

## **Forum: Parental education and child mortality**



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Education has been one of the key concepts used as a variable in explaining health. The influence of parental education on infant and child health and mortality has proved to be universally significant. In the literature on child health, maternal education has received particular attention, as indeed have all other social, demographic and health characteristics of the mother.

I wish to challenge this focus on mothers and expand on the question of the significance of gender differences when considering the influence of parental education on child health. I think it is still an enigma that in some cultures or subcultures it is fathers' and not mothers' education that becomes a more significant variable in explaining child mortality. There is a need to discuss gender differences in the significance of education and the cultural context within which education finds meaning.

Research on the cultural factors related to infant and child mortality, carried out in a low-income area of Istanbul (1986 - 89), found that the most significant variables associated with child mortality were not attributes of the mother, but attributes of the father and the characteristics of the household. After analysis of more than 500 variables for each woman interviewed, in a multiple regression analysis four variables stood out as being the most significant. These were, in order of significance, the father's education; the household composition; the mother's attitude towards abortion; and the amount of drinking and smoking by members of the family other than the mother. In the sample in the above research, the husbands' formal education surpassed the women's formal education as well as all other criteria in explaining child mortality. I described this research in GŸrsoy-Tezcan (1992).

In view of these results, I argued for the need for a review of the theoretical paradigm that necessitates an almost exclusive linkage of child health to a focus on mother-child bonding. In line with this perspective, education should be viewed within a cultural context that also allows for a comment on gender power dynamics within the family and within society at large.

In a cross-national study by Mensch, Lentzner and Preston (1985), it was shown that mother's education was a more powerful explanatory variable than father's education in rural areas (see Aksit and Aksit 1989). It is suggested that in urban areas variations in fathers' education were more extensive and associated more with class and status differences; perhaps for these reasons, father's education rivalled the explanatory effectiveness of mother's education. Hobcraft, McDonald and Rutstein (1984) showed in their cross-national study that in Latin American countries, mother's education had more explanatory power, while in some Asian and Islamic countries, father's education and occupation and mother's work status emerged as rival predictor variables (Aksit and Aksit 1989:571-572).

Similarly, in a study of the 1982 birth cohorts in Turkey, Toros and Kulu (1988) found father's education to stand out as one of the most important factors associated with infant survival. They report that babies whose fathers do not have primary school education are 1.6

times more likely to die within the first year of life than babies whose fathers have at least finished primary school. Babies whose mothers have no primary school education, however, are 1.15 times more likely to die in their first year. Nevertheless, even though father's education has more explanatory power than mother's education in their study, in their conclusion Toros and Kulu give prime importance to mother's education. They cite mother's level of education as one of the most influential factors affecting child health, and only secondarily cite father's level of education as also ensuring lower levels of infant mortality.

These findings and their interpretation of course pose more questions about the process of change that education initiates or provides, and the ideological significance attributed to education. Nevertheless, the findings show that a father's education can be more significant in explaining child health variables and that we need to look at mother's education within a cultural context that also accounts for gender ideology as it operates within the family.

In my Istanbul study, the women's comparable formal education did not emerge as one of the most important variables. I find it extremely meaningful that the compound variable measuring women's attitudes towards abortion had more explanatory power for child mortality than the variable showing literacy and women's formal schooling. Women with the most conservative attitude towards abortion had the highest child-mortality statistics.

The Istanbul sample suggested two extreme types, representing two different social environments. In the 'bad cases' there is extreme patriarchal control of the woman in that she lives with her in-laws; her husband has a poor education, and thus his dependency on his family is greater; she has internalized reproductive values which leave her without much capacity for autonomy; and there is heavy drinking and smoking in the household.

In contrast to this picture, in the 'good cases' there is high education for fathers and, together with this, a separate, nuclear family residence into which babies are born. The woman's views on abortion are more liberal than religious or secular dictates, indicating a woman ready to try alternatives; and the household is free of the ill-effects of alcohol or cigarette consumption.

It appears from the above research that only one of the most important four compound variables is a personal characteristic of the mother herself: her attitude towards the 'legitimacy' or acceptability of abortion. The other three variables, her husband's education, the presence or absence of agnatic in-laws, and heavy drinking and smoking in the household, are all environmental factors within which the mother tries to nurture her child.

For the Istanbul sample, the husband's education may be a more important determinant because the women are considerably restricted in their environments, and subject to the authority of their husbands in making daily decisions (see GYrsoy-Tezcan 1992).

In response to a set of questions meant to ascertain decision-making behaviour, only a minority of women said they had more say over certain issues than their husbands. In general, the majority of women did not feel themselves to be the decision makers in their households. Thus within this relatively homogeneous low-income group some extra years of schooling did not necessarily translate to autonomy and behaviour change that influences child health<sup>1</sup>.

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<sup>1</sup> In the sample (N-229) the women's formal education ranged from 0 to 11 years of formal schooling: 29 per cent of the women had no schooling, 18 per cent had 1 - 4 years of schooling, 45 per cent had five years of schooling and only 8 per cent had six or more years of schooling. Their husbands had more schooling: only 8 per cent had no schooling at all; 10 per cent had 1 - 4 years, 62 per cent had five years of schooling and 20 per cent had further education.

As for their husbands' education, more education for the husband may mean easier access to important institutions like hospitals and to relevant health-related knowledge. Also, it may mean that the men are less dependent on the world view imposed by their own families. More than the content of the education they have received, their years of schooling may mean an external reference point for the men and thus a break from the patriarchal constraints which also affect their wives and children. The emancipation of men by educational experience may benefit women by allowing men more freedom to support the women in their own lives, which includes their reproductive choices and how they raise their children.

In conclusion, rather than simply concentrating on measuring and assessing education and the mechanisms through which education contributes to child health, we have to look at the gender relations, family dynamics and wider social implications of formal education when thinking of education and its relationship to child health. What is the functional market outcome of education? How much earning capacity and therefore autonomy does it bring to men and women? In what ways (if at all) does it challenge the existing power dynamics within the family and within society? There must be a critical evaluation of mother's and father's education, individually, cumulatively and as these contribute to family dynamics. Social scientists may need to develop new criteria for the successful nurturing of children.

Finally, on the significance of the above discussion in a world where infant and child mortality is decreasing but survival problems are becoming increasingly more complex: research on infant and child mortality inevitably takes the researcher to low-income regions of the world. Thus, the above concerns seem to be confined predominantly to groups with poverty problems. However, similar dynamics may be relevant when looking at health issues of surviving children, including psychiatric disorders. When the focus is shifted away from mortality onto a range of health issues we may find that an analysis of gender power dynamics and their implications for the relationship between health and education becomes a fruitful area of investigation for affluent societies too. Furthermore a shift of focus from concentrating on mothers to an approach that integrates fathers will open the grounds and facilitate the discussion and analysis of the relationship between nation-states, the family, democracy, religion and the institution of education and their influence on child health at national and international levels.

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## **Maternal literacy and health care in three countries: a preliminary report**

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Is literacy a missing link between female schooling and reduced child mortality in developing countries? An affirmative answer might be based on Preston's (1989) model of mortality reduction, which gives a central place to literacy in the spread of improved health knowledge to mothers of young children. Other analysts of the demographic evidence (LeVine 1987; Cleland 1990) have been sceptical about literacy and other skills in the school curriculum, finding it implausible that the level attained in a few years of attendance at low-quality schools during her childhood could be retained by the average woman in her childbearing years and have an impact on her child health care and reproduction sufficient to affect birth and death rates. But answering the question requires measuring literacy directly, which has not been done in demographic research to date. This report presents the first results of literacy assessment in three community-level studies, indicating that literacy skills acquired in schools of rural Mexico, rural Nepal and urban Zambia are retained to some extent into the childbearing years and may affect the reproductive and health behaviour of women with young children.

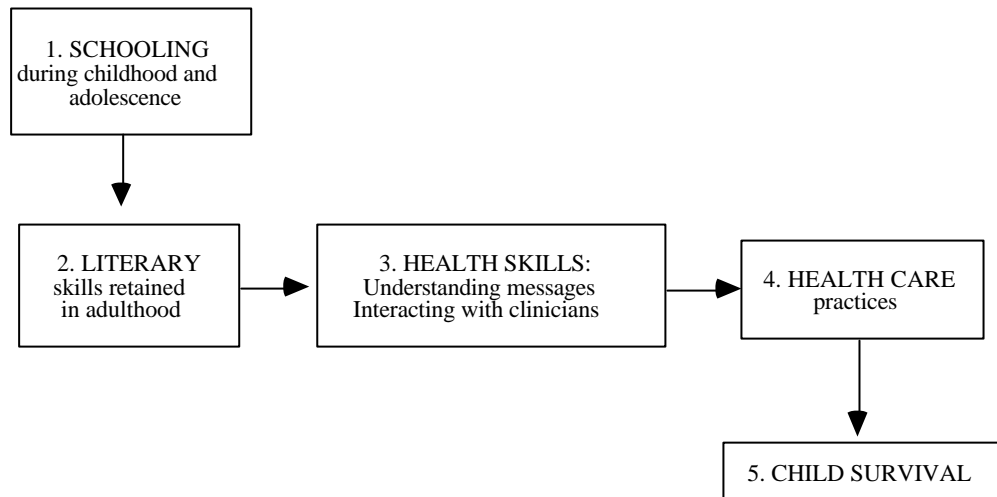
Figure 1 shows a theoretical model of the pathways that might link maternal schooling with child survival through a causal impact of school attendance on literacy, health skills and health-care practices. National censuses and demographic and health surveys have shown robust associations between Boxes 1 and 5 without clarifying the intervening variables that might connect them. There is also a good deal of evidence indicating associations between maternal schooling and health care (Box 4), suggesting that maternal use of health and contraceptive services, as well as domestic sanitary and dietary practices, may be involved, but this still leaves unknown the processes by which attending school during childhood and adolescence affects maternal practices during the childbearing years. Figure 1 proposes a model by which schools do what they are officially intended to do, transmit the literacy skills (Box 2), enabling women to acquire health information and interact effectively with medical personnel (Box 3) on the basis of which they engage in health care practices (Box 4) which reduce the risks to their children's survival. This has seemed an unlikely causal sequence to analysts aware that in many developing countries schooling is of poor quality, there is little apparent support for women to retain literacy skills in their adult lives, and the associations of formal education with mortality and fertility in many populations do not exhibit the thresholds and asymptotes one would expect if they were attributable to the curriculum at a particular level of schooling (such as learning to read in primary school). In other words, the link between Boxes 1 and 2 has seemed implausible, leading analysts to consider more seriously processes other than literacy acquisition to account for the links of schooling to health care and child survival. But the model has not been tested empirically, and that was the aim of the research reported here.

The overall strategy of our research has been to conduct approximate replications of a community-level study, including an interview survey and home observations, in diverse

settings throughout the world that have a substantial population of childbearing women who had attended school. Mexico, Nepal and Zambia were chosen for the first studies because of

**Figure 1**

**Theoretical model linking maternal schooling with child survival through literacy, comprehension of public health information and health practices**



our connections with those countries, but they are also extremely diverse in geographical locations, cultural traditions and socio-economic indicators. Mexico is an 'upper-middle income' country far advanced in its demographic, health and educational transitions, though with a high degree of socio-economic inequality; Nepal is a 'low-income' country at an early stage in these transitions; and Zambia is a 'low income' country that was once wealthier and relatively more developed than it is at present (for example, under-five mortality *increased* by 15 per cent from 1980 to 1992), though it is still one of the most urbanized countries in Sub-Saharan Africa. UNESCO estimates of female illiteracy in 1990 are 15 per cent for Mexico, 87 per cent for Nepal and 35 per cent for Zambia (World Bank 1993). Our Mexican research site was the small town of Tilzapotla, Morelos, located in a rural area unusual for the high proportion of women who had attended school; in Nepal it was Godavari, a rural Kathmandu Valley area similarly advantaged; and in Zambia, an urban neighbourhood of Ndola, a copper-mining town in which residents had access to health and educational services not found in the rural areas.

National data for all three countries show maternal schooling to be associated with lower levels of mortality and fertility. The sample mothers we tested for literacy and language skills had the following mean levels of schooling: Mexico, 7 years (S.D. = 4.1, range = 0-17); Nepal, 1.4 years (S.D. = 2.9, range = 0-12); Zambia, 7.7 years (S.D. = 2.1, range = 0-12). In our Mexico and Nepal research samples, maternal schooling was significantly related to prenatal care, hospital or clinic delivery and contraceptive use, controlling for socio-economic advantages; the Zambia sample also showed relationships between maternal schooling and indicators of health risk, though not the same ones. Thus the 'educational differentials' familiar in the demographic and health literature were found in the three countries and samples being compared.

## What is literacy?

There is no single definition of literacy or approach to its measurement prevailing among contemporary literacy specialists, but all would agree on a definition far broader than a minimal ability to read and write and on the need for direct assessment of the skills involved (Wagner 1992). In this view, literacy is not a dichotomous trait acquired in the first five years of primary school that permits the adult population of a country to be divided into literates and illiterates (as in the convention used by the *UNESCO Statistical Yearbook*), but a package of cognitive and language skills which make it possible to participate in literate discourse and communication, and which can improve during postprimary schooling.

