Health, nutrition and prosperity: a microeconomic perspective*

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Abstract A positive correlation between health and economic prosperity has been widely documented, but the extent to which this reflects a causal effect of health on economic outcomes is very controversial. Two classes of evidence are examined. First, carefully designed random assignment studies in the laboratory and field provide compelling evidence that nutritional deficiency — particularly iron deficiency — reduces work capacity and, in some cases, work output. Confidence in these results is bolstered by a good understanding of the underlying biological mechanisms. Some random assignment studies indicate an improved yield from health services in the labour market. Second, observational studies suggest that general markers of nutritional status, such as height and body mass index (BMI), are significant predictors of economic success although their interpretation is confounded by the fact that they reflect influences from early childhood and family background. Energy intake and possibly the quality of the diet have also been found to be predictive of economic success in observational studies. However, the identification of causal pathways in these studies is difficult and involves statistical assumptions about unobserved heterogeneity that are difficult to test. Illustrations using survey data demonstrate the practical importance of this concern. Furthermore, failure to take into account the dynamic interplay between changes in health and economic status has led to limited progress being reported in the literature. A broadening of random assignment studies to measure the effects of an intervention on economic prosperity, investment in population-based longitudinal socioeconomic surveys, and application of emerging technologies for a better measure of health in these surveys will yield very high returns in improving our understanding of how health influences economic prosperity.

Keywords Iron/deficiency; Deficiency diseases/economics; Nutritional status; Efficiency; Employment; Causality; Cost of illness; Socioeconomic factors; Epidemiologic studies (*source: MeSH, NLM*).

Mots clés Fer/déficit; Carences nutritionnelles/économie; Etat nutritionnel; Efficacité (Economie); Emploi; Causalité; Coût maladie; Facteur socio-économique; Etude analytique (Epidémiologie) (*source: MeSH, INSERM*).

Palabras clave Hierro/deficiencia; Enfermedades carenciales/economía; Estado nutricional; Eficiencia; Empleo; Causalidad; Costo de la enfermedad; Factores socioeconómicos; Estudios epidemiológicos (*fuente: DeCS, BIREME*).

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Introduction

Health and economic prosperity go hand in hand. In micro and macro data, there is abundant evidence that a wide array of health indicators are positively associated with many different dimensions of economic prosperity (see reference (*1*) for an excellent review). Explanations for this association have been much debated.

Isolating the causal pathways linking health and economic outcomes has been a central issue. It is likely that causality runs in both directions. First, higher income individuals invest more in human capital, including health: as their income grows, they invest in better diets, improved sanitation and better health care. Second, if a worker is healthier, less susceptible to disease, and more alert and more energetic, then he or she will probably be more productive and command higher earnings.

This paper focuses on the second pathway and examines the scientific evidence regarding the effect of health on economic prosperity in low-income settings from a micro-economic perspective. While the establishment of this link is not straightforward, the weight of evidence points to nutrition, and possibly other dimensions of health, as significant determinants of economic productivity.

We first discuss experimental and quasi-experimental studies which randomized the subjects into treatment and control groups and examined the impact of an intervention. These studies provide direct evidence on the causal effect of health on the outcomes studied. We then turn to observational studies, which are typically based on survey data and are estimated in conjunction with a model of behaviour that seeks to provide a plausible argument for interpreting the evidence in a causal framework. We conclude that exploiting the advantages associated with each of these complementary approaches is likely to yield important insights about the pathways through which health affects economic prosperity.

Studies and results

Experimental and quasi-experimental studies of health and labour outcomes

The link between nutrition and productivity arguably provides the best documented evidence on interrelationships between

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health and economic prosperity. The evidence suggests that, along with genotype and environmental influences, diet plays a role in the etiology of many chronic diseases. We focus first, therefore, on nutrition.

Substantial strides have been made in our understanding of the links between nutrition and health in low-income settings. Attention has shifted from focusing primarily on inadequate energy or protein intake to incorporating the influence of micronutrients such as iron, iodine, zinc, calcium and several key vitamins. This literature suggests that work output and other labour outcomes are probably influenced by both macro- and micronutrients.

