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Parental Income and Child Health in Japan

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Parental Income and Child Health in Japan*

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Abstract

Previous studies have consistently found evidence of an income gradient in health among children in various countries, and studies in Anglo-Saxon countries have found that this gradient increases with child age. Using nationally representative individual-level data, I examine the association between child health and parental income in Japan. Japan has a child poverty rate that is similar to the rate of many countries that have been studied previously, but Japan outperforms those countries on most health indicators. I find that an income gradient exists in child health in Japan, but that it is less consistent than the gradient found in other countries or among Japanese adults. Moreover, I find no evidence that the gradient increases with child age, a result that is consistent with a prior study of German children. The fact that children in low-income families have relatively modest and non-accumulating health disadvantages may contribute to the overall health of the Japanese population. Nevertheless, there is a statistically significant negative association between parental income and the incidences of asthma, hearing problems, and dental symptoms in children, implying that future efforts to improve the health of underprivileged children should focus on the prevention and control of these diseases. (197 words)

1. Introduction

The literature has established that there is a strong positive association between socioeconomic status (SES) and health. The economic literature has offered three explanations for this gradient: a causal effect of SES on health, a causal effect of health on SES, or a third factor, such as innate abilities that affect both SES and health (Fuchs 2004). To better understand the complex relationship between SES and health, Case et al. (2002) conducted a seminal study in which they examined the relationship between parental income and child health. A focus on the effect of parental income on child health offers the advantage of reducing concerns about reverse causality. Based on US data, these authors found that an income gradient existed from early childhood, and that the gradient grew as children aged. Replication studies in Canada (Currie and Stabile 2003), the UK (Case et al. 2008), and Australia (Khanam et al. 2009) also found evidence of a positive and increasing income gradient in child health, although the findings from the UK were mixed, especially for older children (Currie et al. 2007, Propper et al. 2007, West and Sweeting 2004). Nevertheless, to date, evidence in support of an increasing gradient is limited to Anglo-Saxon countries. Studies from Germany (Reinhold and Jürges 2012) and Indonesia (Cameron and Williams 2009) found a positive income gradient for child health, but they did not find that the gradient increased. The finding from Germany is particularly notable because Germany is similar to the aforementioned Anglo-Saxon countries in terms of per-capita GDP.

This study examines the association between parental income and child health in Japan. Japan is similar to the aforementioned Anglo-Saxon countries in terms of per-capita GDP and income inequality. In the late 2000s, the relative poverty rate among children in Japan was similar to the child poverty rates in Australia, Canada, and the UK, but it was significantly higher than the rate in Germany, as shown in Table I. Table I also shows that the change in the poverty rate between the mid-1980s and the late 2000s was small in each of these countries.[1] Japan differs significantly from the previously studied countries, however, in its high rankings for most health indicators. Indeed, at least until it was hit by the Tohoku earthquake in 2011, Japan had the highest longevity in the world. Japan also has one of the lowest infant mortality rates in the world and the second-lowest obesity rate among the OECD countries (OECD 2011, WHO 2011).

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[1] Studies that compare Japan with the rest of the world in terms of income inequality in the 1990s reach different conclusions. According to the OECD (2008), the Gini index and the relative poverty rate in Japan were consistently well above the OECD average from the mid-1980s to the mid-2000s. However, based on Japanese data collected in 1993, the World Bank (2003) found that Japan had one of the lowest levels of income inequality in the world.

[Insert Table I here]

Because the tax burden is high and the transfer payments to low-income households with children are small, Japan is the only OECD country in which taxes and transfers have consistently increased the child poverty rate since the 1980s (Jones 2007). Until recently, little attention has been paid to child poverty in Japan, and policy development has been slow. Japan has universal health insurance, but unlike Australia, Canada, Germany and the UK, out-of-pocket health care expenses for children are not fully waived. Until the coinsurance rate for children 3 years old or younger was reduced to 20% in 2008, the coinsurance rate was 30% for all individuals younger than 70 years old, although some municipalities and prefectures provide additional subsidies for children's medical expenditures.

