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**Article**

## Causes and consequences of early life health

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14688, January 2009.

<sup>57</sup> “Bretton Woods II Still Defines the International Monetary System,” NBER Working Paper No. 14731 February 2009.

<sup>58</sup> Yin-Wong Cheung, Menzie Chinn, and Eiji Fujii evaluate the claim, made by American politicians, that the Chinese yuan is undervalued in “Pitfalls in Measuring Exchange Rate Misalignment: The Yuan and Other Currencies,” NBER Working Paper No. 14168, July 2008. Also see, “China’s Current Account and Exchange Rate,” NBER Working Paper No. 14673, January 2009, to be

published in *China’s Growing Role in World Trade*, R.C. Feenstra and S.J.-Wei, editors. I test whether/how China has altered its dollar peg over the last four years in “New Estimation of China’s Exchange Rate Regime,” NBER Working Paper No. 14700, February 2009, forthcoming in *Pacific Economic Review*, 2009.

<sup>59</sup> H. Choi, N. Mark, and D. Sul, “Endogenous Discounting, the World Saving Glut and the U.S. Current Account,” NBER Working Paper No. 13571, and *Journal of International Economics*, vol. 75(1), May 2008.

<sup>60</sup> Marcos Chamon and Eswar Prasad

analyze the high Chinese saving rates in “Why are Saving Rates of Urban Households in China Rising?” NBER Working Paper No. 14546, December 2008.

<sup>61</sup> Joshua Aizenman and Yothin Jinjarak project a large drop in China’s current account surplus over the next six years in “The US as the ‘Demander of Last Resort’ and its Implications on China’s Current Account,” NBER Working Paper No. 14453, October 2008.

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## Research Summaries

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### Causes and Consequences of Early Life Health

Anne Case and Christina Paxson\*

On average, wealthy people live longer and have less illness and disease than poor people. This has been well documented across countries, within countries at a point in time, and over time as economic growth occurs. And, the positive correlation between income and health is not limited to the bottom end of the income distribution. Indeed, the *gradient* in health status—the phenomenon that relatively wealthier people have better health and longevity—is evident throughout the income distribution.

However, the causes of the rela-

tionship between income and health are difficult to untangle in adults, and there is little consensus about the relative importance of mechanisms that lead from low income to poor health versus those that lead from poor health to low income. For this reason, we investigate the association between household income and children’s health. By focusing on children, we can eliminate the channel running from health to income: generally, children in the United States do not contribute to family income, so lower earnings of children cannot explain the correlation between poor health in childhood and low family income (although children might reduce parental labor supply, a point we address in our work).

In a series of papers, we explore the links running from low income to poor health in childhood, and document the role of health in the intergenerational transmission of poverty: children born into poorer families experience poorer childhood health, lower investments in human capital, and poorer health in adulthood, all of which are associated with poorer employment opportunities and lower earnings in middle age—the time at which they themselves become parents.

#### Socioeconomic Status and Health in Childhood

Using several large, nationally representative datasets—including mul-

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multiple rounds of the National Health Interview Survey, the Panel Study of Income Dynamics, and the National Health and Nutrition Examination Survey—we find that children’s health in the United States is positively related to household income, and that the relationship between household income and children’s health status becomes more pronounced as children grow older.<sup>1</sup> This continues to be true when we control for a rich set of parental and household characteristics. Moreover, children’s health is most closely related to long-run average household income, and it appears that the adverse health effects of lower permanent income accumulate over children’s lives. Poorer children arrive at the doorstep of adulthood in poorer health and with lower educational attainment—the latter, in part, as a consequence of poor health.

## Mechanisms

A large component of the relationship between income and children’s health can be explained by the arrival and effect of chronic health conditions in childhood. Children from lower-income households are more likely than wealthy children to experience some (although not all) chronic health conditions. In addition, among U.S. children with the same health conditions, those who are richer are reported to be in better health than those who are poorer, suggesting that the chronic conditions of wealthier children are less severe, or are better managed. While this may be because poorer children are less likely to be covered by health insurance, the evidence from research we conducted using data from the Health Survey of England suggests that this is unlikely to be the explanation.<sup>2</sup> Although children in the United Kingdom all have access to medical care through Britain’s National Health Service, the income gradient in children’s health increases with age by the same amount there as in the

United States. We find that the effects of chronic conditions on health status are *larger* in the English sample than in the American sample, and that income plays a larger role in buffering children’s health from the effects of chronic conditions in England.

Children born into wealthier households also are taller on average, at every age, in both the United States and the United Kingdom—partly the result of healthier environments and better nutrition. It has long been recognized that taller people are employed in higher status professions and earn more money. Armed with these facts, we set out to discover the extent to which the better labor market outcomes of taller adults can be traced to their childhood experiences.<sup>3</sup> As early as age 3—before schooling has had a chance to play a role—and throughout childhood, taller children perform significantly better on cognitive tests. The correlation between height in childhood and adulthood is approximately 0.7 for both men and women, so tall children are much more likely to become tall adults. While both genetics and environment have a role to play in the relationship between height and cognition, environmental factors appear to be responsible for two-thirds of the height-intelligence correlation, according to research conducted on cross-trait (height and intelligence), cross-twin correlations between monozygotic and dizygotic twin pairs.