Experimental designs are well suited to isolate the impact of specific nutrients on labour outcomes. Several studies have demonstrated that there is a causal effect of iron deficiency on reduced work capacity (see reference (*2*) for an excellent review). Iron plays an essential role in oxidative energy production. Iron-deficiency anaemia (IDA, with a low level of haemoglobin in combination with low iron stores) is associated with, inter alia, a greater susceptibility to disease, fatigue, and reduced cognitive development. IDA affects physical activity through two main pathways. As the haemoglobin level declines, the maximum amount of oxygen the body can use (aerobic capacity) also declines. As iron stores become depleted, the amount of oxygen available to the muscles declines, reducing the individual's endurance and causing the heart to work harder for the same activity.

Animal and human studies demonstrate a causal relationship between iron deficiency and reduced maximum aerobic capacity (VO_2max), which changes by about 25–30% depending on whether the subjects are anaemic or receive adequate iron supplementation (*3, 4*). IDA is also associated with reduced endurance at below maximal work rates (*2, 5*).

The demonstration that iron deficiency impedes maximal capacity and endurance does not reveal the economic consequences of iron deficiency in daily life. These consequences may be more closely aligned with energy efficiency (i.e. the amount of physiological energy required to perform a given task) (*6*). In a randomized treatment-control study, female cotton mill workers in China who received iron supplementation for 12 weeks were found to have a 5% increase in gross and net energy efficiencies, compared to the controls who received a placebo. Treatment led to significantly reduced heart rates and a 17% increase in production efficiency but no increase in work output, perhaps because output was constrained by the (conveyor belt) technology of the mill and depended on the outputs of co-workers. The treated women did, however, spend more time and expend more energy on non-work activities (*4*). Similarly, female tea plantation workers in Sri Lanka who received iron supplementation did not increase their output but showed an increase in other voluntary activities (*7*).

A longitudinal study of male rubber workers in Indonesia provides the strongest evidence that iron status causally affects economic productivity (*8*). At the baseline, 45% of the study population was anaemic (haemoglobin $\leqslant 13$ g/dl) and, among these workers, baseline productivity (estimated by the amount of latex collected) was about 20% lower than that of non-anaemic workers. The workers were randomly assigned to iron supplementation or placebo (the control group). After 60 days, the blood haemoglobin, aerobic capacity and work output of those who were initially anaemic and received treatment increased to nearly the levels of the non-anaemic workers (whose biological indicators did not change). Among anaemic workers in the control group, the productivity and blood haemoglobin levels also rose, although the increase was substantially smaller than among the treated individuals (probably reflecting the effect of incentive payments that were made to the subjects). These results suggest that iron supplementation can raise the output of workers with IDA by around 20%. This is a very large effect. A potentially serious issue not addressed in the study is the possibility of selective attrition: thus, while 156 workers were included in the study, there were only 77 in the final sample for analysis. Since those who did not benefit from supplementation were more likely to quit the study, the estimated effect of supplementation will be biased upwards.

In sum, clinical and field studies show that iron deficiency affects an individual's aerobic capacity, endurance, energy efficiency, and work output. Studies of children indicate important impacts on cognition (*9*). These mechanisms suggest a sizeable impact on economic success although there is controversy about the magnitude of that effect, with large impacts having been found in only a few studies. Important questions about whether workers change their behaviour in response to iron supplementation remain. Results from the Chinese and Sri Lankan studies are important because they suggest that iron deficiency had little impact on productivity but did affect how individuals allocated their time. If iron supplementation improves the health and well-being of individuals, we expect that they will be more productive not only at work but in other domains of their lives. Also, they may respond to these changes in many ways, such as changing the nature of their work and the time spent on work. While it is important to understand the full array of these responses, they are difficult to capture in experiments which, by design, isolate specific inputs and outputs in a controlled fashion. We return to this issue below.

Compared with the results for iron deficiency, studies of less specific food supplementation interventions are not as clear. Sugarcane cutters in Guatemala who received calorie supplements were no more productive than the controls (*10, 11*) although, because randomization was at the village level, changes in productivity between villages during the study may confound the estimates. In contrast, calorie supplementation had a small but significant positive impact on the amount of digging by road construction workers in Kenya where the 47 study subjects were randomized at the individual level (*12*).