At the same time, Japan has unique and long-established school-based programs that may help to reduce socioeconomic disparities in child health. In particular, the law requires that elementary and middle school children receive annual medical examinations from physicians during school time. In addition, inexpensive school meals that meet strict nutritional standards are provided at approximately 98% of elementary schools and 77% of middle schools (MEXT 2012). For pre-school children from low-income families with two working parents or a single parent, there are licensed (including public) nursery schools that offer free or low-cost care and meet strict quality requirements for staffing, space, and safety equipment. These nursery schools are legally required to provide a nutritionally adequate lunch every school day and medical examinations by a physician at least twice a year.

Epidemiological studies have established that there is a strong association between income and health among Japanese adults (Kagamimori et al. 2009). Specifically, there is a statistically significant positive relationship between income and self-rated health (Shibuya et al. 2002) and between income and the majority of subjective symptoms (Fukuda and Hiyoshi 2012).[2] However, there are a limited number of empirical studies on parental income and child health in Japan. Aida et al. (2008) and Komamura (2009) reported a positive association between average income and child caries using municipality-level data. Based on panel data, Abe (2011) found that hospitalization rates decrease and the use of outpatient care increases with parental income.[3] The findings have been mixed regarding the socioeconomic gradient in the

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[2] Studies that have compared the socioeconomic gradient in adult health in Japan to the gradients in Britain and Finland have reported mixed results (Martikainen et al. 2004, Sekine et al. 2009).

[3] Similar to this paper, Abe (2011) regressed the self-rated health of children on household income and found a positive association between them. The result is difficult

birth weight of Japanese babies (Kohara and Ohtake 2012, Teramoto et al. 2006, Qiu et al. 2011).

This study yields three major findings. First, a positive association between parental income and child health exists in Japan, but the association is limited to specific diseases, and it is less consistent than the relationships found in other countries and among Japanese adults. Second, this study finds no evidence that the income gradient in child health increases with child age. The first and second findings imply that the health disadvantages of low-income children are relatively modest and do not accumulate over time, which may contribute to the overall health of the Japanese population. Third, this study identifies common childhood diseases that have a statistically significant association with parental income. These findings have important policy implications for improving the health of underprivileged children.

2. Data

I use individual-level data from the Comprehensive Survey of Living Conditions (CSLC), a survey of a nationally representative sample conducted by the

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to interpret, however, because the regression model did not control for household size, which varies greatly among Japanese families because of the large number of three-generation households.

Ministry of Health, Labour and Welfare (MHLW).[4] The CSLC is a pooled cross-sectional survey that utilizes self-administered questionnaires to assess the health, basic demographics, and socioeconomic characteristics of household members. Health information is collected in the large-scale CSLC every three years. The sample unit areas are cluster sampled from all 47 Japanese prefectures, and all households within the sampled areas are asked to participate in the household and health surveys. The income survey is conducted on a stratified random sub-sample of these households. For this analysis, I use the combined questionnaires for household demographics, health, and income in the large-scale surveys of the CSLC from 1998, 2001, 2004, and 2007. The numbers of surveyed households in 1998, 2001, 2004, and 2007 were 30,506, 30,386, 25,091, and 23,513, respectively, and the response rates were 79%, 79%, 70%, and 68%, respectively. The selection of the survey waves is based on the long-term increasing trends in both the child poverty rate and the socioeconomic gradient in adult health in Japan (Jones 2007, Kondo et al. 2008).

The subjects of this study are children aged 15 years or younger living in nuclear families. Children who share households with their grandparents are excluded,

[4] I obtained permission to use the questionnaire-level data from the MHLW on October 23, 2012.

primarily because the economic circumstances of elderly individuals depend on wealth (rather than current income), but little information on wealth is collected in the survey. Although support given to children by their grandparents is an important subject, it complicates the analysis significantly and thus is beyond the scope of this paper. I also exclude a small number of children who (1) do not have a mother in the household; (2) have more than two siblings; (3) share a household with adult siblings; or (4) have missing data for essential variables, such as age, sex, or parental income. Excluding children with adult siblings in the household (3) avoids the complication of the presence of income-earning individuals other than the parents in the household. Unfortunately, the CSLC does not collect information on whether children are adopted or living with a stepparent, but adoptions of minor children and remarriages of parents with young children are both extremely rare in contemporary Japan (Moriguchi 2010, Inaba 2011).

