Is the Relationship between Socioeconomic Status and Health Stronger for Older Children in Developing Countries?

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Abstract

Recent research on the relationship between health and income in developed countries has revealed that the impact of income on health accumulates over time. This paper examines whether the same is true in developing countries where one might expect the marginal health product of income to be greater and hence the steepening of the health-income gradient with age to be more pronounced. To the contrary, we find that although low income adversely affects health, the impact remains constant from birth to age 14. This finding is robust to controlling for selective mortality, potential reporting biases in parent-reported health, alternative measures of households' resources and the inclusion of indicators of health at birth and parental health. One possible explanation for the constancy of the health-income relationship is the prevalence and severity of acute illness in developing countries and the possible positive immune-response to exposure to these illnesses.

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1. Introduction

That better health is associated with higher income is well established. Recent research by Case, Lubotsky and Paxson (2002) and Currie and Stabile (2003) has further revealed that, for children in the US and Canada respectively, the impact of income on health accumulates over time. This is an important finding because it means that not only are poorer children in worse health from birth but that their health falls further behind as they age, with likely adverse consequences for educational attainment and earnings.

While these studies are based on developed countries, they raise the question of whether the effects of poverty might also accumulate in developing countries. If the marginal health product of income is greater in developing countries, as seems likely, one would expect the health-income gradient to be steeper and consequently, the accumulative health effect of poverty to be greater. Thus health may be an important link in intergenerational cycles of poverty. While clearly important, this issue has been relatively under-explored in the developing country context to date.[1]

This paper is the first to explicitly investigate how the health-income gradient changes with age in a developing country. We are able to do so by utilizing the rich set of child health measures in the 2000 wave of the Indonesian Family Life Survey (IFLS3). The IFLS3 collects parents' (subjective) evaluations of their children's general health status and a wide array of other health measures including both nurse assessments of health and anthropometric measures. The previous literature on child health in developing countries has focused on the determinants of anthropometric measures such as height for age and weight for height and mortality rates. Measures of height, weight and mortality have been invaluable in assembling robust evidence of a positive association between households' resources and health outcomes (see Strauss and Thomas, 1995), however they provide only limited insight into the functioning of individuals who are not at the low end of the distribution - stunted, wasted or deceased. Moreover, they are unsuitable for an examination of accumulated health effects - height largely reflects nutritional intake in early childhood, after which growth trajectories tend to proceed in parallel; weight largely reflects short term deficiencies in nutritional intake; and mortality risk is highest amongst younger cohorts. In addition to facilitating an examination of accumulative health

[1] One might also expect the labor market consequences of the relative decline in health of poor children to be greater in developing countries owing to the greater reliance on physical labor (see Strauss and Thomas, 1998).

effects, an indicator of general health status provides a more encompassing indicator of health than anthropometric measures, or even of reports of morbidity or symptoms suffered, and has been found to be a good predictor of subsequent mortality (see Idler and Benyamini, 1997 for a review.) However, due to its subjectivity, parent-reported health status may suffer from measurement error, and this measurement error is potentially non-random (Case and Deaton, 2003; Strauss and Thomas, 1998; and O'Donnell, van Doorslaer and Rosati, 2002).[2]

Since the IFLS collects anthropometric information and, unusually, a nurse's ordinal assessment of individuals' health status, we are able to determine the extent to which biases associated with the subjective nature of parent-reported health are driving our results. The IFLS data also allow us to investigate other important conceptual and measurement issues that may impact on the estimated health-income gradients that have not been addressed in the previous literature. For example, because all births and deaths in households are captured by the IFLS panel, we are able to account for child mortality. We can also explore the robustness of the results to alternative measures of households' financial resources because in addition to information on contemporaneous income, which is used in the existing studies of the way the health-income gradient changes with age, the IFLS provides data on household consumption and wealth, which are longer term indicators of households' resources.[3]

The evidence from our investigation confirms that the general health status of children from poor families is compromised by their families' circumstances. However, unlike in developed countries, we find no evidence that this disadvantage accumulates as they age. A possible explanation for this (that is pursued further below) is the prevalence and severity of acute conditions in developing countries compared to the more central role played by chronic conditions in developed countries.

[2] Low height for age (stunting) generally occurs in the first 3 years of life after which the child's body through reduced growth has "adjusted" to low nutrient intake and needs fewer nutrients. Studies that have used general health status indicators for developing countries, albeit in different contexts to that proposed here, include Kassouf et al (2001) and Diaz (2002) for Brazil, Liu and Zhang (2004) for China, Lavy, Palumbo and Stern (1995) for Jamaica, and Case (2001) for South Africa. Self-reported morbidity suffers from the same reporting biases as general health status, although possibly more serious. It is not uncommon for high income individuals to report greater morbidity than those that are less well off. See Cameron (2001) for an example in the context of Indonesia.

[3] Household consumption is commonly used as a measure of households' permanent income. Currie and Stabile (2003) use the average of three years of household income. Case, Lubotsky and Paxson (2002) also use average income to examine the effect of permanent versus current income and conclude that children's health status is most closely associated with permanent income.

2. Data.

The IFLS

The IFLS is a panel survey and was conducted in 1993 (IFLS1), 1996 (IFLS2) and 2000 (IFLS3). The IFLS sample represents about 83% of the Indonesian population. It is a random sample of more than 7000 households and the 2000 wave contains 11686 children. For a more detailed description of the sample design and response rates see Strauss et al (2004). This paper utilizes the health status data from the third wave and supplements it with data from the earlier waves of the survey. [4]

Measuring Health

We utilize both the parent-reported and nurse-assessed measures of health status collected in the IFLS3. Parent-reported child health status is constructed from the question "In general, how is the child's health now?" Possible responses are: 1. Very healthy (10.48%); 2. Somewhat healthy (80.47%); 3. Somewhat unhealthy (8.93%); and 4. Unhealthy (0.11%). Due to the very small number of "unhealthy" responses, we collapse somewhat unhealthy and unhealthy in the analysis that follows.

Each IFLS household was also visited by a nurse who measured individuals' height, weight, and hemoglobin. Nurses were also asked "How does the health of this person compare, in general, to the health status of other people of the same age and sex?" Possible responses ranged from 1 (Much worse) to 9 (Very good). Since very few children were ranked as a 1, 2, 3 or 9, we combined categories 8 and 9 and categories 1, 2 and 3. In order to make interpretation of the parent-reported and nurse-assessed evaluations consistent, we reversed the scale of the nurse evaluations so that better health status is associated with a smaller number. Table 1 shows the resulting distribution of responses for both the parent-reported and nurse-assessed measures.

Measuring Household Resources

The IFLS also provides detailed data on contemporaneous household income, household consumption and the value of household assets and so allows us to examine the robustness of

[4] IFLS3 was a collaborative effort of RAND and the Center for Population Studies (CPPS) of the University of Gadjah Mada. Funding for IFLS3 was provided by the National Institute on Aging (NIA) and the National Institute for Child Health and Human Development (NICHD). The parent-reported and nurse-assessed health status questions were not asked in the first wave. Nurse-assessed health data collected in the second wave has not been publicly released.

the results to different measures of family economic status. Annual household income is calculated as the sum of earnings, asset income, transfers and other income (which includes pensions, scholarships, insurance payments and winnings). Annual household consumption is the sum of food and non-food consumption, both bought and self-produced. This includes a component for imputed rent.[5] Household wealth is the sum of household assets and business assets and includes houses, land, livestock, vehicles, household appliances and furniture, savings deposits, receivables and jewelry, crops, heavy equipment and tools. Summary statistics of all variables are found in the appendix.