Experiments and quasi-experiments indicate that several domains of health other than nutrition have a causal impact on economic prosperity. A recent study in the United Kingdom randomly assigned men with back pain to an exercise programme (the treatment group) or to the usual primary care management (the control group). After a year, those in the treatment group reported less back pain and fewer days of missed work compared to the controls (*13*).

Changes in the price of health care have served as useful tools for assessing the impact of health on labour outcomes. The RAND Health Insurance Experiment (HIE) randomly assigned subjects to different combinations of deductibles and co-payments. Those who received free care used more health care, the health benefits being limited to the poorest and most sick (*14*). However, females who received free care increased their labour force participation rate compared to other females;

a similar finding emerged for males who had not completed high school.

A similar experiment in Indonesia involved changes in the prices of health services. User fees at public health centres were raised in randomly selected "treatment" districts while prices were held constant (in real terms) in neighbouring "control" districts. Two years after the intervention, health care utilization and labour force participation had declined in the treatment areas (where prices were raised), compared to the control areas. Reductions in employment were particularly large (and significant) for men and women at the bottom of the education distribution, i.e. those whom we would expect to be the most vulnerable. The most plausible interpretation of both the HIE and Indonesian results is that the average treatment effects on labour supply indicate a causal role of improved health on the allocation of time to the labour market (*15*).

Results from Canada support this conclusion. During the 1960s and early 1970s, national health insurance was introduced in Canada. Exploiting the fact that the introduction of the system was phased across provinces and occupations, Gruber & Hanratty (*16*) found that employment and wages increased as the workers were covered by national health insurance. The authors conclude that labour demand rose because workers were more productive, either because of increased job mobility and therefore better matching of skills or because their health improved as a result of being covered by health insurance.

The introduction of national health insurance was not designed as an experiment, but this study took advantage of the fact that some people were covered by the system earlier than others. The plausibility of the results rests crucially on the extent to which this "natural experiment" approximates to random assignment. (The authors provide a compelling argument in favour of this interpretation.) It is feasible to design health interventions to provide a similar "natural experiment" in order to evaluate the effect of the intervention — on health status and on other outcomes including economic prosperity. It is unfortunate that there have been relatively few such designs.

Experiments and quasi-experiments have many advantages but potential pitfalls as well. First, if the treatment group benefits from the intervention and controls do not, attrition is likely to be selective. Failure to take this into account can undermine the results and the key advantages of an experimental evaluation. Second, most interventions described in the literature have targeted specific individuals. If individuals share the benefits of the intervention with other family members, then the effects of the intervention on the subjects may be underestimated. For example, workers who receive a calorie supplement may eat less food at home and, therefore, other family members share in the "treatment". This raises the more general issue noted above of complex behavioural responses to interventions. Third, the effects of intervening may be difficult to detect in some institutional settings. The Chinese cotton mill workers provide an example, where the technology of production limited the scope for increases in work output in the treatment group. The immediate effects of supplementation on output among these workers were muted, but workers who received supplementation may ultimately reap the benefits of higher productivity by moving to other tasks, other factories or other jobs. These impacts will be missed in studies that do not follow the subjects for long enough. The Chinese study also suggests that focusing on productivity misses an important link between health and prosperity. In addition to changes in work, healthier workers may allocate more time to leisure and home production, which may result in increased well-being. Enhanced productivity of parents at home may also benefit their children.

