

ASSOCIATION BETWEEN MATERNAL EDUCATION AND INFANT DIARRHEA IN DIFFERENT HOUSEHOLD AND COMMUNITY ENVIRONMENTS OF CEBU, PHILIPPINES

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Abstract—Maternal education is one of the strongest determinants of infant survival in developing countries, however, questions remain regarding the extent to which its effects vary as a function of contextual variables.

In this study, a multi-level interactive model is used to assess whether the protective effect of maternal education on the risk of infant diarrhea is modified by three aspects of the mother's familial and community environment: household assets, community economic resources and the availability of mothers' clubs. 2484 study participants were interviewed in 1984 as part of the Cebu Longitudinal Infant Health and Nutrition Study.

The findings suggest that the protective effect of maternal education on infant diarrhea varies according to the socio-economic environment in which the mother lives: maternal education protects against infant diarrhea in the more economically and socially advantaged communities but has no effect in the more disadvantaged communities. The results also indicate that the protective effect of maternal education is smaller in the wealthier households.

These data suggest that improvement in maternal education level, alone, may not always have the expected beneficial effects on infant health. Corollary measures to improve access of mothers and children to basic community resources and efforts to help mothers be more effective in their various social roles may be necessary preconditions for higher levels of maternal education to result in improved infant health.

Key words—maternal education, infant diarrhea

INTRODUCTION

Maternal education is recognized as one of the strongest determinants of infant survival in developing countries [1–3] and mass primary education for women is a common policy recommendation to improve infant and child health in those countries [4]. Questions remain, however, regarding the extent to which the nature and magnitude of the protective effect of maternal education can be assessed without consideration of the socio-economic and cultural environment in which the mother lives [5–9].

Mosley [7], for instance, examined the large regional variations in infant mortality rate that exist in Kenya and found that differences in infant mortality rate by maternal education level were significantly smaller in the more prosperous regions characterized by a low proportion of families with income below the poverty line. In other words, in those areas where access to basic resources and services is less constrained by a mother's knowledge and resources, the level of maternal education is less important in

determining infant health. Studies of how the protective effect of maternal education varies in different familial and community environments could lead to a better understanding of the meaning of education and to identify important contextual factors which influence a mother's attitudes and behaviors [10]. Ultimately, they may help to determine what would be the best policy to promote infant health.

Contextual factors at the local community level may be particularly important to study because of the high internal socio-economic and demographic differentials typically found within developing countries [10–12]. Furthermore, most public policies are implemented at the community level rather than at the household or individual level. Surprisingly, however, few attempts have been made to characterize the socio-economic and cultural context in which mothers live, and to examine how characteristics of the local community environment modify the well documented effects of maternal education on infant health [13, 14].

In this study, a multi-level interactive model has been used to assess whether the protective effect of maternal education on the risk of infant diarrhea is modified by several aspects of the mother's familial and community environment: the level of household assets, the level of community economic resources

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and the availability of mothers' clubs (a social resource) in the community. The sample, derived from a prospective study of infant health and nutrition in the Philippines, consisted of 2484 mother-infant pairs from randomly selected urban and rural communities of Metropolitan Cebu, Philippines.

MATERIALS AND METHODS

The study population and design

This analysis uses data from the Cebu Longitudinal Infant Health and Nutrition Survey which has been described in detail elsewhere [15-17]. Briefly, the study site is Metropolitan Cebu, an area located on the eastern coast of the Island of Cebu in the central Philippines. It includes the city of Cebu (the second largest city in the Philippines), coastal towns, and a number of mountain and coastal villages. A stratified single-stage sampling procedure was used to select 33 communities or barangays (22 urban and 11 rural). Households were surveyed to collect data on all births between 1 May 1983 and 30 April 1984. The sample initially consisted of 3080 women who had single live births and for whom baseline pregnancy and birth information were available. After delivery, each mother was re-interviewed every two months until the index child reached two years of age. Continued participation over time was high: over the course of the first 12 months, only 360 of the 3080 women were lost as a result of migration while 49 mothers decided to withdraw from the study.

For the present study, the baseline survey provides information on the level of maternal education and on various individual and household socio-economic characteristics. The bimonthly longitudinal surveys provide information on incident episodes of infant diarrhea during the week preceding each survey. Information on community infrastructure and services, and on mothers' clubs was collected at the beginning of the data collection process (March 1983) by interviewing key informants (e.g. barangay captain, school teacher) in each sample barangay.