Two basic literacy skills usually acquired in school were the focus of our study: reading and decontextualized language ability. Reading begins with the ability to decode print into speech but progresses through stages that entail comprehension of increasingly complex written texts (Chall 1983). Decontextualized language ability means competence in speaking and comprehending the formal, distanced language of written texts; this is 'oral literacy' (Olsen 1977; Tannen 1982). It is possible to speak a language competently without this ability, particularly among members of a small community whose shared experience creates common contexts that can be referred to implicitly in conversation. Understanding conversational speech depends on sharing the context (e.g. 'They went there yesterday'), whereas decontextualized language as the communicative medium of public institutions presumes no shared context and is highly explicit (e.g. 'The President and Vice-President went to Washington DC on Thursday'). Decontextualized language has distinctive linguistic characteristics (vocabulary, syntax, pragmatics), including the use of superordinate categories (Snow 1990). For example, in answering the question, 'What is a clock?', mastery of decontextualized language is shown by a child who says 'A clock is a machine that tells time', but not by one who says 'They are like watches, but larger' (Snow and Tabors 1993). Research in the United States has shown decontextualized oral language ability to be associated with reading comprehension in school-aged children (Velasco 1989; Dickinson and Tabors 1991; Snow 1991).

Both reading comprehension and decontextualized language ability are relevant to the question of how school attendance affects mortality and fertility because, as skills improved through schooling but not restricted to the curriculum of a specific level, they could be distributed throughout the range of school attainment levels usually studied in demographic research. Furthermore, decontextualized language is dominant in the discourse of health and family planning clinics and public health announcements as well as classrooms.

In this report we discuss the results of five assessments, two of literacy skills (Box 2, Figure 1) and three of health skills (Box 3):

1. Reading Comprehension. This test assessed the ability to decode a first-grade text by reading aloud; and the ability to explain orally, after reading silently, the meaning of health-related passages taken from primary-school texts at third, fifth and eighth-grade levels.

2. Noun Definitions. This is a test of decontextualized oral language skill (Snow 1990). Each woman was asked for definitions of ten common objects such as 'table' and 'dog', in order to explain them to someone who did not know what they were. Responses were scored as formal by such criteria as the use of superordinate categories: for example, 'furniture' for table, 'animal' for dog.

3. Reading Health Advertisements. Each mother was asked to read and then report orally the meaning of passages taken from health information leaflets circulated by the government. This assessed the ability to comprehend printed health messages actually disseminated by the health bureaucracy (except in Nepal, where none were available).

4. Listening to Radio Advertisements. Each mother listened to the interviewer's reading of health information announcements taken from radio broadcasts, and then reported orally on what they meant. This assessed the ability to comprehend health messages broadcast on the radio.

5. Health Interview. The mother was asked about her health and that of her child by a nurse (in Mexico) or doctor (in Nepal). Zambia results are not available. Responses were scored for the amount of information in response to each question the interviewer asked. This assessed the mother's ability to report information fully in a medical setting.

The mother was also asked to estimate the frequency of her reading newspapers and other printed materials. The results from this measure will be published later.

### **Are literacy skills retained by childbearing women?**

To answer the question whether the mothers of young children retain the literacy skills they acquired in school, Column 1 in Table 1 shows for the three samples the zero-order correlations (Pearson  $r$ 's) of a woman's schooling with her performance on literacy tasks. In Mexico, reading comprehension has a 0.44 correlation with years of school attended, in Nepal 0.95<sup>2</sup>, and in Zambia 0.50 (all significant at the .001 level), indicating that there are differentials by schooling in the ability to read and comprehend text. This does not mean that the sample mothers in Mexico and Zambia are reading at the levels of the reading texts used in the grades at which they left school; their performance is lower, indicating either that they did not reach that level originally (which we believe) or that their comprehension deteriorated over time. This represents an educational deficiency, probably attributable to low-quality schools, but it does not confirm the null hypothesis that schooling has no effect on level of adult reading comprehension. On the contrary, the correlations suggest that reading skill is retained during the childbearing years. The same is true of decontextualized language skill as assessed through Noun Definitions, which are correlated 0.72 with maternal schooling in Mexico, 0.67 in Nepal and 0.50 in Zambia ( $p < .001$  in all three cases). More years of school attendance has resulted in better performance on literacy tasks in all three settings. Column 2, Table 1, shows that Reading and Noun Definitions are also highly but far from perfectly correlated with each other in all samples, suggesting that while they share variance, they are not simply indicators of the same skill.

### **Does literacy predict comprehension of health messages?**

As Table 1 (Column 1) shows, maternal schooling is correlated with the ability to read printed health material in Mexico (0.37,  $p < .001$ ) and Zambia (0.65 in English, 0.42 in Bemba,  $p < .001$ ) and with listening comprehension of radio health advertisements in all three samples (0.71 in Mexico, 0.38 in Nepal, and 0.68 in Zambia for English, all at the .001 levels; 0.20,  $p < .05$ , in Zambia for Bemba language). It is particularly noteworthy that unschooled and illiterate women are less capable of understanding radio health messages even when the messages are spoken in a language they understand; this suggests the impact of schooling on aural discourse comprehension. There is also a basis, in the correlations of Columns 2 and 3 on Table 1, to propose that literacy skills as assessed through Reading and Noun Definitions influence a woman's ability to understand public health messages in print and over the radio.

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<sup>2</sup>. In the Nepal sample, only 23 out of 74 women had attended school at all, and the test was administered in a preliminary version that served to increase further its correlation with maternal schooling. The test procedure was modified for its later use in Mexico and Zambia.

### Does literacy predict health interactions?

As indicated in Table 1, the mothers' performance on the Health Interview in Mexico and Nepal is correlated with their schooling (0.40,  $p < .001$  and 0.31,  $p < .01$ ), and with some of the other skill variables. In Mexico, health interaction shows almost no relationship with reading skills but is related to Noun Definitions (0.37,  $p < .001$ ) and Listening Comprehension (0.30,  $p < .001$ ), both of which involve the ability to use decontextualized language. In Nepal, with a small number of readers, it is related to Reading Level (0.47,  $p < .05$ ) as well as Noun Definitions (0.46,  $p < .05$ ) and Listening Comprehension (0.30,  $p < .01$ ). Thus more effective interaction with a health practitioner is positively correlated with school attendance, literacy skills and aural comprehension of health messages in Mexico and Nepal, though at a lower level than the other variables are related to each other, as might be expected from the fact that giving information to a health care provider resembles school testing less than the other literacy and health tests. We cannot yet answer the question of whether literacy predicts health interactions with any certainty, but the results are positive enough to pursue the problem in multivariate analysis.

**Table 1**

**Intercorrelations of maternal schooling, literacy skills, comprehension of health advertisements, and health interactions.**

	1. Maternal schooling	2. Reading level	3 Noun definitions	4. Reading: health ads	5 Listening: radio ads
<b>MEXICO (N=85-109)</b>					
Maternal schooling	X				
Reading level	0.44+	X			
Noun definitions	0.72+	0.47+	X		
Reading: health ads	0.37+	0.69+	0.56+	X	
Listening: radio ads	0.71+	0.61+	0.74+	0.73+	X
Health interview	0.40+	0.13	0.37+	0.07	0.30+
<b>NEPAL (N=74)</b>					
Maternal schooling	X				
Reading level	0.95+	X			
Noun definitions	0.67+	0.63+	X		
Listening: radio ads	0.38+	0.49*	0.40+	-	X
Health interview	0.31**	0.47*	0.46*	-	0.30**
<b>ZAMBIA (N=160)</b>					
Maternal schooling	X				
Reading level	0.52+	X			
Noun definitions	0.50+	0.55+	X		
Reading ads: English (Bemba)	0.65+ (0.42+)	0.75+ (0.63+)	0.49+ (0.43+)	X	
Listening: English (Bemba)	0.68+ (0.20*)	0.65+ (0.042+)	0.55+ (0.37+)	-	X

\* $p < .05$  \*\* $p < .01$  + $p < .001$

### Conclusions: pathways from schooling to health care

This brief report suggests that mothers who attended school longer in three socially and culturally diverse populations retain a higher level of literacy from their childhood school

experience, and that even though their reading performance is below the level at which they left school, their literacy in adulthood enables them to understand health messages in print and over the radio with greater proficiency and, less consistently, to interact more effectively with a nurse or doctor. These findings support a model of demographic and health transition such as Preston's (1989), in which maternal literacy plays a critical role in facilitating the spread of health information. Despite the limitations of small samples studied with a restricted number of instruments, these preliminary results demonstrate that literacy can be considered part of the pathway through which the schooling of women affects demographic change; and the acquisition of decontextualized language skill, 'oral literacy', has been identified as a potential mediating factor worthy of further research. This skill represents the language of the classroom, the clinic and other bureaucratic settings, and it appears that its acquisition by schoolgirls in childhood makes them better able to use bureaucratic health services as mothers. This literacy skill seems to be acquired even in low-quality schools and to increase with the years spent in school, suggesting an impact corresponding to the most widespread relationships of schooling with mortality and fertility.

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## Parental education and child survival: can the DHS tell us anything new?

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The World Fertility Survey (WFS) and the Demographic and Health Surveys (DHS) have been the foundation for most generalizations regarding the causal impact of parental education on child mortality. Given the limitations of these data sets, it is appropriate to question whether conclusions based on these surveys are justified; a clear understanding of the true relations between education and mortality must precede further study of the mechanisms linking the two. This caution is especially appropriate given that the DHS (including upcoming phases) will continue to be the main source of cross-national information on this relationship for the next ten to fifteen years. We also explore whether further analysis of the DHS is likely to contribute to our understanding of the link between parental education and child mortality.

Research on determinants of child survival based on the DHS must first consider the limitations of retrospective birth histories and child health information contained in the DHS. The failure of many previous studies to account for several obvious shortcomings of these data has undermined the credibility of research findings: see, for example, Hobcraft, McDonald and Rutstein (1984); Cleland and van Ginneken (1988); Bicego and Boerma (1991); and Hobcraft (1993). A few critical, neglected limitations of the DHS that confront all hypothesis testing on this subject are noted below. These problems apply to data collected in the first phase of the project (up to 1990), as well as to those now emerging from the second and third phases.

**Inadequate information on mother-child co-residence.** While respondents are asked whether currently alive children are living with them, they are not asked whether either surviving children or those now dead resided with them in the past, when the children were exposed to the risk of mortality. For those children fostered out or reared by their father at an early age, advantages of maternal schooling would hardly seem to apply. The absence of a childrearing history is especially problematic for analyses that seek to link parental education and child survival, in light of evidence of moderately high levels of fosterage under age five in some areas, especially in West Africa (Page 1989); elevated mortality risks of fostered children (Bledsoe and Brandon 1992); and possible differences in fostering practice according to mother's education. Some mothers, for example, migrate alone to urban areas to pursue advanced schooling or to capitalize on their schooling in the labour market (Lloyd and Desai 1992).

**Differential omission of births and child deaths by level of education.** It is widely believed that less educated women are more likely to omit births from retrospective histories, especially those of children who died (Rutstein 1983). This is presumed to result in underestimation of child mortality differentials by level of education. Among the cross-national analyses on which are based most generalizations concerning parental education and child mortality, none has considered whether the completeness of birth or child-death reporting varies systematically across countries by level of education; this has been raised as

an afterthought by Cleland (1990) and Hobcraft (1993) to explain implausible findings, and dismissed without scrutiny. Satisfactory accounting of differential omission would involve comparison by level of education of (1) mean number of children born by age of mother, to see whether average parities increase consistently with age; (2) sex ratios at birth, to detect selective omission of males or females; (3) infant and child mortality rates by period for similar age groups, to examine the plausibility of trends; and (4) the proportion of recent deaths before age five contributed by infant deaths, and the proportion of infant deaths contributed by neonatal deaths. Such an assessment may find that the weaker association between parental education and child survival observed in sub-Saharan Africa than in higher-income regions is attributable to more consistent reporting or omission of events in African countries than elsewhere, for reasons of cultural or socio-economic homogeneity, for example.

**Differential exclusion from DHS sample by level of education.** Mothers who died during their reproductive ages are excluded from the DHS sample. Orphaned children of these mothers, also excluded, are believed to experience greater risks of dying at early ages than children whose mothers are alive (United Nations 1994). Maternal mortality may be more common among uneducated than educated mothers, as a result of the former's non-modern health beliefs and practices or their poorer access to health services. In this case, effects of education on child mortality would be underestimated using the DHS, particularly where levels of maternal mortality are high. This seems most likely in sub-Saharan Africa, given, for instance, that the DHS recently recorded much poorer knowledge of modes of AIDS transmission among unschooled women in Burkina Faso, Kenya, Malawi, Tanzania, and Zambia.

**Insufficient observations of morbidity and health interventions.** In a review of DHS health data, Hobcraft (1993:172) finds 'fairly clear evidence of differentiation according to the level of mother's education in the prevalence, but more especially in the treatment of childhood diseases'. The evidence is far from clear. The most comprehensive review of these data notes that 'in most cases it is not possible to judge the quality of the data' (Boerma et al. 1994:17). Better reporting of disease incidence by more educated mothers may account for the generally weak relationship between educational attainment and child morbidity, and more educated mothers may report disease episodes more completely in some countries than in others, as a result, for instance, of poor interviewing and field supervision in some surveys. The observed education-morbidity relationship, based on living children only, may also be attenuated if, as seems likely, children of unschooled mothers are more likely to die from disease and hence be excluded from calculation of disease prevalence. Even assuming non-selective mortality, most surveys record insufficient cases of child morbidity, prevention, treatment and nutritional status for women with secondary or higher schooling to assess through multivariate analysis whether differences in these measures are related to maternal education as compared to other factors.

