PARENTAL EDUCATION AND CHILD HEALTH:

EVIDENCE FROM CHINA[♣]

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Abstract

This paper examines the effect of parental, household and community characteristics on the health of children in China. Of particular importance in our analysis is parental education and unobserved mother level heterogeneity (that affect all children born to the same mother). Our results show that (1) parental education generally has a strong effect on child health and mother's educational attainment generally has a stronger effect on child health compared to father's educational attainment. The results are generally supportive of the argument that increased education for the mother typically affects child health by increasing the set of information that is available to the mother (and more generally to the household) and that there is an income effect that is associated with increased father's educational attainment; (2) a threshold level of education (more than primary schooling) has to be attained before parental education starts having a significant effect on child health and (3) failing to account for unobserved heterogeneity generally results in an underestimation of the effect of education on child health; (4) Our results are indicative of significant discrimination against girls. The research findings have important implications for both the family planning program and broader social policies in China.

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1. Introduction

Child health has important effects on learning, on labour 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 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.[4]

Surprisingly, the literature on child health and its determinants in China is quite scarce. Since the 1970s, the central research interest in demography has focused mainly on family planning policy, socio-economic effects of population growth, and fertility transition and its socio-economic consequences.[5] While after the 1994 "Population and Development Conference" in Cairo scholars on 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[6], but to the best of our knowledge no one has used the data sets to analyse comprehensively the factors that influence child health. In consequence, the few existing studies on child health in China have tended to be

[4] See for example Caldwell (1979), Caldwell (1994), Caldwell & Caldwell (1993), Cleland (1990), Bicego & Boerma (1993), Hobcraft (1993)), Basu (1994), Sonalde & Soumya (1998), Gangadharan & Maitra (2000), Mellington & Cameron (1999) and Buor (2003).

[5] 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 70s to control her population growth. The total fertility rate in China has dropped sharply from 4.01(1970) to 1.8 (1999), close to the average level of developed countries. During past thirty years China's population growth has shifted to a population reproduction pattern of low fertility, low mortality and low growth rate (Li, J. M., 2000; Wang, Keng and Smyth, 2002)

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

either purely qualitative, or they have used simple descriptive statistics to analyse the determinants of child health.[7] There is however a reason for this: because the data sets are generally not accessible for foreign scholars, very little research about child health in China has been conducted outside China. One important aim of this paper is to bridge that research gap and to explore strategies for improving child health. In particular in this paper we will examine the relationship between parental education and child health in China. For estimation purposes we use data from the Survey of Population and Reproductive Health conducted in 1997. We analyse the relationship between parental education and child health using an ordered probit model.

Before proceeding further let us summarize the main results of the paper. The estimation results show that (1) parental education generally has a strong effect on child health and mother's educational attainment generally has a stronger effect on child health compared to father's educational attainment; (2) a threshold level of education (more than primary schooling) has to be attained before parental education starts having a significant effect on child health; (3) failing to account for unobserved heterogeneity generally results in an underestimation of the effect of education on child health and (4) our results are indicative of significant discrimination against girls in China. Our results are generally supportive of the argument that increased education for the mother typically affects child health by increasing the set of information that is available to the mother (and more generally to the household) and

[7] This includes the investigation of infant and child survival by Ren (1994) and Ren (1995) using in-Depth Fertility Surveys (1985 and 1987) in several provinces, and the analysis of infant mortality among various nationalities in Guizhou Province by Huang, Wang & Li (1997); and the examination of the risk factors and child mortality of the Miao people living in Yunnan Province by Foggin, Armijo-Hussein, Marigaux, Zhu & Liu (2001).

that there is an income effect that is associated with increased father's educational attainment.

The rest of the paper is organized as follows: Section 2 describes the data set used in our analysis. The estimation methodology and the explanatory variables that are used are presented in Section 3. We discuss the results in Section 4 and Section 5 presents conclusions and policy implications.

2. Data and Descriptive Evidence

The data set used in this paper is the 1997 China National Population and Reproductive Health Survey. This was China's 4th 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 a large number of developing countries around the world. 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 about sexually transmitted diseases (STDs) and AIDS.[8] The sample of the 1997 survey was drawn from 337 counties, which cover all of the 31 provinces (Autonomous Regions/ Municipalities) in China and the survey interviewed 15,213 women of childbearing age residing in rural and urban communities. Post-enumeration check indicated that the data were of fairly good quality (Wang (2001)). The data sets for both individual women and the communities are used in our paper. Unfortunately the survey collected

[8] 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 data sets for policymakers and scholars to evaluate the effectiveness of family planning policy.

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, 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. Therefore, we concentrate our analysis on very young children, specifically the children who were born in the 5 years prior to the date of the survey. The health of an individual at the time of the survey could be affected by parental factors (like inputs used, parental behaviour 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. Since we do not have retrospective data and therefore no information on these "other" factors, analysing all children (children ever born) could result in significant omitted variable bias in the estimates. We restrict our sample to children aged 0 – 5 where parental factors are likely to be more important.

Our data set consists of 4294 children aged 0 – 5 who were born to 3729 women. This appears to be at odds with the official "one child" policy of China. However one needs to keep in mind that 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.[9] Moreover minorities are exempt from the one child policy.

Every woman of childbearing age in the sample was also asked about health inputs and the mother's behaviour when she was pregnant with her youngest child. This includes information about the pre and post-natal care, place of delivery, and mother's lifestyle characteristics and behaviours that are likely affect the child health during pregnancy. Because all of the information is not available for all the children born to the same mother, we distinguish between "all children" and "youngest child" in our analysis of child health. We have this information for 3157 children (by definition born to 3157 women since in this case we are restricting ourselves to the youngest child).

Table 1 presents selected descriptive statistics for both the mother level (common to all children born to the same mother) and the child level variables. Descriptive statistics are presented for all children born to each woman in the five years prior to the survey date and for the youngest child born to each woman in the same time period. Further in each case we present separate descriptive statistics for "all households" and "rural households". Information on health inputs and behavioural variables (when the woman was pregnant) was collected only for the last child born (i.e. the youngest child). Remember that information on community characteristics was collected only for households residing in rural areas. In our actual estimation we conduct separate estimation for each of these categories.

[9] Additionally this rule is not universal. It is determined by each local government and whether or not the policy is enforced is determined by taking into account the target population growth (the quota)

There now exists a large volume of research that examines the relationship between parental education and child health. Most of these studies find the parental education level to be positively associated with child health, and that maternal education appears to have a stronger effect than the father's education. For example, Gangadharan & Maitra (2000) using child level data from Pakistan find that education of the mother has a significant and negative effect on child mortality, and there is a threshold level of education that the mother has to attain before education starts affecting child mortality. Cochrane, Leslie & O'Hara (1982) using data from 16 countries an additional year of education for a mother results in a reduction of 9/1000 in the mortality of her children. Rauniyar (1994) used data from Egypt and found lower risk of mortality and stunting among children of better-educated mothers than among children of mothers with less education. The observed gross effect of maternal education was mediated through socio-economic variables, such as health care use, household health environment, and reproductive factors. Sonalde & Soumya (1998) found a statistically significant relationship between child immunization and maternal secondary education in more than half of the 20 countries they examined. Wilairat (1987), using data from Thailand found that the infants of mothers with more education were more likely to enjoy a better nutritional status and the children of more educated mothers were more likely to have been immunized against disease such as tetanus and polio.