Observational studies of nutrition and economic prosperity

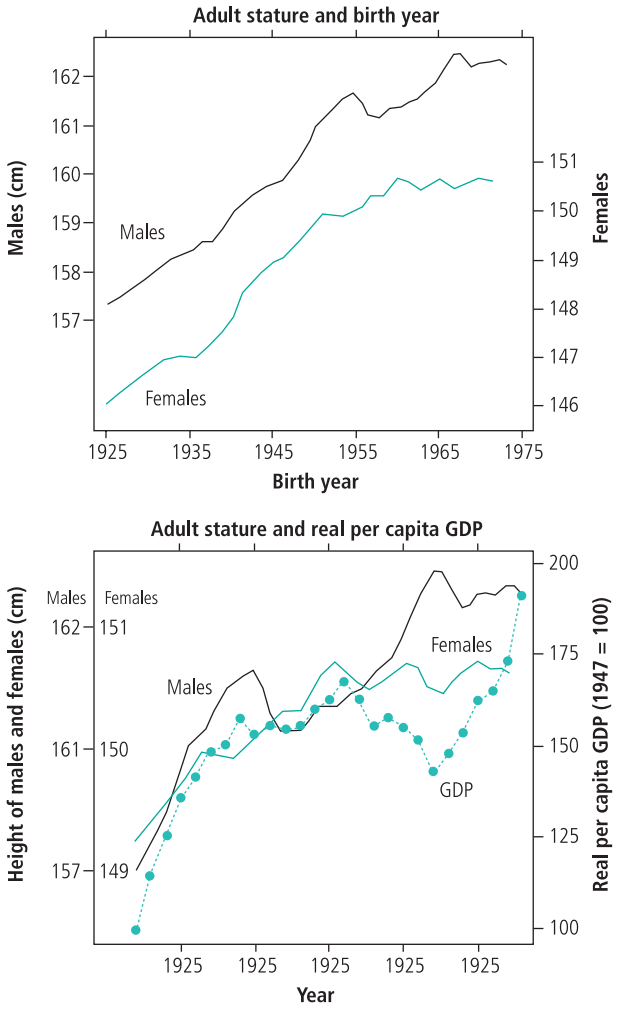
Many early studies of health and productivity focused on the subjects' calorie intakes. The first generation of such studies demonstrated that calories and economic output were positively correlated. Subsequent studies highlighted the importance of unobserved heterogeneity and showed that, when controlled, these positive associations disappeared (*17, 18*). However, studies that treated calories as a choice found that farm outputs (*19*) and the wages of males (*20*) rose with increased calorie intake. Moreover, the per capita calorie and protein intakes had a significant impact on the hourly earnings of both self-employed persons and employees, and the earnings increased with improvements in the quality of the diet — e.g. by increasing the fraction contributed by protein to the total calories (*21*). Arguing that piece-rates were a better indicator of productivity than wages, Foster & Rosenzweig reported that the piece-rate output was affected by calorie intake even after controlling for individual, specific fixed effects (*22, 23*).

A positive impact of calorie intake on productivity is consistent with results from a study made by the Nutrition Institute of Central America and Panama (INCAP) of schoolchildren in Guatemala, in which the treatment group received a high calorie supplement while the controls did not. Those treated were healthier, performed better in school, and had greater work capacity (VO_2max) in early adulthood, compared with the controls (*24*). However, as the supplement was rich in several key micronutrients, the interpretation of these results has been questioned (*25*).

Because nutrient intakes are difficult to measure in household surveys, researchers have turned to anthropometry; the best-documented fact in observational studies is that taller people tend to enjoy greater success in the labour market. Seminal work by Fogel (*26*) has documented secular increases in height which parallel economic growth in the historical literature. Similar patterns have been documented for many of today's low-income countries. The upper panel of Fig. 1 displays the relationship between the year of birth and the attained height of male and female adults who were measured in the 1997 wave of the Indonesia Family Life Survey (IFLS). There was substantial growth in the attained adult height, compared with the generation prior to the 1955 birth cohort — an average increase of about 1.5 cm in each decade. Subsequent cohorts have not fared as well. The figure in the lower panel overlays real GDP per capita in the year of birth for the period after 1947. Considering that adult stature is largely determined during the fetal period and first few years of life, the effects of economic downturns during those years in a person's life will plausibly be reflected in the attained height of an adult. Apparently the link between downturns in the macroeconomy and individual stature is extremely complex and suggests that the scope for households to shift resources across time and among members is considerable. See reference (*27*) for more detail.