Raw Child Health-Income Gradient

Figures 1 through 3 present non-parametric locally-weighted regressions of parent-reported health status on per capita household income, per capita household consumption and per capita household wealth respectively for children up to the age of 14. The protective effect of household resources is clearly indicated by the negative gradient of the majority of the lines. For example, the conditional expectation of self-reported health status is 2.10 amongst 0-3 year olds at the 10th percentile of the per capita income distribution but is 1.97 for those at the 90th percentile of the income distribution (indicating better health). The general health status of children improves with age in Indonesia. This is in contrast to developed country results that show children's health declines as they age.[6] This is due to the differing nature of disease in the two sets of countries. Whereas in developed countries chronic conditions are important determinants of children's general health status, acute illnesses such as diarrhea and acute respiratory infections (involving a cough, nasal discharge and fever) are the most serious threats to child health and life in developing countries - with 28% of all deaths in developing countries

[5] For those households that do not report the value of their home, we calculate predicted values from a hedonic housing model. Similarly, for those households that own houses and did not report imputed rent or whose imputed rent reports were outliers, we predicted rent from the value of the house and district of residence.

[6] Figure A1 in the appendix presents the self-reported health-income relationship for adults and shows that self-reported health starts to decrease from age 15. It also shows little relationship between self-reported health and income for all but the oldest category (65+ years). We limit our attention to children under the age of 14 because household income becomes endogenous once children start to work. Only a small percentage of Indonesian children under the age of 14 work and their income does not constitute a large percentage of household income. Household resources may also be endogenous if mothers of less healthy children reduce their labor supply. In order to investigate this, we exploited the panel nature of the IFLS and examined the impact of having a child in poor health in 1997 on mother's current employment status, hours worked per week and weeks worked per year. We found that having a child in poor health in 1997 had no significant impact on maternal labor supply (controlling for household size, father's presence, age and educational attainment of each parent, the religion of the head of household, province of residence and an indicator for living in a rural area).

being due to infections and parasitic diseases among children under five, Filmer and Pritchett (2004). Unlike chronic disease, these acute diseases are more prevalent at young ages.[7] The implications of the higher prevalence of acute disease in developing countries will be discussed in more detail below.

A further feature of the relationship between parent-reported health status and the household resource variables displayed in these figures is that they present no evidence that the health-income gradient is steeper for older age-groups. This is in contrast with the U.S. and Canadian studies discussed above.[8] In fact, especially in the case of per capita income (the measure used in developed country studies) the gradients for Indonesia seem to flatten with age. We now examine whether the raw health-income relationship is robust to controlling for characteristics of the child, family structure, characteristics of the parents and geographic location.

3. Results

Table 2 reports the coefficients on the household resource variables from ordered probit models for child health status (1=very healthy, 2=somewhat healthy, 3=somewhat unhealthy or unhealthy) for all children aged less than 15, and for separate age-groups. We report z-scores based on robust standard errors that allow for correlation between unobservables for children from the same household. In addition to the natural logarithm of the household resource variable, the results in panel 1 control for household size, the child's age and gender, the age of the parents, religion (Muslim, Protestant, Catholic, Hindu or Buddhist), rural residence and provincial location. We also control for whether the person who assessed the child's health (the respondent) was the child, child's mother, child's father or another adult household member (the omitted category).

The first observation that can be drawn from the results in Table 2 is that the previous section's finding - that the negative relationship between income and health for Indonesian children does not become more pronounced for older age-groups - is robust to the inclusion of these further controls. The coefficient on household resources is generally statistically

[7] Cebu Study Team (1992) finds that the incidence of diarrhea peaks at 9.5 months of age in the Philippines and febrile respiratory infection also rises after birth, peaks and then decreases.
[8] Currie, Shields and Wheatley-Price (2004) find that the health-income gradient does not increase with age in the UK. They attribute this to the existence of the UK's National Health Service

significant except for the 8-11 year old age-group and in the model based on household income for the 12-14 year old age-group. When we test the hypothesis of equality of coefficients on the household resource variable for adjacent age-groups, we find no significant difference for the models based on household wealth, suggesting a common gradient across age-groups. The model based on consumption provides weak evidence (p-value>0.06) that the income gradient increases between the 8-11 and 12-14 age-groups, although this is driven by the low coefficient estimate for the 8-11 year olds. There is no significant difference between the impact of household consumption on child health based on a comparison of 0-3 year olds and 12-14 year olds. For income, we even find some evidence that the health-income gradient *diminishes* with age, with a p-value for the test statistic comparing the coefficient for the 0-3 and 12-14 year old age-groups of 0.04.

Mothers' education has been the focus of much attention in the developing country literature on the relationship between socio-economic status and child health. Mothers' education has been found to be an important determinant of height, weight and mortality (see, Strauss and Thomas, 1995; Skoufias, 1999; and van der Klaaw and Wang, 2004, respectively). Indeed there has been some debate as to whether household income even affects health, once mothers' education has been accounted for (Behrman and Wolfe, 1982). Household income may just proxy for education - education may impart health knowledge and confidence to deal with health professionals, for example, and it may be this knowledge and not income per se that has a positive impact on child health. To investigate this, we add to the control variables an indicator for whether the mother has completed primary school. The results are reported in panel 2 of Table 2.[9] We find that the indicator of maternal education is an important determinant of general health status but only for children under the age of three (consistent with Sahn and Alderman, 1997, and Lavy et al, 1996). Accounting for mothers' education reduces the impact of household resources on child health for this youngest age-group but does not alter the findings regarding changes in the gradient with age.

[9] We originally included a full set of indicators for mothers' and fathers' education. The set of indicators for fathers' education were individually and jointly insignificant. Indicators for mothers' education above primary level were also insignificant.

Issues in the Measurement of Child Health

The ability to identify an increase in the gradient relating income to health across older age-groups may be obscured by a number of potential measurement issues. In this section we investigate whether our findings are due to differences in the way parents and children report on child health, sample selection bias arising from high infant mortality, and measurement error in parent-reported child health.

(i) Child-Reported Versus Adult-Reported Child Health

The results presented in Table 2 show that the relationship between household resources and child health is imprecisely estimated for the 8-11 year old age-group. The IFLS allows children to report on their own health status if they are between eleven and fourteen years of age. It may be that children, especially those at the younger end of the self-reporting spectrum, are not well placed to assess their own health, producing a noisier measure of health and diminishing our ability to identify a steepening gradient. We investigate this issue by excluding all child-reported health observations from our sample and so use only adult-reports of child health. Panel 1 in Table 3 contains results based on adult reporting only.[10] Since most children in the 12-14 age-group reported for themselves, the sample size for this group is greatly reduced (N=486) which adversely impacts on the precision of the results. Nonetheless, we find that excluding the child-reported observations increases the magnitude of the income coefficients for those in the upper two age categories but again our findings with regard to the gradient being constant across age-groups are unaffected. Subsequent reported results continue to restrict the sample to adult-reported child health.

(ii) Mortality

A second potential explanation for the lack of evidence of a steepening of the health-income gradient for older age-groups is selective mortality. Selective mortality refers to the fact that more poor children than rich children die. The UN's World Development Indicators (2003) estimate Indonesia's under-five child mortality rate to be 45 per 1000 children in 1999.

[10] These models include the same control variables as does Table 1, panel 1. In addition, mothers education is included in the model for 0-3 year olds and an interaction term between mothers education and the child being 0-3 years of age is included in the model for children of all ages. Unless otherwise noted, these controls are included in all subsequent regressions.

Amongst the cohort of children from IFLS households that were five years old in 2000 (or would have been), 4.1% died. Child mortality was 6.0% for households in the lowest quintile of the income distribution while only 2.9% for families in the highest income quintile. This "selection-bias" artificially flattens the health-income gradient because it raises the average health of surviving children from poor families relative to those from richer families. Further, infant and child mortality will flatten the health-income gradient more for older cohorts because a cohort's mortality rate increases with age. This effect is exacerbated if mortality rates have declined over time. There is some evidence of this in the IFLS3 data, with infant mortality at around 5.5 per 100 live births in 1986 compared to around 3.5 per 100 live births in more recent years.