In sum, these data problems suggest a need to further explore the association between child health and survival and women's education as a prerequisite to more detailed investigation of possible causal pathways involved in this relationship.

The core questionnaires of DHS-3 developed in 1993, like their predecessors, provide insufficient information to test hypotheses currently in vogue regarding parental schooling and child survival. The most noteworthy additions of DHS-3 for research in this area are questions on income earned in time units for women who worked for cash in the last twelve months; on who decides how the woman's income will be used (woman, husband or partner, joint decision, someone else); and on ideal number of male and female children. These questions will probably have negligible utility as measures of female autonomy and

differential valuation of children as a result of high levels of measurement error. Furthermore, USAID's long-standing interest in the DHS as a vehicle for collection of basic information on fertility and contraceptive use suggests that the fourth set of DHS questionnaires to be developed and implemented in 1997 is unlikely to stimulate further research on pathways linking parental schooling and child health outcomes. A challenge for the many analysts of DHS data in future will therefore be to make more creative use of existing information in explorations of this topic.

Despite the many cautions outlined above, the DHS can be an important source of information on this issue. One promising area for future research, unexamined to date, is the role of 'passive' education in promoting child survival. By this we mean modern identities, occupational, childrearing and communication skills, reproductive and child health knowledge and beliefs imparted outside of primary and secondary schools through prolonged exposure to and absorption of information from print, radio and television media, and through interaction with 'modern' individuals, including husbands, relatives, neighbours and group associates and with modern institutions, including health facilities. Presumably, passive reception of ideas and messages is facilitated by lifelong residence in large urban centres, increasing density and heterogeneity in such centres, the communication revolution under way in more advanced developing countries, and the increased volume of circular migration in most countries during the process of urbanization. Universal health education from non-school channels and subsequent behavioural change parallel the notion of idea diffusion popular in studies of family planning program growth.

The sum of maternal attributes acquired outside of schools in modernizing cities may be sufficient to overcome any child-survival disadvantages associated with lack of schooling. Confirmation of this hypothesis would have particularly important implications for child survival in sub-Saharan Africa, in light of projected increases in the number of girls not receiving primary schooling (Couclough and Lewin 1993), and evidence of constant or increasing mortality at ages 1-4 (when education effects are most pronounced) in Kenya, Niger, Nigeria, and Zambia, which may reflect a regional trend.

This hypothesis is explored using pooled regional samples of post-neonatal infants (1-15 months) and young children (16-59 months) born in the largest cities of 15 countries. The conventional age group of 0-12 months is not examined because neonatal deaths are known to be largely biologically determined, and because of the pronounced heaping at age of death twelve months in all of these surveys, which may reflect an upward or downward trend and may differ by maternal characteristics. The Table presents estimated relative risks of mortality by level of educational attainment among mothers who are lifelong city residents (natives), and mothers who migrated to cities directly from villages during adulthood. To obtain independent estimates of schooling effects, the models are controlled for characteristics that proxy exposure to modern ideas regarding childrearing, as well as other variables commonly associated with child survival in low-income countries (variables shown in notes, estimates not shown). In short, the results do not indicate that women who grew up in cities without attending school experience significantly higher child mortality risks than the most educated city natives. We interpret this to mean that uneducated women who are exposed to modern media, marry educated or professional husbands, or experience the moderate fertility patterns and modern household facilities characteristic of modernizing cities, enhance their children's survival chances to the level conferred by formal education. We leave it to others to examine whether urban schooling increases women's likelihood of experiencing these social and reproductive conditions.

**Interactive migrant status-maternal education logit models of the relative risks of infant (1-15 months) and child (16-59 months) mortality in big cities of developing countries**

	Age	
	1-15 months	16-59 months
<b>Urban native</b>		
<b>Secondary+ education</b>	1.000	1.000
<b>Primary education</b>	1.373	1.611
<b>No education</b>	1.257	1.740
<b>Rural-urban migrant:</b>		
<b>Secondary+ education</b>	1.214	1.046
<b>Primary education</b>	1.754*	3.105**
<b>No education</b>	1.576	3.781**
<b>Constant</b>	-6.237****	-5.003**
<b>Model <math>\chi^2</math> (df=22, 23)</b>	478.301****	245.722****
<b>Cases</b>	13,543	6,935

Significant at \*p<.10, \*\*p<.05, \*\*\*p<.01, \*\*\*\*p<.001, two-tailed test

Notes

1. Based on births in largest cities of 15 countries: Bolivia, Ecuador, Mexico, Peru, Egypt, Morocco, Sudan (north only), Tunisia, Ghana, Kenya (south only), Mali, Senegal, Togo, Uganda (south only), and Indonesia.
2. Migrant births are those occurring in city (post-migration).
3. Models are controlled for husband's level of education, husband's occupation, ownership of television, ownership of radio, weekly listening to radio, floor material, drinking water source, lavatory facilities, electricity in dwelling, length of preceding birth interval, length of succeeding birth interval (16-59 months only), birth order, mother's age at birth, and region of residence (North Africa, sub-Saharan Africa, Latin America, Indonesia).

Our results also imply that the relationship between maternal education and post-infancy survival is mediated by location in which schooling is received. After settling in the city, migrants who (presumably) received secondary schooling in rural areas achieve child survival chances similar to those of the most educated lifelong city residents. Less educated migrants, however, experience child mortality risks over three times as high as more educated urban natives, as well as higher risks than low-educated natives and more educated migrants (not shown). The quality of primary schooling appears to vary more between rural and urban areas than does the quality of later schooling. These findings, based on data from a broad cross-section of countries, obviously suggest a need to further investigate mechanisms by which schooling in urban or rural areas influences child survival. Since schooling in low-income countries is generally superior in big cities, owing to more resources, better teachers, and more modern content, it seems premature to conclude, as Cleland (1990) does, that quality of schooling is an unimportant influence on child survival.

We have presented this exploratory evidence to show that the DHS can still be useful in examining the relationship between parental education and child mortality despite some important limitations. Further research on this topic using the DHS needs to take account of these limitations, particularly in settings where they are most likely to influence mortality differentials.

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## Maternal education and child survival: anthropological responses to demographic evidence

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The positive effect of parental education on child survivorship is well established. The risk of mortality of the under-fives decreases by 2-5 per cent with each year of maternal schooling (Cochrane, O'Hara and Leslie 1980; United Nations 1985). The demographic evidence points to a consistent and pervasive monotonic decline in infant and child mortality associated with increasing education of mothers. It is not clear, however, why education should apparently have such a universal effect on the risks of child death nor what constitute the vital ingredients of this powerful relationship: there is a great need to unpack the contents of the relationship between mortality and education. Anthropology can often be used to interpret

demographic associations; here we highlight some of the anthropological responses to questions raised by demographic evidence.

One of the significant features of this relationship is the fact that it appears to hold across cultures. It might be plausible to argue that education therefore has some universal feature that affects all individuals in the same way. Does education lead to a shift in behaviour, in attitude or perhaps thinking? Anthropologists for their part have concentrated on the acquisition of literacy rather than education *per se*. Initially concerned with showing that preliterate thought was less rational than literate thought, anthropologists are now keen to show that rationality is an essential characteristic of all societies. In any event it is not the acquisition of literacy alone that affects mortality since even two or three years of schooling (rarely enough to make someone literate) has a beneficial effect on child survival. It is more useful to see education not as a single act but as a 'social process involved in instructing, acquiring and transforming knowledge' (Pelissier 1991:75). It is not merely a question of acquiring specific knowledge, but also of individuals' social identity being transformed by the fact of having been schooled. It is pertinent to the debate on the effect of education to view it as an empowering process. Not only is education a process associated with socio-economic development, but it can transform demographic regimes through changes in individual actions. Education has a transformatory force on individuals, social relations and actions (Goody 1977:2-3; Akinnaso 1981:164; Street 1990:6). It is possible that despite variations in the composition of the educational process, its transformatory effect produces similar results in different settings.

If knowledge is the key ingredient to this relationship we might expect better educated mothers to be more successful at preventing the death of their children because of either their school-derived wisdom or their increased openness to non-familial learning. However, the evidence demonstrates that uneducated and educated mothers hold similar views about the causes, prevention and treatment of disease (Caldwell, Reddy and Caldwell 1983; Lindenbaum, Chakraborty and Elias 1985; Zeitlyn and Islam 1993; Basu 1993). Additionally, the wholesale adoption of new ideas and the rejection of old ideas can have dire consequences for children's survival chances: for instance in Brazil, women have 'learnt' that bottlefeeding is better than breastfeeding (Scheper-Hughes 1992:316-326). Data from the Demographic and Health Surveys (DHS) suggest that education does not necessarily make mothers better hygienists (Cleland 1990; Boerma, Sommerfelt and Rutstein 1991).

It is commonly assumed that greater empowerment and autonomy are inevitable consequences of schooling and that these are the main pathways that link education to better child survival. When Caldwell (1979:408) observed that education increased the likelihood of independent decision making he seemed to be confirming an obvious expectation. More recent studies (Zeitlyn and Islam 1993; Jeffery and Jeffery 1993) show that, despite the high value placed on education, educated women are if anything less autonomous than their uneducated counterparts, at least in South Asia. In Islamic societies education may be an asset that enables a woman to make a good marriage. The better the marriage, that is, the wealthier her husband, the more likely it is that she will be confined to strict purdah. It is the less educated women who are forced to become independent decision makers because of the difficult social circumstances in which they find themselves (Zeitlyn and Islam 1993: 5,7).

If education does not necessarily impart better knowledge or greater autonomy to mothers what can it be achieving? An almost universal characteristic of education, more so than the actual content of lessons, is the respect that it commands. Women who are educated gain esteem and self-worth. The consequences are hard to evaluate, but studies are beginning to show that educated women are likely to be better service-users than less-educated women. The complexities of health care services can be daunting and require a combination of

expertise and confidence to cope with bureaucracy. Women often need to be very resourceful and it seems that education is recognized as an asset in this context (Nations and Rebhun, 1988: 153-157; Kaufmann 1991:11; Scheper-Hughes 1992: 100). Being educated often enhances the ability of women to express themselves and communicate effectively with health workers (Karki and Levine 1993). Furthermore, they are likely to be better treated by health workers (Maclean 1974). By seeking an explanation in terms of the higher-quality health care that educated mothers may be able to evoke, it becomes possible to explain why, for instance, the difference in childhood survival related to maternal education persists in urban areas where there is a much greater availability of health services (Cleland and Van Ginneken 1989; Bicego and Boerma 1991).

Thus the positive effect of education on women's care for their children manifests itself less in direct changes in domestic behaviour but more in a general transformation of women's social value. This may or may not be exhibited in greater autonomy — that depends on local mores — but it does appear to affect the quality of service use by women. In this sense education continues to remain a proxy for other social factors. The question could be turned round by seeing, not an educated woman as the product, but education as part of an individual process. Why do some women in adverse circumstances persist in getting educated? Do the same characteristics that led them to study make them more confident, more able to confront recalcitrant health workers? As Das Gupta (1990: 490) says, women's 'basic abilities and personality characteristics... independently of education, occupation, income and wealth' can alone explain to a large extent the survival chances of their children. This leads us to posit that one reason, though not the only one, for the strong association between maternal schooling and child survival is that education is acting to reinforce pre-existing circumstances and traits that are favourable to effective mothering in later life.

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## Maternal education and childcare

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Why are children of educated mothers exposed to lower risks of morbidity and mortality than those of mothers with little or no education? A search for answers to this question is guided by academic as well as programmatic interests. This paper addresses this issue from a programmatic and policy perspective. It focuses on the identification of mechanisms through which mothers' education might influence the risk of child mortality.

In terms of public policy, improvements in female education and improvements in health services are not interchangeable as far as their effects on infant and child mortality are concerned. The effect of female education is complementary to that of health services. In fact, under certain circumstances the effects of the two factors may even be synergistic, because both facilitate changes in health seeking behaviour. These points were illustrated in an earlier study by comparing education-specific infant mortality rates among rural women of two states in India, Kerala and Uttar Pradesh (Jain 1985b). The present study takes that

analysis one step further and focuses on the changes in actual behaviour associated with mothers' education. The aspects of behaviour changes that have been selected for illustrative purposes refer to the care of children, which is also believed to be related to child health and mortality.

This paper does not focus on the determinants of child health and mortality, nor on what mothers learn through schooling which might in turn influence their actual behaviour. For the latter, the reader is referred to other sources (see for example, Joshi 1994 and literature cited therein).