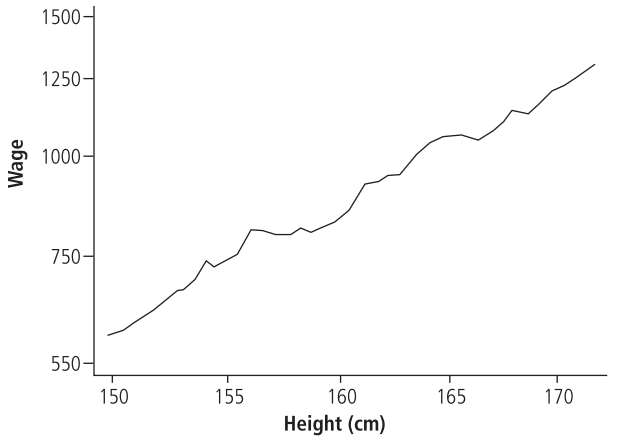
At the micro level, many studies have demonstrated a positive impact of height on hourly earnings. See reference (*28*)

Fig. 1. **Year of birth, attained height and gross domestic product (GDP)**



Source: First Indonesian Family Life Survey. WHO 02.7

Fig. 2. **Association between height (Ln) and earnings (Ln), adult Indonesian males**



Source: Second Indonesian Family Life Survey. WHO 02.8

for a review. Fig. 2 displays this association for adult males in the second wave of IFLS (IFLS2): a 1% increase in height was associated with a 5% increase in earnings. While this empirical result is very robust, its interpretation is complex. Taller people are probably stronger — an attribute that is probably more highly rewarded in lower-income settings. But height is a proxy for more than just strength. Part of height is influenced by genotype and reflects family background. Height is also largely determined in early childhood and reflects a broad array of health and human capital investments made by the parents. This suggests that the correlation between height and wages will diminish as the models control other dimensions of human capital, which is true in the Indonesian data: controlling for age and education cuts the elasticity of wages with respect to height in half, to 2.6%.

In contrast with height, the body mass index (BMI, which is measured by weight/height^2 and expressed in kg/m^2) depends on the net energy intake and so varies through the life course. It captures both longer and shorter term dimensions of nutrition. BMI is related to VO_2max and, thus, to aerobic capacity and endurance (independent of energy intake) (*29–31*). Whether this pathway is one through which health importantly influences productivity is not obvious since many jobs do not require sustained physical effort. Treadmill tests suggest that excess weight (fat) affects the efficiency with which energy is transferred to work output (*32*).

In the developed countries obesity is a central concern; but in most low-income countries, attention has been focused on low levels of BMI (although concerns with obesity are emerging). Data on workers in rural areas of the Philippines indicated that the BMI had no effect on earnings (*21*). However, using the same sample, it was reported that the BMI affected the wages of time-rate workers but not piece-rate workers (*22, 23*). It was argued that health is difficult to observe and employers use the BMI as a marker for health. In urban Brazil, the BMI affected the hourly earnings of both employees and the self-employed, suggesting that the BMI is more than just a health marker (*19*). The authors argue that BMI is probably correlated with strength since its effect is largest among the least educated who are more likely to do manual labour. See also references (*33*) and (*34*). While there is little empirical evidence relating BMI to labour supply, it has been shown to affect the proportion of working time that is spent on very physically demanding activities by men (*35–37*).

Links between the BMI and productivity have not been examined in a dynamic context. This is complicated because BMI has both stock and flow dimensions and thus reflects prior investments in health as well as contemporaneous changes in prices and incomes. In addition, there may be complex lags in how changes in the BMI are translated into changes in aerobic capacity and endurance. The fact that weight can be drawn down and converted to energy in times of need further complicates the dynamics.

More generally, the dynamic links between health and economic prosperity have been little studied. This is an important gap in the scientific literature for several reasons. Health is a stock that evolves over time, and prior health behaviours — and health stocks — are likely to influence current economic status. Virtually nothing is known about the speed with which the effects of health changes at the individual level are transmitted to the labour market in low-income settings. Does a period of poor health (or a negative health

stock) put a worker on a permanently lower wage trajectory or do the negative consequences of ill-health disappear as health subsequently improves? The extent of catch-up is likely to depend on the nature of the health problem, the structure of the labour market, and the characteristics of the worker including age, education and the extent to which the individual has a buffer of resources on which to draw in bad times. Another important advantage of examining the dynamic interplay between health and economic prosperity is that it is likely to help pin down some of the mechanisms through which the two are correlated. Apart from the econometric advantages associated with analyses based on repeated observations of the same person over a period of time, "natural experiments" arising from unanticipated variation in a respondent's life are likely to be a powerful resource in this literature. Reference (*38*) provides a clever example.