We address the issue of child mortality by "adding in" those who died and attributing to them (1) the age they would have been in 2000 had they survived, and (2) the lowest health status. This approach is biased in favor of finding an increasing gradient since children who died as infants 10 years ago, for example, are now being treated as 10 year olds with poor health (whereas if they had survived their health may have improved). Ignoring the generally insignificant estimates for the 12-14 year old age-group, we find that seven out of the 12 estimates in panel 2 of Table 3 are now greater in absolute magnitude and all but two of the t-statistics are now higher, indicating a stronger relationship between household resources and health once mortality is accounted for. Testing for the equality of the impact of household resources across adjacent age-groups again revealed no significant differences, indicating that the health-income profile remains flat across age-groups. Thus selective mortality does not account for the constancy of the gradient across age-groups.[11]

(iii) Parent-Reported versus Nurse-Assessed Child Health

As mentioned above, parent-reported health status may suffer from non-random measurement error. For example, respondents from higher income households may be more critical of their health because of greater exposure to health services.[12] This would bias our coefficients on the household resource variables towards zero (they will under-predict the effect

[11] It is noteworthy that accounting for mortality did not produce the expected larger estimates on income and consumption for the 0-3 year old age-group. For this age-group, accounting for mortality produced a larger estimated impact of mother's education on child health.

[12] Dow et al (1997) provide some experimental evidence in line with this in the context of Indonesia.

of resources on health) but it is not clear how this would affect the differences in coefficients across age categories.[13] Nurse-assessed health does not suffer from the potential reporting biases in parents' reports of their children's health status and so we use this as a robustness check on the role of reporting bias in our results.

We also use nurse-assessed health to investigate a second potential issue with parent-reported health. As mentioned above, in developing countries acute illness is often life-threatening and consequently parent-reported child health in a developing country likely places a greater weight on these acute conditions than is the case in a developed country. Acute morbidity is shorter term in nature and less likely than chronic conditions to have an accumulative negative health effect.[14] Indeed, cumulative exposure to pathogens may even build resistance to acute conditions (Strauss and Thomas, 1995) and thus poor children's more frequent exposure to acute illness (owing say to a lack of sanitation and more congested living quarters) may result in them gaining immunity at a faster rate than wealthier children. This greater immunity may counteract some of the other negative effects of low income at later ages.[15] This explanation for the lack of a steepening of the health-income gradient is supported by Figures 4 and 5. They show that amongst the youngest children, those from the poorest households are much more likely to get diarrhea and spend longer in bed but the protective effect of income diminishes with age.

The nurses who assess health for the IFLS have less knowledge of the child's recent history of acute illness than parents. Their evaluations may thus place a greater weight on longer term components of health and so be more likely to show an increasing gradient. Table 4 presents some results consistent with this. We estimate ordered probit models for both parent-reported and nurse-assessed health status as functions of the number of days the child spent in bed due to illness and the number of days of missed activity due to illness in the four weeks prior to the survey, standardized height, standardized weight, hemoglobin levels and the types of symptoms the child has experienced due to illness in the past four weeks. These symptoms

[13] Lindeboom and Van Doorslaer (2003) find no evidence of differential reporting by income using Canadian data but do find some evidence that reporting differs by age with those aged 20-35 tending to report lower values of health status (conditional on an objective measure of health) than those aged 35 to 70.
[14] Kimhi (2003) suggests that health should be viewed as being comprised of both stock and flow components with acute morbidity being viewed as a flow.
[15] Diaz (2002) also discusses preliminary medical research of the possibility that the higher prevalence of parasitic infections amongst the poor at young ages may protect them against chronic conditions.

include headache, runny nose, cough, difficulty breathing, fever, nausea, diarrhea, skin infection, eye infection, toothache, ear infection, worms, injury and "other" symptoms.[16] We find that the symptoms data, which mostly reflect acute conditions, are important determinants of parents' assessments but not nurse assessments of child health. The physical measures of health were also important determinants of parent-reported child health but were more important in determining a nurse's assessment of a child's health. Assuming that a child's height-for-age, weight-for-height and hemoglobin levels are more highly correlated with long term health, and that symptoms, days spent in bed and days of missed activity are largely indicative of acute morbidity, this is consistent with parent-reported health status reflecting both acute morbidities as well as long term underlying child health and nurse assessments placing more weight on the correlates of long term health. Nurse-assessed health also has the advantage of providing a larger sample size for the 12-14 year old age-group.[17]

Ordered probit results for the relationship between nurse-assessed health and the three measures of household resources are given in Table 3, panel 3. The results indicate that household resources are a significant determinant of nurse-assessed child health. The coefficients on the household resource variables are however remarkably constant across age-groups (for example, using wealth as the measure of household resources yields coefficients of –0.066 for 0-3 year olds, -0.07 for 4-7 year olds, -0.059 for 8-11 year olds and -0.067 for 12-14 year olds). Testing for the equality of the impact of household resources across adjacent age-groups revealed no significant differences, and this was the case for income, consumption and wealth.[18]

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[16] For comparability with the parent-reported health, nurse-assessed health has been converted to a three point scale here.

[17] Whether nurse-assessed or parent-reported health is likely to be a better indicator of general health status is a matter of debate. It may be argued that parents are better placed to rank the overall health of their children because they have a greater knowledge of the child's health history and current functioning. The nurses however probably have greater knowledge of what is "average' health status and do collect the measured health indicators including height, weight, and hemoglobin levels, before giving their overall assessment.

[18] We also examined the relationship between health as measured by standardized height-for-age, weight-for-height (standardized using the NCHS/WHO reference data) and hemoglobin levels and household resources. Iron-deficiency anemia (as indicated by low hemoglobin levels) is a serious nutritional problem in Indonesia and has detrimental effects on energy levels, the intellectual development of children, and resistance to disease. The results confirm that children from wealthier families are taller on average than children from poorer families and have higher hemoglobin counts for the 0-3 and 4-7 year old age-group. Consistent with Lavy, Strauss, Thomas and Vreyer (1996) we find no evidence of a significant relationship between standardized weight for height and household resources. There is no evidence that poorer children fall further behind richer children in terms of hemoglobin or standardized height as they age.

Robustness of the relationship between income and health to third factors.

The results presented above provide evidence that children who belong to households with more economic resources are in better health and that this relationship is unchanging across age-groups. As noted by Case, et al. (2002), these results do not rule out the possibility that the relationship between income and child health reflects a "third factor" such as a lasting effect of poor health at birth or the inheritance of poor health from parents, where these factors are positively associated with low household income. We investigate whether these factors account for the relationship between household resources and child health.

(i) Birthweight

The relationship between health and income may be due to children from poorer families being born with poor health. Household income in childhood may thus only appear to be a determinant of child health because of serial correlation in income. We investigate this by controlling for poor health at birth using an indicator for low birth weight, defined as a weight of less than 2500 grams (7.6% of our sample). Low birth weight babies are more likely to have serious health problems including respiratory distress syndrome, bleeding in the brain and heart and intestinal problems. Information on birth weight is available for only about half of our sample, so there are insufficient observations to estimate models for each age-group. For this reason, we follow Case et al. (2002) and pool observations but allow income to have a differential impact by age by including an interaction term between income and age. Table 5 panel 1 contains the ordered probit results. The results indicate that low birth weight has no significant effect on current parent-reported child health and that this result does not differ by income level or age of the child. Household resources (whether measured by income, consumption or wealth) remain a significant determinant of health status, the effect of which does not vary with age.[19]

[19] Case et al. (2002) find that poor health at birth has a large adverse effect on children's current health, that this is particularly so at low income levels and that although the effect of poor health at birth on current health dissipates with age, improvements with age are slower for poor children. Currie and Stabile (2003) find a negative effect only of very low birth weight (less than 1500 grams) on child health. This is also true in our sample but the impact is estimated off only a very small number of observations and does not affect the coefficients on the household resource variables. Sahn and Alderman (1997) find that low birth weight has a negative effect on subsequent height in Mozambique.