There are several channels through which mother's education affects child health: first, increased education lowers the cost of information that affects child health and more

imposed by the central government.

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 (see for example Gangadharan & Maitra (2000)); 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). For example, Quisumbing & Maluccio (2003) found that assets controlled by women have a positive and significant effect on expenditure allocation towards the next generation, such as food, education and children's clothing.; Third, more education implies that women are more likely to be earning more in the labour market. This is likely to give them better access to antenatal and postnatal services, and be in a better health condition to ensure better health of their children (see for example Buor (2003)). The father's educational attainment on the other hand might be viewed as a proxy for household permanent income (particularly in the absence of any data on household income/expenditure). The effect of father's education on child health could therefore be viewed as an income effect.

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 (EDUCM = 0 if the mother has no schooling; EDUCM = 1 if the highest education attained by the mother is primary schooling; EDUCM = 2 if the highest education attained by the mother is junior middle school; and EDUCM = 3 if the highest education attained by the mother is senior middle school or higher) and the father (EDUCF = 0 if the father has no schooling; EDUCF = 1 if the highest

education attained by the father is primary schooling; EDUCF = 2 if the highest education attained by the father is junior middle school; and EDUCF = 3 if the highest education attained by the father is senior middle school or higher). Four 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 basically healthy and HEALTHSTATUS = 3 if the child is healthy.[10]

What is clear from Table 2 is that higher parental educational attainment is associated with improved child health. The proportion of children who are healthy (HEALTHSTATUS = 3) increases from 85.28% to 95.33% as we move from mothers without schooling to cases where the highest education attained by the mother is senior middle school or higher. And 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 84.72% to 93.66%. 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 4.24% (with mothers who have no schooling) to 0.49% (with mother who obtain senior middle school or higher) and the proportion of children who fell sick, congenitally disabled or disabled (HEALTHSTATUS = 1) drops from 2.92% to 0.49% when mother's education level goes up. Qualitatively the results are quite similar for the sample of rural households.

3. Estimation Methodology and Explanatory Variables Used

[10] We use this categorisation later for the ordered probit estimation of child health status.

The primary focus of this paper is on child health. Each woman in the sample was asked about the outcome of all her pregnancies, the age at each pregnancy, and the health condition of live births. This is the variable that we use as the dependent variable in our analysis. We estimate the health status of the children (at the time of the survey) using an ordered probit model as follows:

$$\text{HEALTHSTATUS} = \beta_1 X_1 + e \tag{1}$$

where HEALTHSTATUS is a categorical variable defined as follows:

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

Equivalently one can write:

$$\text{HEALTHSTATUS} = \begin{cases} 0, \text{ if HEALTHSTATUS}^* < \tau_1 \\ 1, \text{ if } \tau_1 \le \text{HEALTHSTATUS}^* < \tau_2 \\ 2, \text{ if } \tau_2 \le \text{HEALTHSTATUS}^* < \tau_3 \\ 3, \text{ if } \tau_3 \le \text{HEALTHSTATUS}^* \end{cases}$$

where HEALTHSTATUS* is the "true" health status that is not observed. The Likelihood function can then be written as:

$$L = \begin{cases} \Phi\left(\tau_1 - \beta_1 X_1\right) & \text{if HEALTHSTATUS} = 0 \\ \Phi\left(\tau_2 - \beta_1 X_1\right) - \Phi\left(\tau_1 - \beta_1 X_1\right) & \text{if HEALTHSTATUS} = 1 \\ \Phi\left(\tau_3 - \beta_1 X_1\right) - \Phi\left(\tau_3 - \beta_1 X_1\right) & \text{if HEALTHSTATUS} = 2 \\ 1 - \Phi\left(\tau_3 - \beta_1 X_1\right) & \text{if HEALTHSTATUS} = 3 \end{cases}$$

Child health is assumed to depend on a set of parental, household and community characteristics and on health inputs used by the woman at the time of pregnancy. Two

issues arise here. First, the data that we have is on child health at the time of the survey. We do not have retrospective information on child inputs while the child was growing up. Remember that the health of an individual at the time of the survey could be affected by parental factors (like inputs used, parental behaviour 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. Since we do not have retrospective data and therefore no information on these "other" factors, analysing all children (children ever born) could result in significant omitted variable bias in the estimates. We restrict our sample to children born after 1991 where parental factors are likely to be more important Therefore we restrict our analysis to so our sample consists of children in the age group 0 – 5. Second, information on health inputs used and information on certain mother specific characteristics that are expected to affect child health is available only for the youngest child born to each woman. Therefore we conduct separate estimations for "all children" and for the "youngest child". In both cases (because of reasons provided earlier) we conduct two sets of regressions: all samples and the rural sample only.

For the "all children" case, we have multiple children born to the same woman. The descriptive statistics presented in Table 1 show that our data set consists of 4294 children born to 3729 women. Some of the unobserved factors that affect child health (reflected in the error term) consist of child level characteristics, while others are similar across all children born of the same mother. All of these children might be affected by the common characteristics of the mother, biological (for example, some genetic factor that is mother specific) and otherwise (for example, education level of

the mother). It is therefore important to account for this in the estimation. The residual term of the estimating equation (1) can be divided into two parts so that:

$$\text{HEALTHSTATUS} = \beta_1 X_1 + \eta + \varepsilon \qquad (2)$$

Here η is constant across all children born to the same mother (mother level unobserved heterogeneity) and ε denotes any other unobserved characteristics that is likely to affect the health status of children. We assume that $\eta \sim N\left(0,\sigma_\eta^2\right)$, $\varepsilon \sim \text{IIDN}\left(0,1\right)$ and that η and ε are uncorrelated. Our estimation results show that the mother level unobserved heterogeneity component is always statistically significant. Note that fixed mother level characteristics (common to all children born to the same mother) can also be accounted for by including specific explanatory variables – for example the number of elder siblings that have died before this child was born can be regarded as a proxy for the biological endowment of the mother. However the approach used in this paper is preferable because it is more robust – it can account for all possible mother level unobserved characteristics, does not suffer from omitted variable bias and therefore yields consistent estimates. For the "youngest child" case we do not need to control for this mother level unobserved heterogeneity because we have by definition data on one child per woman.

