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# When it comes to survival, mind matters more than money

**Life expectancy at birth has increased dramatically across the globe. The widely held assumption that health and survival improved due to higher living standards with medical progress also contributing, is being disputed by new research indicating that education in fact drives all these changes.**

→ Setting policy priorities in both developing and industrialized countries is influenced by whether income or education is the most important underlying determinant of mortality decline. The answer matters for choosing between programs that directly promote income growth and those that enhance school enrollment and quality of schooling. While one would ideally promote both of these goals along with good health services, reality often necessitates choices between these priorities.

→ Since improving health, income, and education are closely interwoven, it appears difficult to determine the exact patterns of causation. As causes must however always precede consequences, and observed increases in schooling come decades before the resulting higher educational attainment of adults, this problem can be resolved. It is not the fact of being in school but rather the consequent adult skills and knowledge, which results in the behaviors that tend to bring down mortality.

→ Our analysis shows that better education has positive consequences on both higher income and higher life expectancy, thus resulting in a not necessarily causal association between the two.

→ Better education also tends to lead to improved cognition, which is in turn associated with longer planning horizons and more conscious choices of health-related behaviors. These mental factors become increasingly important as the burden of disease shifts from infectious to chronic diseases more closely associated with lifestyle decisions.

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## Introduction

Life expectancy at birth has increased dramatically in virtually all countries over the last few decades. Today, the global average stands at 72 years, compared to just 46 years in 1950, and global child mortality has declined from 22% to 4% over the same period. Despite the magnitude of this remarkable achievement, surprisingly little consensus exists about the drivers of this major success.

## Drivers of change

Global development and economic research communities have widely assumed that health and survival improve primarily as a consequence of higher standards of living, while medical progress plays a secondary role. A reference point for much of the analysis has been the ***Preston Curve***, which illustrates the global relationship between gross domestic product (GDP) per person and life expectancy over the twentieth century. This work reveals a strong but diminishing effect with higher incomes, as well as an upward shift of the curve (Figure 1), which has been interpreted as the effect of medical progress and health care over and above the effect of income.

An alternative view, which has received much less attention, claims that low mortality does not come as an unplanned spin-off from economic growth but rather results primarily from higher female autonomy associated with better female education. In a new paper, researchers tested the two opposing hypotheses with new global data up to 2015, finding that increasing education levels explain the observed life expectancy improvements much better than increasing income.

## Examining the data

The new study revisits the influential Preston paper on the relationship between income and life expectancy for most countries of the world in the 1930s and 1960s, and extends the analysis to the period 1970-2015. Figure 1A shows that the distinct pattern identified by Preston continues over the subsequent half century.

Figure 1B plots the same kind of relationship, replacing GDP per person with the mean years of schooling of the adult population to determine whether educational attainment could be a better predictor of life expectancy than income. The associations are very different, with the curves becoming largely linear and