(ii) Parent's Health

Table 5 panel 2 examines the effect of including measures of parents' health as explanatory variables. Parents' health may be correlated with their children's health through several avenues. For example, children may inherit their parent's genetic predisposition for illness or parents and children may be exposed to common unobserved environmental risk factors. Parents in poor health are likely to have reduced income producing capacity and failure to account for parents' health in the models above could result in attributing the effect of these omitted variables to household income. While less than a perfect solution, we follow Case et al. (2002) and address this issue by including indicators for the parent's health in the models for children's parent-reported health.[20] Table 4 reports results for household income only but the results for consumption and wealth are similar. Although the impact of parental health on the health status of the child is large and significant (for example, if a child has a mother who is very healthy, his or her chance of also being very healthy increases by about 19 percentage points), the coefficients on income are largely unaffected by the inclusion of parental health.

The route via which income affects health

That the effect of low income on child health does not accumulate with age is a positive finding in that it limits the effect of low household income on child health and also the role that poor health plays in intergenerational cycles of poverty. Nevertheless, we do find that low income robustly increases the probability of a child of any age being in poor health. In unreported results, we also find that being in poor general health in the past is associated with lower scores on math tests (see referees' appendix). Given the potentially negative consequences of poor child health on educational attainment and hence earnings in later life, understanding the mechanism by which household resources affect child health is important for the development of policies aimed at mitigating such effects. In particular, our results suggest that income transfers may be a relatively blunt instrument for improving child health. For example, the coefficient estimates in Table 3 suggest that doubling a household's income will

[20] Because in most cases a parent-reports on the child's health status, the coefficients on parent's health status will also absorb any correlation between reporting error in the child and parent's health status variables. To address the issue of reporting bias more closely, we also estimated regressions where we controlled specifically for the health status of the household member who assessed the child's health. This variable was statistically significant for all age categories except 8-11 year olds but did not markedly change the coefficients on household resources.

increase the probability of a child being in very good health by only one percentage point. In this section, we briefly examine potential routes via which income affects child health in order to gain insight into more cost-effective policy options.

Table 6 reports results (pooled across age-groups) of ordered probits of parent-reported health status on household income and the controls used in previous specifications with the addition of a number of factors through which income may affect health. We have grouped these into three categories reflecting 1) nutrition indicators, 2) access to health services, and 3) sanitation and air quality.[21] Table 6 shows that nutritional deficiency (as indicated by children not having enough food to eat in the past month) has a significant negative impact on parent-reported child health status and eating fish improves child health status. Access to health services (as captured by the amount of time to the nearest medical clinic or hospital and the number of mother and child health posts accessible from the village) is associated with better child health.[22] Of the sanitation and air quality variables, living in a household with at least one adult smoker reduces child health status as does living in a village in which air pollution was reported in the last 12 months (both these are significant at the 10% level). Having an outdoor kitchen reduces the inhalation of fumes and smoke by household members and is found to improve child health, as also found by Cebu Study Team (1991) and Van der Klaaw and Wang (2004) in the Philippines and rural India respectively. Of the sanitation variables, only disposing of rubbish in the household yard is significant and has a negative effect on child health.[23]

[21] A large literature exists on the determinants of poor child health, as measured by mortality, height and weight, in developing countries (see for example, for Nicaragua, Wolfe and Behrman, 1982; for rural India, Jalan and Ravallion, 2003; for the Philippines, Cebu Study Team, 1992; for Ghana, Levy, Strauss, Thomas and Vreyer, 1996; and for South Africa, Maitra and Ray, 2004). Our focus here is on whether the determinants of general health status are similar to those found for other health measures in developing countries and the extent to which factors such as nutritional attainment, sanitation and access to health services account for the effect of the household resource variable. The variables we report are just a small number of the large number of variables that the IFLS contain that reflect these categories. These variables were chosen because they had the greatest explanatory power or had been found to be important in previous studies. Non-random placement of health services may cause some of the health service variables being endogenous (Rosenzweig and Wolpin, 1986). Instrumenting for these variables is beyond the scope of this paper.

[22] Lavy, Strauss, Thomas and de Vreyer (1996) similarly find that health services aimed at children are an important determinant of child health in Ghana.

[23] The results for household consumption and wealth are very similar to those presented. The results for nurse-assessed health show a similar pattern although with a number of additional variables being significant determinants of nurse-assessed health. These include any adult household member having health insurance that covers children, the child being fully immunized, having a toilet, the amount of village land that is swamp and whether villagers defecate in the river.

The marginal effect (not reported in table 6) of the logarithm of household income on the probability of being in very good health falls from 0.011 to 0.006 and remains only marginally significant with the inclusion of all of these intervening factors (t=-1.76). In contrast, the marginal effect of maternal primary school education is hardly affected by the inclusion of the additional variables. Thus maternal education seems to have an impact on children's general health status that is independent of nutrition, health services and environmental variables. Mothers' education may operate through health knowledge as found by Chakrabati, 2004 for India and Thomas, Strauss and Henriques (1991) for Brazil. Income seems to improve child health mainly via nutritional effects and, to a lesser extent, access to health services and the provision of a cleaner environment. Thus, while income transfers may improve child health (as shown by Case, 2001 and Duflo, 2000 in South Africa) public policies such as those that provide basic infrastructure and health services, protect against pollution, and particularly those that encourage female educational attainment and increase nutrient intakes, such as mother and child feeding programs, are likely to be just as successful and, our estimates suggest, less expensive.

4. Conclusions

Our investigation confirms that the general health status of children from poor families is compromised by their families' circumstances. However, we find no evidence that this disadvantage accumulates as children age. This finding is robust to accounting for selective mortality, potential reporting biases in parent-reported health, and the inclusion of indicators of health at birth and parental health. This raises the question of why, if health is a stock as it is commonly treated in economic models of health (Grossman, 1972), household resources don't have an accumulative effect on children's general health status in Indonesia. We argue that this is because in the developing world acute illnesses, such as diarrhea and fever, are a major cause of ill-health and, despite their shorter term nature, are an important determinant of assessments of children's health. These illnesses, unlike chronic health conditions that are a more important determinant of children's general health status in developed countries, do not have a negative accumulating effect. The higher incidence of acute illness amongst poorer children in developing countries may even have a positive accumulative effect on health via improved

immunity and this may offset some of the health disadvantages of living in a low income environment.

Although the health effects of living in a poorer household in a developing country do not accumulate over childhood, the finding that living in a poorer household has a robust negative effect on health nevertheless signals a pathway via which poverty is transmitted across generations. Poor health negatively affects children's academic achievements. Lower academic achievement lowers potential labor market earnings and perpetuates a cycle of poverty. Our estimates suggest that raising incomes through transfer payments is likely to be a relatively expensive way to improve the health of poor children. We find that income operates largely through improving children's nutritional intake, and to a lesser extent, improving access to health facilities, sanitation and air quality. Tackling these issues directly through the public provision of these health inputs is likely to be a more cost-effective approach to improving child health and mitigating the effect of poverty on future generations.

