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Parental Education and Child Health: Evidence from China*

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This paper examines the effect of parental, household and community characteristics on the health of children in China. We find that birth order, death of elder siblings, use of prenatal care and alcohol consumption by the mother when pregnant have statistically significant effects on the health of children. Although parental education does not have a significant direct effect on child health, it does affect mothers' behavior during pregnancy and influences the use of health inputs, indirectly impacting the health of children. The research findings have important implications for both family planning programs and broader social policies in China.

Keywords: parental education, child health, China.

JEL classification codes: J1, C31, C35.

I. Introduction

Child health has important effects on learning, on labor productivity (as adults) and, more importantly, on child survival and mortality. Consequently, the subject of child health now stands at the centre of the wider issue of household welfare in developing countries. In recent years there has been a large volume of published literature that has examined the determinants of child health. Of particular importance has been the analysis of the relationship between parental education and child health.[1]

Surprisingly, the published literature on child health and its determinants in China is rather limited. Since the 1970s, research interest in demography has

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1. See, for example, Caldwell (1979), Cleland (1990), Bicego and Boerma (1993), Caldwell and Caldwell (1993), Hobcraft (1993), Basu (1994), Caldwell (1994), Desai and Alva (1998), Mellington and Cameron (1999), Gangadharan and Maitra (2000) and Buor (2003) for empirical evidence from several different developing countries.

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focused mainly on family planning policy, socioeconomic effects of population growth, and fertility transition and its socioeconomic consequences.[2] Although since the 1994 ‘Population and Development Conference’ in Cairo, researchers of China have started paying attention to the problem of women’s reproductive health, child health continues to remain a forgotten issue. Several population surveys, which include information on child health, parents’ characteristics and community characteristics, have been conducted in China,[3] but to the best of our knowledge no one has used these recent datasets to analyze comprehensively the factors that influence child health. There is, however, a reason for this: because the datasets are generally not accessible to foreign scholars, very little research about child health in China has been conducted outside China. One important aim of the present paper is to bridge that research gap and to explore strategies for improving child health. In particular, in the present paper we will examine the relationship between parental education and child health in China using an ordered probit model. For estimation purposes we use data from the *1997 China National Population and Reproductive Health Survey*. We find that birth order, death of elder siblings, use of prenatal care and alcohol consumption by the mother when pregnant have statistically significant effects on the health of children. Although parental education does not have a significant direct effect on child health, it does affect mothers’ behavior during pregnancy and influences the use of health inputs, indirectly impacting the health of children.

The rest of the paper is organized as follows: Section II describes the dataset used in our analysis. The estimation methodology and the explanatory variables that are used are presented in Section III, followed by discussion of the results in Section IV. Section V provides conclusions and policy implications.

II. Data and Descriptive Evidence

The dataset used in the present paper is the *1997 China National Population and Reproductive Health Survey*. This was China’s fourth national fertility survey and the emphasis of this survey was on women’s reproductive health. The survey design is similar to the demographic and health surveys conducted in many developing countries. This survey, conducted by the China National Committee of Family Planning, paid a great deal of attention to women’s reproductive health and child health, technical services of family planning and knowledge

2. The Chinese government introduced the ‘Later, Longer and Fewer’ family planning policy at the beginning of the 1970s and implemented the very strict ‘one-child-per-couple policy’ from the end of the 1970s to control China’s population growth. The total fertility rate in China has dropped sharply from 4.01 (1970) to 1.8 (2000), close to the average level of developed countries. During the past 30 years China’s population growth has shifted to a population reproduction pattern of low fertility, low mortality and low growth rates.

3. For example, the 1982, 1990 and 2000 population census, and the 1997 and 2001 population and reproductive health surveys.

about sexually transmitted diseases and AIDS.[4] The sample of the 1997 survey was drawn from 337 counties, which cover all of the 31 provinces (Autonomous Regions/Municipalities) in China, and 15 213 women of childbearing age residing in rural and urban communities were interviewed. A post-enumeration check indicated that the data were of fairly good quality (Wang, 2001).

The survey was conducted in two phases. In the first phase, the survey covered the basic population information and community environment of the sample units, whereas the second involved the knowledge, attitude and practices of women of childbearing age in regards to childbirth, contraception and reproductive health, their demands for family planning and services related to daily life and production. In the first phase of the survey, a probability proportional sampling method was adopted to sort out 1041 sample units in 337 counties/cities/districts across the country. A total of 186 089 persons were registered, of whom 169 687 were permanent residents. In the second phase, 16 090 of the women of childbearing age registered in the first phase were singled out for interviews; however, 15 213 of them were actually registered.

The datasets for both individual women and communities are used in the present paper. Unfortunately the survey collected the information on the community level characteristics only for the sample of rural women.

Every woman of childbearing age in the sample was asked about her maternity history. In particular, the questions addressed the outcome and the completion time of each pregnancy, the gender of live births, the number of months of pure breastfeeding for each child and the health condition of each live birth at the time of the survey. Unfortunately, women were not asked about the health condition of each child at birth. In the present paper, we restrict our analysis to the youngest child born to each woman of childbearing age.[5] There are three main reasons for doing this. First, we are interested in examining the effect of health inputs and behavioral variables on child health. But this data is available only for the youngest child born to each woman in the sample. Second, the health of an individual at the time of the survey could be affected by parental factors (like inputs used, parental behavior and parental education) and 'other' factors. We assume that as a child grows older, these 'other' factors become more important, while for the very young children parental factors are more important. We do not have retrospective data and consequently we do not have

4. In contrast, the preceding surveys of 1981, 1988 and 1992 emphasized fertility patterns, fertility level and trends of fertility change in China, and provided useful datasets for policy-makers and scholars to evaluate the effectiveness of family planning policies.

5. The fact that woman have multiple children appears to be at odds with the official 'one child' policy of China. However, in rural areas the one child policy was never as strictly enforced as in urban areas and the extent of enforcement varied dramatically across different regions. In most regions, farming households are allowed to have a second child if the first child is a girl or is disabled. Whether or not the policy is enforced by local governments depends on the target population growth (the quota) imposed by the Central Government. Moreover, minorities are exempt from the one child policy.

any information on these ‘other’ factors. Therefore, analyzing all children (children ever born) could result in significant omitted variable bias in the estimates. Third, if we consider all children aged 0–5 years old born to women of childbearing age, we have cases of multiple births to each woman (the average number of children born during the period 1992–1997 for the women of childbearing age is 1.15). This leads to an additional issue: how do we account for the unobserved mother level heterogeneity or factors that are common to all children born to the same mother that affect child health? Traditionally, the published literature has used the mother fixed effect (a mother dummy for each child in the sample). We tried to do that, but the degrees of freedom were significantly reduced. Therefore, we restricted our estimation to the sample of the youngest child born to each woman. In the set of explanatory variables we included *NUMPREVDEAD* (number of children born to the mother that have died). This variable could capture the effect of (unobserved) mother characteristics on child health. For example, if a larger number of children previously born to the woman had died, it could be indicative of some particular health problem for the mother, which has an adverse effect on the health of her children.