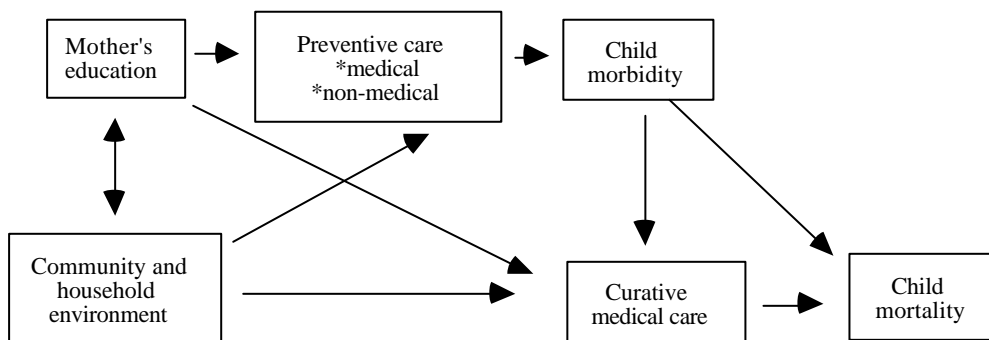
### Analytical framework

The analytical framework used in this analysis is similar to the one used in an earlier analysis, which highlighted the importance of timing and type of care for understanding the determinants of infant mortality in India (Jain 1985a). In trying to identify the mechanisms through which mother's education affects child mortality, I have focused on maternal behaviour with respect to care of the child, considering for this purpose the period from its conception to the date of the survey (see Figure 1). The care variable is first divided into preventive and curative care; preventive care can be further subdivided into medical and non-medical elements. A time dimension can be added to both the preventive and curative care in order to relate it to the age-dependent outcome variables such as neonatal, postneonatal, infant, or childhood mortality. For example, the preventive care during the antenatal period and during the delivery of the child would influence the level of neonatal mortality. The influence of these factors will diminish in the progression from neonatal to post-neonatal mortality and to mortality beyond infancy.

It is hypothesized that the mother's education influences the degree of preventive care which in turn determines the extent and severity of sickness suffered by a child. Mother's education in conjunction with the severity of an illness episode determines the need and use of curative medical care which in turn determines the outcome of a particular episode of sickness.

**Figure 1**

**Schematic presentation of relationship between mother's education and child mortality**



The availability of medical services can modify the relationship between mother's education and care received by a child. It is hypothesized that since all mothers can be assumed to be equally interested in saving the life of their children, they, irrespective of their education, will seek curative care within their means and depending upon the severity of illness. For this reason, the association between mother's education and curative care is

likely to be weak. On the other hand, educated mothers are more likely to use preventive care than mothers with little or no education, because education may lead them to modify their behaviour to reduce risks, in general. While the extent and the severity of illness is also determined by factors other than preventive care, such as availability of safe drinking water, these factors are not included in this analysis because it is concerned with the mechanisms and not the determinants of child morbidity and mortality. For this reason, community and household environmental factors are treated as covariates of maternal education.

### Data and method

The data for the present study are taken from a representative sample survey of married women of reproductive age conducted in two districts of Gujarat (see Visaria, Visaria, and Jain 1994 for further details of the survey). These districts had a combined population of 4.4 million in 1991. Women included in the survey were asked about antenatal, perinatal, and postnatal care for the last two live births preceding the survey. They were also asked about their health-seeking behaviour in terms of visits to a health facility within six months and the purpose of those visits. The survey does not contain information on non-medical care such as nutrition or food intake during pregnancy or about cleanliness and hygienic practices. However, the available information is adequate for assessing the effect of maternal education on preventive and curative medical care.

The index of preventive medical care is constructed from the following eight items:

- I. Antenatal Care
  1. Pregnancy registered with ANM
  2. Blood sample for haemoglobin test taken
  3. Iron and folic acid tablets given
  4. Tetanus injection given
- II. Perinatal Care
  5. Child delivered by trained medical professional
- III. Post-natal Care
  6. DPT injections given
  7. Oral polio vaccine given
  8. BCG injection given

In terms of curative medical care, I have first considered a theoretical construct of autonomy that indicates whether or not the mother requires permission from her in-laws or husband to buy clothes for her children. The degree of her autonomy in buying clothes is then compared with the degree of her autonomy in taking a sick child to the doctor<sup>3</sup>. Next considered is whether or not the mother has visited a health facility during the six months before the survey, and if so, whether this visit was for the treatment of her sick child. This index of curative care is different from one based on information about the illness of a child and whether or not the mother sought medical treatment.

The effect of maternal education on preventive and curative medical care is examined separately for rural and urban areas to control for the differences in community environment in availability of social amenities such as safe drinking water, and availability of medical or health services. I have also adjusted the means and percentage for each education category for the effect of other factors by using the Multiple Classification Analysis. Other factors included in the analysis as main effects are: place of residence (rural, urban); district of residence (Bharuch, Panchmahals); exposure to mass media (radio, cinema and newspaper);

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<sup>3</sup> See Visaria 1993 for various indicators of female autonomy, its determinants and effect on contraceptive use.

and ownership of modern consumer durables. The two residence factors provide a control for the differences in the availability of medical services and other social amenities; exposure to mass media provides a control for information obtained or disseminated from these channels on hygienic practices and availability and importance of using medical services; ownership of modern objects provides a control for the economic status of the household. In addition, age of the mother is included as a covariate to control for the life-cycle stage of the mother.

## **Results**

The infant mortality rate in Gujarat state in 1989 was about 86 deaths per 1000 live births in comparison to 91 for all of India. The infant mortality rates in 1989 were 92 in Bharuch and 99 in Panchmahals districts. I have not estimated the education-specific infant or child mortality rates for the two districts included in the present study, nor the effect of care variables on the levels of infant and child mortality in these two districts.

The index of preventive medical care (PMC) varies between 0 and 8; 29 per cent of children received no preventive care and only 3 per cent received the full care. The average value of this index is 2.9 with a standard deviation of 2.6. The PMC index by mother's education, shown in Table 1, clearly indicates that the use of preventive medical care increases with education. The relationship holds in both rural and urban areas and even after adjusting for the effects of other factors mentioned earlier. The adjusted averages shown in column 6 indicate the net effect of mother's education on the increased use of preventive medical care.

Table 2 shows the degree of autonomy in purchasing clothes for children and in taking a sick child to the doctor. While 27 per cent of the mothers said that they can buy clothes for their children without the permission of their in-laws or husband, 58 per cent said that they can take a sick child to the doctor without such permission. The effect of mother's education on perceived autonomy with respect to buying clothes, a behaviour that can be postponed, is more pronounced than its effect on autonomy with respect to taking a sick child to the doctor, a behaviour that cannot be postponed. Fifty-six per cent of mothers with no schooling said that they can take a sick child to the doctor without the permission of their husband or in-laws. This adjusted percentage is much higher than the 37 per cent of mothers with at least eight years of schooling who said that they can buy clothes for their children without any permission. These comparisons suggest that mothers will do whatever is within their means and whatever is required as far as curative care is concerned and that their education level plays a minor role in health-seeking behaviour to cure a sick child.

The effect of maternal education on actual behaviour in regard to curative care is indicated by the percentage of mothers who have taken their children to a health facility during the six months before the survey. About 18 per cent of women visited a health facility during this period; about 30 per cent of them did so in connection with the health of their children; 90 per cent of these visits were to an outpatient clinic, to take care of an illness episode, and seven per cent were for the immunization of their children. Thus, only about six per cent of the women visited a health facility for curative medical care of their children. As can be seen from Table 3, maternal education has no effect on this index of curative medical care in rural as well as urban areas.

**Table 1**

**Average index of preventive medical care received by mothers and their last child by mother's education, Gujarat, 1989**

Mother's education (years of schooling) (1)	Number of women (2)	Average preventive medical care received			
		Rural (3)	Urban (4)	Total (5)	Adjusted (6)
0	3437.00	2.3	3.3	2.3	2.6
1-4	362.00	3.4	3.8	3.5	3.3
5-7	518.00	4.1	4.3	4.2	3.6
8+	540.00	5.0	5.1	5.0	4.1
Total	4857.00	2.7	4.2	2.9	2.9

Note: Preventive medical care includes antenatal, perinatal, and postnatal care. The index ranges from 0 to 8. Means for the total sample are adjusted through Multiple Classification Analysis for the main effects of place of residence (rural/urban), district of residence (Bharuch, Panchmahals), exposure to mass media, and ownership of modern objects, and age of the mother as a covariant.

**Table 2**

**Percentage of mothers who do not require permission of husband or in-laws for buying clothes for children and taking sick child to doctor by mother's education, Gujarat, 1989**

Mother's education (1)	Number of women (2)	Permission not required			
		Buying children's clothes		Taking sick child to doctor	
		Observed (3)	Adjusted <sup>a</sup> (4)	Observed (5)	Adjusted <sup>a</sup> (6)
0	3472.00	22	25	54	56
1-4	364.00	33	27	60	58
5-7	517.00	36	28	66	53
8 or more	569.00	49	37	74	68
Total	4922.00	27		58	

<sup>a</sup> For the procedure to adjust percentages, see Note, Table 1

In brief, maternal education increases the use of health services for preventive medical care but has no effect on their use for curative medical care. Since these relationships are not affected by the place of residence, it can be concluded that the different availability of health services does not influence the relationship between a mother's education and her use of these services. However, the effect of maternal education on care variables in the absence of health services cannot be ascertained without actually considering the availability of these services at the community level.

In order to indicate the joint effect of mother's education and availability of health services, the information in Table 1 is shown in Table 4 in a slightly different form.

**Table 3**

**Percentage of mothers who took their child to outpatient clinic at a primary health centre or subcentre during the six months before the survey, Gujarat, 1989**

Mother's education (1)	Number of women. (2)	Visited health facility (%)			
		Rural (3)	Urban (4)	Total (5)	Adjusted <sup>a</sup> (6)
0	3785.00	6	6	6	6
1-4	390.00	5	3	4	4
5-7	578.00	9	6	8	8
8+	655.00	6	3	5	6
Total	5408.00	6	5	6	6

<sup>a</sup> For the procedure to adjust percentages, see Note, Table 1

First the index of preventive medical care for each education category is expressed in relation to the value of this index for mothers with no schooling. The results for rural and urban areas are shown separately in columns (2) and (3). These results indicate the effect of education at different levels of the availability of health facilities. Second, the ratio of urban to rural values of this index for each education category is shown in column (4), which indicates the effect of medical services at different levels of mother's education. The health services in urban areas can be assumed to be more available than in rural areas. If so, columns (2) and (3) suggest that the effect of mother's education diminishes with the expansion in health services; nevertheless, it remains quite substantial. In rural areas, mothers with at least eight years of schooling are twice as likely to use health services for preventive medical care as those with no schooling. In urban areas, the likelihood of the use of these services for preventive medical care increases by 50 per cent with the increase in mothers' education from none to eight years of schooling.

**Table 4**

**Relative index of preventive medical care by mother's education, Gujarat, 1989**

Mother's education (1)	Rural (2)	Urban (3)	Ratio of urban to rural (4)
0	100	100	143
1-4	148	115	112
5-7	178	130	105
8+	217	155	102

Source: Columns 3 and 4 in Table 1.

Column (4) indicates that the expansion in health services increases their use for preventive medical care among mothers with no schooling to a greater extent than among mothers with higher education. The effect of greater availability of health services appears to diminish with an increase in mothers' education. It may be tempting to conclude that a similar level of preventive medical care can be achieved either by expanding the availability and quality of health services or by increasing female education; however, such a conclusion will not be appropriate for two reasons. First, since these data do not reflect the use of services provided through the private sector, the effect of education may be underestimated,

and the extent of this underestimation in urban areas may be higher than in rural areas. If so, the effect of female education and the effect of improvements in health services would be additive. Second, there is a time lag between changes in education policies and realization of their effect on female education and eventually on maternal behaviour in the use of existing health services. On the other hand, expansion in health services can disproportionately change the behaviour of those women with little or no education who are already going through their childbearing period; investments in female education are unlikely to have any effect on the behaviour of these women.

### **Concluding remarks**

A number of hypotheses have been advanced to explain the relationship between maternal education and child mortality. For example, Caldwell and McDonald (1981) put forward the hypothesis that 'schooling brings in a new family system in which children (and women) are awarded higher priorities in terms of care and consumption than in traditional societies'. Cleland (1990) discarded the hypothesis about domestic hygiene advanced by Lindenbaum, Chakraborty and Elias (1985) as a pathway linking maternal education to child survival. He then advanced a number of hypotheses, one of which stated that 'schooling enhances knowledge about effective ways to prevent, recognize, and treat childhood illnesses'. Very few studies, however, present information on the effect of maternal education on the type and timing of care. The analysis presented in the present study shows that the level of maternal education is related to the increased use of available health services for preventive but not for curative care. Moreover, these relationships are not greatly affected by the different availability of health services through the public sector. In fact, availability of these services has an important and substantial effect on the behaviour of women with no education. These findings need to be confirmed by further analysis of these data by incorporating the use of health services provided through the private sector; and by considering the availability of health services at the community level.

The lack of a relationship between maternal education and curative medical care observed in this study may be an artefact of the index of curative care used in this study. This index is made up of two components: (1) the probability that a mother has a child who was sick during the six months before the interview, and (2) the probability that the sick child was taken to a health facility. The value of the first component is likely to decrease with an increase in maternal education because the extent of preventive medical care increases with maternal education. If so, the value of the second component, the probability of taking a sick child to a health facility, is likely to increase with an increase in maternal education. We have no direct information to test this hypothesis.