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Figure 1: The Relationship between Child Health Status and Income

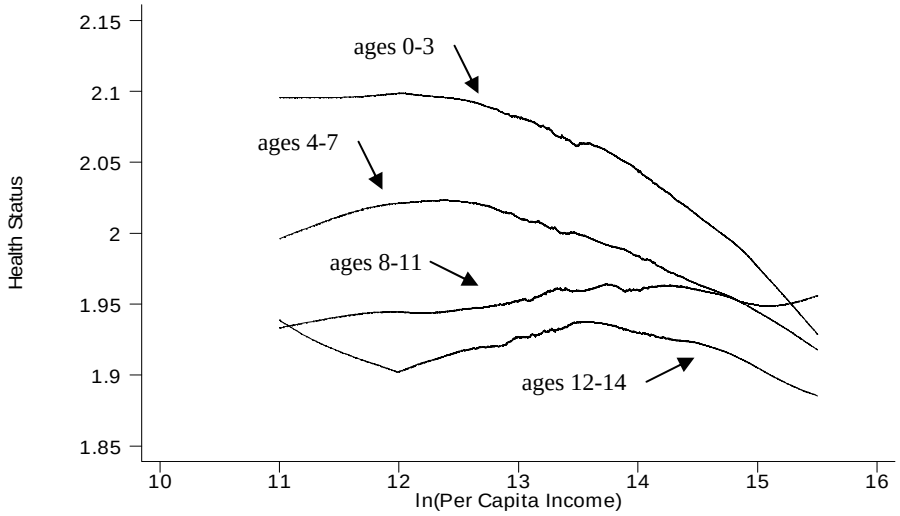

Figure 2: The Relationship between Child Health Status and Consumption

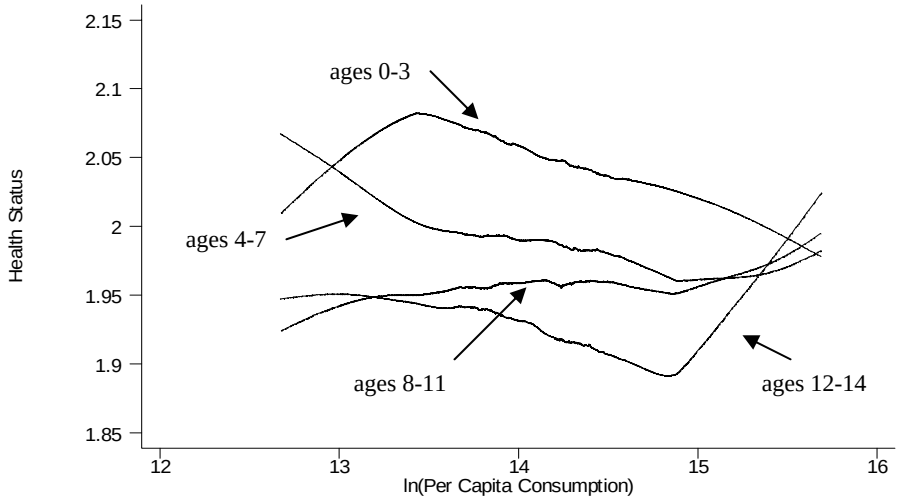

Figure 3: The Relationship between Child Health Status and Wealth

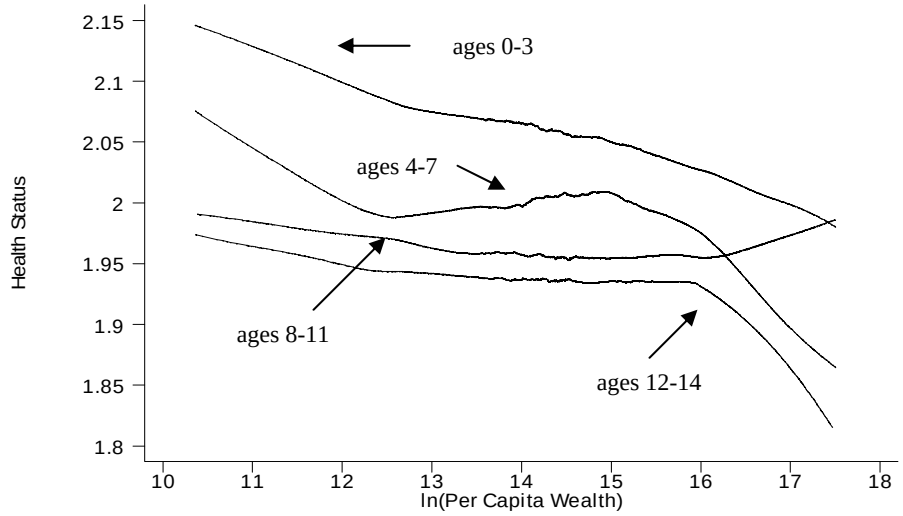

Figure 4

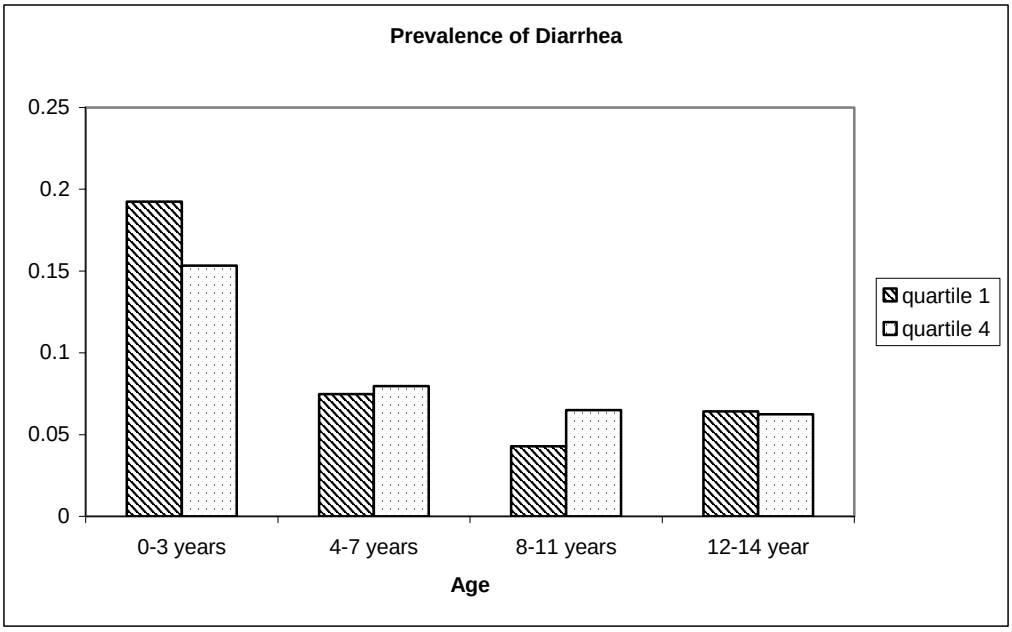

Figure 5

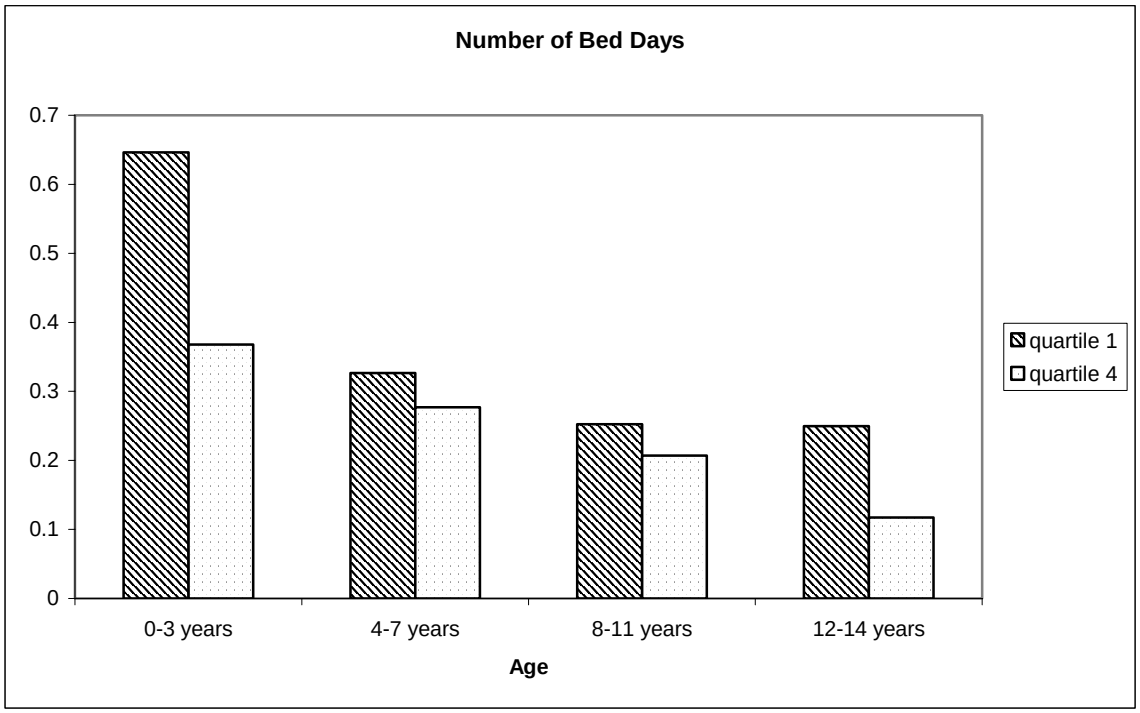

TABLE 1: DISTRIBUTION OF CHILD HEALTH STATUS

	Number	Percent
Parent Reported		
1. Very healthy	1,084	10.58
2. Somewhat healthy	8,249	80.52
3. Somewhat unhealthy/unhealthy	912	8.90
Total	10,245	100
Nurse Assessed		
1. Healthier than average	186	1.87
2	3,881	39.01
3	2,591	26.04
4	2,651	26.65
5	505	5.08
6. Less healthy than average	135	1.36
Total	9,949	100

TABLE 2: HEALTH STATUS AND HOUSEHOLD RESOURCES AT DIFFERENT AGES

	all ages	0-3 year olds	4-7 year olds	8-11 year olds	12-14 year olds
			Controls 1		
log of household income	-0.06	-0.104	-0.095	0.005	-0.032
	(-4.35)	(-4.65)	(-3.86)	(0.20)	(-1.18)
log of household consumption	-0.101	-0.16	-0.081	-0.021	-0.154
	(-3.82)	(-3.59)	(-1.65)	(-0.47)	(-2.80)
log of household wealth	-0.036	-0.045	-0.041	-0.027	-0.039
	(-3.73)	(-2.96)	(-2.26)	(-1.49)	(-1.95)
			Controls2		
log of household income	-0.059	-0.085	-0.103	0.002	-0.035
	(-4.13)	(-3.68)	(-4.21)	(0.07)	(-1.25)
mother completed primary school	-0.011	-0.195	0.093	0.029	0.039
	(-0.30)	(-3.08)	(1.36)	(0.45)	(0.54)
log of household consumption	-0.098	-0.125	-0.09	-0.029	-0.166
	(-3.61)	(-2.73)	(-1.80)	(-0.60)	(-2.92)
mother completed primary school	-0.016	-0.215	0.058	0.038	0.065
	(-0.45)	(-3.44)	(0.86)	(0.62)	(0.90)
log of household wealth	-0.035	-0.031	-0.047	-0.032	-0.041
	(-3.50)	(-1.93)	(-2.49)	(-1.72)	(-1.99)
mother completed primary school	-0.014	-0.229	0.08	0.06	0.045
	(-0.40)	(-3.58)	(1.16)	(0.99)	(0.62)
N	10245	2938	2645	2681	2011

Notes:

1. Dependent variable is child health status (1=very healthy, 2=somewhat healthy, 3=unhealthy/very unhealthy
2. Asymptotic z-scores are in parentheses.
3. Controls 1: the natural log of household size, a set of dummies for each age in years, gender, the presence of the child's mother in the household, the presence of the child's father in the household, the mother's age interacted with an indicator for mother's presence, the father's age interacted with an indicator for fathers presence, indicators for the religion of the head of the household, rural residence and the province of residence, indicators for who reported the child's health status (mother, father, child, or another adult household member).