Table 1 presents selected descriptive statistics for the mother, the youngest child born to each woman in the 5 years prior to the survey date and the year immediately preceding the survey date, the community, the use of health inputs and maternal behavior when pregnant. Information on community characteristics was collected only for households residing in rural areas.

There exists a large volume of published research that examines the relationship between parental education and child health. Most of these studies find that parental education level is positively associated with child health, and that maternal education has a stronger effect than paternal education.[6] There are several channels through which mothers’ education affects child health: first, increased education lowers the cost of information that affects child health and more educated women are more likely to have a better understanding of the value of public health infrastructure and are better able to locate and utilize these services; second, better educated women tend to exert more control over household assets and household expenditure patterns and it has been observed that an increase in the bargaining power of women within the household has a significant and positive effect on child welfare (educational attainment and health status); and third, more education implies that women are more likely to be earning more in the labor market. This is likely to give them better access to antenatal and postnatal services. The father’s educational attainment might be viewed as a proxy for household permanent income (particularly in the absence of any data on household income/expenditure) and the effect of father’s education on child health could, therefore, be viewed as an income effect.

6. See, for example, Rauniyar (1994), Desai and Alva (1998) and Gangadharan and Maitra (2000) for evidence using data from different countries around the world.

Table 1 Sample means and standard deviations

Variables	*All households*		*Rural households*	
	Youngest child 0–5 years	*Youngest child 0–1 year*	*Youngest child 0–5 years*	*Youngest child 0–1 year*
EDUCM1 (mother has no schooling)	0.1733	0.1594	0.2000	0.1888
	(0.3785)	(0.3662)	(0.4001)	(0.3916)
EDUCM2 (highest education of the mother is primary school)	0.3690	0.3598	0.4209	0.4213
	(0.4826)	(0.4801)	(0.4938)	(0.4940)
EDUCM3 (highest education of the mother is junior middle school)	0.3576	0.3657	0.3466	0.3523
	(0.4794)	(0.4818)	(0.4760)	(0.4779)
EDUCM4 (highest education of the mother is senior middle school or higher)	0.1001	0.1151	0.0325	0.0376
	(0.3002)	(0.3193)	(0.1773)	(0.1902)
EDUCF1 (father has no schooling)	0.0494	0.0512	0.0571	0.0599
	(0.2168)	(0.2204)	(0.2321)	(0.2374)
EDUCF2 (highest education of the father is primary school)	0.2829	0.2677	0.3190	0.3086
	(0.4505)	(0.4429)	(0.4662)	(0.4622)
EDUCF3 (highest education of the father is junior middle school)	0.5005	0.4987	0.5302	0.5381
	(0.5001)	(0.5002)	(0.4992)	(0.4988)
EDUCF4 (highest education of the father is senior middle school or higher)	0.1672	0.1824	0.0937	0.0934
	(0.3733)	(0.3864)	(0.2914)	(0.2911)
RURAL (rural residence)	0.8489	0.8397		
	(0.3582)	(0.3670)		
PLATEAU (topography of village)			0.3888	0.3898
			(0.4876)	(0.4880)
SEMI-MOUNTAINEOUS (topography of village)			0.2455	0.2426
			(0.4305)	(0.4289)
BASIN (topography of village)			0.2597	0.2477
			(0.4386)	(0.4319)
UNDERGROUND WATER (main source of drinking water)			0.2810	0.3056
			(0.4496)	(0.4609)

Table 1 (*continued*)

Variables	All households		Rural households	
	Youngest child 0–5 years	Youngest child 0–1 year	Youngest child 0–5 years	Youngest child 0–1 year
RAINWATER (main source of drinking water)			0.3627	0.3452
			(0.4809)	(0.4757)
NOELECTRICITY (electricity connection)			0.9679	0.9695
			(0.1763)	(0.1719)
DISTANCE1 (distance to seat of township government)			5.6000	5.4690
			(5.6319)	(5.4218)
DISTANCE2 (distance to nearest county town)			29.6452	28.8761
			(23.0229)	(22.8850)
HEALTHSTATUS	1.9636	1.9565	1.9590	1.9503
	(0.2459)	(0.2752)	(0.2617)	(0.2966)
GIRL	0.4365	0.4689	0.4250	0.4599
	(0.4960)	(0.4992)	(0.4944)	(0.4986)
AGEMBRTH (age of the mother at the time of childbirth)	25.5663	25.5714	25.4945	25.4616
	(3.7432)	(3.5348)	(3.7989)	(3.5869)
BOTHHAN (both mother and father are ethnically Han)	0.8495	0.8372	0.8422	0.8223
	(0.3576)	(0.3694)	(0.3647)	(0.3824
BIRTH ORDER	1.1058	1.0624	1.1259	1.0978
	(0.3003)	(0.3214)	(0.2862)	(0.3178)
NUMPREVDEAD (number of elder siblings that have died)	0.6781	0.7435	0.6791	0.7635
	(19.8518)	(18.0409)	(21.8929)	(20.2071)
DIFFPREV (time difference from the previous child)	30.4901	31.6104	30.8757	32.0798
	(0.2201)	(0.1552)	(0.2470)	(0.1756)
NUMELDBRO (number of existing elder brothers)	0.5097	0.4579	0.5349	0.4883
	(0.3760)	(0.3026)	(0.4198)	(0.3503)
NUMELDSIS (number of existing elder sisters)	0.6633	0.6026	0.6909	0.6393
	(1.9636)	(1.9565)	(1.9590)	(1.9503)

Table 1 (*continued*)