Drawing on the IFLS study, Table 1 presents empirical results that help illustrate the importance of thinking about dynamic issues. We focus on the wages of males aged 18 to 68 years. The first column uses data from the 1997 wave of IFLS and indicates that the elasticity of wages with respect to BMI is 2.0; this correlation is displayed in Fig. 3. Results in the second column of Table 1 control height, age, education and location of residence: the elasticity is reduced to 1.0, indicating that current weight does reflect, in substantial part, human capital and background characteristics. Prior BMI might serve as a control for these characteristics and so, exploiting the repeat-observation dimension of IFLS, the BMI measured in 1993 was included (column 3 of Table 1). This does predict current wages, and soaks up some of the correlation with current BMI. Controlling the 1993 BMI, the 1997 BMI is interpreted as a weight gain since 1993: its effect is also positive. However, the interpretation of that correlation is not straightforward. It is possible that the increased wages were spent on more energy intake (or less energy output), or that changes in both wages and weight arise because of some other unobserved factor.

To explore the interpretation of this result, we turned to the wages measured in 1993. Column 4 in Table 1 essentially replicates the 1997 results reported in column 2. Wages in 1993 are related to the BMI in 1993 and the BMI in 1997 in column 5. The 1993 BMI remains significant. However, the weight gained between 1993 and 1997 is a significant predictor of the wages in 1993. This is compelling evidence that the BMI and wages are jointly determined (or influenced by other unobserved factors) and that the regressions in Table 1 cannot be given a causal interpretation. Modelling the dynamics underlying the evolution of health and economic prosperity is clearly an important scientific endeavour.

The last two columns in Table 1 suggest one direction of enquiry. Males who have not completed primary schooling are included in column 6; subsequent weight gain is a powerful predictor of wages in 1993. The final column indicates that for males with at least primary schooling, future BMI does not predict current wages. This suggests that the ability to transfer resources across time (credit markets) may play an important role in mediating the effects of variation in health status and economic prosperity. See reference (*39*) for more details.

Conclusions

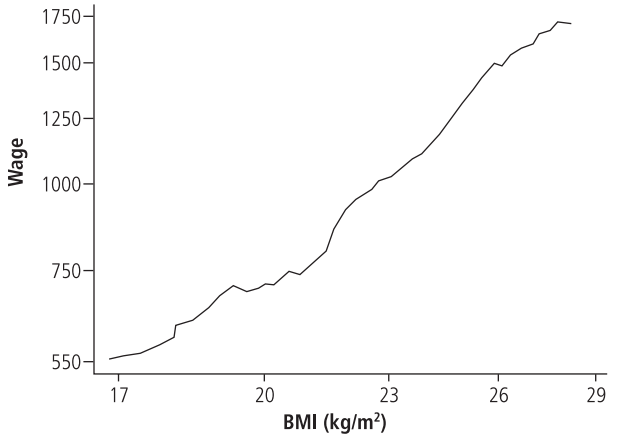
The weight of available evidence indicates that nutritional status affects labour outcomes, particularly productivity. While the exact mechanisms underlying these relationships are not entirely clear, the literature is distinguished by the existence of carefully conducted experimental studies and observational studies that have documented sizeable effects of nutrition on productivity indicators. Explanations based on the underlying biological mechanisms that link nutrients with cell functioning have proved to be a powerful force in support of these

Table 1. **Dynamic relationship between body mass index (BMI) and hourly earnings of adult males[a] (Indonesia Family Life Survey, 1993 and 1997)**