Another factor that needs to be considered in understanding the effect of maternal education is the severity of sickness. It is likely that there is a threshold in terms of the severity of sickness beyond which a majority of mothers, irrespective of their education, would seek curative medical care to save the life of their children. It is below this threshold level that one may find a positive relationship between maternal education and curative medical care. Given the cost of medical care, mothers with low or no education may ration the use of health services for curative purposes whereas mothers with education and resources may over-use the available health services for curative purposes. Some of this over-use of health services may not be effective in reducing child mortality; however, some of it may reflect an early intervention by educated mothers which reduces the incidence and severity of later illness episodes and, thereby, the need for emergency care. Thus, a proper understanding of the effect of maternal education on the use of health services for curative

purposes would require information on the incidence and severity of sickness, timing, and type of care sought by mothers.

While it is important to understand what it is in schooling that changes maternal behaviour, significant progress can be made by focusing and documenting the relationship between maternal education and type and timing of care received by children and their mothers during the gestation period and at the time of delivery. This information can then provide important insights to design health service programs and enhance their use to reduce infant and child mortality.

It is unnecessary to debate the relative importance of female education and primary health care, a debate started by Mosley (1983) in analysing macro-level data from six provinces in Kenya. Mosley (1983) claimed that 'child survival is primarily determined by the social and economic resources in the child's family'. An analysis (Jain 1985a) of the macro-level data from India did not support this claim, which has also been refuted by LeVine and Dixon (1990). The Indian study demonstrated the importance of both medical factors and socio-economic factors such as maternal education and household-level poverty. The present study based on micro-level data further corroborates the importance of both the maternal education and medical-care variables, at least those related to preventive care. Incorporation of non-medical care, for example, practices related to infant feeding, and preventive care made possible by the availability of social amenities like safe drinking water and waste disposal, will further enhance the explanatory power of the analytical model used in the present study.

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## **Maternal education, fertility and child mortality: disentangling verbal relationships**

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While the statistical picture on the quite dramatic universally negative relationship between maternal education and child mortality needs no further sophistication to be validated, the actual behaviours or attitudes or abilities that lie behind the statistics are another matter altogether. In spite of much effort to distil the more important of these behaviours, attitudes and abilities, the conclusions reached are far from dramatic or even universal.

Two questions can be asked. The negative relation between maternal education and child mortality is universal, but are the causal mechanisms that underlie it much more specific to the cultural, spatial or temporal context? Does education confer different advantages on women in different settings, advantages which then, coincidentally or otherwise, all end up in the better survival of children? This is not completely improbable, given the range of possible routes to low mortality and the range of socio-economic and cultural environments in which women may acquire some education, as well as the range of schooling or teaching processes that pass for education in these different societies. It is also not improbable, given the amount of contradictory evidence that seems to be emerging on the possible mediating factors in the education-mortality relationship (Hobcraft 1993).

The second question is more methodological. Our techniques of data collection and analysis are steadily improving, but are they still unable to capture much of the reality of women's everyday lives, especially their lives with their children? Perhaps some matters simply cannot be quantified even if the outcomes of these matters can be easily quantified in a series of unambiguous measures such as age-specific mortality rates and indirect estimates of such rates.

Even if the second question is only partly valid, there is a case for occasionally abandoning quantification to complement our knowledge of the mechanics of the education-mortality relationship. There may also be a case for occasionally abandoning the direct qualitative field method. Instead, perhaps the researcher can (even if only very occasionally) fruitfully speculate on the possibilities, using intuition, direct or indirect knowledge of other cultures, and some conception, however naive, of human nature.

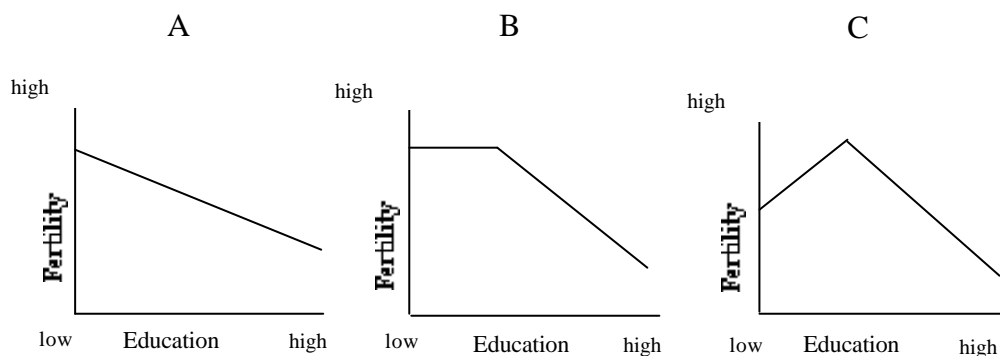
In this paper, I want to illustrate this armchair approach by trying to disentangle in words the mediating roles of the maternal education-fertility and maternal education-child mortality relationships. Can at least a part of the education-child mortality relation be explained through the education-fertility relation and vice versa? Even if the result is a surfeit of words which are virtually impossible to test empirically, the theoretical possibilities should not be discounted. Indeed, the decision to eschew empirical demonstration makes this task more appealing; it is now possible to speculate on interrelationships which the hard-core statistician or demographer would not touch with a bargepole.

## Background

Figures 1 and 2 illustrate the stylistic relationships between maternal education and fertility and between maternal education and child mortality. While both these relations are broadly negative in most data sets it appears that the education-fertility relationship may not be as straightforward at the early stages of education, whether this early stage is defined as one in which few women have education or in which women in any number have only a few years of education. Cleland and Jejeebhoy (1994) present three possible representations of the education-fertility relationship, depicted in the three panels of Figure 1. Panel C is the most interesting in this figure because it suggests that at the early stages of a spread of female education, it is quite possible that there is a real, even if temporary, rise in fertility. This rise is particularly common in the countries of Africa and Asia, in contrast to Latin America and the Arab countries where the education-fertility relation is much more often monotonic (Cleland and Kaufmann 1993). For example, in the early 1970s, marital fertility rates for women with no schooling, and schooling of 1-3 years, 4-6 years and 7+ years were 6.6, 6.7, 7.5 and 6.5 respectively in Bangladesh and 6.4, 7.1, 6.1 and 3.0 respectively in Nepal (Cleland and Jejeebhoy 1994). Such a rise in fertility is analogous to the rise in fertility which seems to universally precede a demographic transition, as demonstrated, for example, by Dyson and Murphy (1985).

**Figure 1**

### Maternal education and fertility



In contrast, the maternal education - child mortality relationship is almost boringly linear in virtually every data set that has been studied. It seems that maternal education exerts an effect on child mortality even at very low levels of education, that is, no threshold level of maternal education is necessary (Figure 2); and it continues to be thus effective as levels of education rise virtually indefinitely (Caldwell 1979; Hobcraft, McDonald and Rutstein 1984; Mensch, Lentzner and Preston 1985; Hobcraft 1993).

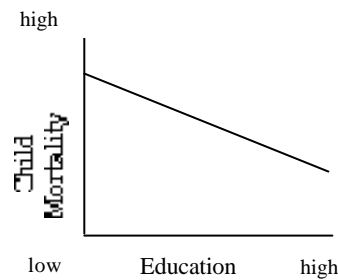
Given what is known about fertility-child mortality interactions (for example, Trussell and Pebley 1984; National Research Council 1989), Figure 2 would be consistent with Figure 1A even if one were seeking an explanation of the education-child mortality link based entirely on the education-fertility relation. Figure 1B is also consistent but suggests that, at least at the early stages of education, the effect on child mortality needs explanations outside the fertility-child mortality connection.

But such explanations are not the focus of this paper. The strain on imagination and intellect is the greatest if one dares to explain Figures 2 and 1C in terms of one another, and I

will dwell on the possibilities in this direction. The greatest challenge is posed by the initial rise in fertility that accompanies education in figure 1C: how can this be reconciled with the simultaneous fall in child mortality depicted in Figure 2? While the latter reflects several pathways which have nothing to do with fertility as an intervening variable, here I try to explore some additional pathways which allow the mortality decline to be explained at least

**Figure 2**

**Maternal education and child mortality**

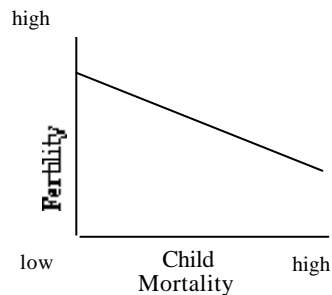


partly by the initial fertility increase with maternal education, and vice versa. Can the fall in fertility associated with education theoretically explain at least a part of the initial rise in fertility with such education?

To explain thus at least a part of the education-child mortality and education-fertility relationships each in terms of the other, the relation between fertility and child mortality is represented stylistically in Figure 3.

**Figure 3**

**Fertility-mortality interactions associated with maternal education**



Does this representation make logical sense? The next two sections speculate on some of the ways in which it may or may not make such sense. This is not to suggest that the education-mortality relationship is solely or even largely an outcome of that between education and fertility; all I seek are some possibilities consistent with our wider knowledge or intuition.

Finally, in suggesting ways in which the education-fertility and education-child mortality relationships mediate each other, I also look briefly at the more conventional part of the curve in Figure 1, where fertility declines with maternal education; but seek some relatively unconventional explanations for its consistency with the negative education-mortality relation

of Figure 2. But most of these possibilities focus on the impact of changes in child mortality on fertility rather than the other way around.

### **Fertility as an intervening variable in the maternal education - child mortality link**

We now have sufficient quantitative and qualitative, micro and macro-level, evidence on the positive relationship between fertility and child mortality. But does this mean that a rise in fertility can never lead to a fall in infant and child mortality? That is, is the right hand part of the curve in Figure 3 inconceivable? To make it more conceivable, it is necessary to decompose the concepts 'fertility' and 'child mortality' into their several immediate determinants and to appreciate that these determinants need not all move together or even in the same direction.

A fertility outcome, that is, the total number of births that a woman has, is determined by three factors: the age at which she begins childbearing, the pace at which she bears children, and the age at which she ceases further childbearing. More importantly, the same fertility outcome can be achieved by different combinations of these three proximate determinants of fertility. For example, a woman can end up with, say, four live births by the age of 35 because she begins childbearing at the age of 18 and then spaces her births four years apart, or by starting childbearing at the age of 21 but maintaining birth intervals of only two years.

Similarly, she may end up with more births by shortening her birth intervals but leaving unchanged her ages at the start and cessation of childbearing. She may end up with more births even if she delays the start of childbearing as long as she shortens her birth intervals sufficiently.

Indeed, the literature suggests that this last kind of behaviour defines the educated woman who has more children than her illiterate counterpart. In turn, what does this imply for this woman's child mortality experience? The net impact would depend on the balance between the adverse effect of shorter birth intervals and the positive effect of a delay in the age at first birth. Reviews suggest that birth intervals have a noticeably larger impact on infant and child mortality than does maternal age, even maternal age at first birth (for example, National Research Council 1989; Hobcraft 1993). But the same reviews also make it clear that the birth-interval effect really begins to operate when the gap between successive births is less than about two years; above this point, there is not a progressive reduction of child mortality risks with increasing times between births.

However, the South Asian region, which is the one most consistently exhibiting an initial rise in fertility with maternal education, is known for its unduly long birth intervals. Even the modernization associated with education does not really seem to shorten the interval between births enough to bring them into the potentially dangerous range of one to two years. This kind of rise in fertility therefore is unlikely to increase child mortality through the child-spacing effect. At the same time, the rising age at marriage which definitely seems to accompany education in this region must be exerting a beneficial effect, however small, on the risks of child death. The net observable relationship between fertility (that is, fertility as an outcome of education and not just fertility *per se*) and child mortality in such a situation could well be positive. Admittedly, its underlying cause is not the increase in the number of live births but some of the other changes which accompany this increase.

The higher fertility associated with maternal education in some contexts also decreases the proportion of first-order births in the educated group. It therefore decreases the proportion of high-risk births of one kind without really increasing the proportion of high-risk births of another kind, that is, very high-order births. All evidence suggests that the initial

rise in fertility in Figure 1C is never large enough to lead to parities of seven or more, which is when the birth order impact on child mortality begins to make itself felt (National Research Council 1989). Nor is such a rise in fertility caused by any remarkable increase in the proportion of births to older women (another high-risk category) and certainly not to the extent where it may make a difference to their child mortality experience<sup>4</sup>.

Further theoretical explanations for a real relationship between increased fertility and decreased child mortality are possible if the determinants of child mortality are decomposed into those which affect the risk of illness and those which affect the outcome of an illness. For example, one of the factors definitely influencing infant mortality, particularly in the first weeks of life, is the conditions surrounding births: the place of delivery, the prenatal attention available to the mother, and so on. These circumstances affect the foetus's and the infant's risk of falling ill. For older children, the use of the health care system affects the outcome of an episode of ill-health; there are now numerous studies demonstrating the value of prompt modern medical care in averting death from many of the otherwise fatal diseases.

From all accounts, educated women are more likely than uneducated women to have their deliveries in an institution or at least attended by trained practitioners. The higher their fertility then, the greater presumably is their exposure to the modern health sector and the greater the ease and confidence with which they can deal with this sector. I refer here to the increasing confidence that comes with repeated exposure independently of the confidence instilled by education. This increased confidence should in turn lead to increased ability to deal with the modern health system during child illness, and therefore to improved child survival.

Another factor that appears in the literature to affect child development as well as survival is the physical and psychological attention to the child; the amount and quality of such attention is believed to be important both in reducing the risk of ill-health and in increasing the speed and efficiency with which ill-health is recognized and treated; in addition, the nature of the care-giver is believed to be important, parents having a more crucial role to play in this regard than siblings, servants or other outsiders. For discussions, often at loggerheads, of various aspects of this issue of childcare, child welfare and child survival see Shah, Walimbe and Dhole (1979) ; Sussman (1980); Hilderbrand et al. (1985); National Research Council (1989); Bledsoe (1990) LeVine et al. (1991); Basu and Basu (1991); Cleland and Kaufmann (1993).