Variables	*All households*		*Rural households*	
	Youngest child 0–5 years	*Youngest child 0–1 year*	*Youngest child 0–5 years*	*Youngest child 0–1 year*
CHEMICAL (if the mother was exposed to pesticide or chemical fertilizer when pregnant with the youngest child)	0.2363	0.2106	0.2739	0.2497
	(0.4249)	(0.4079)	(0.4460)	(0.4331)
SMOKE CHEMICAL (if the mother smoked when pregnant with the youngest child)	0.0187	0.0230	0.0194	0.0244
	(0.1354)	(0.1500)	(0.1380)	(0.1543)
ALCHOL CHEMICAL (if the mother consumed alcohol when pregnant with the youngest child)	0.0295	0.0247	0.0325	0.0284
	(0.1691)	(0.1553)	(0.1773)	(0.1663)
MEDICINE CHEMICAL (if the mother took antibiotic, analgesic or hormonal medicines when pregnant with the youngest child)	0.1039	0.1091	0.1127	0.1147
	(0.3052)	(0.3119)	(0.3163)	(0.3188)
HARDLABOR CHEMICAL (if the mother continued performing hard labor when pregnant with the youngest child)	0.3817	0.3299	0.4396	0.3878
	(0.4859)	(0.4704)	(0.4964)	(0.4875)
PRENATAL (if the woman had taken any prenatal exams performed by professionals when pregnant with the youngest child)	0.7323	0.7826	0.6929	0.7462
	(0.4428)	(0.4126)	(0.4614)	(0.4354)
HOSPDEL (the place of delivery of the youngest child was a hospital)	0.2062	0.2421	0.1179	0.1492
	(0.4046)	(0.4285)	(0.3226)	(0.3565)
FPDEL (the place of delivery of the youngest child was a family planning clinic)	0.1663	0.1867	0.1840	0.2102
	(0.3724)	(0.3898)	(0.3875)	(0.4076)
HOMEDEL (the place of delivery of the youngest child was home)	0.4245	0.4928	0.3388	0.4061
	(0.4943)	(0.5002)	(0.4734)	(0.4914)
DOCTOR (doctor was present during delivery of the youngest child)	0.3202	0.2583	0.3687	0.3036
	(0.4666)	(0.4379)	(0.4825)	(0.4600)
MIDWIFE (midwife was present during delivery of the youngest child)	0.1384	0.1355	0.1616	0.1614
	(0.3454)	(0.3425)	(0.3681)	(0.3681)
FAMILY (family members were present during delivery of the youngest child)	0.1368	0.1449	0.1201	0.1269
	(0.3437)	(0.3522)	(0.3252)	(0.3330)
INDUCEDBRTH (birth of the youngest child was induced)	0.2363	0.2106	0.2739	0.2497
	(0.4249)	(0.4079)	(0.4460)	(0.4331)
Sample size	3157	1173	2680	985

Notes: SD are given in parentheses.

In Table 2 we present some descriptive statistics on the relationship between parental educational attainment and child health. Four categories of educational attainment are considered for the mother and the father (0 if no schooling; 1 if the highest education attained is primary schooling; 2 if the highest education attained is junior middle school; and 3 if the highest education attained is senior middle school or higher).[7] Three categories of child health are considered: *HEALTHSTATUS* = 0 if the child died after birth; *HEALTHSTATUS* = 1 if the child is sick, congenitally disabled or disabled; *HEALTHSTATUS* = 2 if the child is healthy or basically healthy.[8]

It is clear from Table 2 that higher parental educational attainment is associated with improved child health. The proportion of children who are healthy or basically healthy (*HEALTHSTATUS* = 2) increases from 95.90 to 98.85 percent as we move from mothers without schooling to cases where the highest education attained by the mother is senior middle school or higher. We get a similar result when we move from fathers without schooling to fathers with senior middle or higher education: the corresponding proportion increases from 95.42 to 98.80 percent. Table 2 also shows that parental education noticeably reduces the possibility of children dying or falling sick after birth. The mortality rate of children after birth (*HEALTHSTATUS* = 0) falls from 2.05 percent (with mothers who have no schooling) to 0.00 percent (with mothers who have senior middle school or higher) and the proportion of children who fell sick, were congenitally disabled or disabled (*HEALTHSTATUS* = 1) drops from 2.05 to 1.15 percent when mother's education level goes up.

The descriptive statistics presented in Table 2 also show that increases in the educational attainment of the mother have very strong effects on the use of health inputs and her behavior when she is pregnant. For example, we see that there is a 300 percent increase in the probability that the mother seeks prenatal care and an 80-percent drop in the probability that the mother smokes when she is pregnant as we move from mothers' with no schooling to mothers' with senior middle schooling or higher.

III. Estimation Methodology and Explanatory Variables Used

We estimate the health status of children (at the time of the survey) using an ordered probit model as follows:

$$HEALTHSTATUS^* = \beta_1 X_1 + \varepsilon \qquad (1)$$

7. Therefore, *EDUCM1*/*EDUCF1* = 1 if mother/father has no schooling; *EDUCM2*/*EDUCF2* = 1 if the highest education attained is primary schooling; *EDUCM3*/*EDUCF3* = 1 if the highest education attained is junior middle school; and *EDUCM4*/*EDUCF4* = 1 if the highest education attained is senior middle school or higher.

8. We use this categorisation later for the ordered probit estimation of child health status.

Table 2 Parental educational attainment, child health, use of health inputs and maternal behavior (rural households)

Variables	*Mother's educational attainment*				*Father's educational attainment*			
	EDUCM1	*EDUCM2*	*EDUCM3*	*EDUCM4*	*EDUCF1*	*EDUCF2*	*EDUCF3*	*EDUCF4*
Health Status = 0	2.05	2.04	0.54	0.00	3.27	1.99	1.06	0.80
Health Status = 1	2.05	1.15	0.75	1.15	1.31	1.40	1.20	0.40
Health Status = 2	95.90	96.81	98.71	98.85	95.42	96.61	97.75	98.80
CHEMICAL	0.275	0.297	0.258	0.283	0.287	0.293	0.254	0.161
SMOKE	0.052	0.028	0.012	0.012	0.030	0.027	0.005	0.011
ALCOHOL	0.065	0.043	0.021	0.040	0.054	0.041	0.013	0.000
MEDICINE	0.078	0.106	0.114	0.147	0.106	0.123	0.110	0.046
HARDLABOR	0.712	0.512	0.379	0.367	0.655	0.466	0.307	0.184
PRENATAL	0.248	0.598	0.780	0.797	0.375	0.692	0.861	0.862
HOSPDEL	0.039	0.071	0.141	0.195	0.052	0.084	0.177	0.333
FPDEL	0.013	0.150	0.216	0.223	0.097	0.174	0.247	0.184
DOCTOR	0.052	0.264	0.389	0.482	0.166	0.296	0.468	0.575
MIDWIFE	0.275	0.365	0.388	0.327	0.300	0.421	0.352	0.287
FAMILY	0.556	0.241	0.090	0.056	0.401	0.151	0.047	0.046
INDUCEBIRTH	0.092	0.108	0.121	0.175	0.080	0.116	0.142	0.184

where *HEALTHSTATUS* is the 'true' health status and is not observed. Instead, what we observe is the following categorical variable *HEALTHSTATUS*, which is defined as follows:

$$HEALTHSTATUS = \begin{cases} 0 & \text{if } HEALTHSTATUS^* < \tau_1 \\ 1 & \text{if } \tau_1 \leq HEALTHSTATUS^* < \tau_2 \\ 2 & \text{if } \tau_2 \leq HEALTHSTATUS^* \end{cases} \quad (2)$$

Equivalently, one can write

$$HEALTHSTATUS = \begin{cases} 0 & \text{if dead after birth} \\ 1 & \text{if sick, congenitally disabled or disabled after birth} \\ 2 & \text{if basically healthy or healthy} \end{cases} \quad (3)$$

We have modeled the health status of children using an ordered probit model because there is an obvious ordering of the three health states. An alternative to the ordered probit model would be to use a multinomial logit model, where we do not need to make any prior assumptions regarding the ordering of the health status of children. We tried to compute the multinomial logit estimates but could not compute them if we included the dummies for the mother's educational attainment as explanatory variables.

