SCHOOLING AND NON-MARKET OUTCOMES IN MONGOLIA

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Abstract

In this paper, using data from the House hold Socio-Econom ic Survey of Mongolia of 2007-2008 and employing probit and IV-pr obit regressions, we have inve stigated the som e impacts of schooling on health outcom es in Mongolia. We found that for all adults 18-60 years old, an additional year increase in schoolin g increases the predicted probability of not having chronic illness by 0. 107 points and the coefficien t is s tatistically sig nificant. For m ales, an addition al year of schooling increases the predicted probability of not having chronic illness by 0.114, for females by 0.100. Although it is statis tically insignificant, the IV probit estim ate that used the openings of non-selective private colleges in M ongolia as instrum ent for years of schooling generates ne gative ef fects of schooling on the probability of not having chronic illn ess. For children 0-17 years old, an additi onal year increase in m others' schooling raises the predicted probability of not having health com plaints fo r her child by 0.031 and it is statistically significant at 5 percent level. In contrast, fathers' schooling ha s no im pact. Overall, we found little evidence of parent al education im pact on their childre n's health in M ongolia. Our results add to the literature on non-market outcomes of education.

Keywords: schooling, health outcome, non-market outcome of schooling, Mongolia

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1. Introduction

Education rewards not only an individual who acquires it, but the society in which the person lives. With well established theoretical and empirical findings on the labor market or monetary returns to schooling, researchers are now discussing more about non-market or non-pecuniary returns to schooling. Schooling could affect an individual's income growth but could also lead to an individual's making better decisions about his/her own health, his/her family's well-being, and his/her children's education and health. There are private and public as well as market or non-market returns or non-pecuniary returns to schooling. For instance, Owens (2004), in her review of the literature, emphasized that there are private (higher wages and a higher chance to be employed) and public returns to schooling (less crime, higher participation in elections), and market (an productivity increase, efficiency increase in consumption, savings) and non-market (health improvement) outcomes or returns to schooling.

In the past few years, better survey data in Mongolia has become available. This has made possible an increase in research outcomes in income, inequality, poverty, education and labor market issues in Mongolia. Several researchers provide a comprehensive econometric analysis of the rates of private returns to schooling and education in Mongolia between the periods of 2003-2004.[2]Mongolia spends about 18-20 percent of the central government budget on the education sector.Despite the growing evidence on private rates of return to education or labor market outcomes in Mongolia, there is no research on non-market outcomes of education or non-pecuniary returns to education in the country.Thus this research aims to answer the questions: what are the non market outcomes of schooling in Mongolia in terms of health outcome and how do the returns differ by gender? Are more educated people more likely to have healthier children compared to less educated individuals in Mongolia?

Some surveys done by international agencies in the country indicate that there are some positive relationships between women's education and their children's health and their own health behavior. For instance, the 3rd Multiple Indicator Cluster Survey (MICS)[3] reported that a higher level of education of women is associated with higher contraceptive prevalence. Knowledge about HIV is higher among urban women (70 percent) than rural women (38 percent), higher among educated women (82 per cent of higher educated women) than low educated women (16 percent for uneducated women and 27 percent for less educated women) and higher among wealthy women (77 percent) than poor women (28 percent). [4]The survey also showed that in Mongolia, the infant mortality rate[5] and under five mortality rates (66 and 90 per 1000 live births respectively) are highest for mothers who are not educated or have only primary education whereas for educated mothers, the corresponding rates are much lower 18

[2]Patrinos, Ridao-Cano, Sakellariou used the Living Standard Measurement Survey (LSMS) 2003 of Mongolia and found that "the average returns to an additional year of schooling for male wage earners, aged 25-65 in Mongolia are 8.5 percent." In 2010, Banzragch, O., using the LSMS 2003 of Mongolia, the Informal Sector Household Survey 2004 of Mongolia found that "the estimated rate of private return to schooling for Mongolia in the early 2000s ranged from 5.6 percent to 6.5 percent for wage earners and over 7 percent for self-employed individuals and the returns to education are higher for females than for males (2010).

[3]MICS-3 was conducted in 2005 and surveyed 6,220 households and 7,549 women aged 15-49 years.

[4]UNICEF and NSO.(2005). Children and Development.The MICS 2005 reports. Page.46

[5]The infant mortality rate is the probability of dying before the first birthday. The less than five mortality rate is the probability of dying before the fifth birthday.

(3.6 times low) and 22 (4 tim es low) per 1000 live births. Moreover, the survey revealed that those children whose mothers have vocational or higher edu cation are the least like ly to be underweight and stunted compared to children of mothers with lower education. [6]

In the case of Mongolia, in inve stigating the relationship between education and health risk factors such as p rimary angle closu re g laucoma Yip et, al (2011) found that in m ultivariate analysis, adjusted for age, gender, shaffer gr ading, refractive error, those with no form al education were approximately 7 times more likely to develop prim ary angle closure glaucoma compared to those with 8 or more years of schooling.

Researchers note that some non-labor market, or external or non-pecuniary returns or benefits of educatio n m ay arise because ed ucation dev elops m any skills, and increases the health condition of individuals, hence decreasing health expenditure (Becker, 1996). Educated parents rear more educated children (McLanahan and Wojtkiewicz, 1989, Havem an and Wolfe, 1995) and more healthy children (Cu rrie and Moretti, 2003). Educa tion reduces crim e (Lochner and Moretti 2004), enables i ndividuals to participate m ore effe ctively in the political process (Miligan, Moretti andOgeopoulos , 2003), reduces non-healthy beha vior (Miranda and Bratti, 2006), and plays an important role in the quantity-quality model of fertility (Hotz, Klerman and Willis, 1997).

Parents' ed ucation can result in p ositive inte rgenerational effects. Thus, the non-pecuniary effects of education can be extended over long periods. Children living with mothers who have at least a high school education appear to be significantly less likely than other children to become teen parents out of wedlock (See, for exam ple, Sandefur and McLanahan 1990; An, Haveman, and W olfe 1993). On the other hand, there are som e negative social returns to schooling, such as increased stress and constrai nts on tim e. However, this conclusion needs more research and identification for causal reference.

The statistical relationsh ip between schooling and health lo oks strong. A positive correlation between education and health outcomes is one of the well debated, investigated findings in the social sciences such as econom ics, public health, epidem iology, and psychology. This relationship has been observed in many countries for a variety of health outcomes.

Education could im prove health through the following channels: m ore schooling raise efficiency in health production (productive efficiency) (Grossman, 1972), it changes inputs in health production (allocative efficiency) (Grossm an, 2005), that better nourished health causes more and better schooling (Currie, 2009), and education and health are both determ ined by a third factor such as time or risk preferences (F uchs, 1982), and m ore schooling causes m ore income, thus better living environm ent (Case and Deaton, 2005 and Cutler, et all., 2008). Understanding the causality and mechanisms through which the positive impacts are created is helpful in designing health policy.

Individual's education affects not only his/her own health but their children's health positively as well. As Currie and Moretti (2003) assess th ere are at least four po tential channels through which parental education m ay i mprove child lif e quality . They outlined the effects in the following. First, more educated parents earn more, thus may be able to afford more health care. Second, more educated wom en are more likely to marry higher earn ing men, which will rais e

[6]UNICEF and National Statistic Office of Mongolia.(2005). Children and Development.Report of the MICS-3.

family income. Third, education may induce parentsto have healthier behavior, like less smoking, especially educated women may have a lower probability to smoke during pregnancy (p.1496). It is likely that more schooling enables adults to gather information on how to avoid unwanted births.

Research on non-market, or non-pecuniary effects of schooling is currently limited by two difficulties in drawing causal inferences. As Oreopoulos and Salvanes (2011) pointed out, the first difficulty is that acquired schooling may be correlated with many unobservable factors such as innate ability, family background and possible genetic influence. The second difficulty is that more schooling generates more income and more income affects life quantity and quality positively. The third difficulty is that there are other factors which "cause" both more schooling and better health such as income. Researchers note that good health may be due also to occupational choices (choosing occupations with relatively lower occupational hazards), locational choices (electing to live in less polluted areas), more information or skills in acquiring health-related information, better nutrition, fewer health-reducing behaviors (cigarette smoking), and/or more appropriate medical care usage.

Researchers are finding better methodologies to deal with the above mentioned problems like IV method and twin study. Llerys-Muney (2002) concluded that there is a strong causal effect of education on mortality in the US using variation in educational attainment due to compulsory schooling laws, as was used by Acemoglu and Angrist (2001), Lleras-Muney (2005), Fonseca and Zheng (2011) and others. Fonseca and Zheng (2011) find causal evidence that more schooling causes a lower probability of reporting poor health and lower prevalence for diabetes and hypertension in the case of 13 OECD countries. A study using sibling data from Nicaragua in both fixed and random effect models found evidence that the relationship between more schooling and better health is not due to unobserved or unmeasured factors but instead is causal (Behrman and Wolfe 1987). Kenkel (1991) suggests that persons with more schooling are less likely to smoke, and among persons who do smoke, those with more schooling smoke less per day. Miranda and Bratti (2006) managed to draw the causal impact of higher education on smoking behavior in the UK by estimating an endogenous switching count model. Holmlund, Lindahl, and Plug (2008) cited Behrman and Rozenzweig (2002), who used the sample of Minnesota identical twin parents and found that the mother's education had little impact on the education of her child, whereas the father's education had a significant and positive impact on his child's schooling. To offset the effect of unobservables like genes, Researchers Holmlund, Lindahl, and Plug (2008) used the sample of children who were adopted [7] and found that adopted parents' education influence on their adopted children's schooling was small, in the range 0.03-0.04.

This research aims to fill a gap in our understanding of the effects of schooling on health in the case of Mongolia by exploring the effects of an individual's schooling on an adult's own health, and on his/her childrens' health using probit and instrumental variable probit approach. The paper is organized as follows: Section 2 describes the education system of Mongolia. Section 3 describes the research framework and methodology. Section 4 describes our data and its descriptive statistics. Section 5 presents the estimation results, and Section 6 concludes.

[7]They assumed that: "adopted children share only their parent's environment and not their parent's genes. Hence any relation between the schooling of adoptees and, their adoptive parents is driven by the influence parents have on their children is environment, not by their parents passing genes on to them" (p.11).

2. The education system of Mongolia

In Mongolia, the first prim ary and secondary schools were establ ished in 1924 and 1938 respectively. Starting from 1926, the education sy stem consisted from 4 years of for mal schooling. Since 1938, the education system consisted from 7 years of schooling, 4 years of primary and 3 years of lower secondary e ducation. Since the 1960s until 2004, the education system consisted of 10-years of school for 3 years of prim ary education, 5 years of lower secondary education and 2 years of upper seconda ry education. S tudents started school at the age of 8 years. Basic education included pr imary and lower second ary education and was compulsory.

In 2004, the Governm ent of Mongolia im plemented a change from a 10-year school system to an 11-year school system. Instead of starting school at the age of 8, students began school at 7. The 11-year education system consisted of 5ye ars of primary education, 4 years of lower secondary education, and 2 years of upper secondary education. From t he 2008/2009 school year, the Mongolian Parliament again made an amendment to the Education Law, changing the 11-year sch ool system to a 12-year school sy stem. This tran sition will b e com plete by 2016. The latest 12-year education system consists of prim ary education (6 years), lower secondary (3 years) and upper secondary education (3 year s). Now children start school at age 6. Lowe r secondary education caters to pupils from 12 to 14 years old and upper secondary caters pupils from 15 to 18 years old.

In other words, the school sy stem has changed from the 3+5+2 system to 5+4+2 system in 2004 and furtherm ore, to 6+3+3 system in 2008. So now the country has 12 years of school system like in other developed countries.

Basic education includes prim ary a nd lower sec ondary education and it is com pulsory. Pre-school, primary, lower and upper secondary education is free for all and financed by the central government. The Gover nment of M ongolia spends approximately up to 20 percent of the total budget expenditure on the education sector.

For students who com pleted lower secondary educa tion there are three choi ces: to continue to study in upper secondary classes, or enter technical and vocational schools or enter the labor market. Te chnical and vocational training sc hools offer combined occupational and general upper secondary education. Students who comple ted technical and vocational schools can obtain high school diploma and thus enter university.

At the higher education level, ba chelor programs usually last four to five years and six years for m edical universities. Masters program s us ually require 1.5 to 2.5 years and doctorate programs require 3 to 4 years to complete.

2.1 Research framework

In the literature, health level is measured by mortality rates, morbidity rates, self-evaluation of health status, or physiological indicators. Measures of good health in this research are: self-reported health status, and self-reported health problems in the last month. The Mongolian Household Socio-Economic Survey of 2007 asked respondents "Do you have any chronic health problem?".In the entire sample, out of 24,953 adults, 18.3 percent answered positive to having a chronic health problem and the remaining 81.7 percent said no. In the sample that is used for estimations, out of 21,433 adults aged 25 and over, 21.63 percent answered positive to having a chronic health problem and the remaining 78.37 percent said they have no chronic illness. There are 422 missing values for the question. The dependent variable of health status is generated as a dummy variable taking values equal to 1 if a person has no chronic illness and equal to 0 if a person has a chronic health problem.