While increased fertility should decrease each child's access to parental, that is usually maternal, time and care, there is a possible outcome of higher fertility which actually increases such access. This is based on the admittedly limited evidence that high fertility may reduce the participation of women in economic activity (as opposed to the reverse causation, that is, the effect of employment on fertility, which is a contentious matter in the literature). In the Indian context it is certainly true that women with a little education are less likely to be economically active than women with no schooling (Basu and Basu 1991). If this finding is more universally true and if their economic passivity is even partly a result of their higher fertility, then the higher fertility associated with education can work in the direction of improved child health and survival, as long as the loss of attention per child due to more births is not greater than the gain per child due to the mother's presence at home.

All these matters are certainly difficult to investigate empirically, but recent research suggests that they are not impossible to investigate. A mix of more sophisticated data

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<sup>4</sup> Although there is some evidence that effective terminal contraception is less readily accepted by those who are slightly better off socio-economically; this is partly to do with the greater attractiveness of sterilization incentive programs to the worst-off.

analyses as well as more innovative data collection can take us far on these unexplored routes. For example, it appears that detailed time allocation studies hold some promise for elucidating the links between child care and child welfare. Similarly, statistical analysis of the conditions of delivery of higher-order births and the use of modern care according to birth order, controlling carefully for the host of contaminating variables, should provide some insights into the hypothesis that the experience of childbearing improves the quality of childbearing and child care.

### **Child mortality as an intervening variable in the maternal education-fertility link<sup>5</sup>**

In principle, child mortality can affect fertility in more ways than have been traditionally considered in the academic literature on mortality-fertility interactions<sup>6</sup>. Broadly, these can be classified into those effects which govern natural fertility and those which work through changes in volitional fertility. To begin with natural fertility, improved child survival should, on the whole, impinge negatively on natural fertility because, *ceteris paribus*, a child that survives should increase the length of postpartum amenorrhoea if it is breastfed. At the same time there is a potential opposing force. If increased child survival also means, as it usually should, improved foetal survival, then natural fertility should rise, because less time is lost through foetal loss and the waiting time to another conception. The net effect of reduced mortality on natural fertility is therefore somewhat uncertain.

The possible impact of reduced child mortality on controlled or wanted fertility is also ambiguous. The consistent assumption in the literature that the relation between child mortality and fertility is necessarily positive seems rather one-sided. Standard theories of fertility decline have focused on the 'insurance' and 'child replacement' motivations through which higher mortality is associated with higher fertility. It is argued that both these motivations imply that the demand for children (or some variant of demand) should fall as the prospects for child survival improve; though the strength of the relationship is debatable: see for example, Preston (1978). If the child replacement motive dominates, the effect of falling mortality should be on the number of live births wanted, as opposed to the number of living children or the ideal family size; whereas if it is the insurance motive that dictates fertility, then declining mortality should also lead to a decline in the number of children wanted because there is now less need to guard against potential mortality by having more births than are considered ideal.

Whatever the underlying motive therefore, the overall impact of child mortality on volitional fertility is believed to be positive. That is, the child-mortality impact on volitional fertility should be concentrated on the second part of the fertility curve in Figure 1C: on the part where the education-fertility relationship is negative. Any positive child-mortality impact on the first part of the fertility curve, where the education-fertility relation is possibly positive, is believed to be entirely attributable to the impact of child mortality on natural fertility. In turn, this implies that if there is a link between child survival and fertility at this earlier stage, it is foetal rather than child mortality which is the operative factor.

But this reasoning is based on the untested assumption that any initial increase in fertility with maternal education is solely the result of increases in natural fertility. There is no

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<sup>5</sup> This section draws heavily on a section of the introductory chapter of Basu and Jeffery (nd).

<sup>6</sup> The neglect of some of these factors is quite understandable as long as it is accepted that only those hypotheses must be developed which are amenable to empirical testing. But in this paper I am ignoring this assumption and therefore feel freer to roam widely in search of explanations.

provision in the literature for the possibility that at least a part of the fertility increase at lower levels of education may reflect rises in *wanted* fertility. If this presumption can be re-examined, then it is also possible to concede a stronger role to child mortality in volitional fertility outcomes.

Is it really implausible for women with some education, and therefore by extension women who experience lower child mortality, to want more children than women with no education? The plausibility of this assumption is best supported by analogy. The standard economic argument which seeks to explain a relationship between income and fertility expects the demand for children to rise with income, at least until further increases in income result in changes in tastes, aspirations and ideas about the quality-quantity trade-off in children. The economic model therefore allows fertility to rise with income and there is some empirical support for the validity of this model.

But where female education is concerned, it is taken for granted that any positive relation with fertility reflects merely changes in the supply of children, through behaviours which are modern in the sense of loosening shackles on breastfeeding and intercourse frequency but not yet modern enough to embrace contraception as well. This limited interpretation is particularly surprising given the attempts in the literature to attribute at least a part of the education-fertility link to an education-income link.

How could there be a rise in desired fertility with education which is independent of associated rises in income? One possibility is through the falls in infant and child mortality which seem to universally accompany education, independently of changes in income. That is, at the early stages of a decline in infant and child mortality, there could be a rise in the demand for children, even if the overall impact of child mortality on volitional fertility is positive. This is a difficult proposition to test empirically, but is not intuitively or logically outlandish. Just as very poor households may limit fertility because they cannot afford many children, high-mortality households may find it rational to limit fertility because of the higher costs associated with childbearing. If the expenditures on children that subsequently die are included in the calculation of the costs of a living child, then such a child can be very expensive in a high-mortality situation even if its quality is worse (Basu 1991).

If that is the case, the declining child mortality associated with female education should, other things remaining the same, decrease the costs of a surviving child and increase the number of children wanted. Declines in child mortality could make mothers more confident about their child-raising abilities and more willing to bring up an additional child, at least until other cost-increasing factors step in, as they do once the education-fertility relationship becomes more obviously inverse.

### **Some other possibilities**

Finally, there is a third kind of explanation for a possible inverse relation between fertility and child mortality, when the fertility and child mortality are differentiated by education. This is the explanation in which education leads to other changes which have simultaneous opposite effects on fertility and child mortality, *ceteris paribus*. For example, in the absence of countervailing forces, the improved health (particularly the lower incidence of maternal infections) and nutritional status that educated women themselves presumably experience should in principle lead to higher fecundity. At the same time, these maternal advantages should confer some advantages on the foetus and infant, resulting in a lower proportion of high-risk (pre-term or low birthweight) babies and a lower exposure of these babies to maternal infections (National Research Council 1989).

Education, through such means as better biological capabilities as well as through less risky health behaviour, should also reduce maternal mortality per birth. In turn this greater survival of women increases the total period of their exposure to the risk of pregnancy; so that if the denominator in fertility estimates includes all women, those who survive a pregnancy as well as those who do not, educated women should end up with higher fertility than uneducated women. At the same time, this reduced maternal mortality should translate into reduced child mortality if it is true that maternal time and attention are important determinants of child survival.

Finally, perhaps one should not too readily dismiss the simultaneous contradictory impact of the fact of education on fertility and child mortality, through its impact on the personality and attitudes of the woman. If as has been persuasively argued in the literature, the initial rise in fertility experiences by educated women is partly a result of the incomplete modernization that discards traditional fertility-inhibiting behaviours, this same modernization can also lead to a greater commitment to child survival<sup>7</sup>. This commitment may arise not just from the reduced sense of fatalism that is supposed to result from schooling but also from the reduced emotional ability to be consoled any more by the comforting cultural myths surrounding child death<sup>8</sup> and a consequent increased vigour in preventing such death.

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<sup>7</sup>. I refer to a greater commitment to the survival of births which were wanted in the first place. There is some evidence now of the greater vulnerability of the unwanted births of educated mothers.

<sup>8</sup>. The literature of Ben Okri provides a moving example of how the mythological romanticization of a world of spirits can ease the pain of child loss in this world.

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## **Maternal education and theories of health behaviour: a cautionary note**

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Perhaps the most consistent finding in demographic research on child mortality is the strong relationship between the level of maternal education and child survival. This finding has intrigued demographers because it provides us with an opportunity to study how social, economic and behavioural factors affect mortality. It has led to numerous studies of how and why educated mothers behave differently from uneducated mothers.

In contrast, anthropologists seem to be less interested in the relationship between maternal education and child mortality. I think many anthropologists are surprised that we would study the role of culture and social change using a characteristic of an individual. In addition, the phrase 'maternal education' seems to suggest rational-actor models in which an individual makes decisions about behaviour based on rational analysis of the advantages and disadvantages associated with possible actions or inaction. Maternal education suggests this approach since it identifies a central individual — the mother — and the word 'education' implies knowledge and skills associated with logical decision making.

The demographic literature on the relationship between maternal education and child survival relies almost entirely on single decision-maker models. They are generally either rational-actor models or models based on single decision makers who tend to choose either 'modern' or 'traditional' modes of behaviour. These are not the complete rational-actor models used by economists in which all decisions about resource allocation are made

simultaneously (Pollak and Watkins 1993). Instead, these are more partial models in which all decision makers tackle one problem at a time or decide how they will behave in matters of health.

An alternative approach is to examine the behaviour of mothers in a broader social context including the effects of social interactions and social norms. In some instances, a model of health behaviour based on a single decision maker is adequate for designing interventions or summarizing research findings. Some aspects of this broader social or cultural perspective can be built into rational-actor models (Pollak and Watkins 1993). However, by discussing the effect of maternal education on child survival in such a narrow theoretical framework, we risk missing social and cultural features that may be more important than the knowledge and attitudes of mothers.

### **Rational-actor models of health behaviour**

Rational-actor models, such as the Health Belief Model, are most frequently used explicitly in studies that take a KAP or Knowledge-Attitudes-Practices approach to studying health behaviours (e.g., Streatfield, Singarimbun and Diamond 1990). However, the importance of increased knowledge is almost always a central attribute ascribed to more educated women in any study of the social determinants of child survival. Although many demographers shy away from the simplest rational-actor models, they often maintain a role for knowledge and rationality. For example, Das Gupta (1990) stresses the effect of maternal education on women's autonomy. However, in discussing vaccination coverage, she writes that

Having an infant immunized requires a considerable degree of active participation on the part of the parents, in knowing and remembering when to have the child immunized, and in being convinced enough of the benefits of modern health care to put up with the distressing side-effects of immunization... for the sake of the less tangible benefits of preventive health care (Das Gupta 1990: 449).

While some degree of knowledge is certainly necessary, it is not clear that health behaviour is determined by the rational weighing of costs and benefits with knowledge pushing the balance towards the 'right' decision.

Many writers have criticized the use of rational-actor models in different areas of research. In his book *Medicine, Rationality, and Experience*, Byron Good (1994) criticizes what he calls the 'common-sense or empiricist approach to medical social sciences' which he ascribes to the 'medical behavioural sciences' including medical psychology, the sociology of illness behaviour, applied behavioural sciences in public health, and epidemiology:

In large measure... these writings rely on belief and behavior models firmly rooted in a positivist or empiricist paradigm . . . . The individual actor . . . is analytically primary. And applications are largely directed at educating individuals to modify irrational behavior - to reduce risk factors, comply with medical regimens, seek care appropriately (Good 1994: 9).

He identifies three essential elements of this approach: 'the analysis of illness representations as health beliefs, a view of culture as adaptation, and an analytic primacy of the rational, value-maximizing individual' (Good 1994: 39). He is highly critical of each of these elements.

When Good uses the word 'belief' it is in the context of his extensive critique of its use in medical anthropology. He states that in many studies (in particular those applying the

Health Belief Model) "belief" serves as an unexamined proxy for "culture" (Good 1994: 39).

The wealth of meanings associated with illness in local cultures is thus reduced to a set of propositions held by individual actors, which are in turn evaluated in relation to biomedical knowledge.... [In these models] lay medical culture is the precipitate of rational, adaptive behaviors of individuals, and it takes the form of more or less accurate beliefs which are held in individual minds (Good 1994: 42).

Culture is much more than simply a collection of beliefs.

### **Single decision maker, single-decision models**

Some demographers have moved away from discussing the mother's knowledge or beliefs about disease and have tried to place maternal decision making in a broader cultural context. For example, Caldwell states that 'the evidence does not seem to point to women with some schooling knowing much more about disease causation than women with no schooling' (Caldwell 1989b: 105). However, the alternative models generally continue to rely on the notion of the mother as the decision maker and to downplay social expectations and cultural norms of behaviour.

For example, Caldwell (1989a), Das Gupta (1990) and others have discussed the importance of maternal education in freeing women from the social constraints imposed on them in many societies. Bourne and Walker (1991) express this approach quite well when they hypothesize that maternal education works through 'the improved ability of an educated woman to take action: to seek health care; to give her children food; to retain rights to her children's upbringing; in other words, to increase her autonomy' (Bourne and Walker 1991:210).