Finally, we compute and present the regression results from a binary probit model of good health where the dependent variable *GOODHEALTH* is defined as follows:

$$GOODHEALTH = \begin{cases} 1 & \text{if basically healthy or healthy} \\ 0 & \text{if otherwise} \end{cases} \quad (4)$$

For reasons mentioned earlier, we restrict our sample to the youngest children born after 1991. We compute and present separate estimates for the health status of children aged 0–1 and 0–5 years old.[9] The health status of the child is assumed to depend on child characteristics, characteristics of the mother and the father and other community characteristics. Child characteristics include a dummy for the sex of the child (*GIRL*), the time difference from the previous child (*DIFFPREV*), the number of elder siblings that have died (*NUMPREVDEAD*), the number of existing elder brothers (*NUMELDBRO*) and elder sisters (*NUMELDSIS*), and the birth order of the child (*BIRORDER*). We also control for the age of the mother at the time of childbirth by including the following two variables: *AGEMBRTH* (the age of the mother at the time of childbirth) and *AGEMSQ* (the square of the age of the mother at the time of childbirth). The last

9. An anonymous referee enquired why we choose age 1 year and age 5 years as the two cut-off ages. In the published literature, child mortality is defined as child death before reaching the age of 5 years and infant mortality is defined as child death before reaching the age of 1 year. Examining child health in the age groups 0–5 and 0–1 years fits in with this categorization.

term accounts for the possible non-linearity in the effect of the age of the mother at the time of childbirth on child health.

Parental characteristics include three dummies for the highest level of education attained by the mother and the father. These have been described above. We also include a dummy for the ethnicity of the household: *BOTHHAN* = 1 if both the mother and the father are ethnically Han.

For the rural sample, but not for the urban sample, the survey collected information on several community level variables (including the topography of the region, main source of drinking water for the community, whether there is electricity and the distance to the seat of government and to the nearest country town).[10] We use these community level characteristics as additional regressors in the regressions for the rural sample. They are dummies for the topography of the village (*PLATEAU*, *SEMI-MOUNTAINOUS* and *BASIN*), the main source of drinking water of locals (*UNDERGROUND WATER* and *RAINWATER*) and whether the village is electrified (*NOELECTRICITY*). We also include the distance between the sample unit and the seat of township government (*DISTANCE1*) and the distance between the sample unit and county town (*DISTANCE2*). We also conduct a standard test for the joint significance of these community infrastructure variables. These community characteristics, which could be viewed as proxies for availability of health facilities, could have significant effects on child health and ignoring them could result in omitted variable bias.

For the youngest birth, the survey dataset contains information on the use of health inputs, place of delivery and prenatal and postnatal care obtained. They include: *PRENATAL* = 1 if the woman had taken any prenatal health exams performed by professionals during pregnancy of youngest child; *HOSPDEL* = 1 if the place of delivery of the youngest child was a hospital or a maternal and child health centre; *FPDEL* = 1 if the place of delivery of the youngest child was a family planning centre; *DOCTOR* = 1 if the birth attendant of the youngest child was a doctor in a hospital or in a maternal and child health centre; *MIDWIFE* = 1 if the birth attendant of the youngest child was a midwife and *FAMILY* = 1 if the birth attendance of the youngest child was a family member(s). Finally, we include a dummy to indicate whether the birth of the youngest child was induced (*INDUCEDBRTH*). The survey also has questions on the behavior of the mother during pregnancy of the youngest child and we include these variables as they could have implications for the health status of the children.

10. In an earlier version of the present paper, we computed and presented separate estimates for the sample of all households (including a rural residence dummy, but no community characteristics) and for rural households. The anonymous referee suggested that we instead present separate estimates for rural and urban households. Unfortunately, the sample of urban households is too small (85 percent of the women included in the sample reside in the rural areas) and we face severe convergence problems in trying to estimate the results. Therefore, we present only the results corresponding to those households residing in the rural areas. The results for all households are available upon request.

The variables included in the regression as explanatory variables are: *CHEMICAL* = 1 if the woman was exposed to pesticide or chemical fertilizer when pregnant with the youngest child; *SMOKE* = 1 if the woman smoked when pregnant with the youngest child; *ALCOHOL* = 1 if the woman drank alcohol when pregnant with the youngest child; *MEDICINE* = 1 if the woman took antibiotic, analgesic or hormonal medicines when pregnant with the youngest child and, finally, *HARDLABOR* = 1 if the women continued performing hard labor when pregnant with the youngest child. The estimation results for both the health input variables and the behavioral variables have significant policy implications. We conduct a separate test for the joint significance of the health input and behavioral variables in the child health regressions.

IV. Results

The ordered probit regression results for health status and the binary probit regression results for good health (coefficients, robust standard errors to account for arbitrary heteroskedasticity and marginal effects) are presented in Tables 3 and 4. Table 3 presents the results for children aged 0–5 years and Table 4 for children aged 0–1 year. The estimating sample is restricted to the youngest child born to women in the childbearing age residing in rural regions. The results for 'all households' are available on request. A positive and statistically significant coefficient estimate associated with a particular explanatory variable implies that the corresponding explanatory variable significantly increases the probability that the child is healthy, whereas a negative and statistically significant coefficient estimate implies that the corresponding explanatory variable significantly increases the probability that the child dies after birth.

We start with a discussion of the results for the regression results for the children aged 0–5 years. There is a U-shaped relationship between the age of the mother at birth and the health status of the child: the coefficient estimates of *AGEMBRTH* and *AGEMSQ* are both statistically significant, although are of opposite signs. An increase in the age of the mother at the time of birth reduces the probability that the child is healthy or basically healthy, but beyond a certain age this relationship turns the other way. This relationship between the age of the mother at birth and child health is rather surprising. There is a fairly large published literature on the non-linear effect of mother's age at childbirth on child health outcomes. Biologically speaking, early or late childbearing might be detrimental to the health of the fetus because of impaired functioning of a woman's reproductive system. If a woman is either too young or too old, her uterus and cervix might be unable to sustain a normal pregnancy. We seem to be obtaining an opposite relationship between the mother's age at birth and the health of the child. *NUMPREVDEAD* is negative and statistically significant. This essentially implies that an increase in the number of previous children born to the woman that have died, results in a lower health status of the child and the marginal effects show that a unit increase in the number of previous children