The health status of the child will depend on child characteristics, characteristics of the mother and the father and other community characteristics. Let us start with the characteristics of the child. They 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). Finally 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 term accounts for the possible non-linearity in the effect of the age of the mother at the time of childbirth on child mortality. There now exists a fairly large literature on the non-linear effect of mother's age at childbirth on child health outcomes. Biologically speaking, early or late childbearing may be detrimental to the health of the foetus because of impaired functioning of a woman's reproductive system. If a woman is either too young or too old, her uterus and cervix may be unable to sustain a normal pregnancy. See Royer (2004) for a survey of the literature.[11]

Any gender difference in perceived health will be captured by the sign and statistical significance of the coefficient of the sex of the child dummy (GIRL). A priori we cannot say anything about the sign of this variable because the health status in the first few years of life (remember here we are restricting the sample to include children born between 1992 and 1997) should not typically be influenced by the gender of the child as they are partly genetically determined and partly determined by prenatal care, which is perhaps the same for boys and girls as few mothers would know the sex of the child before the child is born. Lower duration between children is likely to have an adverse effect on child quality including child health. This is the resource constraint or the sibling competition effect. Therefore we expect the coefficient of DIFFPREV to be negative. The literature argues that the birth order of the child is likely to have a

[11] Note that AGEMBRTH and AGEMSQ are child level variables and not mother level variables because they are specific to each child.

significant effect on child quality (including child health at birth). Behrman (1988) and Birdsall (1991) argue that since parental resources increase over the life cycle, 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 poor health status for children born earlier (children of a higher birth order).[12] Birth order effects may also be due to 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 be of poorer health status. On the other hand it has also been argued that children born early (first-born children particularly) are also 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 to see that a child of a lower birth order have a lower probability of dying - the sign of BIRORDR should be negative. The variable NUMPREVDEAD captures some mother level characteristic (possibly biological) that could potentially affect the health status of the child. It is quite clear that using only this variable to capture all possible unobserved (mother level) characteristics that could affect the health status of all children born to her, could lead to omitted variable bias. Finally the variables NUMELDBRO and NUMELDSIS capture the effect of gender composition of previously born children on the health status of the child.

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

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

include a dummy for the ethnicity of the household: BOTHHAN = 1 if both the mother and the father are ethnically Han.

For the sample of rural households the survey collected information on several community level characteristics, which we use 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.

For the youngest birth, the survey data set contains information on the use of health inputs, place of delivery and pre and post-natal 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 doctor and FAMILY = 1 if the birth attendance of the youngest child was 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 behaviour 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. The variables included in the regression as explanatory variable 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 HARDLABOUR = 1 if the women continued performing hard labour when pregnant with the youngest child. The estimation results for both the health input variables and the behavioural variables have significant policy implications. We also conduct (separate) test for the joint significance of the health input and behavioural variables in the child health regressions.

4. Results

4.1. All Children

Let us start with the regression results for the "all children" case. The coefficient estimates and the associated standard errors are presented in Table 3. As mentioned earlier we compute separate sets of estimates for all households and for rural households. In each case two sets of results are presented: Model I ignores mother level unobserved heterogeneity and Model II accounts for mother level unobserved heterogeneity. A positive and statistically significant coefficient estimate implies that the corresponding explanatory variable significantly increases the probability that the child is healthy, while a negative and statistically significant coefficient estimate

implies that the corresponding explanatory variable significantly increases the probability that the child dies after birth. For both all households and rural households, mother level unobserved heterogeneity is statistically significant, indicated by the significance of σ_η at the 1% level. Ignoring this mother level unobserved heterogeneity will therefore result in inconsistent estimates. Therefore Model II is our preferred model. We will primarily focus on the results corresponding to Model II, but will highlight some of the interesting differences compared to Model I.

We start with a discussion of the results for "all households". The coefficient estimate of GIRL is negative and statistically significant. This essentially implies that girls (even when born alive) are more likely to die in the age 0 – 5 compared to boys. It is worth remembering that biologically in the early years of life boys has a lower probability of survival compared to girls. The negative and statistically significant coefficient estimate of GIRL is therefore indicative of discrimination against girls. In an environment where parents are unlikely to know the sex of the child before the child is born (so it is likely that abortions rates are likely to be the same irrespective of the sex of the child), what appears to be happening is that resource allocation is heavily skewed in favour of boys. The age of the mother at the time of birth (AGEMBRTH) does not have a statistically significant effect on child health (though the sign is negative). The coefficient estimate of AGEMSQ is positive and weakly statistically significant indicative of non-linearity in the effect of the age of the mother (at the time of birth) on child health.

The birth order dummies are interestingly always positive and statistically significant. This implies that relative to the first-born child, children born later are likely to be of better health. This essentially implies that the life-cycle effect dominates the maternal depletion effect for the sample under consideration. However surprisingly the coefficient estimates of NUMELDBRO and NUMELDSIS are both negative and statistically significant. The surprise element comes from the fact that the birth order dummies and the number of elder siblings both essentially capture the same effect and we would expect to see similar effects on child health. We re-estimated the model but this time excluded NUMELDBRO and NUMELDSIS from the set of explanatory variables. Interestingly while the birth order dummies continue to be positive but they are no longer statistically significant.

It is worth noting that DIFFPREV is never statistically significant. This essentially implies the resource constraint/sibling competition effect is not significant in explaining child health. Also NUMPREVDEAD is negative and statistically significant. An increase in the number of children that have previously died significantly increases the probability that a particular child will not survive after birth. This is possibly indicative of some biological characteristic specific to the woman, which makes her children more vulnerable.

Turning to the effect of educational attainment of the parents on the health status of the child it is worth noting that the parental educational attainment dummies are always positive but none of the father's educational attainment dummies are statistically significant. Further the higher the educational attainment of the parents,

the stronger is the effect of educational attainment on child health at birth. The mother's educational dummies are statistically significant only if the educational attainment is more than primary school. The results therefore imply that a threshold level of education (more than primary schooling) has to be attained before mother's education starts having a significant effect on child health. This is also quite an interesting result because most previous studies (see Jejeebhoy (1995) for a summary) fail to find any evidence of such a threshold in examining the relationship between parental educational attainment and child health/mortality. So what explains this threshold? It could be argued that it is not just literacy/numeracy or mere acquisition of knowledge that matters – what is necessary is a change in the outlook, which is possible only through a longer exposure to knowledge and education i.e., increased years of schooling.

It is generally observed that the mother's educational attainment has a stronger effect on child outcomes (like child health and child educational attainment) compared to the father's educational attainment. Using standard likelihood ratio tests $\left(\chi^2(1)\right)$ for Model I we are never able to reject the null hypothesis that the educational attainment of the mother and the father have similar effects on child health. However in the case of Model II we strongly reject the null hypothesis when the mother has more than primary schooling. Finally failing to account for unobserved heterogeneity generally results in an under-estimation of the effect of education on child health. This is clear when we compare the coefficient estimates for Models I and II.