For self-reported health measurement, researchers caution that there might be some differences related to knowledge of existing health conditions, which in its turn may be related to education. (Cutler and Lleras-Muney, 2006).So, we use another measure of health status of an individual. The survey asked the respondents "Did you have any health complaints in the past month?" 8.87 percent of the respondents answered yes, and 91.13 percent said no. There are 427 missing values for the question. The dependent variable of health complain is generated as a dummy variable taking values equal to 1 if a person had no health complaint in the last month before the survey took place and equal to 0 if a person had no health complaint.

Almost all studies on the relationship between education and health use OLS and probitanalysis. In this research, for the analysis of the impact of adult educational attainment on his/her own health status, we will employ probit regression analysis while exploring their marginal effects. Following the estimation strategy in the literature, we estimate the health status of adults using a probit model as follows:

$$Probit(Healthstatus_i) = \beta_0 + \beta_1 S_i + \beta_2 X_i + \varepsilon_i \quad (1)$$

where the coefficient β_1 measures the effect of a person's own schooling on his/her self-reported health status and the coefficient $\beta_2$measures the effects of a person's other characteristics such as age, gender, marital status, employment status, income, and his/her household's characteristics such as location, access to safe water, electricity, central heating system, and safe sewage system. The key coefficient of interest is β_i. If schooling is exogenous, the probit estimation of equation (1) generates unbiased estimate of β_i.We want to know whether good health maybe due to more schooling because it enables one to acquire more information or skills in collecting health-related information, better nutrition, or more appropriate medical care usage. Education may affect health through getting more accurate health related information. And education may be due to locational choices (electing to live in a relatively more safe environment, or in less polluted areas). As we cited other researchers' assertion that there are other factors which "cause" both more schooling and better health. Thus we include an individual monthly wage income into the probit estimation. More income enables quality health care, better nutrition, and more schooling.

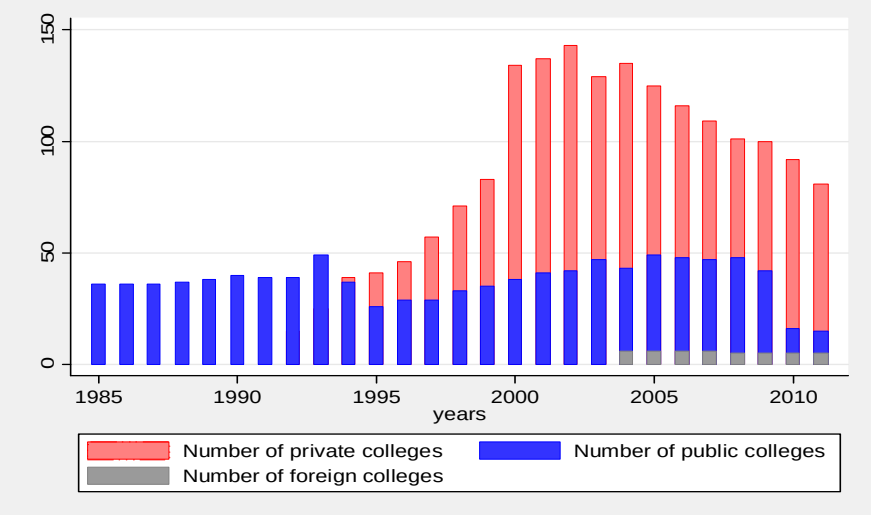
We focus on individuals aged 18 and above. In the literature, researchers use 23, 35 and 42 years (T.Chandola, P.Clarke, J.Morris & D.Blane, 2006, and D.Cutler & A.Lleras-Muney, 2006). However, in this research we focus on individuals ages 18 and above, since we use the instrumental variable that affects individuals in their post-secondary education stage. Education is included in years as in the labor economics literature. In attempt to address endogeneity problem, we use an IV method or a two stage probit model. The method requires an instrument or exclusion restriction, which is a variable that affects education but has no impact on health outcomes and other independent variables in the regression. We use a reform of the Mongolian education system that occurred in 1992 as an instrument for education.

During the socialist period, the government of Mongolia fully regulated the tertiary education sector. Education was financed from the country's budget and was free for students. The government determined the number of enrollments in 2-3 year colleges and 5-year universities by majors according to the economy's predicted needs for the following five year economic development plan. Therefore, before 1992-1993, the enrollment to higher education institutions was limited, and was only open for those who performed successfully on university entrance exams. Entrance exams selected high-ability candidates. The capacity of the tertiary education system was almost stable until the transition.

Just after the transition to a market economy regime, in 1992, the Parliament of Mongolia adopted a new democratic Constitution in which it stated that individuals can provide and receive private education. As a result, starting from 1992, several private primary, secondary schools and colleges, institutes and universities were established. From 1993 to 2008, the scale of higher education kept increasing. In 1991, there were 8 universities and 31 colleges. They all were state owned and governed, and were highly selective schools. However, in 1992, just after the new Constitution was adopted, 15 private higher education institutions were established. In 2007, there were 101 private universities, colleges and institutes and the most of them were non-selective.

This policy change can be viewed as an exogenous event that had removed barriers to receive higher education.We assume that the expansion of the higher education institutions induced variation in the quantity and/or quality of higher education received among various persons in the country. In 1992-1993, individuals aged 24 and above, who did not have chance to receive higher education in public colleges and universities, more likely did not enroll into higher education institutions, due to their already established careers on the labor market thus higher opportunity costs. By contrast, youth aged 17-23 were more likely to be enrolled into newly emerged private colleges if they failed entrance exams into public colleges.

Graph 1. Number of higher education institutions in Mongolia 1985-2010.

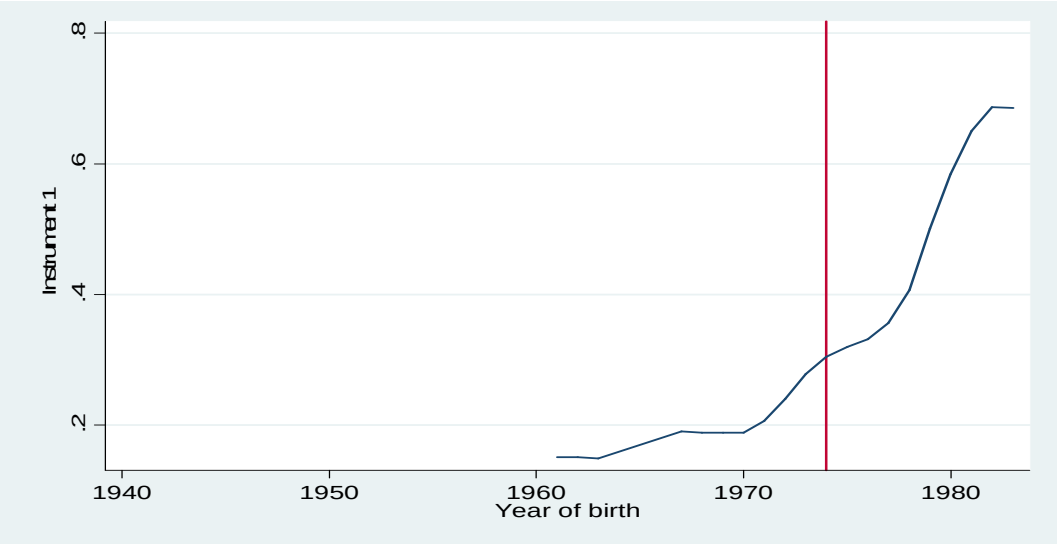


Source: National Statistical Office. Yearly Statistical Book.From various years.

From 1991 to 2008, the number of total colleges and universities[8] increased 3.95 times. Graph 1 illustrates the changes. Similarly, in 1991, there were 33,300 students studying in public colleges and universities.[9] In 2008, that number grew to 161,400 students who were in public and private colleges and universities. In other words, from 1991 to 2008, enrollment grew by 500 percent or increased 4.9 times. [10]As we can observe from Graph 2, enrollment in colleges and universities rose significantly for young people who were born in 1975 or later. [11] Such variation in quantity and quality of schooling is unrelated to ability, genetics, health status or other unobserved characteristics of individuals and therefore estimates of its impact on health status would be free of the biases discussed earlier.

[8]101 private and 48 public colleges and universities are located mostly in the capital city of Ulaanbaatar.
[9]In 1991, 29.700 students were studying in domestic, public colleges and universities and 3.600 Mongolian students were studying in other socialist countries' higher education institutions.
[10]National Statistical Office.Yearly Statistical Book.From various years.
[11] An individual born in 1975 will reach 17 years in 1992 when in the country the first private non-selective colleges were opened.

Graph 2. Enrollment in higher education institutions in Mongolia by birth year of individuals,



Source: HSES-2008 data

We also realize that the policy did not affect the whole population homogeneously. High school graduates of extremely high (low) ability will (not) be able to enter college indisregard of the policy. Financial constraints also play a role. Therefore, only some of the high school graduates arereally affected, and these people at the margin are our focus. We find that higher education expansion increased the probability of going to college tremendously (Graph 2), and that different populations "benefit" from this policy differently. We assume that poor families or families in rural areamore likely to benefit from the expansion policy. Poor families face more severe credit constraints or that the economic conditions make those from poor families less ready to go to college (due to poor academic performance in high school). The expansion increased the supply of college graduates in Mongolia.

For studies in other countries, Duflo (2000) is an extraordinary example who studied how the school construction in Indonesia increased the opportunity of education and therefore economic possibilities. Duflo (2000) used a difference-in difference strategy to identify how school construction affected schooling and income. Currie and Moretti (2003) used the availability of colleges, openings of colleges in the women's county in her seventeenth year as an instrument for maternal education. Following Currie and Moretti (2003) methodology, we use the HSES 2007-2008, to construct measure of the availability of colleges and universities in the country. Each measure is the number of colleges that existed in the country when an individual was 18-21 years olds [12], divided by the number of 20-24 year olds in the country in that year.[13] As Currie and Moretti (2003) explain, " this instrument takes into account the fact

[12]Until 2004, students began school at age of 8, thus after 10 years of secondary school, at age of 18 he/she could enroll into a higher education institution. Individuals can enter into a college at 21, when he/she completed 2-3 years of technical and vocational schools. For instance, students who completed vocational nursing school at 21, could enroll into a medical university.

[13] The National Statistical Office interpolates the numbers of individuals in any given year by 5 years, like 5-9,10-14,15-19,20-24,25-29,30-34,35-39 etc.

that cohort size is likely to have an im pact on the availability of college given any fixed number of schools" (p.1502).

The IV-probit model is a two stage probit model. The first stage model takes the form:

$$Schooling_i = \theta + \gamma X_i + \emptyset Z_i + v_i \qquad (2)$$

The equatio n (2) estimates the s chooling variab le taking into accou nt the set of control variable, X_i, as well as Z_i. The variable, Z_i, is the availability of college for a given individual and varies by birth cohort, is the instrument. The second stage model takes the form:

$$Probit(Healthstatus_i) = \beta_0 + \beta_1 PredSchooling_i + \beta_2 X_i + \varepsilon_i \quad (3)$$

where $PredSchooling_i$ is th e predic ted years of schooling from (2) and e_i , v_i are random errors that are norm ally distributed. Since we control for birth cohort in both stages of the model, the effect of Z_i on $Schooling_i$ is estimated after taking in to account the cohort specific effect. For this instrument to be valid, it should be positively correlated with years of schooling but not affect health outcom es other than through its effect on length of education. W e first estimate (1) for each health ou tcome. For the instrum ental variable approach, we jointly estimate (2), and (3) using m aximum likelihood and assum e e_i , v_i are multivar iate norm al with correlation coefficient ρ_i. We then test whether ρ_i is statistically different from zero. [14]

Following the estim ation stra tegy in the liter ature, we estim ate the impact of f ather's and mother's education on his/her child's health status using a probit model as follows:

$$Probit(ChildHealthstatus_i) = \alpha_0 + \alpha_1 Schooling_i^{Parental} + \alpha_2 X_i + \alpha_3 Location * Yearbirth + \varepsilon_i \quad (4)$$

where the coefficient α_1 measures the effect of a child 's fa ther's and m other's education on the child's health status as reported by a child's parents. The coefficient α_2 measures the child's other ch aracteristics s uch as age, gender, number of siblings, and a child's parents' characteristics like a m other's and father's age, and a child's household's characteristics such as location, distance to the near est medical service, pharmacy, access to safe water, electricity, central heating system , and safe sewage system s. $Location * Yearbirth$ is a vector of indicators f or the loca tion in which a child resides and year of the child's birth and ε_i is a random error term . The $Location * Yearbirth$ effect controls for m any characteristics of the local a rea that m ay af fect hea lth o utcome f or a child such as the availability and quality of medical[15] and educational service, local development, or pollution etc.

