Childhood Health and Household Income

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Abstract

Health Economics literature is rich with studies that find a positive association between childhood health and family income. This relationship is also known as childhood health and income gradient. Several other studies also find that this gradient becomes steeper as children age. This research paper empirically reexamines this phenomenon using 2009-2012 data from the National Health Interview Survey. While the study finds the existence the gradient effects, it finds the gradient to be flatter than those found earlier studies.

Introduction & Background

Childhood health is important for children's human capital development and in turn, has serious implications for their future success. Health economics literature is rich with studies that find a strong positive effect of family income on childhood health. This relationship between childhood health and family income is known as the child health–income gradient and is used to explain the disparity between the health statuses of wealthier and poorer children.

One of the pioneering papers in this area is by Case et al. (2002). The authors not only find a strong effect of family income on childhood health status, but also find this relationship to be even stronger as children age. In other words, they find the income-health gradient to be steeper as children age. The intuition behind a positive association between household income and childhood health is fairly straightforward where wealthier parents manage to afford better medical care and nutritional food items, resulting in better health outcomes. The study attributes the emergence of chronic conditions in early childhood and the accumulation of those effects as the children become older to explain the steepening gradient. While wealthier children are equipped

with better health care facilities manage to tackle the chronic conditions, the adverse health effects of chronic conditions accumulates over time for poorer children in absence of proper health care due to low income. The study by Case et al. (2002) has been very influential in the health economics literature and has been a guiding paper for many other studies. Currie et al. 2007 uses an English data set to recreate the Case et al. (2002) study. The recreated study finds that England also has a child health-income gradient similar to the one in the US. The English gradient while present, is considerably smaller and less steep compared to the one found in the US. The authors attribute this to the single payer health care system in UK which allows the entire population to access health insurance. However; the existence of a gradient has shown that there are some external factors outside the access to health insurance that causes the gradient to steepen as children age.

In a similar study, Khanam et al. (2009) find the gradient effect to be smaller in Australia in comparison to the US and the UK. The authors find the effect of income on health to be lower once the model controls for additional factors such as parental education and parental health. The paper argues that parental health may be the best indicator of child health in poorer households in Australia. In contrast, Reinhold et al. (2012) find the gradient effect in Germany to be as strong as that in the U.S. However; even though the gradient exists in Germany, the effect of income did not accumulate with age. Reinhold et al. (2012) found similar results to Case et al. (2002) for chronic conditions. Wealthier children were able to manage their chronic conditions better. In a recent paper, Currie et al. (2008) examine this effect in the wake of rapid public health care coverage expansions in the US. The paper primarily focuses on the effect of

expanded Medicaid to children post 1996. While the authors find the existence of such gradient effect in the US where poorer children face adverse health conditions as they age, they find this effect to have wakened in comparison to Case et al. (2002). Interestingly, the authors find Medicaid contributing to better childhood health as children age, leading them to explore other causes of poor childhood health.

Given the background, the primary objective of this paper is to reexamine the health-income gradient effect in the US. This is an important contribution given that the most of the studies cited earlier on the US utilizes the data that are at least a decade old and there have been some significant health care reforms that have greatly increased insurance coverage in the US which may have led to a change in the child health-income gradient. The paper finds a gradient effect between childhood health and household income and the effect of income is still found to be increasing with age. However, in comparison with other studies, this paper finds the gradient to be flatter. There are some other factors, such as parental education, that are becoming more important in early childhood that has changed from past literature.

Data

The data source used in this research is from the National Health Interview survey (NHIS). This survey collects data on a wide range of demographic, health, and insurance related variables for both children and adults. The data in this paper covers information from 2009 to 2012 for children below 18 years. The summary statistics for the corresponding data set is reported in table 1.

Table 1 – Summary Statistics

Variable	Mean	Standard Deviation
Age	8.537	5.156
Health Status	1.678	0.841
Log income	9.835	1.038
Family Size	1.462	0.345
Male	0.511	0.500
Black	0.169	0.375
Father Present	0.0341	0.182
Mother Present	0.264	0.441
Mom High School	0.738	0.440
Dad High School	0.553	0.497
Private Insurance	0.022	0.145
Medicaid	0.018	0.131
Public Insurance	0.004	0.066
Number of Observations	**90,220**	

SOURCE: NHIS

In the NHIS health is rated on a scale of 1 to 5, 1 being excellent and 5 being poor. The health status information for the children is based on parental opinion, not from medical observation. The data that this paper uses is for children under 18. The average age is 8.537 and average health status is 1.678. The mean income is $18,676 and natural log is used to keep income measures consistent with past literature. The parental variables, Mom High School and Dad High School, are defined as if the parents have 12 or more years of education. Roughly 74 percent of the mothers and 55 percent of the fathers had more than 12 years of education. The parental education variables are dummy variables, which means if the parents have their high school diploma or more, the variable takes the value of 1 and if they do not have 12 years of education it takes a value of 0. This is similar to the demographic variables where if the child has that characteristic the variable takes the value of 1.