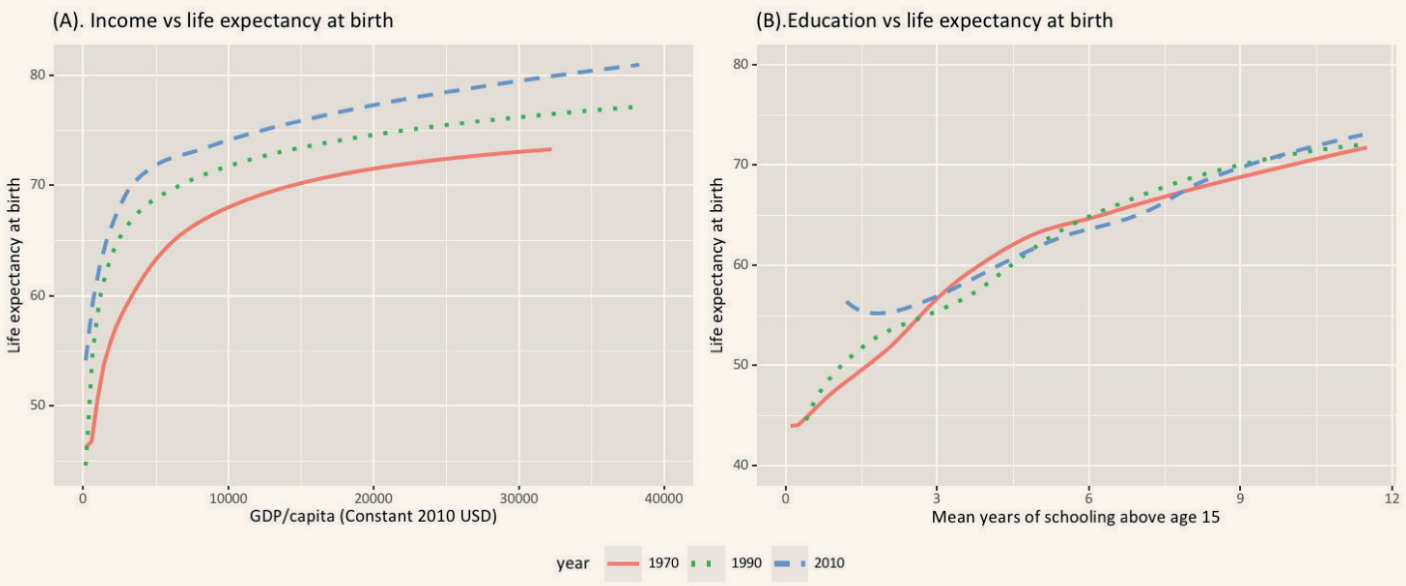


*Figure 1: (A) The relationship between gross domestic product (GDP) per person and life expectancy over the twentieth century. (B) The relationship between mean years of schooling of the adult population and life expectancy over the twentieth century.*

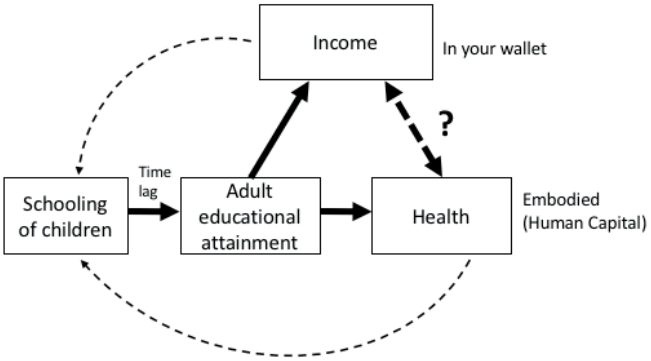


*Figure 2: Possible effects between education, health, and income.*

overlapping. This suggests that educational attainment is a better predictor, in the sense that its effect on life expectancy does not diminish at higher levels and, in particular, that the curve does not shift upwards over time, which points to an additional relevant factor.

To validate this visual analysis, the study conducted multivariate analyses on a balanced panel of 174 countries for 1970–2015, which in addition to GDP per person and mean years of schooling of the adult population, included country and period fixed-effects. In all of the models the effect of educational attainment on life expectancy is highly significant in the expected direction, and the standardized coefficients are clearly larger than those of income.

## A chicken or egg scenario

How can we solve the important question of "what causes what", considering the complex interactions between education, health, and income? Figure 2 illustrates the possible effects among the three. Establishing the causal chain is made clearer by a pattern of time lags. Income and health can, for example, only influence education during the time of schooling (education flow), but not the resulting human capital of adults (education stocks) that is decisive for developing better cognition, a longer time-horizon, and other aspects that change health-related behavior. Improved human capital also tends to lead to higher income. Hence, functional causality can be established according to three specified criteria: a strong empirical correlation, a valid narrative of the causal mechanism, and ruling out alternative explanations such as selectivity and reverse causality. For the effect of educational attainment on health, all three criteria seem to be met.