In an effort to addressthe e ndogeneity problem of parents' e ducation, we use an IV m ethod. Following Currie and Moretti (2003) m ethodology, we use the previously us ed instrum ent of

[14] If t he test is statistically si gnificant, t hen we m ay rej ect th e nu ll h ypothesis t hat the edu cation variab le is exogenous. If the test is statisticall y n ot si gnificant, then we can not rej ect th e null h ypothesis and th e probit model estimates on (1) is appropriate.

[15] There a re se veral re ports done by t he World B ank, Asian Development B ank a nd International Heal th Organization that conclude the importance of improving medical service in rural area in Mongolia.

the availability of colleges and universities in the country for estimating the impact of fathers' and mothers' education on his/her child's health status. The first stage model takes the form:

$$Schooling_i^{Parental} = \theta + \alpha X_i + \emptyset Z_i + v_i \qquad (5)$$

The equation (5) estimates the parental schooling variable taking into account the instrumental variable Z_i. The second stage model takes the form:

$$Probit(ChildHealthstatus_i) = \alpha_0 + \alpha_1 PredSchooling_i^{Parental} + \alpha_2 X_i + \alpha_3 Location * Yearbirth\varepsilon_i + \varepsilon_i \quad (6)$$

where $PredSchooling_i^{Parental}$ is the predicted years of schooling of parents from (5) and

e_i , v_i are random errors that are normally distributed. Since we control for birth cohort in both stages of the model, the effect of Z_i on $ParentalSchooling_i$ is estimated after taking into account the parents' cohort specific effect. For this instrument to be valid, it should be positively correlated with years of schooling of parents but not affect health outcomes of a child other than through its effect on parents' years of education. We first estimate (5) for each health outcome. For the instrumental variable approach, we jointly estimate (5), and (6) using maximum likelihood and assume e_i , v_i are multivariate normal with correlation coefficient ρ_i. We compute and present separate estimates for the health status of children by rural and urban areas as well as by age groups of 0-5, 6-9, and 10-15 years.

2.2 Data and descriptive statistics

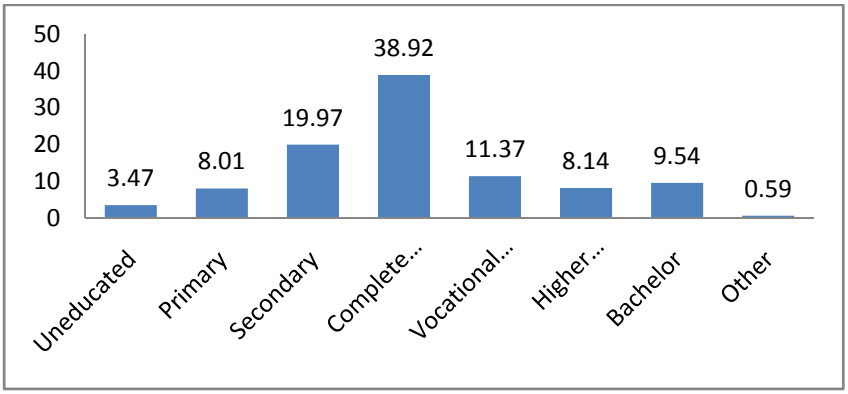
The data set used in this research isthe Mongolian Socio-Economic Survey of 2007-2008 which was administrated to 11,172 households, or 47,416 individuals, from 4 strata, and 5 regions of the country and it is a nationally representative survey. Information is collected on an individual level about age, gender, marital status, household composition, location, schooling, grade repetition, dropping out, health status, educational and health expenditure, migration, labor force participation, wages, and other income. The data contains information on the highest level of education attained by each member of a household.

There are two subsamples of the data: the first data set includes adults. The adult data contains 24, 953 aged 18-60 individuals. The second data set includes11,466 children aged from 0 to 17 years old, whom we matched with their fathers' and mothers' data. The analysis on the impact of parents' schooling on children's health outcome focuses on children between the ages of 0-18.

In the adult sample, 46.4 percent are male and 53.6 percent female. 73 percent of adults in the sample are married or living together, and the remaining 27 percent of adults are divorced, not married or not living together. From Table A2 in the Appendix and Graph 3 below one can see that from 24,092 individuals who responded on the question of their schooling, only 3.47 percent of the respondents are uneducated, 8 percent have primary education, about 20 have lower secondary education, 38,9 percent had completed secondary education or 8-9

grades.11.37 percent have vocational education, while 8.14 percent have a higher education diploma.[16] 9.54 percent of the respondents have university education.

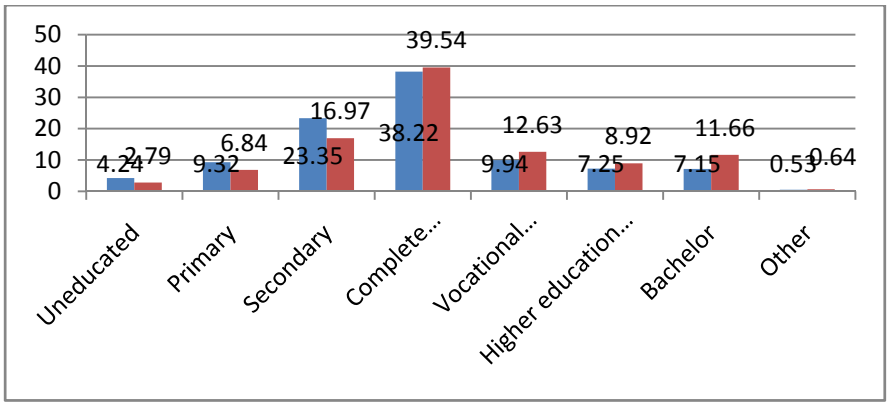
Graph 3. Educational attainment of adults in the sample (in percentage)



Source: HSES 2008 data

Mongolian women are more educated than Mongolian men. For instance, among the uneducated and of those who had only a primary education, men are the majority. Starting from the 10th grade or high school completion, women dominate (Graph 4). More women than men have vocational education, have a degree or higher education diploma and a bachelor's or even a postgraduate degree. This tendency was observed for the respondents of the Living Standard Measurement Survey of Mongolia that was conducted in 2003-2004.

Graph 4. Educational attainment of individuals in the adult sample by gender,



Source: HSES 2008 data

[16]Those who graduated from foreign and domestic special vocational schools, those with incomplete higher education, those who studied for 3 years and graduated from Teachers Institute of Mongolia before 1964, those who graduated from the Party Institute before 1966, those who graduated from the Marxist- Leninism evening higher education institute, those who graduated from the Far East Workers University, and those who graduated from university, college, institute with at least 3 years of studies with diploma since 1994.

By location, 33.7 percent live in the capital city Ulaanbaatar, and 23.6 percent live in aim ag centers.[17] 17.1 percent live in soum centers[18], and the rem aining 24.9 percent (1/4 of the total respondents) live in the countryside leading a nom adic herder's life. Geographically, 16 percent of the respondents live in the western region, 22.4 percent lives in highland areas, 19 percent reside in the central re gion and 8.7 percent live in the eas tern region (See Table A2 in Appendix).

By employment status, from 18,131 responding individuals, about 75.61 percent are employed. By gender, 75.61 percent of m en and 72 percent of women are em ployed. However, by health status, it seems that more women have health problems. For instance, 19.65 percent of men and 23.34 percent of wom en respondents have a ch ronic illness. More over, 10.36 percent of responding wom en said they ha d a health problem during th e last m onth, whereas only 7.14 percent of men said yes.

3. The estimation results[19]

Adult health

The basic model was estim ated as probit with an adult's health as a function of his/her schooling, gender, age in years. Table 1 presents the probitestimates that used equation (1).

Table 1. The probit and marginal effect estimates, by gender.

	Probit (1)	Marginal effects (2)	Men (3)	Marginal effects for men (4)	Women (5)	Marginal effects for women (6)
Health status=1 if has no chronic illness,						
Health status=0 if has chronic illness						
Years of schooling	0.107*** (0.002)	0.024*** (0.0000)	0.114*** 0 (0.004) (	.025*** 0.0000)	0.100*** 0 (0.004) (	.023*** 0.0000)
Constant	0.957 *** (0.052) (		0.687*** 0.071)		0.029*** (0.062)	
Number of obs.	24,953 2	4,953	11,793	11,793 1	3,160	13,160
Health complain=1 if has no complain Health complain=0 if has complain						
Years of schooling	0.006 (0.004) (	0.000 0.0000)	0.006 0 (0.006)	.0000 (0.0000) (	0.007 0 0.005)	.0000 (0.0000)
Constant	-2.0523*** 0 (0.074) (		.0000 0.0000)		0.0000 (0.0000)	
Number of obs.	24,953 2	4,953	11,793	11,793 1	3,160	13,160

Note: Standard errors are in parentheses. The sample includes adults aged 18-60. Controlled for an individual's gender, age in years, marital and employment status, location, regions, dwelling types.

[17] *Aimag:* Mongolia has 21 aimags (a province), the average population is about 50000- 75,000.
[18] *Soum:* Eachaimag is divided into soums (sub-province/county),the average population is about 3000-4,500.
[19] The estim ations c onducted using Stata Statistical So ftware rel ease 11.0. Pr obit and I V-Probit m odels are estimated using the "probit" and "ivprobit" commands in Stata.

It is well known that the interpretation of the coefficients in probit regression is not straightforward. The predicted probability of no having a chronic illness is: F(0.957+male*(-0.063)+age*(-0.034)+schooling*(0.107), where F is the cumulative distribution of the standard normal.[20] If we take the schooling coefficient at its mean, then a one year increase in schooling raises the predicted probability of not having chronic illness by 0.107. Or the marginal effect coefficient for the years of schooling variable is 0.023 and the coefficient is statistically significant at 1 percent. Moreover, we included total monthly health expenditure as an explanatory variable, and the schooling coefficient reduces to 0.023 and it is statistically significant at 1 percent.

For more specification, we included an individual's total monthly health expenditure as an explanatory variable, and the schooling coefficient reduces to 0.023 and it is statistically significant at 1 percent.[21]

Being a male, compared to being a female increases the predicted probability of not having chronic illness by 0.088, and the coefficient is statistically significant at a 5 percent level. Being married (compared to being divorced, widowed or unmarried) increases the predicted probability of not having chronic health problem by 0.211. Being employed versus unemployed increases the predicted probability of not having chronic illness by 0.319, and is statistically significant at a1 percent level. We controlled for the location to see whether urban and rural locations are strong predictors. For individuals,those who reside in Ulaanbaatar and aimag centers compared to soum centers and countryside, after controlling for an individual and his/her household characteristics, one more year of schooling increases the predicted probability of not having chronic health problem by 0.179 and 0.174 and these are statistically significant at 1 percent level. Residing in western and highland regions compared to the central region reduces the predicted probability of not having chronic illness by 0.032 and by 0.032 respectively, however the coefficients are statistically insignificant. But residing in eastern region compared to the central region reduces the predicted probability by 0. 172 and it is statistically significant. The margin between the regions' coefficients are large.

The coefficient of a dummy variable that denotes living in a dwelling with treated city water compared to an unprotected well, transported water and other water systems increases the probability by 0.251 andit is statistically significant at 10 percent level. Among all the estimated coefficients, the coefficient of being a male, employed, married, spending more health care, living in the capital city and aimag centers, in the eastern region, living in a dwelling with city treated water age are the highest which means they are strong determinants of the health status of an individual for the given predictors.

Columns (3) to (6) in Table 1 show the probit and maginaleffects estimates by gender. The schooling estimates differ. The schooling coefficients and marginal effects are higher for men

[20]If we hold gender and age constant at zero, the one year increase in schooling years from 10-11 has a different effect than a one year increase from 9-10.[20]
F(0.957+9*0.107)=1.92
F(0.957+10*0.107)=2.027
F(0.957+11*0.107)=2.134

[21]Moreover, we included an individual's log wages. Income is an important factor for having good health and also more and high quality schooling. Due to the fact that a substantial number of individuals did not report their wages or income, in this model the sample sizedropped from 24,953 to 7,989 individuals. In this augmented model, the schooling coefficient dropped to 0.002 and it is statistically insignificant .

and for women. The estimates for both genders are statistically significant at 1 percent level. For men, a one year increase in schooling increases the predicted probability of not having chronic illness by 0.114 and for women by 0.100 and the impact of schooling looks higher for men than women. Whether these differences result from biology, genes or behavior is not known.

For males and females, age and being employed, living in capital city and a being married increase the predicted probability of not having chronic illness highly and the coefficients are statistically significant at a 1 percent level. For men, one more year in age reduces the predicted probability of not having chronic illness by 0.031, and for women by 0.036. Being employed versus not being employed increases the predicted probability of not having chronic illness for both men and women by 0.547 and by 0.347 respectively. The coefficients are both statistically significant at a 1 percent level. Employment thus, may increase the good health status for men more than for women.