Table 3 Ordered probit regression results for health status and the probit regression results for good health for the youngest child (rural sample only; children aged 0–5 years)

	Ordered probit				*Probit*	
	Estimate	*Marginal effect*			*Estimate*	*Marginal effect*
		0	*1*	*2*		
CONSTANT	7.6651***				7.4478***	
	(2.3679)				(2.4066)	
GIRL	0.0045	−0.0001	−0.0001	0.0002	0.0205	0.0008
	(0.1128)				(0.1136)	
EDUCM2	−0.0123	0.0003	0.0002	−0.0005	0.0289	0.0012
	(0.1467)				(0.1472)	
EDUCM3	0.2620	−0.0051	−0.0047	0.0097	0.2925	0.0109
	(0.1872)				(0.1871)	
EDUCM4	0.2736	−0.0043	−0.0041	0.0084	0.2558	0.0081
	(0.4465)				(0.4374)	
EDUCF2	−0.0460	0.0010	0.0009	−0.0019	−0.0436	−0.0018
	(0.2323)				(0.2348)	
EDUCF3	−0.0268	0.0006	0.0005	−0.0011	−0.0237	−0.0010
	(0.2415)				(0.2438)	
EDUCF4	0.2516	−0.0042	−0.0040	0.0082	0.2727	0.0088
	(0.3257)				(0.3295)	
AGEMBRTH	−0.4256**	0.0090	0.0081	−0.0171	−0.4290**	−0.0174
	(0.1703)				(0.1734)	
AGEMSQ	0.0084***	−0.0002	−0.0002	0.0003	0.0084***	0.0003
	(0.0032)				(0.0032)	
BOTHHAN	−0.0577	0.0012	0.0011	−0.0022	−0.0640	−0.0025
	(0.1638)				(0.1658)	
BORD1	−0.3565*	0.0080	0.0070	−0.0150	−0.3197	−0.0135
	(0.1975)				(0.1970)	

Table 3 ***(continued)***

	Ordered probit				*Probit*	
	Estimate	*Marginal effect*			*Estimate*	*Marginal effect*
		0	*1*	*2*		
NUMPREVDEAD	−0.2646***	0.0056	0.0050	−0.0106	−0.2751***	−0.0112
	(0.0809)				(0.0822)	
DURPREV	−0.0031	0.0001	0.0001	−0.0001	−0.0026	−0.0001
	(0.0029)				(0.0029)	
NUMELDBRO	−0.2168**	0.0046	0.0041	−0.0087	−0.1937*	−0.0079
	(0.1068)				(0.1078)	
NUMELDSIS	−0.1887**	0.0040	0.0036	−0.0076	−0.1824*	−0.0074
	(0.0969)				(0.0978)	
CHEMICAL	−0.1453	0.0033	0.0029	−0.0063	−0.1488	−0.0065
	(0.1267)				(0.1271)	
SMOKE	−0.2125	0.0058	0.0049	−0.0106	−0.1575	−0.0075
	(0.3522)				(0.3611)	
ALCOHOL	−0.6532***	0.0293	0.0209	−0.0502	−0.6380***	−0.0487
	(0.2109)				(0.2134)	
MEDICINE	−0.1560	0.0038	0.0033	−0.0071	−0.1843	−0.0087
	(0.1548)				(0.1547)	
HARDLABOR	−0.0201	0.0004	0.0004	−0.0008	−0.0355	−0.0014
	(0.1274)				(0.1277)	
PRENATAL	0.2972**	−0.0073	−0.0063	0.0136	0.2713**	0.0124
	(0.1310)				(0.1320)	
HOSPDEL	−0.6575	0.0263	0.0195	−0.0458	−0.6668	−0.0472
	(0.4188)				(0.4173)	

Table 3 (*continued*)

	Ordered probit				*Probit*	
	Estimate	*Marginal effect*			*Estimate*	*Marginal effect*
		0	*1*	*2*		
FPDEL	−0.5829	0.0200	0.0156	−0.0355	−0.5776	−0.0353
	(0.3874)				(0.3859)	
DOCTOR	0.6248	−0.0112	−0.0103	0.0214	0.6286	0.0218
	(0.4090)				(0.4076)	
MIDWIFE	0.2621	−0.0052	−0.0047	0.0099	0.2570	0.0098
	(0.1722)				(0.1725)	
FAMILY	0.0615	−0.0012	−0.0011	0.0024	0.0930	0.0035
	(0.2086)				(0.2108)	
*INDUCEBRT*H	0.2854	−0.0047	−0.0045	0.0092	0.3026	0.0097
	(0.2151)				(0.2172)	
PLATEAU	−0.0188*	0.0004	0.0004	−0.0008	−0.0174	−0.0007
	(0.0106)				(0.0108)	
SEMI-MOUNTAINEOUS	0.0072***	−0.0002	−0.0001	0.0003	0.0066**	0.0003
	(0.0030)				(0.0030)	
BASIN	−0.2879	0.0067	0.0059	−0.0125	−0.2945	−0.0130
	(0.2444)				(0.2466)	
UNDERGROUND WATER	−0.5753**	0.0181	0.0145	−0.0326	−0.5864**	−0.0337
	(0.2370)				(0.2391)	
RAINWATER	−0.2053	0.0049	0.0043	−0.0092	−0.2167	−0.0099
	(0.2384)				(0.2411)	
NO ELECTRICITY	0.0198	−0.0004	−0.0004	0.0008	0.0268	0.0011
	(0.1539)				(0.1556)	

Table 3 (*continued*)

	Ordered probit				*Probit*	
	Estimate	*Marginal effect*			*Estimate*	*Marginal effect*
		0	*1*	*2*		
DISTANCE1	0.1413	−0.0029	−0.0026	0.0055	0.1188	0.0047
	(0.1482)				(0.1486)	
DISTANCE2	0.3287	−0.0101	−0.0082	0.0184	0.2875	0.0156
	(0.2602)	−0.0001	−0.0001	0.0002	(0.2661)	0.0008
μ	0.2821***					
	(0.0485)					
Sample size	2680				2680	
Log likelihood	−333.5159				−287.0086	
Restricted log likelihood	−376.7123				−327.8444	
$\chi^2(35)$	86.39***				81.67***	
Equality of education effects: $\chi^2(1)$						
Primary school	0.01				0.05	
Junior middle school	0.71				0.84	
Senior middle school or higher	0.00				0.00	
Joint significance of health inputs: $\chi^2(7)$	12.25*				11.22	
Joint significance of behavioral variables: $\chi^2(5)$	15.17***				14.81**	

Notes: μ, standard deviation of the distribution of unobserved mother-specific heterogeneity. Standard errors are given in parentheses. *, ** and *** indicate significance at the 10%, 5% and 1% level, respectively.

