The importance of maternal schooling for child morbidity and mortality and maternal health behavior in southeastern Uganda

Anne Katahoire, Flemming Scheutz, Svend Sabroe, and Susan Reynolds Whyte

Abstract

A survey conducted in southeastern Uganda revealed that contrary to findings from other studies, maternal schooling did not protect young children born in this area from malnutrition and morbidity. Half the children in the study were stunted and most of them (82%) were reported to have been ill during the two weeks prior to the survey. Mortality however, was more common among children of mothers without any schooling as was the increased risk of incomplete immunization.

Key Words: Maternal Schooling, Child Morbidity and Mortality, Maternal Health Behavior

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Introduction

Although the generally positive association between maternal schooling and the health and survival of children has been documented by many studies (LeVine et al. 1994b), considerable diversity has been found between countries and in the specific benefits that seem to be linked to maternal schooling. For example, malnutrition is one of the most important health and welfare problems among infants and young children in Uganda (Jitta et al. 1992; Barton and Wamai 1994; Macro International et al. 1996), but maternal schooling seems not to protect Ugandan children from malnutrition, contrary to findings from studies conducted elsewhere. In a comparative analysis of child survival by Bicego and Boerma (1991) covering results from 17 Demographic and Health Surveys; the importance of maternal schooling for child survival was weaker in sub-Saharan African countries than elsewhere. Hobcraft (1993) suggested that these weaker associations, observed in Ghana and Uganda in particular, could be a result of these two countries having experienced periods of extreme hardship during the fifteen years covered by the analysis—hardships that may have inhibited schooled mothers from taking advantage of their human capital. In an attempt to distinguish the possible benefits of women's schooling in Uganda, we studied the association between maternal schooling and child morbidity and mortality and maternal health behavior in a poor rural area.

Setting

The survey was carried out in the county of Samia Bugwe (now upgraded to a district and renamed Busia) in southeastern Uganda. The area is characterized by subsistence farming of cassava, maize, and sorghum with some trade along the border with Kenya. It is relatively underdeveloped and offers few employment possibilities. At the time of the survey, primary education was neither free nor universal. About half of the adult women had obtained some years of schooling (Census, 1992**)**. The health situation for the children was characterized by a heavy burden of infectious diseases, with malaria and acute respiratory infections representing the greatest dangers to child survival. Government health centers and dispensaries provided preventive and curative services, for which users paid a fee. Home treatment with medicines bought from shops was another frequently used option for health care.

Methodology

The base population of the survey consisted of all mothers with living children below the age of 60 months residing in Samia Bugwe County in Tororo District during the investigation period of February to March 1996. A cross-sectional study design was adopted and a household questionnaire was administered to each of the selected households in three different localities in Samia Bugwe, namely, Dabani, Masafu and Lumino.

Sampling frame and procedure

A multistage sampling procedure was adopted to sample 300 households and mothers. Three of the ten sub-counties in Samia Bugwe were selected at random. From each of the three sub-counties we selected two parishes, and from each parish two villages, at random. Thus a total of twelve villages (Local Council 1) were sampled. Finally, from each of the 12 villages, 25 households were selected. To ensure equal representation of mothers with no schooling and mothers with some schooling, a stratified sampling procedure was adopted at this stage. If the first household selected had a mother who had been to school and the next household selected also had a mother with schooling, this household was skipped and replaced with the next household having a mother who had not been to school. A similar procedure was followed if the mother in the first selected household had no schooling.

Data collection

The mother in each household sampled was interviewed by a trained health worker using a pre-tested structured questionnaire. Information was obtained about demographic characteristics: date of birth, age, religion, marital status, age at first marriage, age at first child, years of schooling, ability to read and write in the local vernacular and English, mother's occupational status, and years of schooling and occupation for her parents and her husband. Details of the family's living conditions were recorded including: building materials of house walls, roof, and floor; presence of electricity and latrine; and ownership of a working radio and bicycle. Information was collected about the mother's utilization of health services: use of modern birth control, attendance of antenatal clinic during last pregnancy, and number of doses of tetanus toxoid received. Mothers were also asked about whom they had consulted in case of any illness among their children during the two weeks prior to the survey and where treatment was received.