Living in Ulaanbaatar is a strong predictor for both genders. For men, it is 0.137 and for women 0.170 respectively, and the coefficients are statistically significant at 1 percent level. For men, being employed, living in the capital city, living western and highland regions, being married and years of schooling are the strong determinants of the health status for the given set of the predictors. For women, living in the capital city, being employed, living in aimag centers, being married, income, and years of schooling are the strong determinants of the health status for the given predictors. The marginal effects at the mean is a popular measure for models with a categorical dependent variable. The marginal effects are shown in Table A4 in Appendix. Given the nonlinearity of the model, it is difficult to interpret the marginal effects' coefficients.Holding age, and gender equal to their mean, one year increase in schooling would induce an increase in the event of not having chronic illness of about 0.024 and it is statistically significant at a 1 percent level.

For men and women, a one year increase in schooling may induce an increase in the event of not having chronic illness of about 0.114 and 0.100 respectively, holding age, marital, employment status, location, living condition constant and show that the impact of more schooling on the good health status is higher for men than for women. The marginal effects for both gender is the same, 0.023 and they are statistically significant at 1 percent level.

In addition to the health status as a dependent variable, we used health complaints in the last month preceding the survey as a dependent variable. For this specification, if we take the schooling coefficient at its mean, then a one year increase in schooling raises the predicted probability of not having health complaints by 0.006 and however it is statistically insignificant (See Table A6 in Appendix). Or the marginal effect coefficient for the years of schooling on the probability of not having health complain in the last month is -0.000 and the coefficient is statistically insignificant .

Using openings of non-selective private colleges in Mongolia starting in 1992 as instrument for years of schooling generates statistically insignificant, negative effects of schooling on the probability of not having a chronic illness by about -0.003. Although the 95 percent confidence interval for the effects of schooling on the probability of not having a chronic illness [-0.113, 0.108] includes the probit estimates interval of [0.102, 0.113], the p-value is 0.981, which indicates the instrument may not be not a strong one. The measure of college availability has a

negative effect on adults' education. The first stage estimates show that the opening of private colleges and universities in the country per 1000 persons, 20 to 24 years, resulted in 1.9 years of less schooling for all. We perform the Durbin-Wu-Hausman test and -0.686 is less than 4.07 the critical value of chi-squared distribution with 14 degrees of freedom, so years of schooling may not be endogenous and IV may not be the preferred estimator.

One difficulty in interpreting instrumental variable estimates is that not every observation's behavior is affected by the instrument. As J. Angrist and A. Krueger's (2001) have stressed: "instrumental variables methods can be thought of as operating by using only part of the variation in an explanatory variable – that is, by changing the behavior of only some people" (p.12). Thus for the sensitivity analysis of our instrument, we perform the probit analysis for the individuals who were 18-24 years old in 1992 when the increasing number of non-selective private colleges were opened after the 1992 Constitution allowed private educational institutions in Mongolia.

We assume, that this cohort of people were affected by the openings of the private, non-selective colleges the most. In our sample, there are 8,260 individuals who were 18-24 years old in 1992. For this subsample, the probit estimate and the marginal effect coefficient are 0.042 and 0.014 respectively and they are statistically significant at a 1 percent level. However, the IV probit estimate of schooling for the cohort is 0.326 and it is statistically insignificant. Although the IV probit estimate is statistically insignificant and it's p-value is less than 10, the coefficient is positive and the Durbin-Wu-Hausman test coefficient is equal to 14.94 and it is larger than 4.07, the critical value of chi-squared distribution with 14 degrees of freedom. The estimate also suggests that much of the positive impact of one's own schooling on his/her good health status may be coming through age, being a male, being married and employed and living in urban areas.

The findings from the IV probit estimates suggest that there is little bias from omitted ability variables in the probit estimate of the effect of years of schooling on the probability of not having a chronic illness, maybe because omitted variables in the probit equation are uncorrelated with schooling years in our data.

Child health

The sample used for the probit regression consists of 11,466 children aged 0-17 years. 2.2 percent of those children were reported by their parents that a child has chronic health problems. The remaining 97.78 percent do not have chronic health problems. There is considerable published research on the relationship between parental education and child health[22]. Most of these studies found that parental schooling is positively correlated with child health and that the mother's education positively affects her child's health far more strongly than the father's education.

However, when we run the probit model (4), controlling for a child' age, gender, number of siblings, a child's mother's and father's years of schooling, mother's and father's age, location, regions and other household characteristics such as living in a separate apartment, having centralized heating and water system, the mother's schooling coefficients appear to have a negative sign and both parents' schooling coefficients are statistically insignificant

[22]See, for example Handbook on Economics of Education. Vol.1. Chapter 10.

(Table 5). As with th e Currie *et all* (2004) results, there is littl e evidence in influencing parental edu cation on c hildren's he alth. In ad dition to the se exp lanatory va riables, we have estimated $Location_i * Yearof\ birth_i$ effect which yields the coefficient of 0.024 which is statistically significant at a 10 percent level. We think, this specification could capture the part of the effec ts of parental education that ar ises through residential location. The number of siblings that a child has, living in urban areas and location interacted with the child's birth year have statistically sign ificant im pact on lowering probability of having a chronic illn ess for a child aged 0-17 years.Cooking with solid fuels (biomass and coal) leads to high levels of indoor pollu tion and is a m ajor cause of ill-h ealth in the world, particu larly am ong children under five, in the form of acute respiratory illness. [23]However, th e coef ficient for a dummy variable of living in a dwelling with central he ating is 0.016 and is statistically insignificant. Safe drinking water is a basi c necessity of good health. Unsa fe drinking water can be a significant carrier of diseases such as trachom a, cholera, and typhoid.Inadequate disposal of human excreta, and personal hygiene, is associat ed with a wide range of diseases, including diarrheal d iseases and p olio. [24]However, the coef ficients f or dumm y variables of livin g in a dwelling with central heating and city taped water are 0.016 and 0.250 and are statistically insignificant. For urban and rural children, there is no difference in the probit coefficients of the f ather's and m other's educa tion and they are sta tistically ins ignificant (Se e TableA7 in Appendix).

As it was for the case of estimating the impact of an adult's education on one's health outcome, we used health com plaints in the last m onth preceding the survey for children as a dependent variable. For this specification, if we take the schooling coefficient at its mean, then a one year increase in a m other's schooling raises th e predicted probability of not having health complaints for her child by 0.031 a nd it is statistic ally significant at a 5 percent level. (See Table A8 in Appendix). In contrast, a fathers' schooling has no impact. Moreover, for mothers who live in urban area, an additional year increase in h er schoo ling rais es the predic ted probability of not having health com plain for her child by 0.043 and it is s tatistically significant at 5 percen t level. The m arginal e ffect coefficien t for the years of m other's schooling on the probability of not having hea lth com plaints for her child by 0.043 and the coefficient is statistically significant at a 10 percent level.

For the IV estim ates, the equation s (5) and (6) were estim ated separately for fathers' an d mothers' schooling (See Table A7 in Appendix) . The fathers' schooling coefficient for his child hea lth status is neg ative and is statistica lly insignificant. For m other's educa tion, the IV estimate suggest that an additional year of sc hooling of a mother redu ces probability of not having a chronic illness for her child by 0.206 points and the coeffici ent is statistically significant at a 5 level of significance. W e find the IV probit es timates are lower than the probit estimates.Maybe, in the country, the effects of the ope nings of non-selective, private colleges was stronger for fe males than for m ales, thus the effects of the instrum ent on her child is stro nger than th e effect of the instrum ent for m en, however, the negative sign of the effect needs in further investigation.

For more specification, we run the probit m odel (4) for 3 age groups, controlling for the sam e independent variables, plus lo g monthly expenditure for health care for a child. Since the

[23]More than three fourths of the total households in Mongolia (76.5 percent) use solid fuel for cooking.
[24]More than three fourths of the total households in Mongolia (76.5 percent) use solid fuel for cooking.

monthly expenditure was asked, the substantial num ber responde nts did not respond to the question, thus the number of observations decreased from 11, 466 children to 1,048. The mother's schooling coefficients ap pear to ha ve negative signs for 6- 9 and 10-15 year-old children, but positive signs for the all children and 0-5 y ears old group. Both parents' schooling coefficients are statistically insignificant (See Table 2).

Table 2.Probit estimates of parents' schooling effects on children's health status, by age groups

	All children	0-5 years	6-9 years	10-15 years
Mother's schooling	0.000 (0.029)	0.107 (0.058)	-0.038 (0.049)	-0.038 (0.049)
Father's schooling	0.006 (0.029)	-0.018 (0.005) 0.03	8 (0.038)	0.038 (0.038)
Observations	1,048	383 310		310

Notes: The dependent variable is the probability of not having chronic illness for a child.
Standard errors are in pa rentheses. The model specification includes a child's ge nder, age, total monthly medical expenditure on a ch ild, number of sibling, father's and mother's age, mother's and father's log monthly income, dummy variables on western, highland and eastern regions versus central region, living in Ulaanbaatar and aimag centers versus living in soum centers and countryside, living in a separate apartment versus living in other types of dwelling, living in a dwelling that has centralized heating and water and location*child year of birth and log total monthly health care expenditure for a child.

The total monthly health expendi ture's coefficient is negati ve 0.226 and it is statistically significant at a 1 percent leve l. Table 2 shows that although the m other's schooling coefficient is statistically insignificant, the m other's education is a strong predictor of good health for children aged below 5 years com pared with the f ather's education. Glewwe (1999) noted that the mother's years of schooling has a significant positive effect on the ch ild' height whereas the father's schooling has a positive but insignificant effect.

In current research, as the child's age increases, the mother's schooling impact decreases. This implies that there is lit tle, if any, causal relationship betwee n parental characteristics such as education and the child's health outcom e, as it was estimated and documented in the Currie *et all* (2004) and Doyle, Harm on, and Walker (2005) research. There can be several explanations for such estimation results including but not controlled for proxies of genetic endowments such as birth weight and m other's age at birth. The estim ation used formal years of schooling of parents bu t ignored th e quality of schooling by not controlling for proxies of academ ic achievement such as IQ score, GP A score and grade repetition. Also, the data used in the estimation is cross section, and not longitudinal. Another explanation is that the outcom e of children's h ealth is se lf-evaluated s tatus by one of the child' parents, but not defined in the physical dimension thus omitting cognitive and mental development of children. In addition, as Grossman (2006) suggests, one pa rental reported h ealth status m ay not be enough of an indicator of child h ealth. To correct m easurement error bias one shoul d use data that has variety of measures, many of which require physical exam inations and this could be an agenda for the future research.

4. Conclusion

In this paper we have investigated the possible non-market outcomes of schooling in Mongolia by using data from the Household Socio-Economic Survey of Mongolia of 2007-2008. We asked whether more educated people are more healthy in the country? We also asked whether more educated people are more likely to have healthier children, compared to less educated individuals in Mongolia. We made several findings.

First, for all adults, after controlling individual and household characteristics, a one year increase in schooling increases the predicted probability of not having chronic illness by 0.107, and the coefficient is statistically significant at a 1 percent level. Moreover, after controlling for total monthly health expenditures,the schooling coefficient reduces to 0.023 and is statistically significant at a 1 percent. The IV probit estimate that used the openings of non-selective private colleges in Mongolia starting in 1992 as instrument for years of schooling generates negative effects of schooling on the probability of not having chronic illness, although it is statistically insignificant.

Second, after controlling individual and family characteristics and income, for men, a one year increase in schooling increases the predicted probability of not having a chronic illness by 0.114 and for women by 0.100, and the coefficients are statistically significant at a 1 percent level. The schooling coefficients and the schooling marginal effects on adult good health are higher for men and for women.

Third, for children under 18 years old, we found that there is little evidence of an impact of parental education on their children's health outcomes in Mongolia. An additional year increase in mothers' schooling raises the predicted probability of not having health complaints for her child by 0.031 and it is statistically significant at a 5 percent level. In contrast, fathers' schooling has no impact. Moreover, for mothers who live in urban area, an additional year increase in her schooling raises the predicted probability of not having health complaints for her child by 0.043 and it is statistically significant at a 5 percent level.

The model specifications include location and age groups for children. Although the mother's schooling coefficient is statistically insignificant, the mother's education is a stronger predictor of good health of children aged below 5 years than the father's education.The IV probit estimate that used the opening of non-selective private colleges in Mongolia starting in 1992 as an instrument for father's and mother's years of schooling generates statistically insignificant estimates.

To conclude, the use of a single cross-section data suggests that in Mongolia an adult individual's education has a positive impact on his/her health status. Theoretically, parental education should affect their children's health positively. However, we found there is little evidence of the impact of parental education on their children's health outcomes in Mongolia for the given set of observed explanatory variables. This confirms other empirical research findings in the UK and US literature.