The CSLC questionnaire on health asks each household member about his or her own health. For children younger than 12 years old, guardians (including parents) are instructed to help the children respond to the survey questions. Children 6 years old or older are asked about their general health, including their subjective health, impairment in daily life, and the number of days they have spent in bed. Subjective health is a categorical variable assessed using the question, “How is your current health status?" It is measured on an ordinal scale: 1 - excellent, 2 - good, 3 - fair, 4 - poor, 5 - extremely poor. Impairment in daily life is a binary dummy variable that is measured using the question, "Do you have any influence of ill health in your daily life?" The number of days spent in bed is a categorical variable that is measured using the question, "How many days did you spend all day in bed during the past month?" It is measured on an ordinal scale: 1 - none, 2 - 2-3 days, 3 - 4-6 days, 4 - 7-14 days, 5 - 15 days or more.

All of the children are asked about their current symptoms and the presence of any ongoing medical treatment. The questionnaire asks if they have experienced any symptoms due to sickness or injury in the last few days; if the children answer yes, they are then instructed to choose all the symptoms they have experienced from the list provided. The list includes 41 symptoms classified into 12 broad categories. In addition to these broad categories, I examine two specific symptoms, difficulty hearing and wheezing, because previous studies have found a significant socioeconomic gradient related to hearing impairment and asthma in children (Boss et al. 2011, Currie 2009). Similarly, respondents are asked if they are currently receiving any outpatient treatment at medical institutions for illnesses or injuries. If they answer yes, they are given a list of conditions and instructed to indicate all the conditions for which they are currently receiving outpatient treatment.[5] The lists differ slightly in different survey years, but at least 40 diagnoses are listed in each wave of the survey, and the diagnoses (except those related to obstetrics and gynecology) are classified into 15 large categories. In addition to these categories, I examine the common cold (acute nasopharyngitis), hay fever (allergic rhinitis), and asthma because of the high prevalence of these conditions and previous findings that have shown a large socioeconomic gradient in child asthma (Currie 2009).

As a measure of income, I use pre-tax parental income for the year prior to the survey, following the methodology used by Case et al. (2002). I do not control for the overall consumer price level because it changed only slightly. The Consumer Price Index steadily declined from 1997 to 2003, dropping a total of 2.3% over that period, and remained nearly unchanged from 2003 to 2006, according to the Annual Report on the Consumer Price Index (CPI) published by the Statistics Bureau of the Ministry of Internal Affairs and Communications.

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[5] Medical institutions include treatment places for massage, acupuncture, moxibustion, or Judo therapy in addition to hospitals and dental or medical clinics. Information about the type of medical institution is only available in the 1998 wave of the survey. However, the use of these treatment places is uncommon; less than 0.6% of the children in the 1998 sample were treated at them.

The summary statistics for the sample are shown in Tables II and III. Although information on subjective general health is collected for individuals 6 years old or older, it is missing for many 6-year-olds. Thus, I limit the sample to 7- to 15-year-olds in the analysis of the general health variables. Overall, the sample of children aged 0-15 and the sample of children aged 7-15 are similar in demographics and family background. The sample size declines over the years because of the increase in non-response rates and the decline in the birth rate. Among 7- to 15-year-olds, 3% rate their health status as "poor" or "extremely poor", 4% believe that ill health influences their daily life, and 7% spent at least one day in bed during the past month. Among 0- to 15-year-olds, 24% report at least one symptom, and the majority of these children have respiratory symptoms. Of the 0- to 15-year-olds, 18% are receiving outpatient care, most commonly for diseases of the respiratory system.