Measure of infant diarrhea

At each longitudinal survey, the interviewer asked the mother: "did your infant begin an episode of diarrhea during the past 7 days?". In this study, we chose to focus on diarrhea morbidity between the age of 6 and 12 months for two reasons. First, previous studies showed that diarrhea incidence dramatically increases after 6 months of age, i.e. after supplementary foods are introduced into the infant diet [18-21]. In the study sample, the 7-day diarrhea incidence increases from around 7 per 100 at 2 months to 20 per 100 at 6 months and 23 per 100 at 12 months. Second, it is between 6 and 12 months of age that maternal education is likely to have the greatest impact on infant health since, during the first 6 months of life, the harmful effects of poor environmental sanitation

on infants of poorly educated mothers may be offset by the protective effect of breast-feeding. After 6 months, however, as supplementary foods are increasingly introduced into the diet and breast-feeding is progressively curtailed, the impact of maternal education may become stronger.

For this analysis, we included the 2484 infants who were surveyed at 6, 8, 10 and 12 months. The health outcome of interest is multiple episodes of diarrhea, here defined as 2 or more surveys for which diarrhea was reported. Infants with multiple episodes of diarrhea are of major concern since they may enter into a vicious cycle of infection and malnutrition that greatly endanger their survival.

Maternal education and contextual factors

In the Philippines, education is highly valued for both sexes, and the mean education level is relatively high compared to other developing nations. In our sample, mothers have a mean education level of 7 years. For the analysis, the following categorization was used: less than completed primary education (0-3 years); less than completed high school education (4-9 years); and completed high school education (10 years or more).

Due to political turmoil and marked fluctuations in household income over the course of the survey, we used total household assets as the measure of household economic resources. This best reflects the long-standing 'average' economic resources of the household and the capacity to tolerate a sudden drop in cash income. The household assets variable (continuous) refers to the total value of the household's possessions ranging from landholdings to common home pieces of furniture and household appliances, as assessed by the mother at baseline. It has been deflated based on the Philippine Consumer Price Index.

The measure of community economic resources is based on a Guttman-type three level index of economic resources which reflected the cumulative process of economic development. Availability of electricity was the starting point to construct the community economic resources variable, and communities with no electricity were assigned the lowest value. Factors related to transportation and communication services were then used to distinguish two additional levels of economic resources. Out of the 33 sample communities, 8 fall into the lowest level of economic resources, 17 into the intermediate level, and 8 into the highest level. Communities with the lowest level of economic resources were all rural whereas communities with the highest level of resources were all urban. Among the 17 communities with an intermediate level of resources, 14 were urban and 3 were rural.

The second community factor considered in this study is the number of mothers' clubs, a measure of community social resources for women. Various clubs organized by the government, the church or by private institutions and groups were present in the

sample communities. These associations sponsor various programs aimed at improving the quality of life of women, and are often the channel for informal education on different topics including health and nutrition [22]. We distinguished communities with no mothers' clubs, which seemed to be genuinely isolated from the society at large, from communities with one and several mothers' clubs. Out of the 33 sample communities, 10 have no mothers' clubs, 10 others have only one club, while 13 have several clubs. Most communities with no mothers' clubs also have few economic resources. There is no apparent relation, however, between the availability of one or several mothers' clubs and higher levels of economic resources.

Finally, age of the mother has been considered as a potential confounder in the analysis since it is correlated with both maternal education level and maternal experience with regard to child care practices that can influence the risk of infant diarrhea.

Statistical analysis and assessment of interaction

The main goal of the statistical analysis is to assess whether maternal education and characteristics of the socio-economic environment interact to affect the risk of infant diarrhea. From a public health perspective, two factors A and B interact if the number of cases that would occur in the population depend on the extent to which A and B occur together in the same individuals. Under this reasoning, interaction between two risk factors is equivalent to a departure from additivity of the absolute effects, i.e. of the risk or rate differences [23]. Given the above considerations, interaction between maternal education and contextual factors has been assessed on an additive scale.

We have described the magnitude of interaction by comparing the amount of variation in education effect across strata to the overall (main) effect. We have also emphasized precision of the effect through discussion of the reliability of the risk estimates involved.