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Appendix

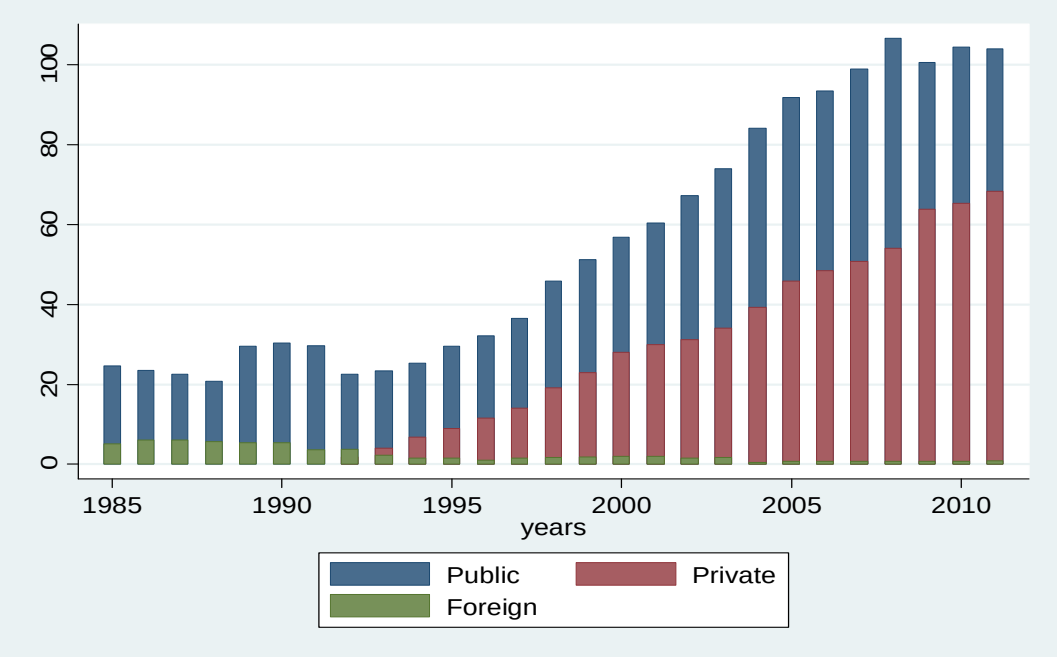
Table A1.The summary of research findings on nonmarket outcomes of schooling.

Outcome	Nature of effects	Research evidence
Productivity increase	Private: market effect	The extensive research on labor market earning magnitude Schultz 1961; Hansen 1963; Becker 1964; Mincer 1962;
Productive efficiency in production of health	Private: non-market effect	Grossman (1972a), (1972b), (2000); De Walgue (2004, 2005),
Consumption increase	Private: non-market effect	The extensive research on consumption growth with more years of schooling Carroll, Summers(1991); Lawrence (1991);
Good health in early childhood affects positively education outcomes in later period.	Private:some external effects	The extensive research on early childhood health care and schooling effects on later period schooling and life quality. Currie (2000);Alderman et.al(2001)
Child quality: better health and schooling	Private: market and non-market effects	Substantioanlevidnce that a child cognitive and health development strongly correlates to mother's and father's schooling.Dawson (1991); Haveman, Wolfe, and Spaulding (1991); Wachtel (1975); Murnane (1981); Sandefur, McLanahan and Wojtkiewicz (1989); Ribar (1993);
Child quality: health	Private; some external effects	Substantial evidence that child health is positively related to parent's schooling. Edwards and Grossman (1979): Wolfe, Behrman (1982): Case, Gertig and Paxson (2005);
Adult health	Private; some external effects	Schooligng increases own health. Grossman (1972b), Wagstaff (1986): Erbsland, Ried and Ulrich (1995);Gilleskie and Harrison (1998);also schooling increases life expectancy (Feldman et al. 1989); also lowers prevalence of severe mental illness (Robins 1984) Glied, Llera-Muney (2008), Chen, Lang (2008):schooling increases access to new information on health.
Spouse's health	Private; modest external effects	Some evidence that own schooling influences spouse's health as well as decreases mortality. Auster, Leveson and Sarachek(1969); Grossman (1975);

Intrafamily productivity	Private: some external effects	Positive relationship between a spouse's schooling and wife/husband's earnings. Benham (1974); Trostel, Walker, and Wooley (2002)
Family planning	Private	Numerous studies report that more educated parents have fewer children in developed and developing countries.De Tray (1973); Michael (1973),Willis (1973); Becker (1991); Schultz (1993), Hotz, Klerman and Willis (1997);
Less smoking	Private: some external effects	Some evidence on the negative realtionship between schooling and smoking. Farrel and Fuchs (1982); Ross and Mirowsky (1999);
Less child mortality	Public and private	Currie and Moretti (2003); Breierova and Duflo (2004)
Savings	Private: some external effects	
Technology	Public	
Social cohesion	Public	Some evidence to suggest that more schooling is associated with higher voting rate.
Increased trust in a society	Public	Helliwell, Putnam (1999): raising overall educational attainment level makes everyone more trusting.
Less reliance on public assistance Public		More education associated with reduced dependence on public assistance
Less crime	Public	Some evidence that schooling is associated with reduced crime activity

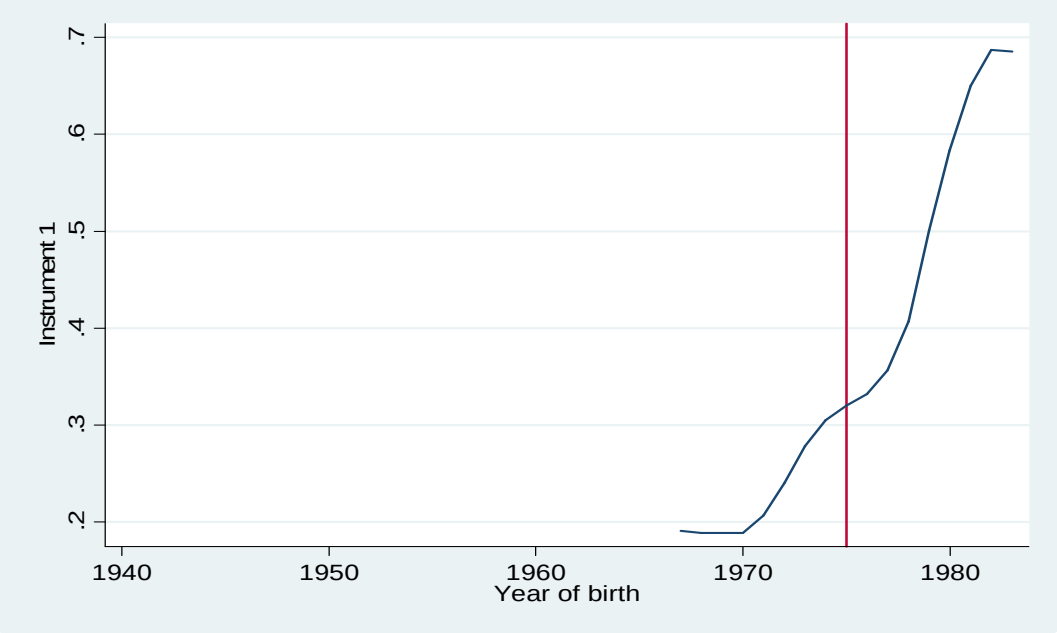
Source: Barbara Wolfe and Robert Haveman (2004). Accounting for the social and non-market benefits of education.Oreopoulos&Salvanes (2011). Priceless: The Nonpecuniary Benefits of Schooling.

Graph A1. Enrollment in higher education institutions in Mongolia, by public and private colleges.



Source: HSES-2008 data

Graph A2. Enrollments in higher education institutions in Mongolia by birth year of individuals,



Source: HSES-2008 data

Table A2. Descriptive statistics of the sample of adult 18-60 years

Schooling						
	Total Male				Female	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Uneducated	836	3.47	47	4.24	35	7	2.79
Primary	1,929	8.01	1,054	9.32	875	6.84
Secondary	4,810	19.97	2,640	23.35	2,170	16.97
Complete secondary	9,377	38.92	4,322	38.22	5,055	39.54
Vocational education	2,739	11.37	1,124	9.94	1,615	12.63
Higher education diploma	1,960	8.14	820	7.25	1,140	8.92
Bachelor	2,299	9.54	809	7.15	1,490	11.66
Other	142	0.59	60	0.53	82	0.64
Total	**24,092**	**100**	**11,308**	**100**	**12,784**	**100**
Health status						
Good health	20,498	82.15	9,729	82.50	10,769	81.83
Others	4,455	17.85	2,064	17.50	2,391	18.17
Total	**24,953**	**100**	**11,793**	**100**	**13,160**	**100**
Location						
Ulaanbaatar	8,414	33.72	3,803	32.25	4,611	35.04
Aimag capital	5,908	23.68	2,760	23.40	3,148	23.92
Rural	10,631	42.60	5,230	44.35	5,401	41.04
Total	**24,953**	**100**	**11,793**	**100**	**13,160**	**100**
Whether a person lives in an a centrally heating apartment						
Centralheating	6,005	24.07	7,570	82.62	8,385	79.62
Others	18,948	75.93	1,592	17.38	2,146	20.38
Total	**24,953**	**100**	**9,162**	**100**	**10,531**	**100**
Whether a person lives in an a dwelling with safe water						
Centralizedwater	4,975	19.94	2,237	18.97	2,738	20.81
Others	19,978	80.06	9,556	81.03	10,422	79.19
Total	**24,953**	**100**	**11,793**	**100**	**13,160**	**100**
Whether a person lives in an anapartment building						
Seperateapartment	5,018	20.11	2,258	19.15	2,760	20.97
Others	19,935	79.89	9,535	80.85	10,400	79.03
Total	**24,953**	**100**	**11,793**	**100**	**13,160**	**100**
Regions						
West region	4,038	16.18	1,982	16.81	2,056	15.62
Highland region	5,605	22.46	2,690	22.81	2,915	22.15
Central region	4,743	19.01	2,251	19.09	2,492	18.94
East region	2,153	8.63	1,067	9.05	1,086	8.25
UB	8,414	33.72	3,803	32.25	4,611	35.04
Total	**24,953**	**100**	**11,793**	**100**	**13,160**	**100**

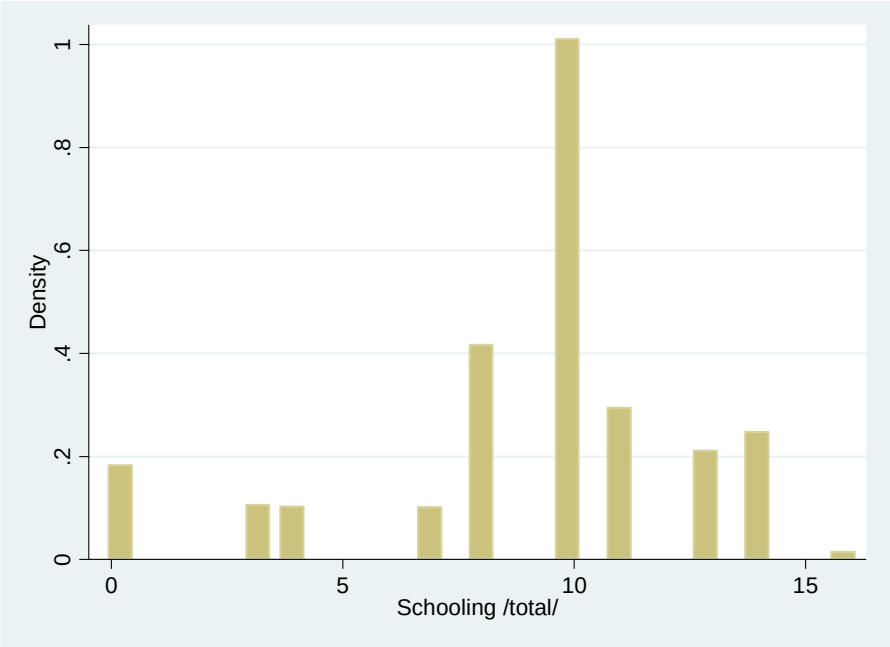
Source: HSES-2008 data

Table A3. Descriptive statistics of the sample of children 0-17 years

Gender						
	Total Male				Female	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Gender	11,560	100	5,880	100	5,680	100
Total	**11,560**	**100**	**5,880**	**100**	**5,680**	**100**
Child health status						
Good health	11,213	97.78	5,711	97.93	,502	97.62
Others	255	2.22	121	2.07	134	2.38
Total	**11,468**	**100**	**5,832**	**100**	**5,636**	**100**
Whether a child lives in an a centrally heating apartment						
Centralheating	2,113	18.2	1,063	18.08	1,050	18.49
Others	9,447	81.7	4,817	81.92	4,630	81.51
Total	**11,560**	**100**	**5,880**	**100**	**5,680**	**100**
Whether a child has a access to safe water						
Centralizedwater	1,682	14.5	843	14.34	839	14.77
Others	9,876	85.4	5,035	85.66	4,841	85.23
Total	**11,558**	**100**	**5,878**	**100**	**5,680**	**100**
Whether a child lives in an apartment building						
Seperateapartment	1,728	14.9	856	14.56	872	15.35
Others	9,832	85.1	5,024	85.44	4,808	84.65
Total	**11,560**	**100**	**5,880**	**100**	**5,680**	**100**
Location						
Ulaanbaatar	2,761	23.8	1,417	24.10	1,344	23.66
Aimag capital	2,680	23.1	1,352	22.99	1,328	23.38
Rural	6,119	52.9	3,111	52.91	3,008	52.96
Total	**11,560**	**100**	**5,880**	**100**	**5,680**	**100**
Regions						
West region	2,681	23.1	1,347	22.91	1,334	23.49
Highlands region	2,957	25.5	1,515	25.77	1,442	25.39
Central region	2,080	17.9	1,080	18.37	1,000	17.61
East region	1,081	9.35	521	8.86	560	9.86
UB	2,761	23.8	1,417	24.10	1,344	23.66
Total	**11,560**	**100**	**5,880**	**100**	**5,680**	**100**