For each child born, the following was recorded: date of birth, sex, place of delivery, whether alive or not, date of death, and cause of death. Additional information was collected on each of the children under five; this information consisted of children's immunization details: weight and height; and a two-week recall of fever, cough with fever, and diarrhea. These are the conditions considered important for infant and child survival in Uganda (Ministry of Health 1993).

Data processing and statistical analysis

The questionnaires were checked immediately after data collection and revised where needed. Data were then keyed in twice using EPIINFO version 6.03 and after having corrected data entry mistakes by running the validation program in EPIINFO, the data file was corrected for logical errors. The anthropometric facilities in EPIINFO were used to determine nutritional status whereas the remaining statistical analyses were done using STATA.

Outcomes were stunted growth, wasting, underweight, morbidity from fever, cough with fever, and diarrhea, immunization, and death among children under 60 months. Other outcomes were mothers' use of health services for antenatal care, modern birth control, tetanus immunization, and place of delivery. The principal determinant investigated for child health and survival was maternal schooling. Other potential risk factors were the family's living conditions, age of the mother, the mother's and her husband's occupational status, and husband's education.

A socioeconomic score was calculated based on items indicating standard of living which included: roof (iron), walls (brick) and floor materials (cement); and presence of a bicycle, a

radio, electricity and a latrine in the household. Families that had four or more of these items were given rank 1. Those with three of these items were given rank 2. Those with two items were given rank 3 and those with one item were given rank 4. Finally, those who did not possess any of the items were given rank 5.

Information on immunization was obtained from the immunization cards of the 52% of children whose mothers had them. For the remaining 48%, information was obtained from the mothers. All children who were at home were examined for a BCG scar.

The children's height was measured to the nearest 1cm and their weight to the nearest 100 grams. Assessment of the children's nutritional status was obtained using EPIINFO version 6.03. This program calculates the exact ages in months, and weight-for-height (wasting), weight-for-age (underweight) and height-for-age (stunting) Z scores. As recommended by WHO, children with Z scores less than -2 standard deviations were categorized as being malnourished.

Associations between outcome and maternal schooling were first analyzed using simple bivariate analysis. Thereafter multiple logistic regression was applied and risk estimates expressed in terms of odds ratios with the aim of building parsimonious models with a good fit. When the unit of analysis was the child, not all observations were independent as most mothers had more than one child. In these instances we used the Huber/White/sandwich estimator of variance to obtain robust variance estimates for the calculation of 95% confidence intervals, as the outcomes studied were independent between clusters, i.e. each woman, but not necessarily independent between children borne by the same woman. The best combination of independent variables with p-values (0.05 associated with the outcome was selected in a non-automated way. Variables were removed and re-entered one by one in order to assess if they added to the fit of the model and if not, they were omitted. The log likelihood ratio test was used to compare the full model with simpler models. In general, a two-sided (-level = 0.05 was chosen for hypothesis testing, and its complement 1-(, as the level of confidence.

Results

The mothers and their children

The three hundred mothers in the study population had given birth to 1,394 children. The minimum number of children was two and the maximum was 11. The median and mean age of the mothers at the time of the interview was 28 years and slightly less than half (47%) of the children still living were under the age of 60 months. Nearly all (95%) the mothers in the study population were married. Women without schooling married at an average age of 16, which was nearly two years earlier than women with some schooling. A quarter (25%) of the women who had been to school had eight or more years of schooling, but the majority had between five and seven years. Only 9% of the husbands had not attended school at all; thus most mothers in the study were married to men who had more education than themselves.

Mothers without schooling had their first child at a younger age (average 17 years) and they gave birth to more children. Table 1 presents the number of living and dead children by maternal schooling.

Schooling	Mothers	Mean number of children	Alive children	(%)	Dead children	(%)	Total
No schooling	150	5.1	640	(82.4)	137	(17.6)	777
1 4 years	43	4.3	155	(84.2)	29	(15.8)	184
5 7 years	70	4.1	243	(84.7)	44	(15.3)	287
8+ years	37	3.9	136	(93.2)	10	(6.8)	146
Total	300	4.6	1174	(84.2)	220	(15.8)	1394

Table 1. Schooling of 300 mothers and their alive or dead children

Nearly one in six (16%) of the children had already died with more dead children among women without any schooling.