Turning to the regressions for the "rural households" (also presented in Table 3), the results are quite similar (both quantitatively and qualitatively) to the results for "all households". Remember that in this case we included the community level variables as additional regressors. Though the community variables are jointly statistically significant, individually very few of the community characteristics have a statistically significant effect on child health and even if they do, the sign of the coefficient seems to be the opposite of what one expects. The individual insignificance of the community variables possibly reflects multicollinearity between these variables. Note that the fact that child health is only weakly correlated with the community infrastructure variables is neither surprising nor new. Remember the community variables capture the effects of all omitted variables, and in particular they also capture the effect of health facilities that are available Indeed several studies (summarised in Strauss & Thomas (1998)) have argued that local infrastructure could be endogenous in the child health regressions. This could happen because of two reasons. First, individuals might choose their residence based on the availability of public health services (see Rosenzweig & Wolpin (1988)). Second, local infrastructure itself might be placed selectively by public policy, perhaps in response to local health conditions (see Rosenzweig & Wolpin (1986)). While 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 however potentially a much more important issue. While we acknowledge this potential endogeneity of the local

infrastructure variables we ignore this issue in our estimation because of the lack of good instruments.

4.2. Youngest Child

We now turn to the regression results for the sample of "youngest child". The results are presented in Table 4 (for all households) and Table 5 (for rural households). As already mentioned, in this case we also include a set health inputs during pregnancy and delivery and a set variables that characterise the behaviour of the mother during pregnancy of the youngest child. We include these variables as they could have implications for the health status of the child. Let us now examine the results.

In each case (all households and rural households) we conduct three sets of estimates. In Model I we restrict ourselves to children born during the period 1992 – 1997. We examine the robustness of the results by restricting the sample to include children born between 1992 – 1996 (Model II) and 1996 – 1997 (Model III). We will discuss the results only for Model I and only highlight the differences between the three models.

We start with a discussion of the results for the regression results for "all households" (Table 4). As far as child level variables are concerned, 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. A higher number of previous children born to the woman that have died is possibly indicative of some biological/genetic characteristic of the woman that has

adverse effect on child health and child mortality. 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. Interestingly all the birth order dummies are positive and statistically significant and the coefficient estimates are monotonically increasing. The implication of all this 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.

Once again educational attainment of the mother and the father both have positive effects on the health of the child. The coefficient estimates are always positive though again not always statistically significant. Unlike in the all children case, if the highest education attained by the father is senior middle school or higher, father's educational attainment starts having a statistically significant effect on the health of the child. The education effect is monotonic – the higher the educational attainment, the stronger the effect on educational attainment on child health. Once again mother's educational attainment has a statistically significant effect on child health only if the mother has more than primary schooling. We conducted standard likelihood ratio tests to examine whether the educational attainment of the mother and the father have similar effects on the health status of the child. The test results show the null hypothesis of equality of effect of the educational attainment of the mother and the father cannot be rejected at any level of educational attainment. One final interesting observation: a comparison of Models II and III show that the effect of the mother's and that father's education on child health is the stronger for children aged 0 – 1 compared to children aged 1 – 5.

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 if the mother had prenatal examination conducted by a professional while she was pregnant with the youngest child. However it is worth noting that the effect of the prenatal care dummy is the strongest for children aged 1 – 5 and most surprisingly the effect is actually negative though not statistically significant for children aged 0 – 1. 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 & Lillard, 1994), India (Maitra, 2004), East Africa (Ghilagaber, 2004) and Bangladesh (Maitra & Pal, 2004) finds similar strong positive effects of pre natal care on child health.

Several of the behavioural variables have a statistically significant effect on the child health status. The coefficient estimates show that child health is significantly poorer if the woman drank alcohol during pregnancy or took antibiotic, analgesic or hormonal medicines when pregnant with the youngest child and if the woman drank alcohol when she was pregnant. On the other hand health status at birth is better if the woman smoked when pregnant with the youngest child (a very surprising result indeed) and if the women continued performing hard labour when pregnant with the youngest child, though in neither case is the effect statistically significant. A joint test confirms that the behavioural variables jointly have a significant effect on child health (with an

associated p-value of 0.0000) for the children aged 0 – 5 and children aged 1 – 5 but not for children aged 0 – 1.

One needs to remember that both the health input and the behavioural variables could be potentially endogenous in the child health regression – this is because women who demand health care (choose to have prenatal care or choose not to smoke when pregnant) might not necessarily be a random subset of all mothers i.e., women with certain characteristics select themselves into this category. However while we acknowledge this potential endogeneity, lack of adequate instruments prevent us from "correcting" our estimates.

Finally turning to the estimates for the "rural households" (Table 5) we find that the results are again similar to those for "all households". In addition we find that the community variables are always jointly significant.

4.3. Other Issues

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". Remember that 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). The effect of father's education on child health could therefore be viewed as an income effect. There are several channels through which mother's 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); third, more education implies that women are more likely to be earning more in the labour market. While 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 behaviour when pregnant on child health.

To examine this issue in greater detail we regressed each of the health input variables and the behavioural 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 (for all households) are presented in Tables 6 and 7. The results for the rural households are available on request. 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 an evidence of a threshold level of education that must be attained before mother's education starts affecting use of health inputs or behaviour when pregnant.

5. Conclusion and Policy Implications

This 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. Our analysis suggests that parental education and unobserved mother level heterogeneity constitute important influences (that affect all children born to the same mother). More specifically, parental education generally has a strong effect on child health with maternal educational attainment generally exerting a stronger effect on child health than the father's educational attainment. Second, a threshold level of education (beyond primary schooling) has to be attained before parental education starts having a significant effect on child health. Third, failure to account for unobserved mother level heterogeneity generally results in an underestimation of the effect of parental education on child health. Fourth, our results are indicative of severe discrimination against girls. Finally the results are generally supportive of the argument that increased education for the mother typically affects child health by increasing the set of information that is available to the mother (and more generally to the household) and that there is an income effect that is associated with increased father's educational attainment.