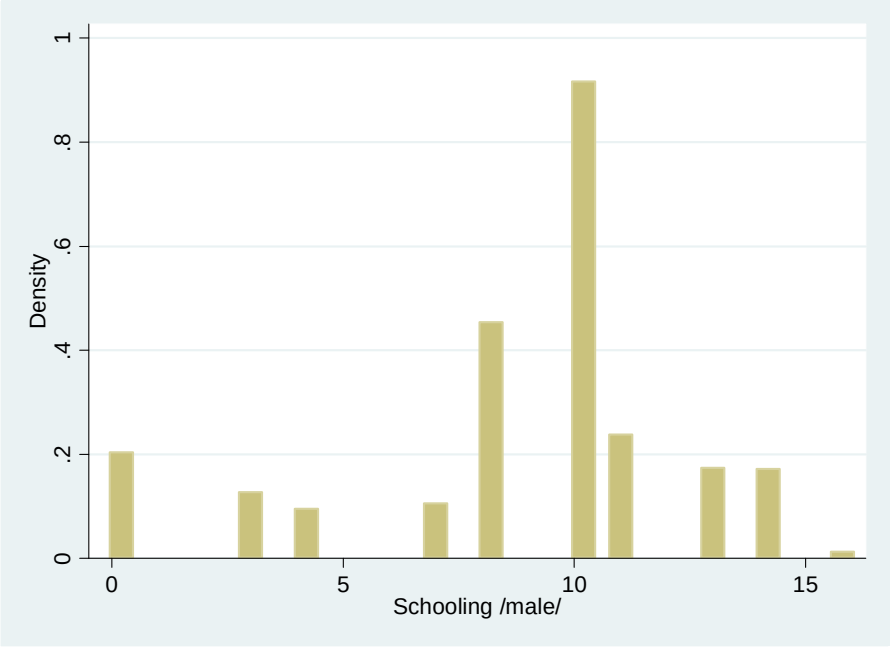
Source: HSES-2008 data

Graph A3. Histogram of individuals' aged 18-60 schooling in Mongolia



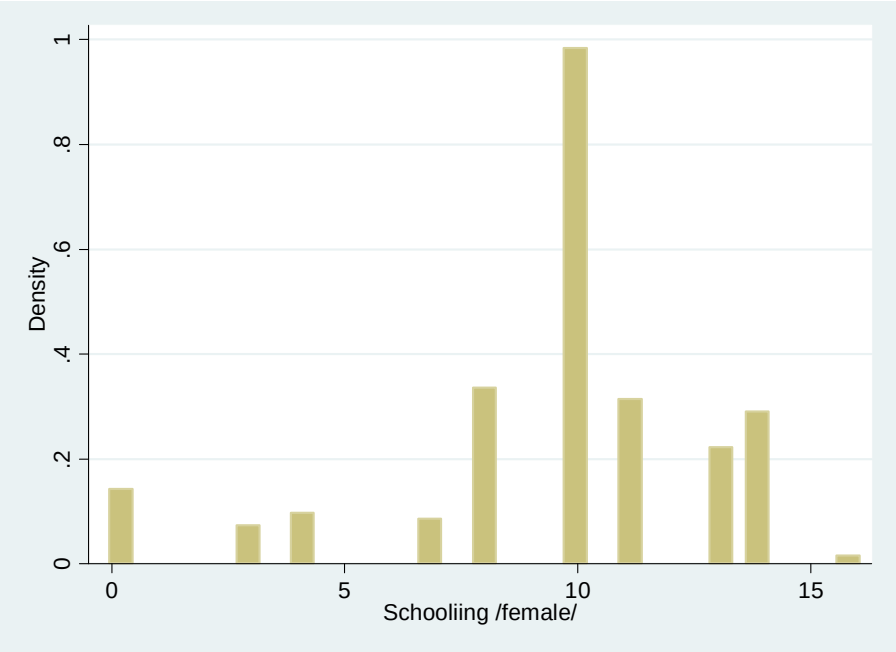
Source: HSES-2008 data

Graph A4. Histogram of adult males' schooling in Mongolia



Source: HSES-2008 data

Graph A5. Histogram of adult females' schooling in Mongolia



Source: HSES-2008 data

Table A4. Effect of years of schooling on health status, adults 18-60 years, by gender, probit and marginal effects estimates

	Probit (1)	Marginal effect (2)	Men (3)	Marginal effect for men (4)	Women (5)	Marginal effect for women (6)
Health status						
Age -	0.034***	-0.0078***	-0.0319***	-0.0071*** -	0.0364*** -	0.0084***
	(0.0009) (	0.0002)	(0.0015)	(0.0003) (	0.0012) (	0.0002)
Gender -	0.063***	-0.0145***				
	(0.0203) (	0.0046)				
Schooling	0.1078*** 0	.0246***	0.1145*** 0	.0235*** 0	.1002*** 0	.0232***
	(0.0029) (	0.0006)	(0.0041)	(0.0009) (	0.0040) (	0.0009)
Married	0.1321***	0.0307*** 0	.0980**	0.0223** 0	.1363***	0.0321***
	(0.0235) (	0.0055)	(0.0390)	(0.0090) (	0.0301) (	0.0072)
Employed	0.4338*** 0	.1059***	0.5475*** 0	.1357*** 0	.3479*** 0	.0841***
	(0.0220) (	0.0056)	(0.0330)	(0.0088) (	0.0296) (	0.0074)
Westregion 0	.0425	0.0095	0.1240**	0.0265**	-0.0255	-0.0059
	(0.0334) (	0.0074)	(0.0487)	(0.0099) (	0.0463) (	0.0109)
Highlandre~n	0.1359*** 0	.0298***	0.2017*** 0	.0425***	0.0784	0.0178
	(0.0309) (	0.0065)	(0.0451)	(0.0089) (	0.0426) (	0.0094)
Eastregion -	0.0079	0.0018	0.0497	-0.0108***	-0.0295	-0.0057
	(0.0390) (	0.0088)	(0.0556)	(0.0119) (	0.0549) (	0.0139)
Ulaanbaatar	0.1560*** 0	.0347***	0.1374*** 0	.0299*** 0	.1709*** 0	.0386***
	(0.0324) (	0.0070)	(0.0477)	(0.0101) (	0.0444) (	0.0097)
Aimag center	0.0256 0	.0058	-0.0177	0.0040 0	.0682 0	.0155
	(0.0267) (	0.0060)	(0.0389)	(0.0088) (	0.0367) (	0.0082)
Centralheating -	0.0541	-0.125	-0.1125 -	0.0260 -	0.0020 -	0.0004
	(0.0423) (	0.0099)	(0.0623)	(0.0148) (	0.0578) (	0.0134)
Centralizedwater	0.0824 0	.0183	0.0990 0	.0214 0	.0658	0.0149***
	(0.0568) (	0.0123)	(0.0850)	(0.0177) (	0.0765) (	0.0170)
Separateapartment -	0.2428***	-0.0598***	-0.1975** -	0.0471**	-0.2726***	-0.0685***
	(0.0508) (	0.0134)	(0.0761)	(0.0192) (	0.0685) (	0.0185)
Constant 0	.9578***		0.6872***		1.0295***	1.907***
	(0.0523) (		0.0630)		(0.0627)	
Observation	**24,953**		**11,793**		**13,160**	

Note: Standard errors are in parentheses. The sample includes adults aged 18-60.

Table A5. Effect of years of schooling on health status, by gender, IV-probit estimates

	Probit (1)	Marginal effect (2)	IV probit
Health status			
Age -	0.034***	-0.007***	-0.035***
	(0.000 (	0.0002)	-0.0011
Gender -	0.063***	-0.014***	0.0268
	(0.0203) (	0.0046)	-0.0509
Schooling 0	.1078***	0.0246***	-0.0013
	(0.0029) (	0.0006)	-0.0561
Married 0	.1321***	0.0307***	0.2049***
	(0.0235) (	0.0055)	-0.0444
Employed 0	.4338***	0.1059***	0.5794***
	(0.022) (	0.0056)	-0.078
Westregion 0	.0425	0.0095	0.0323
	(0.0334) (	0.0074)	-0.0347
Highlandre~n 0	.1359***	0.0298***	0.0952**
	(0.0309) (	0.0065)	(0.038)
Eastregion -	0.0079	0.0018	-0.0361*
	(0.039) (	0.0088)	(0.0460)
Ulaanbaatar 0	.1560***	0.0347***	0.4109***
	(0.0324) (	0.0070)	(0.1350)
Aimag center	0.0256	0.0058	0.2168*
	(0.0267) (	0.0060)	(0.1019)
Centralheating -	0.0541	-0.125	-0.0231
	(0.0423) (	0.0099)	(0.0461)
Centralizedwater 0	.0824	0.0183	0.1570**
	(0.0568) (	0.0123)	(0.0697)
Separateapartment -	0.242***	-0.059***	-0.182***
	(0.0508) (	0.0134)	(0.0607)
Constant 0	.9578***		1.574***
	(0.0523) (		0.3209)
Observation	**24,953**		**24,953**

Note: Standard errors are in parentheses. The sample includes adults aged 18-60.

Table A6. Effect of years of schooling on health complain in the last month, by gender, probit and marginal effects estimates

	Probit (1)	Marginal effect (2)	Men (3)	Marginal effect for men (4)	Women (5)	Marginal effect for women (6)
Health complain						
Age	-0.0236***	0.0026***	0.0198***	0.0019*** 0	.0256*** 0	.0032***
	(0.0011) (	0.0001) (	0.0020)	(0.0001) (	0.0015) (	0.0001)
Gender 0	.1540***	0.0171***				
	(0.0262) (	0.0029)				
Schooling	0.0067 -	0.0007 0	.0066	0.0006	-0.0077	0.009
	(0.0041) (	0.0004) (	0.0061)	(0.0006) (	0.0056) (	0.0046)
Married -	0.0131	-0.0014	0.0683	0.00065	-0.0008	-0.0001
	(0.0300) (	0.0033) (	0.0533)	(0.0049) (	0.0369) (	0.0046)
Employed -	0.174***	-0.0202***	-0.1769***	-0.0181*** -	0.1796*** -	0.0233***
	(0.0279) (	0.0033) (	0.0445)	(0.0048) (	0.0361) (	0.0048)
Westregion -	0.1027**	-0.0108**	-0.1398* -	0.0125**	-0.0750	-0.0090
	(0.0429) (	0.0042) (	0.0651)	(0.0053) (	0.0571) (	0.0066)
Highlandre~n	-0.2511*** -	0.0251*** -	0.2528***	-0.0218*** -	0.2499*** -	0.0283***
	(0.0411) (	0.0036) (	0.0624)	(0.0047) (	0.0547) (	0.0055)
Eastregion 0	.0272	0.0030	-0.0334	-0.0031	0.0739	0.0097
	(0.0491) (	0.0056) (	0.0750)	(0.0069) (	0.0652)	(0.009)
Ulaanbaatar -	0.0886**	-0.0096**	-0.0904 -	0.0085**	-0.0863	-0.0110
	(0.0401) (	0.0042) (	0.0616)	(0.0056) (	0.0529) (	0.0064)
Aimag center	0.0397 0	.0045 0	.0655	0.0065	0.0187	0.0023
	(0.0341) (	0.0039) (	0.0518)	(0.0053) (	0.0453) (	0.0057)
Centralheating	-0.0349 -	0.0038 -	0.0120 -	0.0011	-0.0526	-0.0064*
	(0.0539) (	0.0058) (	0.0833)	(0.0079) (	0.0707) (	0.0085)
Centralizedwater -	0.0224	-0.0024	0.0621	0.0062	-0.0765	-0.0092
	(0.0706) (	0.0077) (	0.1099)	(0.0113) (	0.0924) (	0.0108)
Separateapartment 0	.0488	0.0055	-0.0930	-0.0085	0.1403	0.0187
	(0.0632) (	0.0073) (	0.1009)	(0.0088) (	0.0814) (	0.0115)
Constant -	2.52***		-2.25***		-2.301***	
	(0.0741) (		0.0933)		(0.0869)	
Observation	**24,953**		**11,793**		**13,160**	

Note: Standard errors are in parentheses. The sample includes adults aged 18-60.