The additive model of risk (linear probability model) is the model of choice to assess interaction on an additive scale [24], and it has been used here to produce adjusted risk difference estimates. Maximum likelihood estimates of adjusted risk differences have been generated by using SAS weighted least square procedure iteratively, as described by Wallenstein and Bodian [25]. Variations in adjusted education effect by level of household assets, level of community economic resources and number of community mothers' clubs have been analysed by modeling each interaction separately, i.e. 3 models have been run successively, each containing all covariates plus interaction terms involving maternal education and one of the three effect modifiers of interest. The main effect additive model was also run to assess the overall (main) protective effect of maternal education.

RESULTS

The sample distribution of maternal education, maternal age, household assets, economic resources and number of mothers' clubs in residence community is displayed in Table 1. Out of the initial sample of 3080 infants enrolled at birth, 596 infants were missing one or more of the four longitudinal surveys between 6 and 12 months and were not considered in this analysis. As shown in Table 1, those infants tended to have younger and more highly educated mothers than the infants included in our sample, and they were more likely to live in communities with a higher level of economic resources and a higher number of mothers' clubs.

Among the 2484 infants included in the present analysis, 598 (24%) had multiple diarrheal episodes, here defined as two or more surveys for which diarrhea was reported. The crude cumulative incidence of multiple diarrhea between 6 and 12 months of age is presented in Table 2 by level of maternal education and other social factors. As expected, there is an inverse association between maternal education level and multiple infant diarrhea. The protective effect of education is particularly pronounced, however, for women who completed high school: there are 6.8 fewer cases of multiple diarrhea per 100 among infants of mothers who completed high school education as compared to infants of mothers with no or some primary education only (95% confidence interval: -11.8; -1.8). In other words, the risk of multiple diarrhea is *ca* 25% lower at high than at low education level.

We first examined the modifying influence of community economic resources on the maternal

Table 1. Distribution of maternal education and other social factors among participants and non-participants (infants who missed one or more of the four longitudinal surveys between 6 and 12 months)

	Participants (2484)	Non-participants (596)
<i>Maternal education (years):</i>		
Less than primary (0-3)	12.5%	6.5%
Less than high school (4-9)	64.8%	64.0%
Completed high school (10+)	23.2%	29.5%
<i>Maternal age (years):</i>		
Mean	26.3	25.0
25th perc.	22	21
Median	26	24
75th perc.	30	29
<i>Household assets (pesos):</i>		
Mean	10168	15411
25th perc.	785	357
median	2249	1575
75th perc.	6703	6069
<i>Community economic resources:</i>		
Low	9.5%	4.9%
Intermediate	52.2%	47.1%
High	38.3%	48.0%
<i>Number of community mothers' clubs:</i>		
0	12.4%	6.4%
1	35.8%	37.1%
2+	51.9%	56.5%

Table 2. Crude incidence of multiple diarrhea by level of maternal education and other social factors

	Number Infants	Incidence P. 100	RD	95% CI
<i>Maternal education (years):</i>				
Less than primary (0-3)	310	26.8	0	--
Less than high school (4-9)	1598	25.0	-1.8	(-6.3; 2.7)
Completed high school (10+)	576	20.0	-6.8	(-11.8; -1.8)
<i>Household assets:</i>				
Below median (<2249 pesos)	1242	25.0	0	--
Above median (≥2249 pesos)	1242	23.1	-1.9	(-4.7; 0.9)
<i>Community economic resources:</i>				
Low	236	19.5	0	--
Intermediate	1296	25.5	+6.0	(1.3; 10.7)
High	952	23.3	+3.8	(-1.0; 8.6)
<i>Number of community mothers' clubs:</i>				
0	307	20.8	0	--
1	889	21.3	+0.5	(-3.9; 4.9)
2+	1288	26.8	+6.0	(1.7; 10.3)
<i>Maternal age:</i>				
Below median (<25 yrs)	1074	25.5	0	--
Above median (≥25 yrs)	1410	23.0	-2.5	(-5.4; 0.4)

education-infant diarrhea association (Table 3). There is no clear association between maternal education and infant diarrhea in the most economically disadvantaged communities. The inverse association is present only in communities with higher levels of economic resources (positive interaction). The protective effect of maternal education, measured in terms of risk differences, is especially large for women who completed high school. In communities with the highest level of economic resources, there were 10 fewer cases of frequent diarrhea per 100 among infants of mothers with a high school diploma as compared to infants of mothers with less than primary school education.