About 50 percent of the sample was male and approximately 17 percent were African American.

Model

The estimated model in this paper is similar to that proposed by Case et al. (2002). The dependent variable is childhood health status as a function of household income, parental controls variables on insurance availability and additional variables to control for regional and year effects.

ChildhoodHealth=$\alpha_0 + \beta_1 \ln(family\ income) + \beta_2 Father's\ education +$

$\beta_3 Mother's\ education + \beta_4 FatherPresent + \beta_5 Mother\ Present + \beta_6 \ln(family\ size) +$

$\beta_7 Black + \beta_8 Male + \beta_9 PrivateInsurance + \beta_{10} Medicaid + \beta_{11} PublicInsurance +$

$\beta_{12} Region + \beta_{13} YearofSurvey + e)$

The model is estimated using the ordered probit estimation methodology given that the dependent variable is not a continuous one and takes values between 1 through 5.. This model is estimated for four different age groups 0-3, 4-8, 9-12, and 13-17 to evaluate the changes to income-health gradient as children age.

Results

The estimated ordered probit coefficients are reported in table 2. Panel A reports the effect of household income on childhood health status for different age groups. The estimated coefficients are negative and significant at the 1% level which emphasizes the importance of household income in influencing childhood health[1]. As we can see, the absolute values of the coefficients marginally increase as we move to older age groups. This corroborates that the accumulated effect of income on childhood health as a child ages as cited by the literature.

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[1] The coefficients are negative because the worse value health status can have is 5 and the best is 1. Trending towards 1 is an optimal outcome.

Table 2 – Ordered Probit Estimations

Health Status	Ages 0-3	Ages 4-8	Ages 9-12	Ages 13-17
	Panel A			
ln(family income)	-0.224***	-0.224***	-0.261***	-0.272***
	(0.000)	(0.000)	(0.000)	(0.000)
	Panel B:			
ln(family income)	-0.116***	-0.162***	-0.201***	-0.209***
	(0.000)	(0.000)	(0.000)	(0.000)
Family size	0.339***	0.212***	0.140***	0.148***
	(0.000)	(0.000)	(0.000)	(0.000)
Male	0.059***	0.079***	0.051***	-0.029**
	(0.002)	(0.000)	(0.004)	(0.036)
Black	0.065*	0.075***	0.126***	0.130***
	(0.016)	(0.000)	(0.000)	(0.000)
Father Present	-0.084	-0.068	-0.073	-0.054
	(0.280)	(0.119)	(0.129)	(0.143)
Mother Present	-0.028	-0.019	-0.016	-0.020
	(0.362)	(0.416)	(0.603)	(0.392)
Mom High School	-0.162***	-0.150***	-0.130***	-0.150***
	(0.000)	(0.000)	(0.000)	(0.000)
Dad High School	-0.264***	-0.212***	-0.180***	-0.186***
	(0.000)	(0.000)	(0.000)	(0.000)
	Panel C:			
ln(family income)	-0.117***	-0.164***	-0.202***	-0.208***
	(0.000)	(0.000)	(0.000)	(0.000)
Medicaid	-0.046	0.070	0.145*	0.161***
	(0.496)	(0.159)	(0.040)	(0.003)
Public Insurance	-0.188	-0.327***	0.137	0.348***
	(0.222)	(0.002)	(0.284)	(0.000)
Number of Observations	16250	28627	17205	28138

Source: NHIS, Controls 1 is just a basic function between health status and ln(family income). NHIS controls 2 introduce the race, gender and parental controls as well as the region and year controls. The final control group uses the same controls as the second but introduces the insurance variables. (*) significant at 10 %;(**) significant at 5%; (***) significant at 1%.