[Insert Tables II and III here]

3. Estimation Methods and Results

3.1. Regression of General Health Variables

First, I estimate base regression models of general health variables using the data for children aged 7-15. As explanatory variables, I include dummy variables for age, sex, year, number of siblings, each parent's age, each parent's working status and the father's presence in the household in addition to log parental income.[6] Following previous studies, I estimate an ordered probit model of subjective health. In addition, I estimate a binary probit model in which the dependent variable takes the value of one if subjective health is rated “poor” or “extremely poor”. This follows the suggestion of Etilé and Milcent (2006) to use binary categories (poor/non-poor health) to reduce the bias that arises from reporting heterogeneity.[7] I estimate an ordered probit model of the number of days in bed and a binary probit model of whether children report impairment in daily life. I use data from all four survey waves in the regression of subjective health and impairment in daily life. I use data from the 1998, 2001, and 2004 waves in the regression of the number of days in bed because the data for this variable are unavailable for 2007.[8]

Table IV shows the results of the base regression models for the general health

[6] Unfortunately, the CSLC does not collect information regarding education in the survey waves used in this study.

[7] In addition, Jones and Schurer (2011) found that controlling for unobserved heterogeneity eliminates the association between income and very good reported health, but it does not eliminate the association between income and poorer reported health status.

[8] Observations with missing dependent variables are excluded in each regression analysis.

variables. Consistent with previous studies, the coefficient of log parental income is significantly negative in the ordered probit regression of subjective health, as shown in the far left column; however, the results are weaker for the other measures of general health. The coefficient of log parental income is not statistically significant in the regression for “poor” or “extremely poor” subjective health, is negative but only marginally significant in the regression of the number of days in bed, and is not significant in the regression of impairment in daily life.[9]

[Insert Table IV here]

To examine the possibility that the income gradient in child health increases as children age, I conduct a sub-sample regression analysis of general health variables by child age, dividing the sample into three age groups: 7- to 9-year-olds, 10- to 12-year-olds, and 13- to 15-year-olds. This categorization roughly corresponds to the age groups in Japanese schools; Japanese children begin elementary school at the age of 6 and begin middle school at the age of 12. Table V shows the estimated coefficients of log parental income by age group. The results do not support the hypothesis that disparities in child health associated with parental income increase as children age. The

[9] There is little change in the results when logged income is replaced with income dummies.

results of the ordered probit regression of subjective health show that the coefficient with the greatest absolute value corresponds to the youngest age group. There are no consistent age-related trends in the regression of “poor” or “extremely poor” subjective health, the number of days spent in bed, or impairment in daily life.

[Insert Table V here]

3.2. Self-reported Symptoms

Next, I estimate binary probit models of self-reported symptoms using data from all of the children aged 0-15 in all four survey waves. On the same set of explanatory variables as above, I regress dummy variables that take the value of one if a child reports any symptom, difficulty hearing, wheezing, or any symptom in each of the categories listed in the questionnaire.[10] Table VI shows the estimated coefficients and the marginal effects of log parental income for the regression of self-reported symptoms. The results vary significantly among the symptoms. On one hand, the coefficients of log parental income are negative and marginally significant for dental symptoms and symptoms of the ear and respiratory system, and they are significantly negative for

[10] I did not conduct a regression analysis of symptom categories with less than 100 reports in the sample.

difficulty hearing and wheezing. On the other hand, the coefficients are significantly positive for injury and skin-related symptoms, and they are insignificant for the other symptom categories. The coefficient of log parental income is not statistically significant in the regression of any reported symptoms.

[Insert Table VI here]

To re-examine the possibility that the income gradient in child health increases with child age, I conduct a sub-sample regression analysis of subjective symptoms by child age. I limit my analysis to symptoms reported by at least 500 children and divide the sample into five age groups: 0- to 3-year-olds, 4- to 6-year-olds, 7- to 9-year-olds, 10- to 12-year-olds, and 13- to 15-year-olds. Table VII shows the estimated coefficients of log parental income by age group. Again, the results do not support the hypothesis that the gradient increases with child age. The strong negative association between parental income and wheezing appears to decrease as children grow older. It is difficult to find any consistent patterns of age-related changes in the income gradient for the other dependent variables. For these dependent variables, the coefficients of log parental income are either more negative or less positive for the 4-6 age group than for the 0-3 age group, but they are either less negative or more positive for the 7-9 age group than for the 4-6 age group.