The magnitude of interaction measured in terms of absolute difference in effect of a high school education, at high vs low level of community economic resources, represents 9.4 cases per 100. The magnitude of the overall (main) protective effect of high education is 8.5 cases per 100 (95% confidence interval: -13; -4). Hence, the amount of variation in

the education effect is larger than the overall effect itself. The observed variations in the maternal education effect seem to be essentially related to an increased risk of diarrhea for infants of mothers with less than primary school education in better-off communities.

A similar pattern of variation in education effect is observed with the number of community mothers' clubs (Table 4): there is no clear association between maternal education and infant diarrhea in communities with no mothers' clubs. The expected inverse association is observed only in communities with one or several mothers' clubs (positive interaction), and is particularly strong for women who completed high school education. The absolute amount of variation in the effect of completing high school (i.e. magnitude of interactive effect) represents *ca* 11 cases per 100, which is larger than the overall main effect. The observed variations in the maternal education effect seem to be primarily related to an increased risk of multiple diarrhea for infants of the most poorly

Table 3. Adjusted effect (risk differences) of maternal education on multiple diarrhea in communities with different levels of economic resources

	Community economic resources						
	Low		Intermed.		High		Overall
	Risk*	RD†	Risk	RD	Risk	RD	RD‡
<i>Education (years)</i>							
<Primary	19.5 (76)	0	28.5 (165)	0	25.5	0 (69)	0
<High school	21.0 (149)	+1.5	22.0 (873)	-6.5	23.2	-2.3 (576)	-3.3
High school+	18.9 (11)	-0.6	19.4 (258)	-9.0	15.5	-10.0 (307)	-8.5

*Adjusted risk estimates have been computed for infants of 25 year-old mothers living in households with 4000 pesos of assets and in communities with 1 mothers' club.

†Adjusted risk difference estimates derived from an interactive additive model containing all covariates and interaction terms between maternal education and community economic resources.

‡Adjusted risk difference estimates derived from the main effect additive model containing all covariates.

Table 4. Adjusted effect (risk difference) of maternal education on multiple diarrhea in communities with different number of mothers' clubs

	Number of mothers' clubs						Overall RD‡
	0		1		2+		
	Risk*	RD†	Risk	RD	Risk	RD	
<i>Education</i>							
<Primary	22.8 (86)	0	28.9 (100)	0	33.4	0 (124)	0
<High school	24.7 (196)	+1.9	22.7 (598)	-6.2	29.0	-4.4 (804)	-3.3
High school+	23.6 (25)	+0.8	18.2 (191)	-10.7	23.2	-10.2 (360)	-8.5

*Adjusted risk estimates have been computed for infants of 25 year-old mothers living in households with 4000 pesos of assets and in communities with intermediate level of economic resources.

†Adjusted risk difference estimates derived from an interactive additive model containing all covariates and interaction terms between maternal education and community mothers' clubs.

‡Adjusted risk difference estimates derived from the main effect additive model containing all covariates.

educated mothers in communities with one or several mothers' clubs. Despite the large magnitude of the observed interactive effects, the coefficients of interaction between maternal education and the two community-level factors were not statistically significant.

Finally, the modifying influence of household assets on the maternal education-infant health association has been assessed. In Table 5, variations in education effect are reported for two specific asset values which correspond to the 20th and 80th percentiles of the sample distribution. Although an inverse association between maternal education level and infant diarrhea is apparent at both household assets levels, the association is weaker in wealthier households (negative interaction). The absolute difference in protective effect of completed high school education, at high vs low household assets level, is equal to 2.7 cases per 100 which represents 32% of the overall (main) effect. This interactive effect was statistically significant ($P < 0.05$). The variations in the maternal education effect arises because the risk of diarrhea for infants of mothers with less than

primary school education is lower in wealthier households.

DISCUSSION

The study findings suggest that the protective effect of maternal education on infant diarrhea varies according to the socio-economic environment in which the mother lives: maternal education is not protective in the most disadvantaged communities, but is inversely associated with infant diarrhea in the more socioeconomically advantaged communities. Furthermore, although maternal education has a protective effect at all levels of household assets, the magnitude of this protective effect seems to be smaller in the wealthier households.