Panel B estimates the model after including additional control variables. A clearer picture emerges once we compare the estimated coefficients for the income variable across different age groups. As we can see, the absolute values of the coefficient increase as we move to higher age groups. This provides evidence that the income health gradient becomes steeper as children age and further highlights the accumulated effect of income on childhood health. The estimated model in Panel B also provides additional insights. Though parental presence has a positive effect on childhood health,

it is not statistically significant. The Black and male coefficients both have positive values for almost every age group for both. This infers that the likelihood of being in poor health is higher for a male or an African American. The effect of parental education on childhood health is positive and significant. Intuitively this is important because parents that are better educated are more likely to be better informed and have a greater knowledge of their child's health. This helps these children to have better health statuses because their parents are able to help them better. Interestingly, the effect of father's education is stronger than that of mother's which comes as a contrast to the earlier literature which finds a stronger role for mother's education.

The Panel C reports the results for the expanded model that controls for insurance availability along with the controls included in Panel B. For conciseness, we only report the estimated coefficients for the income and insurance variables. The coefficients on income reveal similar information to those reported in panel A and B. The coefficient on Medicaid is negative and insignificant for the lowest age group, but the coefficient becomes positive as we move to older age groups. In fact, it becomes positive and significant for the last two age groups. This implies that older children with access Medicaid have a higher chance of being in worse health. This may be because children with access to Medicaid are already in the poorer income brackets so they may be experiencing some of the other adverse effects and the results are showing that just having access to Medicaid is not increasing their chances of being in good health. The results are similar for other forms of publicly offered insurance.
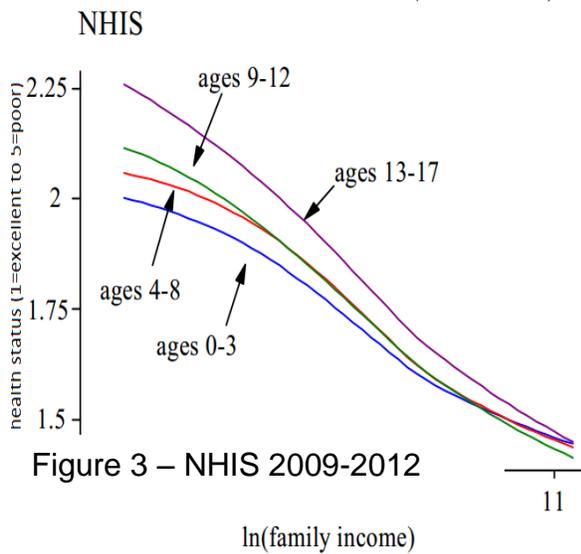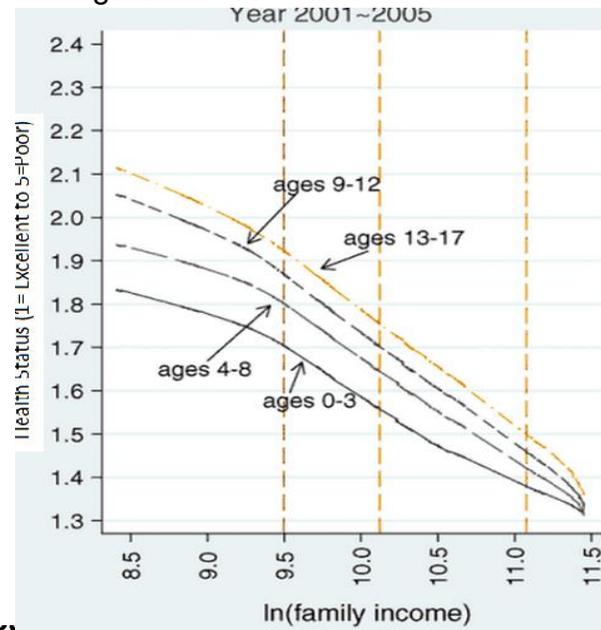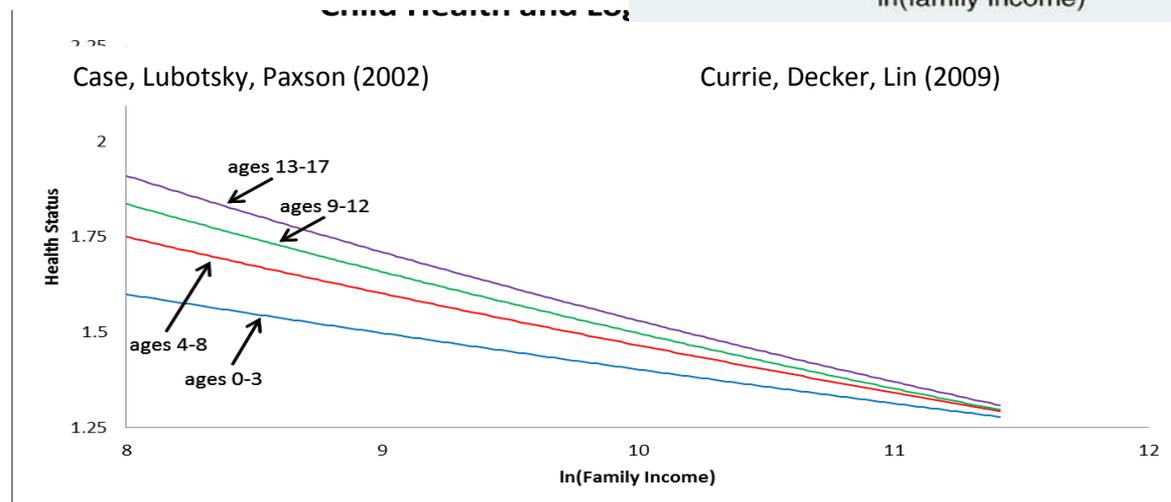
Figure 1 - NHIS 1986-1995