These results indicate at least two pertinent policy areas for intervention: education and gender preference. An increase in women's educational attainment typically increases labour 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 poor Asian countries, women often have less say about family decisions compared to their husbands. One of the beneficial roles of women's education is to empower them to assert their preferences more effectively. The generally positive influence of parental education on child health provides a compelling case for directing resources into the educational sector in order to raise the average level of education attainment of the whole country. These initiatives may be directed both at increasing the education investment and decreasing the education cost. The public expenditure on education as a ratio of GDP has been stagnant at 2.5% since the 1980s. This level of public expenditure is not only lower than the world average of 4.8% of GDP, but also lower than the average of 3.9% for the developing countries in 1997. Although China increased spending on education considerably in absolute terms during the last twenty years, it nevertheless devotes a much smaller share of GDP to education than many other developing countries (Wang and Yao, 2003). At the same time the average educational cost in China is rising fast, thereby driving many children from school in poor regions. According to the World Bank's project on basic education in Western Areas in China, the average family spends 20% of its income on education for children studying in their own communities and 29% when children need to attend boarding schools in Western areas of China. This proportion is higher for poor families.[13] Families with more than one child face particular difficulties, often resulting in having to choose to send some children to

[13] This is an issue that is common across a number of developing countries. For example Kingdon (2003) notes that households in rural North India spent approximately Rs. 318 on each child per year to send them to a government school. Consequently, an agricultural labourer with 3 children in the school going age group has to work for 40 days in the year just to send the children to primary school.

school at the expense of others. In such cases girls tend to be the ones who miss out due to the prevalence of son-preference in rural areas. The strong influence of maternal educational attainment and the identification of a threshold educational level, establish a case for the increased and targeted provision of education in favour of women. Increasing educational opportunity for women, especially for those residing in rural areas may significantly improve the health status of children. Given the long gestation lags for such policies, it is advisable to direct the expansion of educational opportunities towards school-aged girls. The educational gap in China between men and women has been narrowing since the 1950s, but it is still positive. For example, even though the adult female illiteracy ratio in China has declined rapidly since the 1950's, it is still very high at 31.9% in 1990, compared to the adult male illiteracy ratio of 13.0%.

Finally the severe discrimination against girls in China, the government might well consider adjusting the current one-child family planning policy and to design programs to promote sexual equality and to change parental attitudes that favour sons over daughters. The severe discrimination against girls is a consequence of a strong son preference in China. A number of studies of Chinese fertility have demonstrated that son preference has existed in a high fertility regime (Zhao (1997)) in China before the 1970s. Moreover, both local and national fertility surveys have consistently reported increasing son preference since the beginning of the 1980s. Under the one child family planning policy, couples who have only daughters are significantly more likely to continue childbearing and are less likely to use contraception and abortion

(Li & Cooney (1993); Qian (1997); Chen (2002) and Poston Jr (2002)).[14] Given that the strong son preference has serious negative effects on girl's health, the government should properly adjust the current one-child family planning policy. Couples should be afforded more choice over family size. The possible increase in family size would affect the future population structure beneficially considering the rapid ageing problem in China that has been the result of the dramatic decline in fertility that China has experienced in the last two decades. Social policies that go beyond family planning and address issues of gender equity involving empowerment of women and advancement of reproductive health may further contribute to a reduction in the extent of son preference (Gu & Roy (1996); Chu (2001); Qi & Chu (2002)). However, such policies pose a great challenge to the society of China, which is predominantly rural and has a history of over 2000 years of Confucian ideology.

[14] The data from three China Population Census' shows that the Sex Ratio at Birth (SRB) in China was 108.4 in 1982, 111.3 in 1990 and 116.9 in 2000, respectively. The rising SRB in China since the early 1980s when China carried out the one-child family planning policy has also demonstrated that the strict implementation of the one-child policy has intensified son preference in China.

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Table 1: Sample Means and Standard Deviations

Variables	All Households		Rural Households	
	All Children 0 – 5	Youngest Child 0 – 5	All Children 0 – 5	Youngest Child 0 – 5
Level 1 Variables				
EDUCM1 (Mother has no schooling)	0.1612	0.1733	0.1895	0.2000
	0.3677	0.3785	0.3920	0.4001
EDUCM2 (Highest education of the mother is primary schooling)	0.3663	0.3690	0.4244	0.4209
	0.4819	0.4826	0.4943	0.4938
EDUCM3 (Highest education of the mother is junior middle school)	0.3669	0.3576	0.3510	0.3466
	0.4820	0.4794	0.4773	0.4760
EDUCM4 (Highest education of the mother is senior middle school or higher)	0.1057	0.1001	0.0351	0.0325
	0.3074	0.3002	0.1841	0.1773
EDUCF1(Father has no schooling)	0.0469	0.0494	0.0554	0.0571
	0.2115	0.2168	0.2289	0.2321
EDUCF2 (Highest education of the father is primary schooling)	0.2829	0.2829	0.3242	0.3190
	0.4505	0.4505	0.4682	0.4662
EDUCF3 (Highest education of the father is junior middle school)	0.4948	0.5005	0.5263	0.5302
	0.5000	0.5001	0.4994	0.4992
EDUCF4 (Highest education of the father is senior middle school or higher)	0.1754	0.1672	0.0941	0.0937
	0.3803	0.3733	0.2920	0.2914
RURAL (Rural residence)	0.8483	0.8489		
	0.3587	0.3582		
PLATEAU (Topography of Village)			0.3887	0.3888
			0.4875	0.4876
SEMI-MOUNTAINEOUS (Topography of village)			0.2478	0.2455
			0.4318	0.4305
BASIN (Topography of village)			0.2536	0.2597
			0.4352	0.4386
UNDERGROUND WATER (Main source of drinking water)			0.2842	0.2810
			0.4511	0.4496
RAINWATER (Main source of drinking water)			0.3555	0.3627
			0.4787	0.4809

NOELECTRICITY (Electricity connection)			0.9691	0.9679
			0.1732	0.1763
DISTANCE1 (Distance to seat of township government)			5.5743	5.6000
			5.5882	5.6319
DISTANCE2 (Distance to nearest county town)			29.4541	29.6452
			23.0902	23.0229
Level 2 Variables				
HEALTH STATUS	2.8302	2.8825	2.8161	2.8724
	0.5725	0.4494	0.6004	0.4718
GIRL	0.4574	0.4365	0.4483	0.4250
	0.4982	0.4960	0.4974	0.4944
AGEMBRTH (Age of the mother at the time of childbirth)	25.1993	25.5663	25.0821	25.4945
	3.6955	3.7432	3.72714	3.7989
AGEMSQ (Square of the age of the mother at the time of childbirth)	648.6599	667.6403	642.9971	664.3941
	203.1827	209.0953	204.2123	211.7395
BOTHHAN (Both mother and father are ethnically Han)	0.8416	0.8495	0.8323	0.8422
	0.3651	0.3576	0.3737	0.3647
BIRTH ORDER	1.7620	1.8489	1.8073	1.8996
	1.0866	1.1058	1.1112	1.1259
NUMPREVDEAD (Number of elder siblings that have died)	0.2774	0.3003	0.2674	0.0269
	0.6827	0.6781	0.6895	0.1617
DIFFPREV(Time difference from the previous child)	17.1800	19.8518	18.6723	0.2862
	28.7493	30.4901	28.8002	0.6791
NUMELDBRO (Number of existing elder brothers)	0.2049	0.2201	0.2281	21.8929
	0.5093	0.5097	0.5347	30.8757
NUMELDSIS (Number of existing elder sisters)	0.3340	0.3760	0.3730	0.2470
	0.6361	0.6633	0.6649	0.5349
CHEMICAL (If the mother was exposed to pesticide or chemical fertilizer when pregnant with the youngest child)		0.2363		0.2739
		0.4249		0.4460
SMOKE CHEMICAL (If the mother smoked when pregnant with the youngest child)		0.0187		0.0194
		0.1354		0.1380
ALCHOL CHEMICAL (If the mother consumed alcohol when pregnant with the youngest child)		0.0295		0.0325
		0.1691		0.1773
MEDICINE CHEMICAL (If the took antibiotic, analgesic or hormonal medicines when pregnant with		0.1039		0.1127