The variations in maternal education effects by level of community economic resources seem to be due primarily to an increased risk of diarrhea for infants of mothers with less than primary education in communities with high overall levels of resources. All communities with a low level of economic resources are rural (8/8) while most communities (22/25) with intermediate or high level of resources are urban. Therefore, these data do not permit a separate assessment of the effects of economic level and urban vs rural residence. The greater risk of frequent diarrhea for infants of poorly educated mothers living in better-off communities may be due to several concomitant factors. First, environmental contamination may be higher in more urbanized and economically developed communities where population density is higher. Second, poorly educated mothers who live in such communities may have less access to community services (e.g. sanitation and water), which makes it more difficult for them to protect their infants against high levels of environmental contamination. The proportion of infants living in high density neighborhoods is greater in urban (33%) than rural (25%) communities. While the proportion of households without excreta disposal facilities is higher in rural areas (66% vs 23%), the proportion of such households who live in high

Table 5. Adjusted effect (risk differences) of maternal education on multiple diarrhea in households with different assets levels

	Household assets				
	570 pesos (20th perc.)		8810 pesos (80th perc.)		Overall RD‡
	Risk*	RD†	Risk	RD	
<i>Education</i>					
<Primary	26.6 (207)	0	23.6 (103)	0	0
<High school	23.5 (873)	-3.1	22.3 (725)	-1.3	-3.3
High school+	17.5 (162)	-9.1	17.2 (414)	-6.4	-8.5

*Adjusted risk estimates have been computed for infants of 25 year-old mothers living in communities with intermediate level of economic resources and 1 mothers' club.

†Adjusted risk difference estimates derived from an interactive additive model containing all covariates and interaction terms between maternal education and household assets.

‡Adjusted risk difference estimates derived from the main effect additive model containing all covariates.

density areas is higher in urban communities (39% vs 12%). Furthermore, whereas 8% of all urban mothers have less than primary education, 20% of the mothers living in households without any excreta disposal facilities have a low level of education. By and large, therefore, it is the less educated mothers who live in the more highly contaminated urban areas. In the rural areas, the relationship is not as strong: 21% of all rural mothers have less than primary education, while 27% of the mothers living in households without excreta disposal facilities have a low level of education. In sum, this suggests that the environmental conditions in which infants of poorly educated mothers are raised are worse in more urbanized and economically developed communities than in rural communities.

Another contributing factor may be the lower prevalence of breast-feeding in urban as compared to rural areas of Metropolitan Cebu. Although the urban/rural difference in breast-feeding practices is more pronounced among women with a high maternal education level, it is also apparent among women with a low education level. At 6 months postpartum, for instance, the percentage of poorly educated mothers who do not breast-feed is 3% in rural areas, and 9% in urban areas. At 12 months, comparative figures are 11% in rural areas and 20% in urban areas. The observed decrease in breast-feeding practices in urban areas may be particularly detrimental for infants of poorly educated mothers who are more exposed to environmental contamination.

Changes in breast-feeding practices clearly have multiple determinants. One possible explanation is that, in more urbanized and economically developed communities, there are more wage labor opportunities available for women who wish to, or need to, outside of the home. Long distances to and from work, or highly structured work schedules, may prevent women wage workers from returning home to breast-feed their infant or from bringing their infant along to work [26–28].

The pattern of interaction between maternal education and the availability of mothers' clubs in the community was surprising. The presence of mothers' clubs was associated with an increased risk of diarrhea for infants of mothers with less than primary education, and had no beneficial effects on infants of better educated mothers. This could merely reflect the fact that clubs are usually created in communities where the need for social and health programs is greater, e.g. where infant diarrhea is more prevalent. However, additional information would be needed on the context in which the clubs were created, the time since creation, and the nature of the clubs' activities to substantiate this interpretation.

The variations in maternal education effects by level of household assets were related to a decreased risk of frequent diarrhea for infants of mothers with less than primary education living in wealthier house-

holds. This could mean that household assets allow mothers to have access to community water and sanitation services. This would be especially beneficial, of course, for infants of poorly educated mothers who live in the worst environmental conditions. Furthermore, a majority of women with low educational attainments turned to self-generated employment in the informal sector [27, 29, 30]. Household assets may provide these women with the capital necessary to invest in a small home-based business such as a sari-sari store (i.e. a small grocery store). In urban Cebu, greater household assets have been associated with an increased probability for the mother to work at home as opposed to away from home [31]. The fact that the mother can pursue her economic activity at home may have positive effects on the child's health since the mother would have more time, presumably, to take care of the child, in particular to breast-feed. Furthermore, given the proximity of her work site, the mother may decide to return to work earlier after the birth of the infant, and the additional income may benefit the infant in many other ways such as improvement of the infant supplementary diet [32, 33].