Covariates	Ln (hourly earnings) in 1997			Ln (hourly earnings) in 1993			
	BMI-97 only (1)	Add height and education (2)	BMI-97 and BMI-93 (3)	BMI-93 (4)	BMI-97 and BMI-93 (5)	<Primary school (6)	⩾Primary school (7)
Ln (BMI) in 1997	2.03 (0.12)	1.03 (0.10)	0.82 (0.16)	–	0.35 (0.17)	0.82 (0.31)	0.03 (0.21)
Ln (BMI) in 1993	–	–	0.34 (0.17)	0.96 (0.14)	0.78 (0.18)	0.75 (0.33)	0.85 (0.21)
Ln (height)	–	2.36 (0.34)	2.40 (0.44)	2.27 (0.40)	2.52 (0.44)	3.39 (0.82)	2.00 (0.54)
Years of education (spline)							
0–5 years	–	0.05 (0.01)	0.04 (0.01)	0.05 (0.01)	0.05 (0.01)	0.03 (0.02)	0.00 (0.00)
6–11 years	–	0.09 (0.01)	0.10 (0.01)	0.09 (0.01)	0.10 (0.01)	0.00 (0.00)	0.10 (0.01)
>11 years	–	0.11 (0.01)	0.10 (0.01)	0.14 (0.01)	0.14 (0.01)	0.00 (0.00)	0.14 (0.01)
Age and location controls	No	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.06	0.29	0.30	0.30	0.30	0.14	0.28

[a] The sample included adult males (aged 18 to 68 years) earning income at the time of the survey. Standard errors (given in parentheses) are robust to arbitrary forms of heteroelasticity and take into account correlations due to survey clustering. Age is specified as spline; location includes controls for each province and urban area.

Fig. 3. **Wages (Ln) in relation to body mass index (Ln), adult Indonesian males**



Source: First Indonesian Family Life Survey. WHO 02.9

conclusions, particularly with regard to the important role of iron in nutrition.

A plausible argument can be — and has been — made that other dimensions of health are likely to affect economic prosperity. Compared to the impact of nutrition on productivity, these links have not been as well established in the scientific literature. Remarkably little is known about the dynamics linking innovations in health and innovations in economic prosperity and the kinds of behavioural responses that accompany health innovations.

These are critical gaps in our knowledge. Filling them calls for integrating the advantages of experimental designs with those of broad-purpose social surveys. Longitudinal surveys with repeated observations on the same individual will be required to understand the dynamic aspects of the links between health and productivity. Although this is a standard tool in experimental studies, there is a paucity of longitudinal social surveys in low-income countries. Moreover, few social surveys have attempted to measure health with the same care as experimental studies. Rapidly emerging technologies for health measurements in the field have dramatically reduced the cost and many assessments can be completed in the household with portable equipment. Bio-markers such as saliva, finger-prick blood (dried on filter paper), and hair can all be collected, stored and transported at minimal cost. The collection of a wide array of health indicators in population-based longitudinal social surveys is not only feasible, but also highly desirable. At the same time, broadening health surveys to collect good socioeconomic data, including detailed work outcomes, will substantially enhance the potential contributions of these studies. When these sorts of data are placed in the public domain, scientists will be far better equipped to understand how health affects economic success.

Longitudinal surveys, in combination with the changes that will occur in the global economy, will provide an extraordinarily rewarding investigation for pinning down some of the causal mechanisms linking health and economic success. It is likely, however, that relying on these "natural experiments" alone will not be enough. There are good reasons to expand the horizon of experimental studies. Specifically, measuring the broader socioeconomic outcomes than is typically the case, examining behavioural responses to the treatment, and following subjects for an extended period will substantially increase the contributions of these studies. For example, for an intervention that seeks to eradicate malaria in a given area, one might not only measure the incidence of malaria before and after the intervention, but also track changes in economic productivity as well as behavioural responses to the intervention (such as changes in migration and investments). Since economic and social changes are likely to take some time to emerge, the subjects will need to be followed up well beyond the intervention period. Taking into account the medium and longer term impacts on both health and economic outcomes will therefore be conducive to a more comprehensive assessment of the intervention.