[Insert Table VII here]

3.3. Ongoing Outpatient Treatment

Finally, I estimate binary probit models of ongoing outpatient treatment using the data from the full sample of children 15 years or younger from all four survey waves. On the same set of explanatory variables as above, I regress dummy variables that take the value of one if a child is receiving outpatient treatment for any diagnosis, for any diagnosis in each of the categories listed in the questionnaire, or for each of the three most common respiratory diagnoses (the common cold, hay fever, and asthma).[11] Because the regression does not control for health status, the coefficients of log income reflect the income gradient not only in child health but also in care-seeking behavior. Self-reported symptoms and general health indicators could be included as explanatory variables to estimate the association between parental income and children's use of outpatient care conditional on reported health and symptoms. I do not take this approach because current health care utilization could inversely affect current symptoms. In addition, both the reporting of symptoms and care-seeking behavior may be affected by parental health knowledge and awareness.

[11] I did not conduct a regression analysis for diagnosis categories with less than 100 reports in the sample.

Table VIII shows the estimated coefficients and the marginal effects of log parental income. The coefficients are significantly positive in the regression of outpatient treatment for any diagnosis. The coefficients are also significantly positive for hay fever and for diagnoses related to the skin and subcutaneous tissue, but they are insignificant for the other categories of diagnoses that were examined.

[Insert Table VIII here]

To explore possible changes in the relationship between parental income and outpatient care utilization that may occur as children grow older, I conduct a sub-sample regression analysis by child age. I limit my analysis to the diagnosis categories with at least 500 outpatients and divide the sample into the same five age groups that were described in the previous section. The estimated coefficients of log parental income by age group are shown in Table IX. In the regression of outpatient care utilization for any diagnosis, the coefficient and the marginal effect clearly increase with child age. The results for the individual diagnosis categories also demonstrate the pattern of an increasing positive association between parental income and outpatient care utilization.

[Insert Table IX here]

4. Discussion and Conclusion

There are several major findings of this study. First, there is a positive and significant parental income gradient in child health in Japan, but the gradient is less consistent than the gradient found in other countries and among Japanese adults. It is difficult to directly compare the results of this study with the results of previous studies in other countries because of the differences in survey methodology and possible heterogeneity in reporting.[12] Nevertheless, this study does not find a strong negative association between parental income and several health-related variables (bed days, impairment in daily life, subjectively rated "poor" or "extremely poor" health, the majority of self-reported symptoms and the majority of diseases receiving treatment), a result that clearly differs from previous studies that have found a significant negative association between parental income and various measures of child health (Cameron and Williams 2009, Case et al. 2002, Propper et al. 2007). Moreover, in contrast to Fukuda and Hiyoshi's (2012) findings, which show a significant income gradient among Japanese adults in all categories of symptoms other than rhinopathy and dermopathy, I find no evidence of an income gradient among children in symptoms related to the eyes or the digestive system, musculoskeletal symptoms, or injuries.

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[12] "Anchoring vignettes" and objective health information such as blood test results and physician-assessed health could be used to reduce these concerns (Bago d'Uva et al. 2008). Unfortunately, the CSLC does not collect such data.

Second, this study finds no evidence of an increasing income gradient in child health with child age, similar to the findings of studies conducted in Germany (Reinhold and Jürges 2012) and Indonesia (Cameron and Williams 2009). The results from the regression of subjective health, based on a sample of 7- to 15-year-old children, show that the gradient does not increase with age among Japanese children in this age range, in contrast to the results of previous studies in the US (Case et al. 2002), Canada (Currie and Stabile 2003), and the UK (Case et al. 2008). Additionally, the results from the regression of subjective symptoms and the regression of diseases receiving outpatient treatment, based on a sample of 0- to 15-year-old Japanese children, show no support for an increasing gradient in any symptoms or diagnoses, in contrast to previous findings from the US (Case et al. 2002).