the youngest child)		0.3052		0.3163
HARDLABOUR CHEMICAL (If the mother continued performing hard labour when pregnant with		0.3817		0.4396
the youngest child)		0.4859		0.4964
PRENATAL (if the woman had taken any prenatal exams performed by professionals when pregnant		0.7323		0.6929
with the youngest child)		0.4428		0.4614
HOSPDEL (the place of delivery of the youngest child was a hospital)		0.2062		0.1179
		0.4046		0.3226
FPDEL (the place of delivery of the youngest child was a family planning clinic)		0.1663		0.1840
		0.3724		0.3875
HOMEDEL (the place of delivery of the youngest child was home)		0.5417		0.6276
		0.4983		0.4835
DOCTOR (doctor was present during delivery of the youngest child)		0.4245		0.3388
		0.4943		0.4734
MIDWIFE (midwife was present during delivery of the youngest child)		0.3202		0.3687
		0.4666		0.4825
FAMILY (family members were present during delivery of the youngest child)		0.1384		0.1616
		0.3454		0.3681
INDUCEDBRTH (Birth of the youngest child was induced)		0.1368		0.1201
		0.3437		0.3252
Sample Size	3729	3157	3103	2680

Notes:
Figures in Parenthesis are standard deviations

Table 2: Parental Educational Attainment and Child Health

	Health Status				
	0	**1**	**2**	**3**	**Sample Size**
		All Households			
EDUCM = 0	4.24	2.92	7.56	85.28	754
EDUCM = 1	3.9	1.28	7.25	87.57	1641
EDUCM = 2	1.14	0.74	5.43	92.69	1492
EDUCM = 3	0.49	0.49	3.69	95.33	407
					4294
EDUCF = 0	5.68	2.62	6.99	84.72	229
EDUCF = 1	3.96	1.27	8.47	86.31	1264
EDUCF = 2	1.99	1.33	5.74	90.93	2107
EDUCF = 3	1.44	0.86	4.03	93.66	694
					4294
		Rural Households			
EDUCM = 0	2.01	2.19	7.31	88.48	547
EDUCM = 1	2.06	1.12	7.04	89.79	1165
EDUCM = 2	0.44	0.8	4.34	94.42	1129
EDUCM = 3	0	0.32	3.16	96.52	316
Total					3157
EDUCF = 0	3.21	1.92	8.33	86.54	156
EDUCF = 1	2.02	1.34	8.06	88.58	893
EDUCF = 2	0.95	1.14	5.13	92.78	1580
EDUCF = 3	0.38	0.38	2.84	96.40	528
Total					3157

Table 3: Ordered Probit Estimation Results of Health Status of All Children Aged 0 – 5

	All Households		Rural Households	
	Specification I	**Specification II**	**Specification I**	**Specification II**
GIRL	-0.1078 **	-0.1227 **	-0.1061 *	-0.1178 *
	(0.0536)	(0.0619)	(0.0586)	(0.0657)
EDUCM2	0.0826	0.0949	0.0936	0.1042
	(0.0705)	(0.0870)	(0.0744)	(0.0883)
EDUCM3	0.3539 ***	0.4018 ***	0.3719 ***	0.4085 ***
	(0.0825)	(0.1034)	(0.0907)	(0.1081)
EDUCM4	0.5260 ***	0.5990 ***	0.5306 **	0.5853 **
	(0.1542)	(0.1832)	(0.2411)	(0.2751)
EDUCF2	0.0398	0.0538	-0.0018	0.0035
	(0.1109)	(0.1360)	(0.1221)	(0.1432)
EDUCF3	0.1798	0.2185	0.0983	0.1201
	(0.1121)	(0.1383)	(0.1248)	(0.1475)
EDUCF4	0.2199	0.2553	0.2639	0.3000
	(0.1428)	(0.1725)	(0.1649)	(0.1922)
AGEMBRTH	-1.4316 *	-1.4705	-2.7689 ***	-2.9236 ***
	(0.7738)	(0.9013)	(0.9715)	(1.1026)
AGEMSQ	0.3572 **	0.3659 *	0.6566 ***	0.6902 ***
	(0.1734)	(0.2016)	(0.2209)	(0.2504)
BOTHHAN	-0.0603	-0.0635	-0.0449	-0.0437
	(0.0687)	(0.0835)	(0.0782)	(0.0916)
BORD2	0.2485 **	0.2577 **	0.2437 **	0.2611 **
	(0.1085)	(0.1075)	(0.1113)	(0.1124)
BORD3	0.4484 **	0.4516 ***	0.4953 ***	0.5176 ***
	(0.1901)	(0.1741)	(0.1878)	(0.1784)
BORD4	0.4623 *	0.4216 *	0.4570 *	0.4470 *
	(0.2657)	(0.2365)	(0.2573)	(0.2371)
BORD5	1.1921 ***	1.1175 ***	1.2077 ***	1.1798 ***
	(0.4080)	(0.3864)	(0.4030)	(0.3933)
NUMPREVD	-0.2645 ***	-0.2412 ***	-0.2896 ***	-0.2771 ***
	(0.0819)	(0.0703)	(0.0772)	(0.0703)
DURPREV	-0.0003	-0.0007	0.0002	-0.0001
	(0.0013)	(0.0015)	(0.0016)	(0.0018)
NUMELDBRO	-0.1970 **	-0.1657 **	-0.1853 **	-0.1664 **
	(0.0780)	(0.0776)	(0.0759)	(0.0770)
NUMELDSIS	-0.2427 ***	-0.2238 ***	-0.2616 ***	-0.2536 ***
	(0.0896)	(0.0815)	(0.0858)	(0.0831)
RURAL	0.0179	0.0227		
	(0.1022)	(0.1216)		
PLATEAU			0.1608	0.1694
			(0.0982)	(0.1165)
SEMI-MOUNTAINEOUS			-0.1555 *	-0.1781
			(0.0909)	(0.1107)
BASIN			0.0542	0.0509
			(0.0962)	(0.1165)
UNDERGROUND WATER			0.0965	0.1064
			(0.0781)	(0.0911)
RAINWATER			0.0662	0.0763
			(0.0743)	(0.0873)
NO ELECTRICITY			0.2503 *	0.2851 *
			(0.1437)	(0.1692)
DISTANCE1			-0.0031	-0.0026
			(0.0058)	(0.0069)
DISTANCE2			0.0030 **	0.0032 **
			(0.0013)	(0.0015)
τ_1	-3.1732 ***	-3.4471 ***	-4.2817 ***	-4.5991 ***