Table A7. The probit estimates children 0-17 years, by location and the IV probit estimates

	Probit (1)	Marginal effect (2)	Urban (3)	Marginal effect for urban (4)	Rural (5)	Marginal effect for rural (6)	Instrument of mother schooling	Instrument of father schooling
Health status								
Age	0.0051 0	.0002	0.0767 0	.0038	0.1874***	0.0075***	-0.0160	-0.0026
	(0.0166) (	0.0007)	(0.0671) (	0.0033)	(0.0590)	(0.0023) (	0.0190) (	0.0175)
Gender	-0.0514 -	0.0023	-0.1233 -	0.0061 0	.0303	0.0012 -	0.0606	-0.0523
	(0.0535) (	0.0024)	(0.0759) (	0.0037)	(0.0767)	(0.0030) (	0.0546) (	0.0540)
Brothers	0.1040*** 0	.0047***	0.1097*** 0	.0054*** 0	.1040***	0.0041***	0.0530	-0.0733**
	(0.0239) (	0.0010)	(0.0345) (	0.0017)	(0.0339)	(0.0013) (	0.0314) (	0.0300)
Fatherschooling	0.0052 0	.0002	0.0158 0	.0007 0	.0019	0.0001		-0.1246
	(0.0107) (	0.0004)	(0.0161) (	0.0008) (	0.0145)	(0.0005)		(0.0713)
Motherschooling -	0.0094	-0.0004	-0.0183 -	0.0009 -	0.0072	-0.0002	-0.2068**	
	(0.0125) (	0.0005)	(0.0200)	(0.001) (	0.0164)	(0.0006)	(0.0787)	
Age of father	-0.0078	-0.0003	-0.0236* -	0.0011**	0.0117	0.0004	-0.0229	-0.0099
	(0.0081) (	0.0003)	(0.0105) (	0.0005)	(0.0126)	(0.0005) (	0.0101) (	0.0083)
Age of mother	-0.0044 0	.0002	0.0032	0.0001 -	0.0149	-0.0005 0	.0118 -	0.0009
	(0.0090) (	0.0004)	(0.0120) (	0.0006)	(0.0136)	(0.0005) (	0.0112) (	0.0093)
Separateapartment	0.1617	0.0067*	0.0140 0	.0006 0	.0214	0.0008	-0.1005	-0.1205
	(0.0880) (	0.0033)	(0.1177) (	0.0057)	(0.1182)	(0.0046) (	0.1399) (	0.1426)
Centralheating	0.0020	0.00009	-0.0347 -	0.0017 -	0.1787	-0.0076	0.0923	0.0224
	(0.0781) (	0.0035)	(0.1052) (	0.0054)	(0.1049)	(0.0047) (	0.1215) (	0.1166)
Centralizedwater -	0.1234	-0.0062	-0.3167**	-0.0209 -	0.2016	-0.0095	0.4036**	0.3374*
	(0.0957) (	0.0053)	(0.1326) (	0.0112)	(0.1280)	(0.0070) (	0.1697) (	0.1656)
Westregion 4	9.2514**	1					0.1664	0.1959*
	(20.9314) (	0)					(0.0895)	(0.0907)
Highlandre~n 4	8.9609**	1					-0.0789	-0.0212
	(20.9313) (	0)					(0.0858)	(0.0801)
Eastregion 0	.0166	0.0007	-0.0675	-0.0034	0.1807	0.0061	0.2134*	-0.2008
	(0.1155) (	0.0051)	(0.1392) (	0.0072)	(0.2127)	(0.0060) (	0.1036) (	0.1064)
Ulaanbaatar 0	.2501**	0.0094	0.3445	0.0147*	-0.0631	-0.0026	18.23	36.19
	(0.1563) (	0.0049)	(0.2014) (	0.0047) (	0.2667)	(0.0120)	(24.67)	(22.68)
Aimag center	-0.215***	-0.0114*	-0.1644	-0.0088 -	0.2399	-0.0121	17.90	35.80
	(0.1304) (	0.0080)	(0.1781) (	0.0104) (	0.1962)	(0.0122)	(24.67)	(22.69)
Location*birth 0	.0245**	0.0011	0.0980	-0.0048	0.1171***	0.0046***	0.0089	0.0179
	(0.0104) (	0.0004)	(0.0669) (	0.0033)	(0.0294)	(0.0011) (	0.0123) (	0.0113)
Constant -	95.871**		-193.6361		-467.6***		31.14	-68.20
	(42.0483) (		134.4504)		(118.2205)		(50.02)	(45.85)
Observation	**11,466**		**5,415**		**6,051**		**11,466**	**11,466**

Note: Standard errors are in parentheses. The sample includes adults aged 18-60.

Table A8. Probit estimates of the effect of years of schooling on health complain in the last month, children 0-17 years, by location

	Probit (1)	Marginal effect (2)	Urban(3)	Marginal effect for urban (4)	Rural (5)	Marginal effect for rural(6)
Health complain						
Age -	0.0244	-0.0015	-0.241***	-0.017*** -	0.1524** -	0.0078**
	(0.0137) (	0.0008) (	0.0595)	(0.0041) (	0.0544) (	0.0027)
Gender -	0.1276**	-0.0079**	-0.0897 -	0.0063	-0.1704**	-0.0087**
	(0.0473) (	0.0029) (	0.0657)	(0.0046) (	0.0694) (	0.0035)
Brothers	-0.0531** -	0.0033** -	0.0760** -	0.0054**	-0.0374	-0.0019*
	(0.0218) (	0.0013) (	0.0321)	(0.0022) (	0.0306) (	0.0015)
Fatherschooling 0	.0029	0.0001	-0.0258	-0.0018	0.0236**	0.0012
	(0.0094) (	0.0005) (	0.0134)	(0.0009) (	0.0130) (	0.0006)
Motherschooling	0.0319**	0.0019 0	.0435** 0	.0031	0.0237	0.0012
	(0.0114) (	0.0007) (	0.0176)	(0.0012) (	0.0154) (	0.0007)
Age of father	-0.0023	-0.0001	0.0109	0.0007	-0.0232*	-0.0011*
	(0.0071) (	0.0004) (	0.0092)	(0.0006) (	0.0113) (	0.0005)
Age of mother	0.0077 0	.0004 0	.0049	0.0003 0	.0146 0	.0007
	(0.0079) (	0.0005) (	0.0106)	(0.0007) (	0.0121) (	0.0006)
Seperateapartment	0.1489 0	.0103 0	.2227	0.0175	-0.0232	-0.0011
	(0.1171) (	0.0089) (	0.1548)	(0.0134) (	0.1958) (	0.0096)
Centralheating	-0.0971 -	0.0057 -	0.0431	-0.0030 -	0.1387 -	0.0062
	(0.1065) (	0.0059) (	0.1350)	(0.0093) (	0.1800) (	0.0071)
Centralizedwater -	0.0694	-0.0041	-0.1881 -	0.0175	-0.1521	0.0089
	(0.1355) (	0.0077) (	0.1806)	(0.0056) (	0.2207) (	0.0148)
Westregion	-0.656*** -	0.030*** -	0.2980** -	0.017***	-0.742***	-0.03***
	(0.0845) (	0.0028) (	0.1179)	(0.0056) (	0.1100) (	0.0036)
Highlandregion	-0.346*** 0	.0186 -	0.1223** -	0.0080	-0.362***	-0.016***
	(0.0681) (	0.0031) (	0.0970)	(0.0059) (	0.0850) (	0.0036)
Eastregion 0	.0079	0.0004	0.2779**	0.0248*	-0.0336	-0.0016
	(0.0783) (	0.0049) (	0.1151)	(0.0125) (	0.0984) (	0.0047)
Ulaanbaatar -	14.2911	-0.9331				
	(17.1423) (	0.5322)				
Aimag center	-13.9575	-0.9067				
	(17.1415) (	0.6645)				
Location*birth -	0.0070	-0.0004	-0.224***	-0.015*** -	0.0730** -	0.0037**
	(0.0085)	0.0005	(0.0592)	(0.0041) (	0.0270) (	0.0013)
Constant 2	6.4151		448.64***		291.83**	
	(34.4129) (		118.95)		(108.73)	
Observation	**11466**		**5415**		**6051**	

Note: Standard errors are in parentheses. The sample includes adults aged 18-60.

Table A9. Effect of years of schooling on health status in the last month, children 0-5 years, by gender, probit estimates

	Probit (1)	Marginal effect (2)	Boys (3)	Marginal effect for boys (4)	Girls (5)	Marginal effect for girls (6)
Health status						
Age -	0.1085	-0.0067	-0.3379*	-0.0062 -	0.0067 -	0.0003
	(0.0831) (	0.0051) (	0.1664)	(0.0049) (	0.1543) (	0.0082)
Gender -	0.2855	-0.0178				
	(0.2581) (	0.0157)				
Brothers	0.0854 0	.0053 0	.3843 0	.0070 0	.1399 0	.0074
	(0.1562) (	0.0098) (	0.2652)	(0.0069) (	0.3290) (	0.0172)
Fatherschooling	-0.0186 -	0.0011 -	0.1633 -	0.0030	0.0631	0.0033
	(0.0508) (	0.0031) (	0.1178)	(0.0026) (	0.0826) (	0.0045)
Motherschooling	0.1075 0	.0067 0	.0965 0	.0017 0	.1295 0	.0069
	(0.0588) (	0.0035) (	0.1152)	(0.0022) (	0.1060) (	0.0057)
Age of father	0.0056	0.0003 -	0.0252	-0.0004 0	.0431	0.0023
	(0.0437) (	0.0027) (	0.0737)	(0.0014) (	0.0838) (	0.0043)
Age of mother	-0.0424	-0.0026	-0.0550 -	0.0010 -	0.0943 -	0.0050
	(0.0481) (	0.0029) (	0.0841)	(0.0016) (	0.0880) (	0.0044)
Westregion 0	.1575	0.0088	-0.7067	-0.0251		
	(0.4368) (	0.0222) (	0.6844) (	0.0407)		
Highlandre~n	0.4347 0	.0207 0	.1212 0	.0020 0	.3498 0	.0153
	(0.4436) (	0.0160) (	0.8583)	(0.0130) (	0.6800) (	0.0250)
Eastregion	0.1392	0.0079 -	0.0274	-0.0005 1	.1113	0.0305
	(0.4096) (	0.0212) (	0.7304)	(0.0140) (	0.9021) (	0.0189)
Ulaanbaatar	0.0139 0	.0008* 0	.0270	0.0004	-0.0588	-0.0031
	(0.4179) (	0.0259)	0.7353	(0.0132) (	0.7006) (	0.0383)
Aimag center	-0.4568 -	0.0358 -	0.1233 -	0.0024 -	0.6956 -	0.0551
	(0.3549) (	0.0333)	0.5942	(0.0126) (	0.7301) (	0.0800)
Centralheating	-0.7623 -	0.693 -	0.1533 -	0.0030 -	1.4905 -	0.1565
	(0.0.4923) (	0.0626)	(0.9516)	(0.0216) (	0.7773) (	0.1341)
Centralizedwater	-0.5481 -	0.0458 -	0.9962 -	0.0387	0.8175	0.0325
	(0.5845) (	0.0624) (	0.9641)	(0.0682) (	1.1401) (	0.0379)
Separateapartment	-0.0424	0.0421*	1.1400 0	.0130 0	.4176 0	.0185
	(0.0481) (	0.0200) (	0.9228)	(0.0142) (	1.1374) (	0.0437)
Total healthexp	-.570e-07	-3.56e-08	4.99e-08	9.19e-10	-4.4e-06***	-2.37e-07
	(3.06e-07) (	0.0000) (	5.34e-07) (	0.0000) (	1.46e-06) (	0.0000)
Constant 2	.775**		5.9546***		1.5595	
	(1.010) (		2.0136)		(1.4348)	
Observation	**383**		**212**		**171**	

Table A10. The probit and IV probit estimates, children 0-5 years, by gender, probit estimates

	Probit (1)	Marginal effect (2)	Instrument of mother schooling	Instrument of father schooling
Health status				
Age	-0.0796 -	0.0067 -	0.1135 -	0.0877
	(0.0453) (	0.0051) (	0.1425) (	0.0957)
Gender	-0.0514 -	0.0178 -	0.1789 -	0.0721
	(0.1397) (	0.0157) (	0.4634) (	0.3220)
Brothers 0	.1366	0.0053	-0.4188	-0.1093
	(0.0727) (	0.0098) (	0.6798) (	0.2318)
Fatherschooling -	0.1298	-0.0011		-0.4119
	(0.0271) (	0.0031)		(0.3295)
Motherschooling 0	.0464	0.0067	-1.2372	
	(0.0289) (	0.0035) (	1.6465)	
Age of father	-0.0116 0	.0003 -	0.0559	-0.0007
	(0.0187) (	0.0027) (	0.1036) (	0.0498)
Age of mother	-0.0226	-0.0026	0.1054	0.0025
	(0.0216) (	0.0029) (	0.2012) (	0.0580)
Separateapartment	0.4404 0	.0088 0	.3838 0	.6560
	(0.2512) (	0.0222) (	1.3887) (	0.7612)
Otherheating 0	.0305	0.0207	-0.8386	-0.4678
	(0.1917) (	0.0160) (	0.1215) (	0.6443)
Centralizedwater	-0.0963	0.0079 2	.2327 0	.3714
	(0.2279) (	0.0.0212)	(3.6328)	(0.8598)
Westregion 0	.3300	0.0008*	-0.3015	0.1766
	(0.2442) (	0.0259) (	0.9243) (	0.4901)
Highlandre~n	-0.0997 -	0.0358 -	1.5285	0.2383
	(0.1783) (	0.0333) (	2.5361) (	0.5012)
Eastregion	-0.3892 -	0.693 -	0.0657	0.2790
	(0.2539) (	0.0626) (	0.7657) (	0.4801)
Ulaanbaatar -	0.3825	-0.0458	1.6331	1.1088
	(0.3743) (	0.0624) (	2.1824) (	0.8692)
Aimag center	0.4734 0	.0421* 1	.3726	0.2189
	(0.3776) (	0.0200) (	2.3568) (	0.5496)
Constant 3	.3461		13.6951	5.5545**
	(0.5011) (		13.4834)	(2.0347)
Observation	**383**		**383**	**383**