The first problem with these approaches is that they provide little insight into why mothers with more autonomy choose modern health practices. Das Gupta (1990) refers to the educated woman's increased abilities and knowledge (e.g., of immunization). Caldwell, however, states that

These changes do not arise primarily from the acceptance of school instructions, but rather from a feeling that the school has enrolled [educated women] in a different society, not necessarily wholly Western but certainly transitionally so. They are aware that the health centre, the medical practitioner, immunization of children against disease and taking early action about infant diarrhoea all belong to the same system as their school, the officials, the government and themselves (Caldwell, Reddy and Caldwell 1983:198).

In other words there is only one decision to be made: the decision to be modern. Joshi (1994:3) explores this acceptance of modern behaviour using the 'identity acquisition hypothesis' which 'assumes that schooling leads to a behavioural change through imitation of people in the "modern sector."'

In these formulations education makes women better rational actors not because they have more knowledge but because they have increased freedom to act and they base their decisions on 'modern attitudes' This approach does not offer much chance of explaining variation in behaviour among educated women. It also seems to abandon rational decision making although the woman enters the 'modern world' which is often thought to be characterized by rational decision makers.

The single decision maker is just as problematic as the single decision. Good (1994) is very critical of models based on decisions made by individual actors even after consultation with family and close acquaintances:

The ability of the individual to appraise symptoms, review available resources then make voluntary choices is simply a myth for many in our society and in other societies.... It is rather a model of how members of our society are thought to act, an ideological model which reproduces conventional understandings and serves best when used to study middle-class Americans (Good 1994: 43).

In particular, these models may not be appropriate for developing countries where extended family relationships and local attitudes may impose more restrictions on individual action. For example, Nichter (1990: 199) points to the role played by influential community leaders in encouraging women to get their children vaccinated. More general community attitudes can also play a role. In a study in Haiti by Coreil et al. (1994: 235), women report that there are unexplained differences between communities that affect receptivity of vaccination. 'In some neighborhoods groups of women walk together to and from the [health] post and take turns watching the children. Social support appears to be an important positive reinforcement for utilization'.

### **Social expectations**

We cannot understand changes in child survival without taking due note both of women's knowledge, attitudes and behaviour about child health, and of societal expectations. In all societies women perform almost all of the tasks associated with feeding, educating, and preserving the health of children, especially very young children. In some societies, especially those in which the emotional bonds between husband and wife are weak, fathers are notoriously uninvolved in the concerns of young children. When health programs address child health issues and when surveys collect information about child health they must deal primarily with women, including mothers, grandmothers, and older sisters. However, this does not imply that the rest of society is not concerned about the health of young children. Women are never exempt from blame or scorn if they are judged to have failed to raise a healthy child or if they are seen to risk failure. For example, when Coreil et al. (1994) asked women why some mothers don't get their children vaccinated the term 'negligence' was mentioned frequently. Women told them that 'there are people who just don't care' (Coreil et al. 1994: 234).

We cannot ignore the fact that society has strong expectations for the care of children and that changes in these expectations are a central part of the revolution in child survival. These expectations include concepts of proper foods, acceptable forms of discipline, and concerns about specific threats to the social and physical development of children. Social concepts of what is expected of mothers vary by education and social class and may reflect limitations facing an individual woman such as her physical strength or her marital status. These social expectations may provide a better approach to understanding behaviour than attempts to understand the decision-making processes of individuals. Although rational actor-models can easily incorporate the costs associated with rejecting social expectations (Pollak and Watkins 1993), this implies that these costs are only a part of the total picture, a part that is often ignored in research.

In some settings, rational-actor models have proved to be quite useful and many researchers will defend their theoretical strengths. At a minimum, these models often provide simple 'commonsense' idioms for describing the observed relationships between social

variables and intermediate variables. However, rational-actor models are very clumsy at explaining social change. It is clear that increasing proportions educated do not fully explain (even in a statistical sense) the changes in behaviour and child survival that have been documented over the last century. It does not help us much to postulate some kind of spillover effect in which uneducated women who are in the minority in a community may learn from observing the educated women. To understand societal-level changes, we need to move beyond models of what individuals learn and how they make decisions.

### **A societal view of maternal education and childrearing**

In Lindenbaum's (1990a, b) widely quoted work on the effect of women's education on childrearing, she seems to avoid any suggestion of a single decision maker but she also avoids a simple social-expectations model in which women do what is expected of them. She stresses that the education of women changes the way society sees women and what society expects from women. This goes beyond how women see themselves and what they see as their proper courses of action. This unique feature of Lindenbaum's work is easily seen in a comparison of some of her statements about maternal education in Bangladesh with comments by LeVine and his colleagues (1991) about Mexico. Although both Lindenbaum and LeVine (both anthropologists) point to changes in attitudes about women and child care, they discuss these changes in very different ways.

In their excellent study of Mexico, LeVine and his colleagues discuss the effects of women's education on fertility and child mortality in terms of women's attitudes about themselves and about child care. For example, they state that 'schooling influences *individual* attitudes in the direction of modernity and individualism as embodied in Western ideologies' (LeVine et al.1991: 485, emphasis added). This concern for the attitudes and beliefs of women is reflected in the three questions their research addresses (LeVine et al.1991: 460). Their first question concerns the effect of education on 'women's preferred patterns of health and reproductive behaviour'. The second asks 'What kind of education experience do girls have in school that might plausibly influence their behaviour as mothers years later?'. The third asks about the potential importance of 'a broad process of school-influenced change in parental investment strategies and child care practices'. This third question moves beyond the woman to the couple.

In contrast, Lindenbaum sees these as changes that pervade those parts of society (men and women) affected by Western education, and affect the expectations for educated women. For example she states: 'The "hygienic" disciplines of the body reflect also what is currently perceived to be desirable, polite, or modern behaviour, embodied in the person of the "educated woman" ' (Lindenbaum 1990a: 437). Similarly,

Those who favour female education thus dwell on manners and social attributes as well as the useful and worthy tasks (keeping household accounts, tutoring children, nursing family members) now expected of women in 'respectable' households (Lindenbaum 1990a: 433).

These attitudinal changes affect women, but they are shared by others in society and affect what others expect of women and mothers. Lindenbaum does report differences in behaviour and attitudes between educated and uneducated women, but she avoids language that suggests a simple linkage between women's attitudes and their behaviour.

Lindenbaum's formulation of these issues in terms of general social attitudes and expectations for educated women provides an important alternative to models based on decisions made by individual mothers. This approach is sometimes reflected in the writings

of Caldwell and others. Caldwell (1989b: 106) notes that 'It is not so much what you learn or understand, but how you see yourself and how others see you'. However, most of his examples stress how women see themselves. For example, he states that 'illiterate women do feel a lack of capability when dealing with the modern world' (Caldwell 1989b: 106). This can be contrasted with Lindenbaum's quotation from an impoverished woman: 'If I send my daughter to school, other people will speak badly about me' (Lindenbaum 1990a: 433). Caldwell seems to emphasize how women see themselves and what degree of autonomy they are granted whereas Lindenbaum stresses the expectations of society which are shared by men and women.

### **Macro studies of social change**

There is another strain of demographic research on the cultural aspects of recent health transitions that takes a macro-social, comparative perspective. This approach grew out of a conference on 'Good Health at Low Cost' (Halstead, Walsh, and Warren 1985) which focused on how a few societies have achieved low mortality rates without massive increases in per capita income. The conclusions of this approach are significant because they invoke increases in female education as a part of the process, but do not depend on models of individual actors.

Caldwell has made several contributions to the literature on this subject. When he takes this macro-social view, he relates the high levels of female autonomy and education to other features of society. For example, he discusses the effects of religion on the demand for education and notes that one condition for unusual educational advances is 'a basic reverence for enlightenment or education' (Caldwell 1989a: 21). He also notes that 'countries that advance most rapidly in this area are those in which parents achieve as much satisfaction at seeing their daughters at school as their sons' (Caldwell 1989a: 21). However, when he compares educated and uneducated mothers in a single society this perspective of education as a reflection of societal attitudes is replaced by education as a force that changes individuals. For example, in discussing the effect of education on women in South India, he notes that

the woman who has been to school knows that the school expects her to take action and that she should not be bound by deference to traditional decision-making patterns and excessive female modesty when children's health is at stake. *Strangely enough, this is a view usually shared by her parents-in-law* (Caldwell 1989b: 106, emphasis added).

The macro-social approach leads to a view of societies as organisms which develop over time in a manner that reflects both their history and their current circumstances. This is a useful approach in many ways. It recognizes the historical context of culture, it provides an overview of cultural changes, and it reflects the fact that individuals are not completely autonomous actors. It also has the advantage of avoiding simple mechanistic assumptions about how changes in 'knowledge' affect social reality. However, this approach has the disadvantage that it leaves behind the micro-social perspective in which individuals take actions. It leaves us with a vague feeling that individual behaviour is somehow an illusion, or that it reflects only small deviations from a societal average.

### **Individual behaviour and the social environment**

The macro-social and individual approaches to studying the relationship between social and economic factors and child mortality reflect the spectrum of philosophies of culture described by Hammel (1990: 466). He reviews a range of philosophical approaches that extends from 'an autonomous, almost totalitarian "culture" that determines social action to an almost anarchic one in which culture is shaped by the hands of independent participants'. He tries to bridge this gap by proposing a more elaborate view of culture:

Culture is an evaluative conversation constructed by actors out of the raw materials afforded by tradition and ongoing experience. It is continually modified by them in processes of social interaction, and their behavior is guided by anticipation of such cultural evaluation (Hammel 1990: 457).

In order to understand the context in which individual actors behave and how that context changes, we must examine the nature of the 'evaluative conversation' in which they participate.

Following similar approaches to culture, many medical anthropologists now investigate the nature of this 'evaluative conversation' through the use of narrative. This approach involves asking individuals to tell detailed stories about illnesses. Narrative is seen as a natural way in which individuals try to understand their own past and present. In their introduction to an issue of *Social Science and Medicine* devoted to narrative research, Mattingly and Garro (1994) write:

Narrative offers what is perhaps our most fundamental way to understand life in time. Through narrative we try to make sense of how things have come to pass and how our actions and the actions of others have helped shape our history; we try to understand who we are becoming by reference to where we have been. . . . Social and cultural context informs and forms narratives. Reflections on social roles, probable causes, assessments of alternative ways for responding to illness, and moral commentaries are among those aspects that may be included (Mattingly and Garro 1994: 771).

Narratives are not just an important research tool. They may be a major mechanism of social and cultural change. They serve this function because they transmit more than just facts. Narratives serve as a central mechanism for reaching and communicating consensus on what the 'facts' are and what social meanings are attached to them.

This role of narrative is suggested by Farmer's (1994) research on the development of cultural concepts of AIDS in a rural area of Haiti. He interviewed the same 20 villagers at least once in each of six consecutive years to document the developing awareness of AIDS. When he began the interviews in 1983, the villagers knew very little about AIDS and had no stories to tell about it. He says that 'before the advent of truly natural discourse about *sida* [i.e., AIDS], there was simply no consensus as to what *sida* was' (Farmer 1994: 806). However, after a man in the village died of AIDS, the illness stories became quite common.

People began to recount the 'same story', and the illness of which they spoke came to have characteristics and features that varied less and less from informant to informant. The consensus was cobbled together towards the end of 1987 (Farmer 1994: 807).

Although this process of consensus building through stories or narratives is very clear in the case of this new disease, a similar process probably drives changing perceptions of more common diseases and the effectiveness of preventive and curative measures.

Using narratives to examine differences between educated and uneducated mothers might lead to a better understanding of the contributions of different knowledge and experiences, different reference groups and role models, and different social expectations. It might also prove to be a useful link between changes in individual behaviours and macro-level social changes.

## **Conclusions**

Differences in child survival by maternal education continue to provide a valuable opportunity for uncovering the ways in which culture and social change affect health. However, we must be careful in selecting the theoretical models that shape our discussions and the design of future research. Theoretical models based on the actions of individual decision makers will lead us to more studies of the knowledge, attitudes and practices of those individuals. A theoretical perspective that focuses on the broader society might lead to very different types of studies. For example, many researchers are now interviewing men about their fertility preferences. However, there is very little similar research by demographers on the opinions on child care among anyone other than mothers and other caregivers.

Not all demographers will, or should, run to the field to collect narratives about health. There is still great value in statistical approaches to documenting the associations between demographic, social, and economic characteristics and health practices and mortality. However, in describing our research we should be very careful when using language that suggests theories of culture and behaviour. Instead, it is generally preferable to stick to the language of intermediate variable models which indicate the behaviours through which education affects mortality without attempting to explain the motivations for behaviour. When we use language that implies theories of behaviour, we should be explicit about the theory we are choosing and we should discuss the limits of our data when it comes to testing that theory. In many cases it is preferable to use 'theory neutral' language, insofar as that is possible, and stick to pure description.

We are often tempted to move beyond intermediate-variables models which merely describe behaviour rather than explaining it. Unfortunately, this often leads us to draw conclusions that focus on specific elements of what is in fact a very complex web of factors. Careful, precise descriptions of societies, whether in statistical or qualitative terms, can be more enlightening than a simplified explanation for a complex phenomenon. For example, a careful review of Lindenbaum's widely respected work shows that she is basically describing the meaning of education in the society she studied. Although her research clearly reflects a theory of culture and behaviour that emphasizes the broad social context, she has not attempted to articulate a theory of mortality change. She has not attempted to isolate a single change in attitudes or knowledge or societal expectations which provides the key to understanding the observed link between maternal education and child survival. She has not tried to determine whether the differences in behaviour are attributable to women's different attitudes about themselves, society's expectations of educated women, or changes in women's status.