## Economic Consequences of Early Life Health

Having documented the association between early life socioeconomic status, health in childhood, height, and cognitive function, we also were interested in measuring the impact of childhood health and cognitive function on outcomes over the life course. We quantified the lasting effects of childhood health and economic circumstances on adult health,

employment, and socioeconomic status, using data from the 1958 British birth cohort that has been followed from birth (all children born in England, Scotland, and Wales in the same week of 1958) into middle age.<sup>4</sup> Controlling for parental income, education and social class, we find that children who experience poorer uterine environments and poorer health in childhood have significantly lower educational attainment, poorer health, and lower socioeconomic status as adults. Moreover, prenatal and childhood health both appear to have direct effects on health and economic status in middle age: controlling for educational attainment and for socioeconomic status and health in earlier adulthood, we find that markers of prenatal and childhood health are significant predictors of health and economic status at age 42.

For both the United States and the United Kingdom, we find that the association between height and earnings is economically significant. For the United States, results from the PSID indicate that an increase in men’s heights from the 25<sup>th</sup> to the 75<sup>th</sup> percentile of the height distribution—an increase of four inches—is associated with an increase in earnings of nearly 10 percent. Furthermore, this association is not driven by lower earnings of unusually short people, but rather is observed throughout the range of heights. Although men earn more than women on average at all heights, the average increase in earnings with height is similar for men and women. We were able to use two British birth cohorts—the 1958 and 1970 cohorts, both followed through time—to document the association between cognitive function in childhood (measured at several points in time), height in adulthood, and earnings. We find that the “height premium” in the labor market—in which each inch of height is associated with approximately 2 percent higher earnings—is largely explained by test scores in childhood. These

results are consistent with taller individuals earning more on average, not because of their height *per se*, but rather because of the cognitive skills with which height is correlated. We corroborate our findings from the British birth cohorts with those from the British Household Panel Study (BHPS), which allowed us to look at individuals of all working ages.<sup>5</sup> We find in the BHPS that each inch of height is associated with a 1.5 percent increase in wages on average in the United Kingdom, for both men and women. Half of the premium can be explained by the association between height and educational attainment among BHPS participants. Of the remaining premium, half can be explained by taller individuals selecting into higher status occupations and industries. These effects are consistent with our earlier findings: that taller individuals on average have greater cognitive function, which manifests in greater educational attainment and better labor market opportunities.

The impact of early health and environment, as measured by height, continues to have an effect later in life. We investigate the relationship between height, cognitive function, and health status at older ages, using longitudinal data collected by the Health and Retirement Study (HRS).<sup>6</sup> We use several waves of data from the HRS to document the extent to which height is associated with more favorable outcomes for individ-

uals above the age of 50. We find that taller men and women have greater cognitive function on average, measured on a wide variety of dimensions. They report significantly fewer difficulties with activities of daily living, on average, and significantly greater health and mental health. We find too that the greater educational attainment of taller adults followed by the HRS could explain their better cognitive outcomes at older ages. However, in the absence of data from cradle to grave on cognition, it is not possible to know this. One possibility is that education plays a causal role in helping individuals to maintain cognitive ability over time. Another is that higher educational attainment reflects better early-life cognitive ability, which persists into old age. Yet another explanation is that educational attainment is a better marker for early-life economic advantage than are respondents' own reports of childhood socioeconomic status. Future research that uses data on cohorts followed from early to late life may shed light on which of these mechanisms are at work.

How does early life socioeconomic status protect children's health? We have not seen mothers paste dollar bills to their children to keep them healthy—we suspect that studying interactions between mothers, who are generally the gatekeepers for children's health, and the health care system may yield additional insights.

<sup>1</sup> A. Case, D. Lubotsky, and C. Paxson, "Economic Status and Health in Childhood: The Origins of the Gradient," NBER Working Paper No. 8344, June 2001, and *American Economic Review* 92(5) (December 2002), pp. 1308–34.

<sup>2</sup> A. Case, D. Lee, and C. Paxson, "The Income Gradient in Children's Health: A Comment on Currie, Shields, and Wheatley Price," NBER Working Paper No. 13495, October 2007, and *Journal of Health Economics* 27(3) (January 2008), pp. 801–7.

<sup>3</sup> A. Case and C. Paxson, "Stature and Status: Height, Ability and Labor Market Outcomes," NBER Working Paper No. 12466, August 2006, and *Journal of Political Economy* 116(3) (June 2008), pp. 499–532.

<sup>4</sup> A. Case, A. Fertig, and C. Paxson, "The Lasting Impact of Childhood Health and Circumstance," NBER Working Paper No. 9788, June 2003, and *Journal of Health Economics* 24 (January 2005), pp. 365–89.

<sup>5</sup> A. Case, C. Paxson, and M. Islam, "Making Sense of the Labor Market Height Premium: Evidence from the British Household Panel Study," NBER Working Paper No. 14007, May 2008, and *Economic Letters* 102(3) (December 2008), pp. 174–6.

<sup>6</sup> A. Case and C. Paxson, "Height, Health and Cognitive Function at Older Ages," *American Economic Review Papers and Proceedings* 98(2) (May 2008), pp. 463–7.