Table A11. Effect of years of schooling on health status in the last month, children 6-9 years, by gender, probit estimates

	Probit (1)	Marginal effect (2)	Boys (3)	Marginal effect for boys (4)	Girls (5)	Marginal effect for girls (6)
Health status						
Age	0.0430	0.0052 -	0.0086	-0.0009 0	.1149	0.0113
	(0.1379) (	0.0167) (	0.2283)	(0.0261) (	0.1946) (	0.0189)
Gender 0	.2731	0.0331				
	(0.2083) (	0.0254)				
Brothers	0.1759 0	.0213 0	.3535	0.0404*	0.0960 0	.0094
	(0.1078) (	0.0130) (	0.1853)	(0.0206) (	0.1567) (	0.0154)
Fatherschooling	0.0386 0	.0046 0	.0035 0	.0004 0	.0534 0	.0052
	(0.0383) (	0.0046) (	0.0688)	(0.0078) (	0.0511) (	0.0050)
Motherschooling	-0.0388 -	0.0047 -	0.0702 -	0.0080	0.0042	0.0004
	(0.0499) (	0.0060) (	0.0853)	(0.0095) (	0.0679) (	0.0067)
Age of father	-0.0310	-0.0310	-0.0221 -	0.0025 -	0.0450 -	0.0044
	(0.0335) (	0.0335) (	0.0505)	(0.0057) (	0.0519) (	0.0051)
Age of mother	0.2527 0	.0030 0	.0187 0	.0021 0	.0233 0	.0022
	(0.0356) (	0.0043) (	0.0537)	(0.0061) (	0.0551) (	0.0054)
Westregion	0.2175 0	.0235 1	.0582 0	.0650	-0.4572	-0.0570
	(0.3926) (	0.0375) (	0.7298)	(0.0281) (	0.6375) (	0.0962)
Highlandre~n	-0.2958 -	0.0407 -	0.0436 -	0.0051 -	0.6594 -	0.0875
	(0.3044) (	0.0471) (	0.4133)	(0.0492) (	0.5782) (	0.0957)
Eastregion	-0.2042	-0.0277 0	.1740	0.0180 -	0.6162	-0.0874
	(0.3384) (	0.0511) (	0.5181)	(0.0482) (	0.6193) (	0.1151)
Ulaanbaatar	237.38 1		301.58 1		192.27 1	
	(172.21) (	0)	(260.14) (	0)	(261.86) (	0)
Aimag center	237.41 1		301.04 1		192.80 1	
	(172.23) (	0)	(260.16) (	0)	(261.94) (	0)
Centralheating	5.6806*** 0	.4332*** 5	.7902*** 0	.4156***	5.683***	0.3940***
	(0.4966) (	0.0534) (	0.8445)	(0.0808) (	0.7351) (	0.0811)
Centralizedwater -	4.8423	-0.9841***	-4.4467	-0.9791 -	4.905 -	0.9833
	(.) (	0.0010) (	.) (	0.0091) (	.) (	0.0036)
Separateapartment -	0.3346	-0.0461	-0.0048 -	0.0005 -	0.7953 -	0.1129
	(0.4391) (	0.0692) (	0.6483)	(0.0745) (	0.7148) (	0.1327)
Location*birth	0.1191 0	.0144 0	.1510 0	.0172 0	.0967 0	.0095
	(0.0863) (	0.0103) (	0.1304)	(0.0151) (	0.1313) (	0.0127)
Total healthexp	1.12e-06**	-1.36e-07**	1.14e-06	-1.31e-07 -	1.06e-06 -	1.04e-07
	(4.78e-07) (	0.0000) (	7.87e-07) (	0.0000) (	6.55e-07) (	0.0000)
Constant -	474.62		-601.12		0.0967	
	(346.06) (		522.86) (		0.1313)	
Observation	**310**		**144**		**166**	

Table A12. The probit and IV probit estimates, children 6-9 years, by gender, probit estimates

	Probit (1)	Marginal effect (2)	Instrument of mother schooling	Instrument of father schooling
Health status				
Age 0	.0430	0.0052	-0.0844	0.0442
	(0.1379) (	0.0167)	(0.1800) (	0.1442)
Gender	0.2731 0	.0331	0.2546 0	.2718
	(0.2083) (	0.0254)	(0.2219) (	0.2083)
Brothers	0.1759 0	.0213	0.1819 0	.1848
	(0.1078) (	0.0130)	(0.1099) (	0.1186)
Fatherschooling 0	.0386	0.0046	0.1364	
	(0.0383) (	0.0046)	(0.3382)	
Motherschooling -	0.0388	-0.0047		0.0223
	(0.0499) (	0.0060)		(0.2585)
Age of father	-0.0310 -	0.0310	-0.0320 -	0.0265
	(0.0335) (	0.0335)	(0.0359) (	0.0381)
Age of mother	0.2527	0.0030	0.0239	0.0195
	(0.0356) (	0.0043)	(0.0365) (	0.0402)
Separateapartment 0	.2175	0.0235	-0.3455	-0.3160
	(0.3926) (	0.0375)	(0.4474) (	0.4366)
Centralheating -	0.2958	-0.0407	5.9168***	5.674***
	(0.3044) (	0.0471)	(0.4947) (	0.4848)
Centralizedwater -	0.2042	-0.0277	-5.3144***	-4.915***
	(0.3384) (	0.0511)	(0.5492) (	0.5465)
Westregion	237.38 1 0		.1127	0.2463
	(172.21) (	0)	(0.5116)	(0.4077)
Highlandre~n 2	37.41	1	-0.3864	-0.2794
	(172.23) (	0)	(0.3821)	(0.3139)
Eastregion 5	.6806***	0.4332***	-0.3043	-0.1955
	(0.4966) (	0.0534)	(0.4493) (	0.3570)
Ulaanbaatar -	4.8423	-0.9841***	273.994	240.36
	(.) (	0.0010)	(200.59)	(179.47)
Aimag center	-0.3346	-0.0461	274.20	240.36
	(0.4391) (	0.0692)	(200.86) (	179.54)
Location*birth	0.1191 0	.0144	0.1376 0	.1205
	(0.0863) (	0.0103)	(0.1008) (	0.0900)
Total healthexp	1.12e-06**	-1.3e-07**	-1.2e-06**	-1.07-06**
	(4.78e-07) (0	.0000)	(5.38-07)	(4.62e-07)
Constant -	474.62		-549.96	-480.83
	(346.06) (		405.28)	(361.57)
Observation	**310**		**310**	**310**

Table A13. Effect of years of schooling on health status in the last month, children 10-15 years, by gender, probit estimates

	Probit (1)	Marginal effect (2)	Boys (3)	Marginal effect for boys (4)	Girls (5)	Marginal effect for girls (6)
Health status						
Age	0.0293 0	.0015 0	.0684 0	.0035	-0.0044	-0.0002
	(0.0550) (	0.0029) (	0.0778)	(0.0040) (	0.0777) (	0.0040)
Gender -	0.0001	-6.85e-06				
	(0.0837) (	0.0044)				
Brothers	0.1107*** 0	.0059	0.1380**	0.0071*** 0	.0888	0.0046
	(0.0366) (	0.0019) (	0.0521)	(0.0026) (	0.0522) (	0.0027)
Fatherschooling	0.0267 0	.0014 0	.0300 0	.0015 0	.0234 0	.0012
	(0.0162) (	0.0008) (	0.0227)	(0.0011) (	0.0238) (	0.0012)
Motherschooling	-0.0175 -	0.0009 -	0.0243 -	0.0012 -	0.0114 -	0.0005
	(0.0198) (	0.0010) (	0.0283)	(0.0014) (	0.0287) (	0.0015)
Age of father	-0.0050	-0.0002 0	.0045	0.0002 -	0.0155	-0.0008
	(0.0127) (	0.0006) (	0.0182)	(0.0009) (	0.0182) (	0.0009)
Age of mother	0.0014	0.0000	-0.0139	-0.0007	0.0187	0.0009
	(0.0142) (	0.0007) (	0.0196)	(0.0010) (	0.0214) (	0.0011)
Westregion	0.1809 0	.0087 0	.2746 0	.0123 0	.1037 0	.0051
	(0.1341) (	0.0058) (	0.1909)	(0.0073) (	0.1926) (	0.0090)
Highlandre~n	0.1002 0	.0050 0	.1186	-0.0058	0.1030 0	.0051
	(0.1224) (	0.0059) (	0.1670)	(0.0077) (	0.1830) (	0.0086)
Eastregion	-0.1436	-0.0086 0	.0301	0.0015 -	0.2789	-0.0182
	(0.1420) (	0.0095) (	0.2150)	(0.0106) (	0.1963) (	0.0156)
Ulaanbaatar	81.4056	1 1	26.66	1 3	7.355	1
	(65.3763)	(0) (	89.647)	(0) (	94.851)	(0)
Aimag center	81.0692	1 1	26.41	1 3	6.952	1
	(65.3801)	(0)	(89.657)	(0) (	0.94.853) (	0)
Otherheating	-0.0153 -	0.0008 -	0.1492 -	0.0089	0.1448	0.0066
	0.2492	(0.0136) (	0.3222) (	0.0220) (	0.4166) (	0.0164)
Centralizedwater	0.2280 0	.0103 0	.4773	0.0179*	0.0301 0	.0015
	(0.2148) (	0.0082) (	0.3331)	(0.0088) (	0.2834) (	0.0142)
Separateapartment -	0.1769	-0.0107	-0.3144 -	0.0205 -	0.0044 -	0.0034
	(0.2033) (	0.0138) (	0.3048)	(0.0245) (	0.2765) (	0.0024)
Constant -	161.0217		-251.84		-72.7302	
	(131.3913) (		180.2049)		(190.59)	
Observation	**4245**		**2135**		**2110**	

Table A14. The probit and IV probit estimates, children 10-15 years, by gender, probit estimates

	Probit (1)	Marginal effect (2)	Instrument of mother schooling	Instrument of father schooling
Health status				
Age	0.0293 0	.0015 0	.0279	-0.0877
	(0.0550) (	0.0029) (	0.0558)	(0.0957)
Gender -	0.0001	-6.85e-06	0.002	-0.0721
	(0.0837) (	0.0044) (	0.0850)	(0.3220)
Brothers 0	.1107	0.0059	0.1140**	-0.1093
	(0.0366) (	0.0019) (	0.0419)	(0.2318)
Fatherschooling	0.0267 0	.0014 0	.0171	-0.4119
	(0.0162) (	0.0008) (	0.0624)	(0.3295)
Motherschooling	-0.0175 -	0.0009 -	0.0067	
	(0.0198) (	0.0010) (	0.1550)	
Age of father	-0.0050 -	0.0002 -	0.0034	-0.0007
	(0.0127) (	0.0006) (	0.0160)	(0.0498)
Age of mother	0.0014	0.0000	0.0001	0.0025
	(0.0142) (	0.0007) (	0.0165)	(0.0580)
Separateapartment 0	.1809	0.0087	-0.1841	0.6560
	(0.1341) (	0.0058) (	0.2085)	(0.7612)
Centralheating	0.1002	0.0050	-0.0073	-0.4678
	(0.1224) (	0.0059) (	0.2542)	(0.6443)
Centralizedwater -	0.1436	-0.0086	0.2138	0.3714
	(0.1420) (	0.0095) (	0.2327)	(0.8598)
Westregion 8	1.4056	1	0.1792	0.1766
	(65.3763) (	0)	(0.1346)	(0.4901)
Highlandre~n 8	1.0692	1	0.1044	0.2383
	(65.3801) (	0)	(0.1253)	(0.5012)
Eastregion	-0.0153 -	0.0008 -	0.1406	0.2790
	0.2492 (	0.0136)	(0.1433)	(0.4801)
Ulaanbaatar	0.2280	0.0103 8	0.83 1	.1088
	(0.2148) (	0.0082)	(65.44)	(0.8692)
Aimag center	-0.1769	-0.0107	80.49	0.2189
	(0.2033) (	0.0138)	(65.45)	(0.5496)
Location*birth 0			.0404	
			0.0328	
Constant -	161.0217		13.6951	5.5545
	(131.3913) (		13.4834)	(2.0347)
Observation	**4245**		**4245**	**4245**