	(0.8568)	(1.0035)	(1.0828)	(1.2393)
τ_2	-2.9847 ***	-3.2354 ***	-4.1007 ***	-4.4004 ***
	(0.8570)	(1.0035)	(1.0856)	(1.2418)
τ_3	-2.4749 ***	-2.6537 ***	-3.6015 ***	-3.8455 ***
	(0.8583)	(1.0043)	(1.0869)	(1.2423)
σ_η^2		0.5506 ***		0.4909 ***
		(0.1139)		(0.1268)
Number of Observations	4294	4294	3643	3643
Equality of Education Effects: $\chi^2(1)$				
Primary School	0.08	1.1518	0.37	0.5928
Junior Middle School	1.08	19.0500 ***	2.49	12.9320 ***
Senior Middle School or Higher	1.62	19.1742 ***	0.79	11.4678 ***
Joint Significance of the Community Variables $\chi^2(8)$			28.1218 ***	26.2834 ***

Notes:
Standard errors in parentheses;
Significance: '*'=10%; '**'=5%; '***'=1%.

Table 4: Ordered Probit Estimates for Health Status of Youngest Children (All Households)

	Age 0 – 5	Age 1 - 5	Age 0 – 1
GIRL	-0.0496	-0.0498	-0.0295
	0.0675	0.0910	0.1056
EDUCM2	-0.0102	0.0768	-0.0180
	0.0956	0.1270	0.1528
EDUCM3	0.2703***	0.2416	0.4139**
	0.1141	0.1486	0.1887
EDUCM4	0.3530*	0.2135	0.5957*
	0.2018	0.2693	0.3221
EDUCF2	0.1017	-0.0080	0.2404
	0.1498	0.2106	0.2325
EDUCF3	0.2569*	0.1785	0.3581
	0.1546	0.2175	0.2378
EDUCF4	0.5175***	0.4996*	0.5245*
	0.1937	0.2742	0.2968
AGEMBRTH	-0.3602***	-0.6714***	-0.1678
	0.1059	0.2063	0.1597
AGEMSQ	0.0069***	0.0133***	0.0029
	0.0020	0.0040	0.0030
BOTHHAN	-0.1123	-0.1565	-0.1393
	0.1001	0.1410	0.1540
BORD2	0.3242**	0.4000*	0.0388
	0.1278	0.2348	0.1844
BORD3	0.5136**	0.5171	0.1448
	0.2087	0.4306	0.2889
BORD4	0.5444*	0.1790	0.9068**
	0.2839	0.6246	0.4545
BORD5	1.3116***	1.4848	0.6675
	0.4431	0.9809	0.5608
NUMPREVDEAD	-0.2983***	-0.2781	-0.1868
	0.0840	0.1852	0.1122
DURPREV	-0.0019	-0.0004	-0.0016
	0.0018	0.0029	0.0024
NUMELDBRO	-0.1885**	-0.1435	-0.2011
	0.0901	0.1888	0.1351
NUMELDSIS	-0.2443***	-0.2256	-0.1643
	0.0906	0.1927	0.1294
RURAL	0.0074	0.0186	-0.0445
	0.1360	0.1785	0.2281
CHEMICAL	-0.1051	-0.1357	-0.0118
	0.0809	0.1070	0.1319
SMOKE	0.1076	0.6757	-0.1128
	0.2424	0.4608	0.3190
ALCOHOL	-0.4880***	-0.7076***	-0.2039
	0.1581	0.1963	0.2987
MEDICINE	-0.2695***	-0.3050**	-0.1979
	0.0960	0.1274	0.1565
HARDLABOUR	0.0303	0.0866	-0.0610
	0.0786	0.1026	0.1296
PRENATAL	0.1472*	0.2363**	-0.0179
	0.0833	0.1063	0.1453
HOSPDEL	-0.1507	-0.0108	-0.3910
	0.1635	0.2162	0.2715
FPDEL	0.1237	0.3376	-0.1564
	0.1676	0.2262	0.2750
DOCTOR	0.0365	-0.0121	0.1674
	0.1736	0.2251	0.2930
MIDWIFE	0.1267	0.1559	0.0749

	0.1077	0.1376	0.1816
FAMILY	0.1018	0.2173	-0.0490
	0.1316	0.1743	0.2140
INDUCEBRTH	0.0930	0.0835	0.1693
	0.1402	0.2019	0.2136
τ_1	-6.6487***	-10.4309***	-4.4179**
	1.4142	2.6608	2.1532
τ_2	-6.3684***	-10.0729***	-4.2147**
	1.4132	2.6588	2.1525
τ_3	-5.7436***	-9.4620***	-3.5309
	1.4121	2.6569	2.1515
Number of Observations	3157	1984	1173
Equality of Education Effects: $\chi^2(1)$			
Primary School	0.32	0.10	0.71
Junior Middle School	0.00	0.04	0.03
Senior Middle School or Higher	0.26	0.41	0.02
Joint Significance of Health Input Variables $\chi^2(8)$	9.67	10.91	4.61
Joint Significance of the Behavioural Variables ($\chi^2(5)$)	22.72 ***	26.42 ***	2.91

Notes:
Standard errors in parentheses;
Significance: '*'=10%; '**'=5%; '***'=1%

Table 5: Ordered Probit Estimates for Health Status of Youngest Children (Rural Sample)