Table 4 Ordered probit regression results for health status and the probit regression results for good health for the youngest child (rural sample only; children aged 0–1 year)

	Ordered probit				*Probit*	
	Estimate	*Marginal effect*			*Estimate*	*Marginal effect*
		0	*1*	*2*		
CONSTANT	7.9112**				7.4568*	
	(4.0193)				(4.0209)	
GIRL	−0.0165	0.0003	0.0002	−0.0004	−0.0257	−0.0007
	(0.1922)				(0.1930)	
EDUCM2	0.2012	−0.0032	−0.0020	0.0053	0.2500	0.0067
	(0.2588)				(0.2601)	
EDUCM3	0.4515	−0.0066	−0.0042	0.0109	0.4832	0.0119
	(0.3358)				(0.3350)	
EDUCM4	0.1130	−0.0017	−0.0011	0.0027	0.0809	0.0021
	(0.5775)				(0.5654)	
EDUCF2	−0.0899	0.0016	0.0010	−0.0025	−0.1031	−0.0030
	(0.4064)				(0.4100)	
EDUCF3	0.0068	−0.0001	−0.0001	0.0002	−0.0435	−0.0012
	(0.4278)				(0.4304)	
EDUCF4	−0.1191	0.0022	0.0014	−0.0036	−0.1618	−0.0052
	(0.5205)				(0.5227)	
AGEMBRTH	−0.4464	0.0074	0.0047	−0.0121	−0.4245	−0.0118
	(0.2852)				(0.2858)	
AGEMSQ	0.0094*	−0.0002	−0.0001	0.0003	0.0090	0.0003
	(0.0055)				(0.0055)	
BOTHHAN	−0.0941	0.0015	0.0009	−0.0024	−0.1069	−0.0027
	(0.2820)				(0.2839)	
BORD1	−0.8898**	0.0165	0.0097	−0.0262	−0.7831**	−0.0231
	(0.4007)				(0.3919)	

Table 4 (*continued*)

	Ordered probit				*Probit*	
	Estimate	*Marginal effect*			*Estimate*	*Marginal effect*
		0	*1*	*2*		
NUMPREVDEAD	−0.4303***	0.0072	0.0045	−0.0117	−0.4433***	−0.0123
	(0.1438)				(0.1463)	
DURPREV	−0.0118**	0.0002	0.0001	−0.0003	−0.0108**	−0.0003
	(0.0052)				(0.0052)	
NUMELDBRO	−0.2968	0.0049	0.0031	−0.0080	−0.2606	−0.0072
	(0.2154)				(0.2155)	
NUMELDSIS	−0.2329	0.0039	0.0024	−0.0063	−0.2149	−0.0060
	(0.2007)				(0.2013)	
CHEMICAL	−0.2096	0.0040	0.0024	−0.0065	−0.2101	−0.0066
	(0.2233)				(0.2236)	
SMOKE	−0.5869	0.0201	0.0104	−0.0305	−0.5537	−0.0284
	(0.6013)				(0.6115)	
ALCOHOL	−0.2926	0.0069	0.0040	−0.0110	−0.2546	−0.0094
	(0.5143)				(0.5237)	
MEDICINE	−0.0157	0.0003	0.0002	−0.0004	−0.0200	−0.0006
	(0.2759)				(0.2769)	
HARDLABOR	−0.1491	0.0026	0.0016	−0.0042	−0.1712	−0.0050
	(0.2249)				(0.2258)	
PRENATAL	0.0039	−0.0001	0.0000	0.0001	−0.0342	−0.0009
	(0.2696)				(0.2731)	
HOSPDEL	−0.7649	0.0265	0.0136	−0.0401	−0.7715	−0.0416
	(0.8002)				(0.7958)	
FPDEL	−0.9859	0.0376	0.0184	−0.0559	−0.9755	−0.0561
	(0.7573)				(0.7544)	

Table 4 (*continued*)

	Ordered probit				*Probit*	
	Estimate	*Marginal effect*			*Estimate*	*Marginal effect*
		0	*1*	*2*		
DOCTOR	0.6265	−0.0098	−0.0061	0.0159	0.5924	0.0154
	(0.8150)				(0.8148)	
MIDWIFE	0.0332	−0.0005	−0.0003	0.0009	0.0105	0.0003
	(0.3761)				(0.3814)	
FAMILY	−0.3076	0.0067	0.0040	−0.0107	−0.3546	−0.0132
	(0.4306)				(0.4359)	
INDUCEBRTH	0.7282	−0.0068	−0.0046	0.0114	0.7272	0.0117
	(0.4550)				(0.4523)	
PLATEAU	−0.0244	0.0004	0.0003	−0.0007	−0.0239	−0.0007
	(0.0183)				(0.0185)	
SEMI-MOUNTAINEOUS	0.0178***	−0.0003	−0.0002	0.0005	0.0173***	0.0005
	(0.0062)				(0.0062)	
BASIN	−0.6331	0.0136	0.0079	−0.0215	−0.6328	−0.0220
	(0.5789)				(0.5813)	
UNDERGROUND WATER	−1.2213**	0.0529	0.0243	−0.0771	−1.2106**	−0.0774
	(0.5708)				(0.5729)	
RAINWATER	−0.9228*	0.0309	0.0157	−0.0466	−0.9236*	−0.0477
	(0.5551)				(0.5586)	
NO ELECTRICITY	−0.0535	0.0009	0.0006	−0.0015	−0.0599	−0.0017
	(0.2831)				(0.2843)	
DISTANCE1	−0.0802	0.0014	0.0009	−0.0022	−0.1222	−0.0036
	(0.2668)				(0.2677)	

Table 4 (*continued*)

	Ordered probit				*Probit*	
	Estimate	*Marginal effect*			*Estimate*	*Marginal effect*
		0	*1*	*2*		
DISTANCE2	1.2234***	−0.0858	−0.0336	0.1193	1.1703***	0.1107
	(0.4273)	0.0003	0.0002	−0.0004	(0.4305)	−0.0007
μ	0.2012***					
	(0.0654)					
Sample size	985				985	
Log likelihood	−118.72				−101.9938	
Restricted log likelihood	−148.77				−130.8039	
$\chi^2(35)$	60.08***				57.62***	
Equality of education effects: $\chi^2(1)$						
Primary school	0.29				0.43	
Junior middle school	0.54				0.75	
Senior middle school or higher	0.07				0.08	
Joint significance of health inputs: $\chi^2(7)$	7.32				7.52	
Joint significance of behavioral variables: $\chi^2(5)$	4.05				3.92	

Notes: μ, standard deviation of the distribution of unobserved mother-specific heterogeneity. Standard errors are given in parentheses. *, ** and *** indicate significance at the 10%, 5% and 1% level, respectively.