Finally, by coordinating longitudinal social surveys with the interventions, it will be possible to combine the evidence from these complementary approaches and draw conclusions about the effects of health on economic prosperity with greater confidence. To be sure, none of this is easy. However, the challenge provides an extraordinary opportunity for health scientists, social scientists and practitioners to collaborate in order to yield new knowledge which may have a lasting impact on populations throughout the world. ■

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Résumé

Santé, nutrition et prospérité : perspective microéconomique

L'existence d'une corrélation positive entre santé et prospérité économique est largement attestée, mais on ne sait pas exactement dans quelle mesure elle reflète un lien de causalité entre la santé et la situation économique, et cette question est très controversée. Le présent article examine deux catégories de données. Tout d'abord, des études soigneusement conçues d'intervention par tirage au sort, au laboratoire et sur le terrain, montrent clairement que les carences nutritionnelles, et en particulier la carence martiale, réduisent la capacité de travail et dans certains cas la productivité. Ces résultats sont étayés par une bonne connaissance des mécanismes biologiques en cause. Certaines de ces études indiquent un renforcement des effets positifs des services de santé sur le marché du travail. Ensuite, des études d'observation laissent à penser que les marqueurs généraux de l'état nutritionnel, comme la taille et l'indice de masse corporelle (BMI) sont des facteurs prédictifs significatifs de réussite

économique bien que leur interprétation puisse être faussée par le fait qu'ils traduisent des influences remontant au milieu familial et aux premières années de l'enfance. Ces études ont aussi montré que l'apport énergétique et peut-être aussi la qualité de l'alimentation étaient également des facteurs prédictifs de réussite économique. Cependant, l'identification des mécanismes en jeu est malaisée et suppose des hypothèses statistiques difficilement vérifiables sur une éventuelle hétérogénéité inapparente. L'importance pratique de ce problème est illustrée au moyen de données d'enquêtes. De plus, en raison de l'impossibilité de tenir compte des interactions dynamiques entre les modifications de l'état de santé et la situation économique, les progrès rapportés sont modestes. En élargissant les études d'intervention par tirage au sort à la mesure des effets d'une intervention donnée sur la prospérité économique, en investissant dans des enquêtes socio-économiques longitudinales en population, et en appliquant les nouvelles technologies de façon à améliorer la mesure de la santé lors de telles enquêtes, on obtiendra des résultats extrêmement intéressants qui permettront de mieux connaître les mécanismes selon lesquels la santé influe sur la prospérité économique.

Resumen

Salud, nutrición y prosperidad: una perspectiva microeconómica

La correlación positiva existente entre salud y prosperidad económica está ampliamente documentada, pero hay gran división de opiniones en cuanto a si ello denota o no un efecto causal de la salud en los resultados económicos. Se examinan aquí dos tipos de elementos de prueba. En primer lugar, los resultados de estudios cuidadosamente diseñados de asignación aleatoria en el laboratorio y en el terreno demuestran contundentemente que las carencias nutricionales – en particular el déficit de hierro – reducen la capacidad de trabajo y, en algunos casos, el rendimiento laboral. La fiabilidad de esos datos se ve reforzada por el detallado conocimiento de los mecanismos biológicos subyacentes. Algunos estudios de asignación aleatoria muestran un mayor efecto positivo de los servicios de salud en el mercado laboral. En segundo lugar, diversos estudios observacionales parecen indicar que los marcadores generales del estado nutricional, como la estatura y el índice de masa corporal (IMC), tienen un importante valor predictivo del éxito económico, si bien su interpretación se presta a confusión debido al hecho de que reflejan influencias de los primeros años de la infancia y del entorno familiar. Otros estudios observacionales muestran que el aporte calórico y, posiblemente, la calidad de la alimentación también son variables predictivas de los logros económicos. Sin embargo, en estos estudios, la identificación de las vías causales no resulta fácil, y obliga a pergeñar hipótesis estadísticas de difícil verificación sobre la heterogeneidad no observada. Algunos ejemplos basados en datos de encuestas demuestran la importancia práctica de esa limitación. Además, el hecho de no tener en cuenta la interacción dinámica entre los cambios experimentados por la salud y la situación económica ha determinado que los progresos publicados en la literatura sean escasos. La ampliación de los estudios de asignación aleatoria con miras a medir los efectos de una intervención en la prosperidad económica, la inversión en estudios socioeconómicos longitudinales basados en la población y la utilización en tales estudios de nuevas tecnologías que permitirán medir mejor la salud se traducirán en grandes avances en el conocimiento de los mecanismos por los que la salud influye en la prosperidad económica.

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