In most demographic research, the theories of behaviour we employ are implicit in the language we use rather than stated explicitly. Therefore, the language we use both reflects and affects the way we think about things. It would be a mistake to let a narrow interpretation of the effect of maternal education limit our thinking about how individual women decide to

care for their children. We must be careful not to choose models of individual decision making simply because surveys of women report a characteristic of individuals that suggests knowledge and logical thinking. We cannot let our variables choose our theoretical models or direct our future research.

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## **How is greater maternal education translated into lower child mortality?**

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A large number of studies have shown, almost as convincingly as anything can in the social sciences, that a mother's education has an independent, strong and positive impact on the survival of her children. Nevertheless, unless the mechanisms whereby maternal education is converted to low child mortality can be worked out, some researchers will continue to doubt the finding. Furthermore, the finding will prove of little use for the short-term reduction of child mortality, although it will reinforce the existing arguments for a greater emphasis on the schooling of girls, in this case to give the next generation a greater chance of survival.

This forum was organized in order to encourage the exploration of these mechanisms and in the hope of recording new advances in this direction. In spite of good contributions throwing light on important aspects of the question, and suggesting leads for future work, it is still hard to avoid the conclusion that the full exploration of the mechanisms with the obtaining of clinching proof has hardly begun. The major difficulty is the kind of research that must be done to obtain proof. There is general agreement that the reduction of child mortality must be achieved in one of three ways: by mothers co-operating to a greater extent with preventive health services; by mothers co-operating to a greater extent with curative health services; and by mothers being more active in the household and everyday life to ensure that the child does not become sick or have an accident in the first place, or that the sickness is soon brought under control so that medical intervention is not necessary. The first two mechanisms are ones that demographers given to the design of quantified field investigations ought to be able to test. The last is a very different matter and requires subtle anthropological techniques, especially participant observation. This is not merely a question of interesting anthropologists in such research, but of their developing techniques which can establish a level of 'proof' which will convince others in the social sciences community. Traditionally, anthropologists have devoted most of their interest not so much to behaviour as to the concrete results of behaviour: kinship links formed, exchanges carried out and so on. The study of events that do not happen, for instance the elements in maternal care which explain why children did not get sick, is research of a different order. Yet such maternal behaviour is probably important: in an area in Nigeria far from medical services much better survival rates were found among the children of mothers with schooling (usually incomplete primary schooling) than those without (Orubuloye and Caldwell 1975; Caldwell 1979). How far, then, has this forum allowed us to proceed?

Akile GŸrsoy argues that fathers have been mysteriously ignored and that the Turkish evidence shows this to be unwarranted. I could not agree more, and I have increasingly tried to lay stress on parental education. There are two reasons. The first is the fact that, if the nature of the household and of the parent-child relation is substantially changed by the education of the mother, it seems most unlikely that the education of the father will have no impact, although it might be a lesser one.

The second is that father's education shows up in the World Fertility Survey (WFS) and Demographic and Health Surveys (DHS) as also being an important factor in increasing child survival. Indeed, in some countries it appears to be as important as mother's education, or even more important. The tendency for demographers to ignore these findings is probably explained by a fear that men's education is so strongly interrelated with their incomes that any attempt to control for income would not be wholly successful (demographers used to argue this about women's education and its relation to whom they married and hence household incomes). They are also aware that mothers are usually more sensitive to children's illnesses than are fathers, and this is undoubtedly correct as measured by the likelihood of first noticing that something is wrong (Caldwell et al. 1989: 376). Yet, as GŸrsoy argues is the case in Turkey, fathers may well be the parents with the most resources and the most influence among healers and medical institutions. There are also other circumstances when fathers' influence may be particularly strong. One is tight nuclear families where fathers are expected to nurture as well as mothers. The other is when the whole society is conscious of health, and agreed on the need for early treatment, and when free health facilities are easily available, as is exemplified by the situation in Sri Lanka (Caldwell et al. 1989).

The question has inevitably arisen as to why education has an impact. Many demographers have concluded that it has little to do with the content of the lessons, noting that even a little schooling of future mothers in poor rural schools with undereducated teachers has an impact on child survival and that the impact of education seems to vary little between areas with good schools and those with poor ones. Robert LeVine and colleagues have presented evidence in the forum that maternal literacy does have an impact on child survival in locations as widely apart as rural Mexico, rural Nepal and urban Zambia. Without disputing the accuracy of this finding, one might note that the association between being literate and attending school is much stronger in the contemporary Third World than it was, for instance, in early nineteenth century protestant northern Europe with its biblical literacy. One could also argue that literacy has its impact less in the sense of what is read and learnt than in how people see themselves and others see them. This certainly seemed to be the societal emphasis in our South Indian experience (Caldwell, Reddy and Caldwell 1985: 37-39). Nevertheless, the LeVine contribution is salutary, for social scientists can overlook the obvious, and it is true that Third World school lessons contain a great deal about cleanliness, hygiene and avoiding disease. Lindenbaum, Chakraborty and Elias (1989) concluded from research in rural Bangladesh that school children assumed that they were being taught how educated (or perhaps 'civilized') people behaved and followed these rules in later life without consciously doing so to minimize illness.

If the effect of schooling is to change people because of the experience rather than the content of the syllabus, and to change the way that they see themselves and others see them, then Martin Bockerhoff and Laurie De Rose may be right in arguing that the urban experience is the equivalent of a substantial amount of schooling in rural areas. Their statistical findings argue this case eloquently, although it should be noted that the comparison is between the urban-born and the rural-urban migrant. At each level of maternal education, child mortality might well be higher still among those who stayed in rural areas. There are other possibilities. Those who had their education in the urban areas might have been most

transformed as individuals not so much by their lifelong urban experience as by the interaction of urbanization and education during their schooling. Or they might just have had better schools. Alternatively they might live closer to health facilities than the migrants residing in squatter areas on the urban fringe, or a lifetime of urban experience and contacts might give them greater skills in making the system work than are possessed by the relative newcomers. If my suspicion is correct that in turn rural-urban migrants' children have better survival rates than the children of those of similar educational levels but who remained in rural areas, there could be many explanations: the influence of the urban milieu, the absence of the constraints of older relatives and relatives-in-law, the selectivity of migration for the more determined and innovative, or access to better health services. Whatever is the case it is clear that education must be one part of a larger process in the transformation of individuals to be better parents as measured by the propensity of their children to survive.

Georgia Kaufmann and John Cleland argue that this distinct personality that assists the survival of their children may either be inborn or formed at a very early age so that persistence in getting education, or doing well at school, or just staying on at school is evidence of the same integrated personality, or the innately bright individual, that will later prove to be, in health terms, the most successful parent. In a health transition sense, the best and the brightest almost automatically survive the system and rise to the top. In our research in South India (Caldwell et al. 1985) parents practically never gave as a reason for sending children to school that they were likely to succeed or had urged their own enrolment, but 55 per cent of the removal of boys from school and 35 per cent of that of daughters was explained by the fact that the child had failed, was not doing well, did not wish to stay there, or did not get on well with the teachers. Thus the selectivity of school survivors may be a factor, but the school must add a great deal too for otherwise, in a system like South India where almost two-thirds of girls are removed from school for reasons other than their success or compatibility with it, we would not anticipate child survival rising almost linearly with the duration of maternal schooling. It is also possible that some of the drop-outs are natural rebels who would be most likely to fight the system to obtain treatment for their children.

Anrudh Jain presents interesting data indicating that duration of maternal education has no impact in making mothers more likely to seek curative help for their children but does make them more likely to make use of preventive health measures like immunization. This conflicts with the commonsense assumption that in any rational parent both tendencies would move in the same direction unless there were reasons for suspecting the curative services to be worthless or expensive. It also conflicts with our experience in rural South India (see below). It is possible that more educated mothers are more compliant to the official will, or just receive the message, in that everyone is urged to have their children immunized while there can be no such definite message about seeking a cure for the whole range of sicknesses from which children suffer. We might also conclude that mothers who are more likely to seek preventive care are also more likely to try to prevent illness or accident in the home.

Alaka Basu's paper will be treated briefly here, not because it is not of value, but because it parallels this commentary in being another commentary rather than the presentation of findings upon which to comment. It might be noted, however, that child survival seems to increase linearly with maternal education and not to be U-shaped as I believe would follow from her education-fertility-child mortality model.

Finally, I want to point to possible lines of investigation which are suggested by three groups of publications from our work. These are not completely distinct areas and they are certainly not in conflict with each other.

The first is the 1979-84 research in rural South India (Caldwell, Reddy and Caldwell 1983a, 1988; Caldwell et al. 1990). That research found three quantifiable differences by

education of mother that were significant in their magnitude and each likely to result in the greater survival of the children of more educated mothers. The first of these is that educated mothers were more likely to take children to the health centre for both preventive and curative medicine. Their mothers-in-law allowed it and expected it, for most parents now try to arrange their sons' marriages to educated young women and one of their strongest motives is that such women are more likely to ensure the survival of their grandchildren (Caldwell, Reddy and Caldwell 1983b: 357). Why the young educated mothers are more likely to go to the modern health centre is more complex. Their schools' attitudes certainly encouraged it and the school sometimes sent children to the centre. But, when questioned, they just seemed to take it for granted: they had been to school, a part of the modern world, and the clinic was just another part of that world. It was very different among the unschooled illiterates who believed that they did not understand these institutions and that the institutions were not for them. The second difference was that the more educated the mothers were, the longer time they spent with the doctor. This is because the doctor expects to understand the educated woman and he expects them to understand him. Inevitably, the doctor is more likely to be right about his diagnosis and the mother is more likely to be able to carry out the treatment accurately. The third difference is that, when the treatment fails to improve the child's condition, the educated are much more likely to report this back to the clinic. The uneducated just shake their heads, say the doctor has done his best, and assume — often correctly — that the clinic would shelve responsibility by accusing the mother of irresponsibility and of not having followed the prescribed treatment.

The second approach was work on the locus of responsibility (Caldwell and Caldwell 1994). Going to school makes females (and males) feel that they have more control over events and more responsibility if they do not intervene to prevent undesirable outcomes. They feel guiltier if they do not take a sick child to the health centre for treatment, or if they are unaware of where their small children are and what they are doing. Going to school is itself clearly different from the ancient ways and schools emphasize the new. In addition, educated mothers do have more control over events in that mothers-in-law are likely to cede this to them.

The third approach originated in the Forum of this journal (*Health Transition Review* 1, 2). That forum was centred on Samuel Preston and Michael Haines's book, *Fatal Years: Child Mortality in Late Nineteenth Century America* (1991). There Preston and Haines presented their unanticipated finding that there was little difference in child survival by mothers' education in the United States around the turn of the century. My explanation (Caldwell 1991) was that even the less educated women in the America of a century ago believed whole-heartedly, often pathetically, in modern science. They often did not know much about it but they did not question it. For it was part of their culture which had been developing for centuries. They had no alternative explanations of ill-health and subscribed to no alternative treatments. Their children's cures were a product of how good medical science was at the time and whether they could afford access to it. There are alternative explanations for sickness and alternative treatments in the Third World and how quickly, consistently and thoroughly mothers resort to modern medical services is a product of just how strongly and single-mindedly they believe in modern medicine and how much they feel personally responsible for controlling the situation. Faith in modern, Western science is taught only partly by the health system itself. The main proselytizer for modern science is the school, even in its earliest grades when no science is taught formally (cf. Caldwell 1980: 237-245). Belief in the necessity of access to modern health services intensifies with each year at school. It is this import of both modern medicine and modern education with its commitment to modern medicine, and indeed all modern science, which determines how thoroughly both curative and preventive services are used; it explains the large differentials in child survival

by maternal duration of education found in the contemporary Third World to a greater degree than has ever been the case in the West. Substantial levels of female education in Sri Lanka could not be translated into low child mortality until a comprehensive free health system was put in place after the Second World War; and a dense provision of modern medical services in oil-rich Libya and Saudi Arabia could not yield low child mortality until a cohort of educated young mothers came onto the scene (Caldwell 1986: 173-178).

These explanations are different facets of the same thing. The imparting by the school of a belief in modern science and of an individual locus of responsibility are by no means wholly different. They are each expressed in the way educated mothers use the health services. In terms of the relationship between the duration of maternal education and the effective use of modern health services to lower child mortality, much of the explanation is probably found in this complex of factors and much of it can be quantitatively researched. But a substantial part of the explanation for the impact of maternal education in the reduction of child mortality may lie in home caring behaviour and in the prevention of sickness or accidents happening at all. We have been less successful in researching this area, not necessarily because it is quantitatively less important but because much of it cannot be quantitatively researched, except perhaps as a residual effect.

Douglas Ewbank provides us with a stimulating review of the problem, reminding us that we should devote more time to looking at societies rather than individuals. In some ways this is a comforting view for demographers working with samples of whole societies. The paper is so comprehensive that I wish to make only two points. The first is that, whether we are placing stress on whole societies or on individuals, there must be mechanisms which translate the behaviour of individual mothers into their children's survival, and, although Ewbank says very little about these mechanisms, we will undoubtedly be closer to understanding the whole process when we have teased them out. The second point is, given that child survival rates vary between different communities in the same society, what role is played by different levels of education between the communities or between their leaders.

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