4. Controls 2 adds an indicator for mother's education (at least primary school) to controls 1.

TABLE 3: ROBUSTNESS TO ISSUES IN THE MEASUREMENT OF CHILD HEALTH STATUS

	All ages	0-3 year olds	4-7 year olds	8-11 year olds	12-14 year olds
parent reported health status only					
log of household income [3]	-0.064	-0.085	-0.094	-0.018	-0.058
	(-4.35)	(-3.68)	(-3.84)	(-0.68)	(-1.00)
	[0.011]	[0.013]	[0.015]	[0.003]	[0.010]
log of household consumption	-0.098	-0.125	-0.084	-0.066	-0.245
	(-3.33)	(-2.73)	(-1.69)	(-1.25)	(-2.42)
log of household wealth	-0.033	-0.031	-0.04	-0.038	-0.032
	(-3.17)	(-1.93)	(-2.16)	(-1.95)	(-0.74)
accounting for child mortality (parent reported health status only)					
log of household income	-0.063	-0.077	-0.100	-0.051	0.012
	(-4.67)	(-3.44)	(-4.26)	(-2.10)	(0.27)
log of household consumption	-0.109	-0.109	-0.125	-0.110	-0.172
	(-3.87)	(-2.47)	(-2.65)	(-2.33)	(-2.12)
log of household wealth	-0.03	-0.034	-0.035	-0.048	0.002
	(-3.20)	(-2.17)	(-2.10)	(-2.86)	(0.05)
Nurse assessed health status					
log of household income	-0.077	-0.069	-0.096	-0.056	-0.086
	(-5.17)	(-3.33)	(-4.17)	(-2.18)	(-3.26)
log of household consumption	-0.148	-0.112	-0.190	-0.127	-0.198
	(-5.25)	(-2.70)	(-4.28)	(-2.97)	(-3.88)
log of household wealth	-0.065	-0.066	-0.07	-0.059	-0.067
	(-6.10)	(-4.37)	(-4.25)	(-3.47)	(-3.35)
N	9949	2853	2551	2614	1931

Notes:

1. Dependent variable is child health status (1=very healthy, 2=somewhat healthy, 3=unhealthy/very unhealthy)
2. Asymptotic z-scores are in parentheses.
3. The square brackets show the change in the probability of reporting very healthy (relative to somewhat healthy or very unhealthy) associated with a one-log point increase in household income.
4. The models in panel 1 and 2 include the explanatory variables in "controls 1" (see Table 2). In addition, the model for ages 0-3 includes an indicator for mother's education. An interaction term between mother's education and the child being 0-3 is included in the model for children of all ages. Models in panel 3 include the explanatory variables in "controls 2" (see Table 2) with the exception of the set of indicators for who reported the child's health status.

