Adivasis (Tribal)                                     | 1064         | 0.09  | 0.28               | 0       | 1       |
| Household Level Variables                             |              |       |                    |         |         |
| Standard of Living                                    | 11899        | 10.35 | 5.84               | 0       | 30      |
| Highest Education achieved by a male in the household | 11667        | 6.72  | 4.90               | 0       | 15      |
| Child Characteristics                                 |              |       |                    |         |         |
| Child's age in months                                 | 11899        | 28.56 | 18.52              | 0       | 119     |
| Child's sex (Ref: Male)                               | 11899        | 0.46  | 0.50               | 0       | 1       |
| Mother's Characteristics                              |              |       |                    |         |         |

|   |       |       |      |    |    |
|---|-------|-------|------|----|----|
| Parity                                      | 11899 | 2.86  | 1.83 | 1  | 13 |
| Mother's Age                                | 11899 | 27.50 | 5.74 | 15 | 49 |
| Human Capital                               |       |       |      |    |    |
| Knowledge of milk intake during pregnancy   | 11899 | 0.73  | 0.44 | 0  | 1  |
| Colostrum feed                              | 11899 | 0.74  | 0.44 | 0  | 1  |
| Smoke harmful for health                    | 11899 | 0.80  | 0.40 | 0  | 1  |
| Water intake during diarrhea                | 11899 | 0.56  | 0.50 | 0  | 1  |
| Social Capital                              |       |       |      |    |    |
| Social Networks                             | 11668 | 0.99  | 1.12 | 0  | 3  |
| Development Social Capital                  | 11874 | 0.33  | 0.78 | 0  | 7  |
| Religion and Caste social capital           | 11886 | 0.28  | 0.58 | 0  | 2  |
| Cultural Capital                            |       |       |      |    |    |
| Interviewers' rating                        | 11892 | 1.63  | 0.38 | 0  | 2  |
| Empowerment                                 |       |       |      |    |    |
| Practices veiling                           | 11867 | 0.63  | 0.48 | 0  | 1  |
| Has a say in the decision if child is ill   | 11592 | 0.85  | 0.34 | 0  | 1  |
| Needs Permission for visit to Health Centre | 11891 | 0.80  | 0.40 | 0  | 1  |

Table showing weighted correlations between Maternal Education and Neonatal, Infant and Child Mortality

| Mother's Education             | Neonatal Mortality | Infant Mortality | Child Mortality |
|--------------------------------|--------------------|------------------|-----------------|
| Illiterate                     | 0.0481             | 0.052            | -0.142          |
| Any Primary education          | 0.0012             | 0.006            | 0.1013          |
| Any Upper Primary education    | 0.0075             | -0.007           | -0.0371         |
| Any Secondary education        | -0.0321            | -0.0446          | -0.0352         |
| Any Senior secondary education | -0.0239            | -0.0263          | -0.0225         |
| Any College education          | -0.0169            | -0.0214          | -0.0207         |
| N                              | 11634              | 9268             | 486             |

Higher education is negatively correlated with neonatal, infant and child mortality. It is less so for neonatal mortality as it is affected by structural factors such as institutional coverage. Survival past this phase leads to a reduction in chances of death. Even any upper primary education (i.e. between 6 to 8 years of education) is negatively correlated with infant and child mortality.

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