To study the possibility of a different pattern for the determinants of child mortality, the study carried out the analysis separately for under-five mortality (Figure 3). Again, for the association with GDP per person there was strong non-linearity and a shift of the curve over time that was particularly pronounced between 1970 and 1990. Viewed in relation to Mean Years of Schooling of women aged 20–39, the relationship was again much more linear with virtually no shift between 1970 and 1990. Between 1990 and 2010, child mortality in the countries with the highest-mortality rates declined more rapidly than suggested by the gains in mothers' education. This is an indication that massive efforts by the international community and

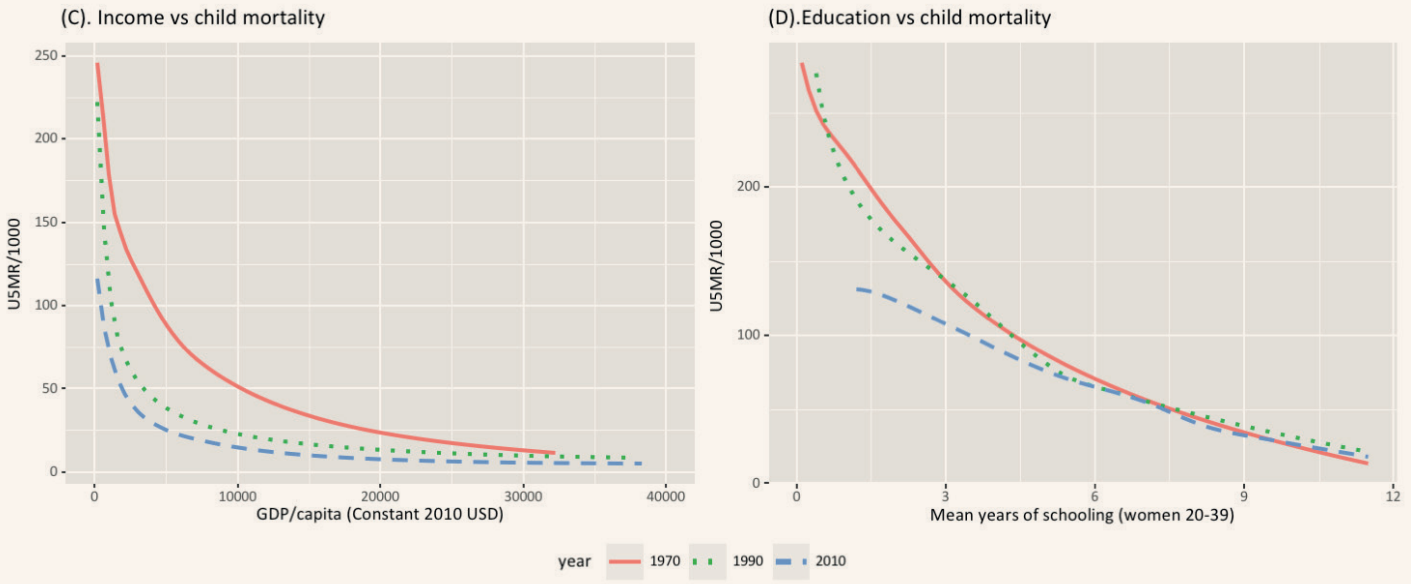


*Figure 3: Effect of income (C) and education (D) respectively on the under-five mortality rate (U5MR).*

private donors to lower child mortality in recent years for some of the least developed countries were indeed successful, and resulted in a greater child mortality decline than would be expected from improving educational attainment alone. This was not equally the case with respect to adult mortality.

## Prioritize education for all

This new study on the importance of cognition and education for improving health and longevity falls into a line of earlier IIASA research that established the importance of improving educational attainment for multiple dimensions of development. In particular, this work found that universal primary and secondary education is key for poverty eradication and economic growth, as well as for strengthening adaptive capacity to climate change. Together, these analyses suggest that universal education and health can indeed be considered as root causes of development and deserve to be seen as priority policies when it comes to trying to meet the Sustainable Development Goals because they are prerequisites for successfully meeting the other goals.

In sum, the global time series analysis of national data discussed here, strongly suggests that the apparent positive association between health and income can largely be attributed to increasing educational attainment, which simultaneously leads to rising incomes and better health outcomes. In other words, empirical evidence supports the hypothesis that the apparent association between GDP and life expectancy as depicted by the Preston curve and widely assumed in the literature is a spurious one, with education in fact driving both changes.

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## REFERENCES AND USEFUL RESOURCES

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