Surprisingly, infants of better educated mothers did not benefit from higher levels of household assets. Furthermore, although the modifying effects of household assets were statistically significant, the decrease in diarrhea risk with increasing household assets observed for infants of poorly educated mothers was small in absolute terms. The effects of household assets might be higher in communities with higher levels of economic resources, i.e. there might be a positive interaction between household assets and community economic development. Because of sample size limitations, however, it was not possible to test the 3-way interaction this implies.

Several limitations of this study must be acknowledged. As previously noted, highly educated mothers were more likely to be excluded from the analysis because they missed one or more of the 4 longitudinal morbidity surveys between 6 and 12 months postpartum. This could have introduced a selection bias if the selection odds of disease was different from unity for highly educated or poorly educated mothers. For instance, if highly educated mothers of infants with frequent diarrhea were less likely to participate than highly educated mothers of infants with no frequent diarrhea, this would lead to an overestimation of the protective effect of maternal education. We examined the distribution of the number of diarrheal episodes among infants with 3 longitudinal surveys and found that it was comparable to that of infants with 4 longitudinal surveys (included in the study). Therefore, although the possibility of some selection bias cannot be completely eliminated, there is no evidence that this type of bias is occurring in the data.

Another limitation of this study is that diarrhea is based only on mothers' reports. To minimize recall error, the recall period was restricted to the week

preceding the survey. Kalter *et al.* [34] showed that the sensitivity and specificity of a mother's report of frequent loose or liquid stool in Cebu is 95 and 80% respectively, when validated against medical diagnosis. It is plausible, however, that poorly educated mothers are less likely to report episodes of infant diarrhea which may be viewed as 'normal'. If poorly educated women underreported diarrhea, however, information bias would result in an underestimate of the protective effect of maternal education. On the other hand, if the less educated mothers, especially those in better-off communities, thought that there was a benefit from reporting diarrhea, this could lead to an overestimate of the protective effect of maternal education in better-off communities and, therefore, to an overestimate of the interaction between maternal education and community economic development. Although this type of reporting bias could be a major concern in a one-time cross-sectional survey, it is unlikely in this study which involved multiple periodic surveys. Indeed, after the first or second survey, most mothers probably realized that no material benefits (e.g. free clinic visit or treatment) were attached to reporting diarrhea.

Finally, the estimated differences in protective effect of maternal education by community-level factors must be interpreted with some caution since they rely heavily on the accuracy of the risk estimates in the most disadvantaged communities, i.e. in communities with little economic resources and no mothers' clubs. Because relatively few mothers, especially highly educated ones, lived in those communities, the reported risk estimates are statistically unstable. This could explain why, despite the large magnitude of the observed interactive effects, the coefficients of interaction between maternal education and the two community-level factors did not reach statistical significance. It should be noted, however, that tests of interaction have low power because the alternatives to the null hypothesis are not very specific [24, 35]. Thus, non-significant *P*-values should not be interpreted as an absence of interaction, *per se*.

Although no definite conclusions can be drawn from the data presented here, the magnitude of the observed variations in maternal education effect suggests that the protective effect of maternal education does vary according to the familial and community environment in which the mother lives. In other words, the socio-economic and cultural environment together with the level of maternal education influence maternal attitudes and behaviors in relation to the transmission of infant diarrhea. Variations in the magnitude of the protective effect of maternal education are particularly large as a function of community-level factors. This confirms the importance of studying social and economic contextual factors in investigations of childhood morbidity and mortality. As Mosley and Chen [36] suggested, this calls for a better integration of social, behavioral and biomedical research paradigms if progress is to

be made in understanding how socio-cultural changes influence the ability of mothers to promote the health of their infants through the adoption of healthy behaviors. Our results also suggest that improvement in maternal education level, alone, may not have the expected beneficial effect on infant health. Corollary improvements in socio-economic conditions also appear necessary. There is little doubt that education is an important individual tool for coping which contributes to increase women's knowledge, social status and power to control their lives. However, measures to improve access of mothers and families to basic community resources and to help mothers carry out their various social roles, effectively, may be necessary preconditions for higher levels of maternal education to result in improved infant health.

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