Figure 2 - 2001-2005

Figure 3 – NHIS 2009-2012

Case, Lubotsky, Paxson (2002)

Currie, Decker, Lin (2009)

The above figures compare the evidence on income-health gradient from three different studies on the US that utilizes the NHIS data for different time periods. Figures 1 and 2 are from Case et al. (2002) and Currie et al. (2007), and correspond to period 1986-1995 and 2001-2005 respectively. Figure 3 reports the evidence from our study and corresponds to 2009-2012. The common theme among these three figures is that household income affects childhood health positively and the gradient steepens as children age. Interestingly, the gradient flattens as from 1986-1995 through 2009-2012. This implies that though income is an important variable in determining childhood

health, its effect has weakened over time. This can be attributed to various control variables that are included in the model. The most important one is the parental education. As we know, the educational attainment of US population has grown over time. Given that educated parents are better informed and affect childhood health positively, the flattening gradient can be attributed to parental education. Also, the access to insurance and public health care has increased over the last two decades, hence can be argued to be factors contributing to flatter income-health gradient.

Policy Implications

Many of the recent policies regarding health insurance reforms over the past 20 years have focused intensely on the expansion of health coverage. While expanding coverage allows more people to see a physician and be able to take care of themselves before it becomes an emergency, there are other factors that are more relevant affecting childhood health. One of the factors that policy makers should consider beyond the provision public health insurance is the provision of health education both to children as well as to parents. As our previous analysis shows that parental education is one of the very influential factors that have contributed in flattening the gradient. This is important in the sense that such health education programs make parents more aware of their child's health and hence, will help them to make informed decision to improve their children's health by utilizing the available insurance. Further, the literature cited earlier also finds the existence of gradient effect even in countries with universal health insurance coverage. This further indicates that simply expanding health insurance coverage is not enough to make the gradient disappear. Universal health coverage does stabilize the gradient, however; this has allowed more poor people to have their

children stay in better health longer. Future health policy may want to make an attempt to improve the health of older children. Older children tend to be in worse health than younger children and this might be due to a lesser utilization of insurance among adolescents in poorer households. Focusing on making their health better, possibly through education programs or creating more incentives to see the doctor, could lead to a greater equalization in human capital by the time they reach early adulthood.

Conclusion

This paper makes an important contribution to the health economics literature by empirically reexamining the concept income health gradient for the US by using 2009-2012 NHIS data. The empirical exercise reveals the existence of gradient effect, albeit much flatter that is documented in the literature. Importantly,   other factors such as parental education are important contributors in flattening this gradient effect. Further the study emphasizes that expansion of medical coverage cannot be the lone solution to eliminate this effect as the study finds older children to have weaker health even in the presence of public health coverage programs

As an extension, it will be interesting to reexamine the contribution of chronic conditions in explaining the existence of gradient effects. It would be interesting to see if poorer children are still more likely to be diagnosed with these diseases even in the presence of an increased access to health insurance. Also extending the research to include more detailed parental variables could provide some more insights on how to help parents help their children. This could lead to some important information that could be used in future health care reform policies.

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