TABLE 4: THE DETERMINANTS OF PARENT-REPORTED AND NURSE-ASSESSED HEALTH STATUS

	parent-reported health		nurse-assessed health	
	Coef.	**z-score**	**Coef.**	**z-score**
days of missed activity due to illness	0.078	4.12	0.008	1.32
number of beds in bed due to illness	0.018	0.75	0.018	1.39
symptom: headache	0.089	1.89	0.035	0.85
symptom: runnynose	0.214	4.66	-0.035	-0.85
symptom: cough	0.034	0.73	0.005	0.14
symptom: difficulty breathing	0.394	3.67	-0.085	-0.97
symptom: fever	0.152	3.23	0.039	1.00
symptom: nausea	0.151	1.93	-0.022	-0.36
symptom: diarrhea	0.091	1.39	-0.031	-0.55
symptom: skin infection	0.157	2.52	0.043	0.81
symptom: eye infection	0.128	1.18	-0.097	-1.07
symptom: toothache	-0.012	-0.19	-0.118	-2.33
symptom: earache	0.133	1.69	-0.338	-0.80
symptom: worms	0.476	1.22	2.244	3.71
symptom: other	0.576	3.12	0.054	0.36
symptom: injury	0.735	2.11	0.107	0.37
standardized height for age	-0.034	-2.12	-0.098	-6.24
standardized weight for height	-0.057	-3.27	-0.087	-5.46
hemoglobin	-0.018	-1.40	-0.093	-7.81

Notes:

1. For ease of comparison, nurse assessed health has been converted to a 3 point scale.
2. Dependent variable is child health status (1=very healthy, 2=somewhat healthy, 3=unhealthy/very unhealthy)

TABLE 5: ROBUSTNESS TO POSSIBLE THIRD FACTORS: BIRTHWEIGHT AND PARENTS' HEALTH STATUS

Controlling for Birthweight (all ages)					
	1	**2**	**3**	**4**	**5**
log of household income	-0.100	-0.100	-0.099	-0.100	-0.104
	(-3.45)	(-3.44)	(-3.39)	(-3.45)	(-3.46)
age	-0.111	-0.108	-0.108	-0.117	-0.126
	(-1.44)	(-1.40)	(-1.41)	(-1.49)	(-1.57)
income x age	0.005	0.005	0.005	0.005	0.006
	(0.97)	(0.96)	(0.96)	(1.05)	(1.14)
low birth weight		0.129	0.198	0.127	-0.962
		(1.04)	(0.21)	(1.03)	(-0.60)
low birth weight x age		-0.027	-0.027	0.065	0.224
		(-1.19)	(-1.19)	(0.43)	(0.83)
low birth weight x income			-0.004		0.070
			(-0.08)		(0.68)
low birth weight x age x income				-0.006	-0.016
				(-0.60)	(-0.93)
N	4862	4862	4862	4862	4862
Controlling for Parent's Health Status (parent reported health status only)					
	all ages	**0-3 year olds**	**4-7 year olds**	**8-11 year olds**	**12-14 year olds**
log of household income	-0.054	-0.069	-0.087	-0.011	-0.054
	(-3.74)	(-3.00)	(-3.60)	(-0.43)	(-0.90)
mother-very healthy	-0.791	-0.933	-0.654	-0.769	-0.832
	(-8.76)	(-7.12)	(-4.28)	(-4.65)	(-2.12)
mother-somewhat healthy	-0.150	-0.271	-0.077	-0.064	-0.26
	(-2.60)	(-3.22)	(-0.75)	(-0.57)	(-1.02)
father – very healthy	-0.669	-0.674	-0.747	-0.531	-0.935
	(-7.02)	(-5.11)	(-4.61)	(-2.91)	(-2.72)
father – somewhat healthy	-0.219	-0.201	-0.272	-0.238	-0.196
	(-3.67)	(-2.15)	(-2.69)	(-2.17)	(-1.04)
N	8351	3032	2690	2128	505

Notes:
1. Dependent variable is child health status (1=very healthy, 2=somewhat healthy, 3=unhealthy/very unhealthy)
2. Asymptotic z-scores are in parentheses
3. The models controlling for birthweight include the explanatory variables in "controls 1" (see Table 2) with the exception of the set of indicators for age.
4. The models include the same controls as in panels 1 and 2 of Table 3.

TABLE 6 - INTERVENING FACTORS

	Parent-Reported Child Health Status				
log household income	-0.065	-0.043	-0.058	-0.059	-0.035
	(-3.78)	(-2.32)	(-3.17)	(-3.25)	(-1.76)
Mother completed primary school x (age0-3)	-0.25	-0.23	-0.25	-0.23	-0.22
	(-3.41)	(-3.14)	(3.37)	(-3.17)	(-2.99)
Nutrition:					
An adult in the household indicated that the child's food consumption in the last month was less than adequate		0.235			0.219
		(4.35)			(4.02)
The number of times the child ate meat in the last week		-0.009			-0.009
		(-0.89)			(-0.82)
The number of times the child ate fish in the last week		-0.157			-0.014
		(-2.05)			(-1.81)
Access to Health Services					
Number of hours to the closest medical clinic/hospital			0.308		0.30
			(3.41)		(3.17)
A household member has health insurance that covers children			0.029		0.036
			(0.50)		(0.61)
The child is fully immunized			-0.054		-0.051
			(-0.97)		(-0.90)
The number of mother and child health posts accessible from the village			-0.01		-0.01
			(-2.24)		(-2.21)
Sanitation/Air Quality					
Any adult in the household is a smoker				0.081	0.077
				(1.70)	(1.62)
The kitchen is located outside of the house				-0.082	-0.076
				(-1.82)	(-1.70)
The household leaves rubbish in its yard				0.096	0.091
				(1.94)	(1.80)
The household has a dirt floor				0.077	0.065
				(1.30)	(1.09)
The household boils its drinking water				-0.083	-0.089
				(-1.07)	(-1.14)
The household has a toilet				0.002	0.028
				(0.05)	(0.66)
The house is surrounded by stagnant water				0.03	0.017
				(0.44)	(0.25)
Amount of the village land that is swamp				-0.00004	-0.00003
				(-1.30)	(-1.20)
The village air was polluted in the last 12 months				0.077	0.104
				(1.23)	(1.64)
Villagers defecate in the river				0.034	0.008)
				(0.80)	(0.18)
Pseudo-R2	0.033	0.037	0.036	0.036	0.042
N	6165	6165	6165	6165	6165

Notes:
1. Dependent variable is child health status (1=very healthy, 2=somewhat healthy, 3=unhealthy/very unhealthy)
2. Asymptotic z-scores are in parentheses.
3. All models also include the explanatory variables in "controls 1" (see Table 2).