Third, although parental income is not associated with the majority of the common diseases of children, significant income gradients are associated with some diseases. Consistent with previous studies, there is a significant negative association between parental income and hearing difficulty, wheezing, and dental symptoms (Aida et al. 2008, Boss et al. 2011, Currie 2009, Komamura 2009). At the same time, outpatient treatments for asthma, ear-related diagnoses, and dental diagnoses are not significantly related to parental income, suggesting underutilization of outpatient care by low-income children with these symptoms. Because childhood asthma, hearing impairments and dental diseases may have serious negative impacts on educational and labor market outcomes (Currie 2009, Glied and Neidell 2010), future efforts to improve the health of underprivileged children should focus on the prevention and control of these diseases.

The income gradient in child health in Japan is less consistent and less cumulative than in previously studied countries, implying that the health disadvantages of low-income Japanese children are comparatively small despite the high child poverty rate and the lack of comprehensive public support for low-income households with children. The relatively small health disadvantages of children from low-income families may contribute to the overall health of the Japanese population. Further studies are needed to explore the role of schools and nurseries in reducing the socioeconomic gradient in child health and the effect of parental SES on children's health behavior and health care utilization.

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Table I. The relative poverty rate among children in the late 2000s in Japan and in previously studied countries

	Relative poverty rate among children, late 2000s	Average annual change in the relative poverty rate between mid-1980s and late 2000s
Japan	**14.2**	**1.3**
Australia	14.0	1.9
Canada	14.8	-0.2
Germany	8.3	2.1
United Kingdom	13.2	2.2
United States	21.6	-0.1
OECD average	12.3	1.0

Source: OECD (2011).

Table II. Summary statistics for demographic and family characteristics and subjective general health ratings

	Age 0-15		Age 7-15	
	Mean	S.D.	Mean	S.D.
N	29263		16313	
Survey year				
1998	0.31	0.46	0.31	0.46
2001	0.28	0.45	0.29	0.45
2004	0.21	0.41	0.20	0.40
2007	0.20	0.40	0.20	0.40
Age (in years)	7.46	4.54	10.93	2.58
Male	0.51	0.50	0.51	0.50
Father in household	0.94	0.23	0.92	0.26
Parental income (in million yen)	634	406	687	449
Father's income	544	367	576	408
Mother's income	90	168	111	187
1 sibling	0.54	0.50	0.54	0.50
2 siblings	0.23	0.42	0.25	0.43
Father's age (in years)	36.8	11.0	39.2	12.4
Mother's age (in years)	36.5	5.9	39.7	4.8
Father works	0.94	0.25	0.91	0.28
Mother works	0.50	0.50	0.60	0.49
Subjective health				
Excellent	-	-	0.48	0.50
Good	-	-	0.19	0.40
Fair	-	-	0.30	0.46
Poor	-	-	0.03	0.16
Extremely poor	-	-	0.00	0.04
Unknown	-	-	0.03	0.17
Impairment in daily life			0.04	0.04
Days in bed				
None	-	-	0.93	0.25
1-3 days	-	-	0.06	0.24
4-6 days	-	-	0.01	0.09
7-14 days	-	-	0.00	0.05
15 days or more	-	-	0.00	0.03
Unknown	-	-	0.03	0.16

Table III. Summary statistics for subjective symptoms and diagnoses (age 0-15, N=29263)

	Mean	S.D.
Subjective symptoms		
Any symptom	0.24	0.43
Systemic/neurological	0.05	0.23
Eyes	0.01	0.09
Ears	0.01	0.09
Difficulty hearing	0.01	0.08
Chest	0.00	0.04
Respiratory system	0.14	0.35
Wheezing	0.03	0.16
Digestive system	0.03	0.17
Dental	0.01	0.12
Skin	0.06	0.23
Musculoskeletal	0.01	0.11
Limbs	0.00	0.06
Genitourinary system	0.00	0.06
Injury	0.02	0.15
Receive outpatient care for		
Any diagnosis	0.18	0.39
Endocrine/metabolic disorders	0.00	0.04
Mental and behavioral disorders	0.00	0.04
Diseases of the eye	0.00	0.06
Diseases of the ear	0.01	0.12
Diseases of the circulatory system	0.00	0.06
Diseases of the respiratory system	0.09	0.28
Acute nasopharyngitis (common cold)	0.03	0.16
Allergic rhinitis (hay fever)	0.03	0.16
Asthma	0.02	0.15
Diseases of the digestive system	0.00	0.05
Diseases of the teeth	0.03	0.18
Diseases of the skin and subcutaneous tissue	0.04	0.19
Diseases of the musculoskeletal system	0.00	0.05
Diseases of the genitourinary system	0.00	0.04
Injury/trauma	0.01	0.10
Anemia/diseases of the blood	0.00	0.03
Malignant neoplasm (cancer)	0.00	0.02
Other diseases	0.02	0.14