born to the mother that have died is associated with a 1 percentage point decrease in the probability that the child is healthy or basically healthy. A higher number of previous children born that have died is possibly indicative of some biological/genetic characteristic of the woman that has an adverse effect on child health. Surprisingly, an increase in the number of elder brothers (*NUMELDBRO*) and elder sisters (*NUMELDSIS*) both have a negative and statistically significant effect on the health status of the child. The birth order dummy (*BORD1*) is negative and statistically significant (although weakly so) and the marginal effects imply that the first born child is 1.5 percentage points less likely to be healthy or basically healthy. The implication of all these results is that children of a higher birth order are likely to be of better health and the later the child is born the better is the health status. The effect of birth order of a child on health status has been a source of debate in the published literature. Generally, it is accepted that birth order is likely to have a significant effect on child quality (including child health at birth). Behrman (1988) and Birdsall (1991) argue that because parental resources increase over a lifetime, children born later in life are more likely to benefit because more resources are available to parents in the later stages of life. This is likely to be reflected in higher levels of poor health status for children born earlier (children of a higher birth order).[11] Birth order effects might also be a result of biological characteristics: children of lower birth order are born to older mothers and because of the maternal depletion effect children born to older mothers are more likely to have lower birth weight and, hence, to be of poorer health status. However, it has been argued that children born early (first-born children particularly) are likely to have a lower birth weight. Similarly, birth order effects can arise because of cultural factors. For example, Horton (1988) argues that the eldest son is particularly important because they perform the funeral rites. Overall, however, we would expect a child of lower birth order to have a lower probability of dying, and this could explain the sign of the first born dummy.

Interestingly, the educational attainment of parents does not have a statistically significant effect on the health status of children. In fact, the marginal effects show that the effects are typically less than 1 percentage point.

With the exception of prenatal care, none of the health input variables have a statistically significant effect on the health status of children. This possibly reflects collinearity between these variables. It is also worth noting that the health input variables are also not jointly significant. Prenatal care has a positive and statistically significant effect on child health: the health of the child is better (the marginal effects show that the probability that the child is healthy or basically healthy at the time of the survey is higher by 1.36 percentage points) if the mother had prenatal examinations conducted by a professional while she was

11. Note that we denote children born earlier as having a higher birth order and children born later as having a lower birth order.

pregnant with the youngest child. None of the other health input variables have a statistically significant effect on child health. The result that prenatal care has a positive effect on child health is nothing new: previous research using data from Malaysia (Brien and Lillard, 1994), India (Maitra, 2004), East Africa (Ghilagaber, 2004) and Bangladesh (Maitra and Pal, 2004) finds similar strong positive effects of prenatal care on child health. The individual insignificance of the health input and health infrastructure variables (like the type of care attained at child birth) possibly reflects multicollinearity between these variables. Several published studies (summarized in Strauss and Thomas (1998)) argue that local health infrastructure could be endogenous in the child health regressions, which might occur for two reasons. First, individuals might choose their residence based on the availability of public health services (see Rosenzweig and Wolpin, 1988). Second, local infrastructure itself might be placed selectively by public policy, perhaps in response to local health conditions (see Rosenzweig and Wolpin, 1986). Although for China the first issue is unlikely to be particularly important because migration within the country is quite restricted (and also because selective migration in response to local infrastructure variables is unlikely to be particularly common in a developing country like China), selective placement of health services is potentially a much more important issue. Although we acknowledge this potential endogeneity of the local infrastructure variables, we ignore this issue in our estimation because of the lack of good instruments.

Of the behavioral variables, we find that the only variable that has a statistically significant effect on child health is whether the woman drank alcohol during pregnancy. The effect of alcohol consumption is very strong: in particular, the marginal effects show that consumption of alcohol during pregnancy results in a 5 percentage point reduction in the probability that the child is healthy (matched by a 3 percentage point increase in the probability that the child is dead and a 2 percentage point increase in the probability that the child is sick or is congenitally disabled. However, it is worth noting that the behavioral variables are jointly statistically significant (even if individually not so), indicating mother's behavior during pregnancy has a strong effect on child health.

As with the health input or health infrastructure variables, the behavioral variables could be potentially endogenous in the child health regression: this is because women who exhibit certain kinds of behavior while pregnant (e.g. women who choose not to drink alcohol when pregnant) might not necessarily be a random subset of all mothers (i.e. women with certain characteristics select themselves into this category). However, as before, although we acknowledge this potential endogeneity, a lack of adequate instruments prevents us from 'correcting' our estimates.

Finally, it is worth noting that several of the community infrastructure variables are also statistically significant. It is also worth noting that these community infrastructure variables are jointly statistically significant. An increase in the distance to the seat of township government reduces the probability that the child is healthy (although the effect is statistically significant only at the 10 percent level) and an increase in the distance to the nearest country town, surprisingly, increases the probability that the child is healthy. The dummy that the village is located in a semi-mountainous region (*SEMI-MOUNTAINOUS*) is associated with a significant reduction in the probability that the child is healthy.

The probit estimates for *GOODHEALTH* are qualitatively very similar to the ordered probit estimates of health status. As before, there is a U-shaped relationship between the age of the mother at the time of the birth of the child and child health. An increase in the number of children born to the mother who have died previously significantly reduces the probability of good health. An increase in the number of elder brothers (*NUMELDBRO*) and elder sisters (*NUMELDSIS*) both have a negative and statistically significant effect on the probability of good health. Of the behavioral variables we find that the only variable that has a statistically significant effect on child health is whether the woman drank alcohol during pregnancy. The effect of alcohol consumption is very strong: in particular, the marginal effects show that consumption of alcohol during pregnancy results in a 5 percentage point reduction in the probability that the child is healthy. With the exception of prenatal care, none of the health input variables have a statistically significant effect on the health status of children. Prenatal care has a positive and statistically significant effect on child health: the health of the child is better (the marginal effects show that the probability that the child is of good health at the time of the survey is higher by 1.24 percentage points).

Let us now turn to the corresponding ordered probit regression results for health status and the probit regression results for good health for the youngest child aged 0–1 years. The estimated coefficients, standard errors and marginal effects are presented in Table 4. The results are less well defined here, which is possibly a result of the smaller sample size. In particular, it is worth noting that none of the behavioral and health input variables have a statistically significant effect on child health. The birth order dummy (*BORD1*) is negative and statistically significant (although weakly so) and the marginal effects imply that the first born child is 2.6 percentage points less likely to be healthy or basically healthy. Once again, *NUMPREVDEAD* is negative and statistically significant, implying that an increase in the number of previous children born to the woman that have died results in a lower health status of the child, and the marginal effects show that a unit increase in the number of previous children born to the mother that have died is associated with a 1.7 percentage point decrease in the probability that the child is healthy or basically healthy. Additionally, we find that an increase in the duration between the birth of the index child (i) and the previous child ($i - 1$) has a negative and statistically significant effect on the health status of the child. The results for the probit estimation of good health are very similar.