Figure A1: Relationship between Self-Reported Health and Income for Adults

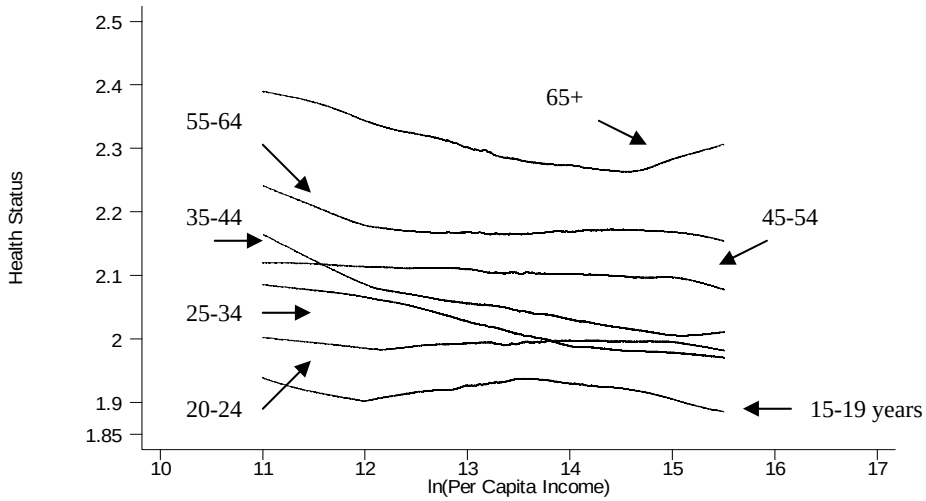

Table A1: Summary Statistics

Variable	Obs	Mean	Std. Dev	Min	Max
Parent reported health status	10245	1.983	0.441	1	3
Nurse assessed health status	9937	2.982	1.028	1	6
log of household income	10245	15.396	1.152	6.81	20.91
log of household wealth	10245	15.915	0.625	14.13	17.70
log of household consumption	10245	16.548	1.595	9.21	21.23
log of household size	10245	1.787	0.402	0.69	3.61
age	10245	6.822	4.410	0	14
female	10245	0.490	0.500	0	1
mother present	10245	0.937	0.243	0	1
father present	10245	0.875	0.331	0	1
age of mother	10245	31.422	10.998	0	67
age of father	10245	33.762	15.250	0	83
father responded to questions about child health	10245	0.152	0.359	0	1
mother responded to questions about child health	10245	0.583	0.493	0	1
child responded to questions about child health	10245	0.208	0.406	0	1
Religion is Protestant	10245	0.047	0.212	0	1
Religion is Catholic	10245	0.016	0.125	0	1
Religion is Hindu	10245	0.045	0.207	0	1
Religion is Buddhist	10245	0.003	0.056	0	1
rural	10245	0.572	0.495	0	1
low birth weight	4949	0.075	0.264	0	1
Mother’s highest level of education: primary school	10245	0.475	0.499	0	1
Mother’s highest level of education: lower secondary school	10245	0.147	0.354	0	1
Mother’s highest level of education: upper secondary school	10245	0.171	0.376	0	1
Mother’s highest level of education: tertiary	10245	0.049	0.216	0	1
Father’s highest level of education: primary school	10240	0.408	0.491	0	1
Father’s highest level of education: lower secondary school	10240	0.137	0.343	0	1
Father’s highest level of education: upper secondary school	10240	0.196	0.397	0	1
Father’s highest level of education: tertiary	10240	0.077	0.266	0	1
days of missed activity due to illness	10244	1.171	2.699	0	31
number of beds in bed due to illness	10242	0.324	1.358	0	30
symptom: headache	10245	0.292	0.455	0	1
symptom: runnynose	10245	0.505	0.500	0	1
symptom: cough	10245	0.379	0.485	0	1
symptom: difficulty breathing	10245	0.039	0.193	0	1
symptom: fever	10245	0.343	0.475	0	1
symptom: nausea	10245	0.078	0.268	0	1
symptom: diarrhea	10245	0.098	0.297	0	1
symptom: skin infection	10245	0.105	0.306	0	1
symptom: eye infection	10245	0.045	0.206	0	1
symptom: toothache	10245	0.102	0.303	0	1
symptom: earache	10245	0.001	0.028	0	1
symptom: worms	10245	0.001	0.031	0	1
symptom: other	10245	0.014	0.117	0	1
symptom: injury	10245	0.001	0.028	0	1
standardized height for age	6183	-1.542	1.303	-6.47	5.13
standardized weight for height	6183	-0.523	1.148	-3.82	5.10
hemoglobin	8584	11.758	1.499	3	29.10
mother's self-reported health status: very healthy	10167	0.071	0.257	0	1
mother's self-reported health status: somewhat healthy	10167	0.751	0.432	0	1
father's self-reported health status: very healthy	10148	0.068	0.252	0	1
father's self-reported health status: somewhat healthy	10148	0.715	0.451	0	1

percentage correct: cognitive test	4790	57.311	28.387	0	100
percentage correct: math test	4790	65.941	25.388	0	100
self-assessed child health in 1997 was unhealthy/very unhealthy	4790	0.054	0.227	0	1
father responded to questions about child health in 1997	4790	0.167	0.373	0	1
mother responded to questions about child health in 1997	4790	0.604	0.489	0	1
child responded to questions about child health in 1997	4790	0.146	0.353	0	1
child's food consumption in the last month inadequate	10112	0.154	0.361	0	1
the number of times the child ate meat in the last week	10245	1.248	1.754	0	7
the number of times the child ate fish in the last week	10245	3.407	2.772	0	7
Number of hours to the closest medical clinic/hospital	10243	0.156	0.196	0	3
Any adult in the household is a smoker	10113	0.782	0.413	0	1
The kitchen is located outside of the house	10244	0.271	0.444	0	1
Te household leaves rubbish in its yard	10245	0.145	0.352	0	1
The household has a dirt floor	10245	0.125	0.331	0	1
The household boils its drinking water	10240	0.942	0.234	0	1
The household has a toilet	10245	0.617	0.486	0	1
The house is surrounded by stagnant water	10244	0.109	0.312	0	1
A household member has health insurance that covers child	10112	0.147	0.354	0	1
The child is fully immunized	10118	0.264	0.441	0	1
Amount of the village land that is swamp	7816	77.655	693.854	0	7000
The village air was polluted in the last 12 months	8192	0.124	0.329	0	1
Villagers defecate in the river	8114	0.664	0.472	0	1
Number of mother & child health posts accessible from the village	8114	7.056	6.597	0	45

REFEREE'S APPENDIX:

In addition to its effect on health in adulthood, poor childhood health could also reduced educational attainment. There are two avenues through which this could occur. First, poor health is associated with more days of missed school and this is likely to lead to reduced academic performance. Second, poor health may also have a direct impact on cognitive development. The IFLS allows us to investigate the impact of poor general health on each of these inputs into educational attainment because a cognitive and a math assessment test were administered to respondents aged 7 and above. Those aged 7 to 14 were asked twelve cognitive questions and five simple math questions. The math test tests simple algebra. In the cognitive test the respondent is presented with a number of patterns and has to choose a piece that completes the pattern. Both tests are multiple choice. From the test results, we construct the percentage of correct answers on the cognitive test and the percentage of correct answers for the math test. The cognitive test examines skills in abstract reasoning and does not directly examine skills learnt at school. In contrast, the mathematics test examines numeracy skills learnt at school, and for this reason we use an individual's math test score as a measure of their academic achievement. Because we are interested in determining the impact of poor health on these outcomes (as opposed to the impact of being unwell at the time of the test), we exploited the panel nature of the IFLS data and examined whether being in poor health in the past (defined as being in poor health in the 1997 survey) leads to reduced current cognitive development and academic achievement.

INTELLECTUAL DEVELOPMENT AND ACADEMIC ACHIEVEMENT
Dependent variable is percentage correct

	Cognitive test		Math Test	
	coefficient	***z-score***	***coefficient***	***z-score***
ln(household income)	1.91	4.75	1.94	4.07
ln(household size)	-2.60	-2.27	-2.34	-1.80
poor health in 1997	-1.62	-1.09	-3.33	-1.98
age is 6				
age is 7	4.29	0.49	4.11	0.25
age is 8	10.97	1.24	11.98	0.73
age is 9	15.87	1.80	17.73	1.08
age is 10	19.33	2.20	20.73	1.26
age is 11	25.08	2.85	24.04	1.47
age is 12	25.35	2.88	26.61	1.63
age is 13	27.98	3.17	27.63	1.68
age is 14	27.77	3.13	26.55	1.61
age is 15				
Mother's highest level of education: primary school	3.77	2.66	4.37	2.70
Mother's highest level of education: lower secondary school	8.88	5.07	8.62	4.14
Mother's highest level of education: upper secondary school	8.27	4.51	10.46	4.80
Mother's highest level of education: tertiary	6.73	2.99	9.96	3.79
Father's highest level of education: primary school	6.53	3.93	5.87	3.13
Father's highest level of education: lower secondary school	7.84	3.94	6.28	2.84
Father's highest level of education: upper secondary school	9.58	4.86	8.44	3.70
Father's highest level of education: tertiary	12.58	5.70	9.86	3.92
R-squared	0.24		0.21	
N	4790		4790	

Control variables include: gender, the presence of the child's mother in the household, the presence of the child's father in the household, the mother's age interacted with an indicator for mother's presence, the father's age interacted with an indicator for father's presence, indicators for the religion of the head of the household, rural residence and the province of residence, indicators for whether the person who assessed the child's health in 1997 (the respondent) was the child, child's mother, child's father or another adult household member (the omitted category).