Table IV. Regression of subjective general health (base model)

Dependent variable	Subjective (ill) health		# of days in bed	Impairment in daily life
Model	Ordered probit	Binary probit	Ordered probit	Binary probit
Log parental income	-0.076***	-0.002	-0.059*	0.012
Year 2001	0.050*	0.007	0.297***	0.145***
Year 2004	-0.055*	-0.005	0.218***	0.120**
Year 2007	-0.018	-0.004	-	0.088
Age 8	-0.011	0.057	-0.019	0.078
Age 9	0.024	-0.052	-0.140**	0.053
Age 10	0.008	0.04	-0.081	0.133*
Age 11	0.028	0.007	-0.127*	0.170**
Age 12	0.168***	0.159*	-0.145**	0.135*
Age 13	0.191***	0.237***	-0.122*	0.185**
Age 14	0.238***	0.144	-0.052	0.195**
Age 15	0.275***	0.325***	-0.207***	0.240***
Male	-0.014	-0.01	-0.006	0.112***
1 sibling	-0.067**	-0.029	-0.05	0.032
2 siblings	-0.109***	-0.109*	-0.069	-0.059
Father in household	-0.124	-0.189	0.316	0.023
Father's age	-0.002	-0.005	-0.011**	-0.002
Mother's age	0.011***	0.006	0.002	0.005
Father works	0.311***	0.381	0.074	-0.1
Mother works	-0.090***	-0.068	-0.014	-0.063
N	15820	15820	12763	15975
ll	-17904.0	-2022.1	-3676.6	-2841.6
chi^2	256.836	46.125	87.996	48.37

Notes: The reference categories are the survey year 1998 and 7 years of age. In the ordered probit regression of subjective health, the explanatory variable is defined as 1 - excellent, 2 - good, 3 - fair, 4 - poor, 5 - extremely poor. In the binary probit regression of subjective health, the explanatory variable equals 1 for “poor” or “extremely poor” and 0 otherwise. The number of days in bed is categorized into the following: 0 days, 1-3 days, 4-6 days, 7-14 days, and more than 15 days. The number of days in bed is unavailable for 2007. Observations with missing dependent variables are excluded in each regression analysis.

Table V. Coefficients of log parental income in a sub-sample regression of subjective general health by age group

Dependent variable	Subjective (ill) health		# of days in bed	Impairment in daily life
Model	Ordered probit	Binary probit	Ordered probit	Binary probit
Age group				
7-9	-0.091***	0.003	-0.064	0.088
10-12	-0.067**	0.077	-0.045	-0.033
13-15	-0.075***	-0.063	-0.064	0.001

Notes: The other explanatory variables include the following: dummy variables for age, sex, survey year, number of siblings, each parent's age and working status, and the father's presence in the household. In the ordered probit regression of subjective health, the explanatory variable is defined using the following scale: 1 - excellent, 2 - good; 3 - fair, 4 - poor, 5 - extremely poor. In the binary probit regression of subjective health, the explanatory variable equals 1 for “poor” or “extremely poor” and 0 otherwise. The number of days in bed is categorized into the following: 0 days, 1-3 days, 4-6 days, 7-14 days, and more than 15 days. The number of days in bed is unavailable for 2007.

Table VI: Coefficients and marginal effects of log parental income in a binary probit of subjective symptoms (N=29263)

	Coefficient	Marginal effect
Any symptom	-0.004	-0.001
Systemic/neurological	-0.014	-0.002
Eyes	0.018	0.000
Ears	-0.090**	-0.002*
Difficulty hearing	-0.106**	-0.002**
Respiratory system	-0.038*	-0.008*
Wheezing	-0.120***	-0.007***
Digestive system	-0.003	0.000
Dental	-0.063*	-0.002*
Skin	0.053**	0.006**
Musculoskeletal	0.007	0.000
Injury	0.085**	0.005**

Notes: The other explanatory variables include the following: dummy variables for age, sex, survey year, number of siblings, each parent's age and working status, and the father's presence in the household.