Health measures and use of health services

Measures of the nutritional status of the children under five showed that 51% were stunted, 27% were underweight, and 4% were wasted. Malnutrition was more common among the children of the women without any schooling, but this difference was not statistically significant. There was no difference with regard to duration of breastfeeding or period with breastfeeding exclusively.

82% of the children under five were reported to have been ill during the two weeks prior to the survey without statistical difference between children borne by mothers with or without some schooling. Symptoms of fever, cough with fever, and diarrhea were reported in that order of frequency. Mortality occurred predominantly in the first year and was more common among children of mothers without any schooling. While 92% of the children who died did so before their fifth birthday, the mean age of death was 11 months. The main causes of death reported by the mothers were measles, malaria and acute fevers, diarrhea, tetanus, nutritional diseases, respiratory tract infections, accidents and poisoning.

Immunization status for children 12 months and over (by which age they should have completed the immunization schedule) was complete for 55% of the children between 12 and 60 months. Nearly three-quarters had received the BCG vaccine, but only 58% had been immunized against measles. The children borne by mothers having at least some schooling were significantly more often immunized than children of mothers without schooling.

Use of antenatal services and modern birth control was significantly more common among women with some schooling. A similar trend, although not statistically significant, was found with regard to place of delivery; 41% of women with some schooling had delivered their latest child at a health unit compared to 34% of the women without any schooling at all.

Associations between mothers' schooling and children's health and survival

The associations between mothers' schooling and children's nutritional status, morbidity, and immunization are shown in Table 2.There was no increased risk of stunting and wasting among children under five born to mothers without schooling. Nor did the children of these mothers have an increased risk of morbidity from fever, cough with fever, and diarrhea. However, there was an increased risk of incomplete immunization against tuberculosis (BCG), diphtheria, pertussis, tetanus (DPT), and polio (OPV) among children born to mothers with no schooling.

Table 2. Maternal schooling as a determinant for nutritional status, morbidity, and immunization presented as crude odds ratios (OR) and adjusted odds ratios* with 95% confidence intervals (CI)** using multiple logistic regression analysis.

Outcome	Schooling	No schooling	Crude OR	Adjusted OR (95%CI)
Nutritional status				
Not stunted	138	113		
Stunted	132	125	1.16	1.10 (0.73;1.68)
Not wasted	205	181		
Wasted	68	74	1.23	1.11 (0.70;1.75)
Normal weight	255	236		
Underweight	12	9	0.81	0.70 (0.27;1.78)
Morbidity				
No fever	91	86		
Fever	187	172	0.97	0.73 (0.47;1.13)
No cough & fever	141	101		
Cough & fever	137	157	1.60	1.51 (0.96;2.37)
No diarrhoea	150	129		
Diarrhoea	128	129	1.17	0.92 (0.62;1.38)
Immunisation				
BCG	158	134		
No BCG	39	61	1.84	1.73 (1.01;2.97)
DPT	138	100		
No DPT	61	97	2.19	1.67 (0.99;2.82)
OPV	141	105		
No OPV	58	92	2.13	1.60 (0.95;2.68)
Measles	126	103		
No measles	73	94	1.58	1.34 (0.82;2.20)

* adjusted for socioeconomic background and husband's education

** The non-independence of some observations; i.e. some women had more than one child, were taken into account by using a robust variance estimator.

. As shown in Table 3, children born to unschooled mothers were also at a significantly higher risk of dying before their fifth birthday than those born to mothers with some schooling.

Table 3. Maternal schooling as a determinant for child mortality before the age of five years and maternal education presented as crude odds ratios (OR) and adjusted odds ratios* with 95% confidence intervals (CI)** using multiple logistic regression analysis.

Outcome	Schooling	No schooling	Crude OR	Adjusted OR (95%CI)
Mortality				
Died	78	125		
Alive	287	264	1.74	1.56 (1.09;2.24)

* adjusted for socioeconomic background and husband's education
** The non-independence of some observations; i.e. some women had more than one child, were taken into account by using a robust variance estimator.

The associations between maternal schooling and utilization of health services for delivery, antenatal care, birth control and for immunization against neonatal tetanus are presented in Table 4.

Table 4. Maternal schooling as a determinant for non-utilization of preventive health services expressed as crude odds ratios (OR) and odds ratios* with 95% confidence intervals (CI)** using multiple logistic regression analysis.