	Age 0 – 5	Age 1 - 5	Age 0 – 1
GIRL	-0.0471	-0.0332	-0.0300
	0.0729	0.0997	0.1132
EDUCM2	0.0037	0.1177	0.0048
	0.0977	0.1310	0.1565
EDUCM3	0.2799	0.2194	0.4753**
	0.1184	0.1544	0.1967
EDUCM4	0.5350		0.3221
	0.3206		0.3896
EDUCF2	0.0422	-0.0799	0.1508
	0.1565	0.2206	0.2463
EDUCF3	0.1778	0.0919	0.2545
	0.1613	0.2267	0.2528
EDUCF4	0.5789**	0.5276	0.5621*
	0.2252	0.3264	0.3383
AGEMBRTH	-0.4788***	-0.6560***	-0.3858**
	0.1266	0.2174	0.1904
AGEMSQ	0.0090***	0.0128***	0.0071**
	0.0024	0.0042	0.0036
BOTHHAN	-0.1127	-0.1246	-0.1974
	0.1101	0.1572	0.1697
BORD2	0.3437**	0.3971	0.1605
	0.1374	0.2506	0.1977
BORD3	0.5605**	0.5690	0.3081
	0.2171	0.4500	0.3003
BORD4	0.5565*	0.1377	1.0396**
	0.2929	0.6508	0.4590
BORD5	1.4208***	1.6126	1.0076*
	0.4535	1.0122	0.5845
NUMPREVDEAD	-0.3363***	-0.3160*	-0.2883**
	0.0860	0.1914	0.1164
DURPREV	-0.0009	0.0001	-0.0017
	0.0020	0.0031	0.0027
NUMELDBRO	-0.1866**	-0.1611	-0.2041
	0.0935	0.1966	0.1417
NUMELDSIS	-0.2721***	-0.2484	-0.2474*
	0.0941	0.2019	0.1393
CHEMICAL	-0.1267	-0.1411	-0.0591
	0.0833	0.1113	0.1352
SMOKE	0.0037	0.3898	-0.1156
	0.2610	0.4684	0.3508
ALCOHOL	-0.4884***	-0.7362***	-0.1899
	0.1649	0.2080	0.3092
MEDICINE	-0.2227**	-0.2307*	-0.1459
	0.1031	0.1374	0.1696
HARDLABOUR	0.0334	0.0940	-0.0624
	0.0813	0.1077	0.1338
PRENATAL	0.1528*	0.2377**	-0.0237
	0.0865	0.1105	0.1550
HOSPDEL	-0.3662*	-0.2740	-0.4337
	0.2095	0.2920	0.3276
FPDEL	-0.0424	0.1682	-0.2113
	0.1995	0.2775	0.3154
DOCTOR	0.2166	0.1812	0.2693
	0.2069	0.2820	0.3328
MIDWIFE	0.1304	0.1533	0.1138

	0.1120	0.1449	0.1876
FAMILY	0.0231	0.0918	-0.0721
	0.1424	0.1894	0.2355
INDUCEBRTH	0.0820	0.1249	0.1882
	0.1544	0.2265	0.2367
PLATEAU	0.1042	-0.0103	0.1561
	0.1332	0.1898	0.2025
SEMI-MOUNTAINEOUS	-0.1850	-0.2590	-0.1534
	0.1298	0.1830	0.2011
BASIN	0.1217	0.0426	0.1655
	0.1362	0.1941	0.2123
UNDERGROUND WATER	0.1552	0.2459*	0.0176
	0.1035	0.1450	0.1608
RAINWATER	0.0378	0.0879	-0.0432
	0.0942	0.1252	0.1535
NO ELECTRICITY	0.1420	-0.4951	0.6137**
	0.2057	0.3458	0.3000
DISTANCE1	-0.0078	-0.0084	-0.0098
	0.0075	0.0106	0.0116
DISTANCE2	0.0048**	0.0041	0.0058**
	0.0019	0.0026	0.0029
τ_1	-7.9820***	-10.7374***	-6.5293***
	1.6796	2.8281	2.5339
τ_2	-7.7084***	-10.3727***	-6.3455***
	1.6787	2.8259	2.5332
τ_3	-7.0866***	-9.7823***	-5.6317***
	1.6773	2.8238	2.5311
Number of Observations	2680	1695	985
Equality of Education Effects: $\chi^2(1)$			
Primary School	0.04	0.49	0.20
Junior Middle School	0.20	0.17	0.38
Senior Middle School or Higher	0.01		0.18
Joint Significance of Health Input Variables $\chi^2(8)$	11.21	11.26	3.86
Joint Significance of the Behavioural Variables $\chi^2(5)$	19.24 ***	21.45 ***	2.30
Joint Significance of the Community Variables $\chi^2(8)$	22.38 ***	14.69 *	13.95 *

Notes:
Standard errors in parentheses;
Significance: '*'=10%; '**'=5%; '***'=1%.

Table 6: Effect of Parental Educational Attainment on Use of Health Inputs

	PRENATAL	HOSPDEL	FPDEL	DOCTOR	MIDWIFE	FAMILY
EDUC2	0.5464***	0.1556	0.1497	0.2107**	0.2680***	-0.4423***
	0.0742	0.1122	0.0935	0.0824	0.0733	0.0830
EDUC3	0.9750***	0.5541***	0.2213**	0.5352***	0.0540	-0.8558***
	0.0845	0.1131	0.0975	0.0864	0.0798	0.1057
EDUC4	0.9462***	0.8118***	-0.3023*	0.7421***	-0.2969**	-0.4208*
	0.1677	0.1483	0.1598	0.1410	0.1485	0.2286
HEDUC2	0.4740***	0.1002	1.0691***	0.7780***	0.0911	-0.3562***
	0.1296	0.1999	0.3043	0.1834	0.1243	0.1291
HEDUC3	0.6999***	0.2835	1.1989***	0.9047***	0.1608	-0.6780***
	0.1313	0.1994	0.3041	0.1836	0.1256	0.1341
HEDUC4	0.8702***	0.3595*	1.2165***	1.1466***	-0.0132	-1.0615***
	0.1563	0.2112	0.3139	0.1960	0.1452	0.1886
Equality of Education Effects: $\chi^2(1)$						
Primary School	0.19	0.05	7.65***	6.94***	1.21	0.25
Junior Middle School	2.43	1.09	8.42***	2.77*	0.39	0.82
Senior Middle School or Higher	0.09	2.33	16.12***	2.27	1.46	3.71**

Notes:
Standard errors in parentheses;
Significance: '*'=10%; '**'=5%; '***'=1%.

Table 7: Effect of Parental Educational Attainment on Mother's Behaviour when Pregnant with the Youngest Child

	CHEMICAL	SMOKE	ALCOHOL	MEDICINE	HARDLABOUR
EDUC2	0.0796	0.1693	-0.0698	0.0426	-0.2604***
	0.0758	0.1552	0.1256	0.0925	0.0738
EDUC3	0.0102	-0.2656	-0.5010***	-0.0621	-0.5942***
	0.0831	0.1983	0.1574	0.1012	0.0805
EDUC4	-0.3698**	-0.4288	-0.9272***	-0.4464***	-0.8451***
	0.1638	0.3426	0.3346	0.1818	0.1496
HEDUC2	0.1391	-0.1994	-0.1354	0.2143	-0.2093*
	0.1259	0.2184	0.1927	0.1685	0.1267
HEDUC3	0.0595	-0.3322	-0.3213	0.2893*	-0.3112**
	0.1280	0.2293	0.2008	0.1702	0.1283
HEDUC4	0.0842	-0.5617*	-0.0682	0.3929**	-0.3733**
	0.1485	0.2988	0.2347	0.1884	0.1473
Equality of Education Effects: $\chi^2(1)$					
Primary School	0.13	1.44	0.06	0.66	0.10
Junior Middle School	0.08	0.04	0.37	2.49	2.66
Senior Middle School or Higher	3.33**	0.06	3.53*	0.08	3.92**

Notes:
Standard errors in parentheses;
Significance: '*'=10%; '**'=5%; '***'=1%.