Table VII: Coefficients and marginal effects of log parental income in a sub-sample analysis of subjective symptoms

		Age				
		0-3	4-6	7-9	10-12	13-15
Any symptom	Coefficient	-0.026	-0.058	0.038	-0.002	0.027
	Marginal effect	-0.009	-0.019	0.011	-0.001	0.008
Systemic/neurological	Coefficient	-0.013	-0.108*	0.095	-0.010	-0.021
	Marginal effect	-0.002	-0.010*	0.008	-0.001	-0.003
Respiratory system	Coefficient	-0.039	-0.058	-0.046	-0.065	0.024
	Marginal effect	-0.011	-0.015	-0.009	-0.011	0.004
Wheezing	Coefficient	-0.133**	-0.115*	-0.174**	-0.051	-0.088
	Marginal effect	-0.013**	-0.008*	-0.009**	-0.002	-0.002
Digestive system	Coefficient	0.024	-0.058	0.094	0.080	-0.099*
	Marginal effect	0.002	-0.004	0.005	0.005	-0.007*
Skin	Coefficient	0.056	0.008	0.077	0.026	0.103*
	Marginal effect	0.008	0.001	0.009	0.002	0.008*
Injury	Coefficient	0.140	-0.061	0.210***	0.085	0.051
	Marginal effect	0.004	-0.003	0.014***	0.005	0.004

Notes: The binary probit model is used for the estimation. The other explanatory variables include the following: dummy variables for age, sex, survey year, number of siblings, each parent's age and working status, and the father's presence in the household.

Table VIII: Coefficients and marginal effects of log parental income in a binary probit of outpatient care (N=29263)

	Coefficient	Marginal effect
Any diagnosis	0.051***	0.014***
Eyes	0.117*	0.001
Ears	0.000	0.000
Circulatory system	0.012	0.000
Respiratory system	0.018	0.003
Common cold	0.001	0.000
Hay fever	0.064*	0.004*
Asthma	-0.003	0.000
Teeth	0.023	0.002
Skin and subcutaneous tissue	0.073**	0.006**
Injury/trauma	0.028	0.001

Notes: The other explanatory variables include the following: dummy variables for age, sex, survey year, number of siblings, each parent's age and working status, and the father's presence in the household.

Table IX: Coefficients and marginal effects of log parental income in a sub-sample analysis of outpatient treatment

		Age				
		0-3	4-6	7-9	10-12	13-15
Any diagnosis	Coefficient	-0.002	-0.047	0.041	0.121***	0.149***
	Marginal effect	-0.001	-0.014	0.011	0.029***	0.033***
Respiratory system	Coefficient	-0.029	-0.066	0.029	0.084	0.108*
	Marginal effect	-0.005	-0.011	0.004	0.009	0.009*
Common cold	Coefficient	0.044	-0.07	-0.077	-0.010	0.093
	Marginal effect	0.005	-0.005	-0.003	0.000	0.002
Hay fever	Coefficient	0.064	0.009	0.068	0.039	0.137**
	Marginal effect	0.002	0.001	0.006	0.003	0.008*
Asthma	Coefficient	-0.144**	-0.017	0.086	0.045	0.065
	Marginal effect	-0.007**	-0.001	0.006	0.002	0.002
Teeth	Coefficient	0.034	-0.028	-0.013	0.100	0.051
	Marginal effect	0.001	-0.003	-0.001	0.007	0.003
Skin and subcutaneous tissue	Coefficient	0.010	-0.028	0.155**	0.101	0.213***
	Marginal effect	0.001	-0.003	0.012**	0.007	0.012***

Notes: The binary probit model is used for the estimation. The other explanatory variables include the following: dummy variables for age, sex, survey year, number of siblings, each parent's age and working status, and the father's presence in the household.