Parental education, surprisingly (particularly in the case of maternal education), does not appear to have a statistically significant effect on child health. The anonymous referee suggested that it is worth examining the actual channels through which parental education affects child health in the initial stages of the child's life, because it is difficult to believe that parents with more schooling years are more likely to give birth to healthy babies. As we discussed earlier, there are several channels through which mother's education affects child health. Although it is difficult, if not impossible, to isolate the effect of each of these three channels, one thing is clear: generally, women with more education are more aware of the benefits of health inputs on child health and on the effects of behavior when pregnant on child health.

To examine this issue in greater detail we regressed each of the health input variables and the behavioral variables on the highest level of education attained by the woman and her husband and a set of other characteristics that can potentially affect the probability of the woman/couple choosing to use specific health inputs and behave in certain ways when pregnant. The probit estimation results are presented in Tables 5 and 6. The results are generally supportive of the information effect associated with increased mother's education and the income effect associated with increased father's educational attainment. It is also worth noting that there is generally also evidence of a threshold level of education that must be attained before mother's education starts affecting use of health inputs or behavior when pregnant.

V. Conclusion and Policy Implications

The present paper uses data from the *1997 China National Population and Reproductive Health Survey* to examine the effect of parental, household and community characteristics on the health of children. The estimation results show that (i) children of a higher birth order (born later) are likely to be of better health; (ii) an increase in the number of previous children born to the woman that have died is associated with a lower health status of the child, possibly capturing some unobserved health or genetic condition of the mother that has an adverse effect on the health of all children born to her; (iii) the health of the child is better if the mother had prenatal examinations conducted by a professional while she was pregnant with the child; (iv) alcohol consumption when pregnant has a negative and statistically significant effect on the health status of the child; and (v) parental educational attainment does not have a strong direct effect on the health status of children. This is not to say that parental education is unimportant. Parental education, particularly mother's education has a strong indirect effect: parental education is strongly associated with use of health inputs when pregnant and has significant effects on the behavior of the mother when she is pregnant. We also find that a threshold level of education has to be attained before mother's education starts having a statistically significant effect on her behavior while pregnant and on the use of health inputs.

These estimation results indicate one pertinent policy area for intervention; namely, women's education. Increased educational opportunities for women, particularly for those residing in rural areas is likely to have significant effects

Table 5 Effect of parental educational attainment on use of health inputs (rural sample only)

	PRENATAL	*HOSPDEL*	*FPDEL*	*DOCTOR*	*MIDWIFE*	*FAMILY*
EDUCM2	0.4896***	0.1084	0.1046	0.1529*	0.2639***	−0.3317***
	(0.0768)	(0.1221)	(0.0973)	(0.0854)	(0.0757)	(0.0923)
EDUCM3	0.8594***	0.3860***	0.2055**	0.4070***	0.0686	−0.5874***
	(0.0886)	(0.1250)	(0.1022)	(0.0903)	(0.0831)	(0.1175)
EDUCM4	0.7027***	(0.6549***	−0.1506	0.4380***	−0.0450	−0.3146
	(0.1981)	(0.1911)	(0.1914)	(0.1654)	(0.1661)	(0.3051)
EDUCF2	0.4751***	0.1660	1.0749***	0.7976***	−0.0294	−0.3700***
	(0.1350)	(0.2233)	(0.3179)	(0.1945)	(0.1284)	(0.1423)
EDUCF3	0.6392***	0.3404	1.1709***	0.8832***	0.0321	−0.5597***
	(0.1366)	(0.2229)	(0.3175)	(0.1946)	(0.1297)	(0.1473)
EDUCF4	0.7476***	0.4254*	1.2790***	1.1025***	−0.0601	−1.0894***
	(0.1645)	(0.2404)	(0.3292)	(0.2093)	(0.1514)	(0.2179)
Equality of education effects: $\chi^2(1)$						
Primary school	0.01	0.04	7.83***	8.05***	0.04	
Junior middle school	1.45	0.03	7.55***	4.15**	0.02	0.82
Senior middle school or higher	0.03	0.44	12.37***	5.18**	3.69*	3.71**

Notes: Standard errors are given in parentheses. *, ** and *** indicate significance at the 10%, 5% and 1% level, respectively.

Table 6 Effect of parental educational attainment on mother's behavior when pregnant with the youngest child (rural sample only)

	CHEMICAL	*SMOKE*	*ALCOHOL*	*MEDICINE*	*HARDLABOR*
EDUCM2	0.0916	0.1824	0.0533	0.0658	−0.2213***
	(0.0770)	(0.1759)	(0.1264)	(0.0951)	(0.0760)
EDUCM3	0.0379	−0.4738*	−0.3788**	0.0084	−0.4813***
	(0.0856)	(0.2503)	(0.1629)	(0.1056)	(0.0838)
EDUCM4	−0.3415*	0.0746		−0.5235**	−0.8422***
	(0.1868)	(0.4272)		(0.2575)	(0.1833)
EDUCF2	0.1026	−0.1902	−0.1500	0.2259	−0.1743
	(0.1273)	(0.2520)	(0.1984)	(0.1722)	(0.1299)
EDUCF3	0.0353	−0.3364	−0.3494*	0.3340*	−0.2394*
	(0.1297)	(0.2670)	(0.2074)	(0.1747)	(0.1318)
EDUCF4	0.1261	−0.3837	−0.0659	0.5517***	−0.2739*
	(0.1520)	(0.3542)	(0.2384)	(0.1956)	(0.1538)
Equality of education effects: $\chi^2(1)$					
Primary school	0.00	1.12	0.58	0.55	0.08
Junior middle school	0.00	0.11	0.01	2.04	1.85
Senior middle school or higher	3.07*	0.53		9.34***	4.62**

Notes: Standard errors are given in parentheses. *, ** and *** indicate significance at the 10%, 5% and 1% level, respectively.

on the health status of children. There are several economic and non-economic benefits of increasing the educational attainment of women. Typically it is argued that an increase in women's educational attainment typically increases labor market participation and provides better employment opportunities and, hence, raises their incomes. This raises the status of women both in society and within the family. Evaluation of the benefits from educating women have led economists and policy-makers to argue that educating women yields substantial benefits in the form of higher economic returns compared to similar expenditures on men (see Schultz, 2002). In addition to these economic benefits, there are non-economic and behavioral effects of increased educational attainment of women. One of the beneficial effects of increased women's education is to empower them to assert their preferences more effectively. This has significant behavioral implications: as we see increased educational attainment of women generally having a positive influence on the use of health inputs and on mothers' behavior during pregnancy, a compelling case is provided for increased and targeted provision of education in favor of women. Given the long gestation lags for such policies, it is advisable to direct the expansion of educational opportunities towards school-aged girls.

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