Outcome	Schooling	No schooling	Crude OR	Adjusted OR (95%CI)
Antenatal care				
Yes	148	133		
No	2	17	9.46	20.48 (2.56;164.15)
Birth control				
Yes	19	8		
No	131	142	2.57	1.50 (0.58;3.90)
Tetanus immunization				
At least one dose	137	121		
given	13	29	2.53	2.45 (1.13;5.30)
Not given				
Place of delivery				
Health unit	117	89		
Home	170	175	1.35	1.18 (0.74;1.86)

* adjusted for socioeconomic background and husband's education
** When outcome was place of delivery the non-independence of some observations; i.e. some women had more than one child, were taken into account by using a robust variance estimator.

There were increased risks of non-attendance of antenatal care, no neonatal tetanus immunization and no use of birth control among mothers with any schooling. Attendance of antenatal care and receiving of tetanus toxoid went together in that one had to attend antenatal care to receive TT. However, the findings showed no significant association between maternal schooling and place of delivery.

Discussion

The nutritional status of children under five in the study was generally poor (half were stunted and 4% were wasted), and maternal schooling in this context did not seem to protect small children from malnutrition. These findings are contrary to those from studies conducted elsewhere (Bicego and Boerma 1991; Hobcraft 1993; Joshi 1994; Sandiford 1997) that found an increased risk of stunting and wasting among children born to mothers with no schooling. The ecological and socioeconomic environment within which children in Samia Bugwe are born and brought up may be relevant to the overall poor nutrition in several ways. Poor food security, with consequent insufficient diet, may present problems that maternal schooling in itself does not solve. This study did not yield data on these points. What it did show was high child morbidity, which is also an important cause of malnutrition. Mothers with or without schooling may have had difficulty in protecting their children from diarrhea and other infections that directly affect their nutritional status. Joshi (1994), in a study conducted in Nepal, found that maternal schooling was a predictor of height for age (stunting) but not weight for height (wasting). These findings, according to Joshi, support results from other studies indicating that maternal schooling is of limited effectiveness in protecting children where extensive sources of infection are present. This might very well have been the case in Samia Bugwe. Findings from other studies on the relation between maternal schooling and child morbidity are mixed, with some showing weak association and others showing none (Cleland 1990), but as pointed out by Hobcraft (1993) schooled and unschooled mothers may have a differing propensity to report diarrhea episodes.

Although there was no association between child morbidity and maternal schooling, there was a greater risk of children not completing immunization if their mothers had not been to school. Thus it may be expected that the two categories of children were at risk of different diseases. These results support earlier findings from an evaluation report of the national immunization program conducted in six districts in Uganda where it was observed that mothers who had some schooling were twice as likely to have their children immunized as those without formal schooling (Berkley 1989). They are also congruent with conclusions of other studies done elsewhere (Boerma et al. 1991; Das Gupta 1990).

Most important was the issue of child survival. Children born to unschooled mothers were at a significantly higher risk of dying before their fifth birthday than those born to mothers with some schooling. Similar findings have been reported from studies conducted elsewhere in the world (Caldwell 1979; Cochrane, O'Hara and Leslie 1980; Cleland and van Ginneken 1988; Bicego and Boerma 1991; Hobcraft 1993). What is to be emphasized concerning the present study is that this was the case even after controlling for household socioeconomic status. And it was the case even though there were no associations between child health indicators and maternal schooling.

Conclusion

Findings from this study, like those from others elsewhere, have shown that there is an increased risk of death before the age of five for children born to mothers with no formal schooling. This suggests that mothers' schooling may play an important and independent role in the overall survival of children.

Most children in rural Samia Bugwe were born and brought up in an environment of poverty, food shortage, insufficiency of government health services, poor sanitation, and unprotected water sources. In this kind of environment, children of both schooled and unschooled mothers were likely to fall ill and suffer malnutrition. But as findings from this survey showed, the children of those women who had been to school were less likely to die of these conditions. This could be because schooled women were more likely to have used preventive services for themselves and for their children, as the survey findings showed. This would mean that their children were less likely to be affected by immunizable diseases like tetanus and measles. But many of the dangers to children's lives such as malaria and acute respiratory infections cannot be avoided by immunization. Children of women who have been to school may have survived these diseases because their mothers were better able to manage crises, seek effective help, and provide home care and medication for acutely ill children.

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