

Companion for Chapter 9

Health for All

SUMMARY

- Good health stands at the center of sustainable development, enhancing the ability of a community to develop human capital, undertake economic activities, and attract investment. In 1948, the Universal Declaration of Human Rights made it clear that health is a human right and a basic need. The goal is to reach the "highest attainable standard of physical and mental health".
- In 1978, world health officials adopted the Alma-Ata Declaration which called for universal health by 2000. Unfortunately, the world did not meet this aspiration in 2000: the HIV/AIDS pandemic was running rampant, malaria and tuberculosis infections rose tremendously as a crisis of drug resistance emerged in both cases.
- In 2000, the Millennium Development Goals took up the challenge of global health for all: three of the eight MDGs are centered on health. There has been significant progress, particularly since 2005 due to the advancement in the science of public health, the breakthroughs in modern medicine, and the innovations in areas such as food production and urban infrastructure.
- At the time of the Industrial Revolution, worldwide life expectancy at birth (LEB) — the average age a newborn would reach at a given time — was approximately 35 years. As of 2010–2015, world LEB has increased to 70 years. However, in the developed countries, LEB is almost 80 years, whereas in the least developed countries (LDCs), LEB is only 60 years. There is a two-decade gap in average life expectancy between the richest and poorest countries.
- Plotting a scatter plot of per capita income of a country and its LEB shows that generally richer countries have a higher life expectancy than poorer countries. In particular, when countries are very poor, even small incremental changes in income correlate with very steep gains in life expectancy. One interpretation is that modest but targeted investments in public health, as small as \$60 per person per year, can make profound differences for poor people's health.
- There are large differences across countries in the under-5 mortality rate (U5MR). The U5MR is the number of children under the age of 5 that die for every 1,000 live births. For the developed countries, the U5MR is about 7/1,000, and for the LDCs, it is around 99/1,000.
- In low-income countries, the maternal mortality rate (MMR), defined as the number of pregnancy-related deaths for every 100,000 live births, is falling sharply. It decreased from 900 in 1990 to 450 in 2014.
- Another important statistic used to measure health outcomes is disability-adjusted life-years (DALYs). The DALYs of a population is the sum of life-years lost plus the years lost to disability. A normal life span is considered to be 80 years. If an adult dies before reaching 80 years, then we refer to life-years lost. A year of life with a disability is counted as a part of a year of life lost, with the portion lost dependent on the severity of the disability.
- DALYs per capita are used to understanding the varying disease burdens across the world. When DALYs per capita is high, the disease burden is very high. Sub-Saharan Africa has the

highest disease burden, while high-income countries have the lowest disease burden. Sub-Saharan Africa has an extraordinarily heavy burden in HIV/AIDS and in the categories of communicable and parasitic diseases, and pregnancy and nutrition-related conditions. For other conditions such as cardiovascular diseases or cancers, the DALYs per capita in Africa and the rest are not very different.

- There is a two-way causation whereby poverty contributes to disease, while disease also contributes to poverty: this can create a vicious spiral where a household get trapped in poverty, and thereby succumb to disease, which in turn lowers the earning power and further traps the household in debt and poverty, etc.
- First, poverty leads to poor health because: 1) The poor often cannot afford a doctor, medicine or transport to a hospital; 2) They often live in a dangerous home environment with no sanitation or unsafe drinking water; 3) Undernutrition causes immunosuppression; 4) Illiteracy and innumeracy lead to poor health knowledge and weak health-seeking behaviors; 5) The poor are vulnerable to taking dangerous work with various life-threatening conditions.
- Second, poor health leads to poverty because: 1) It prevents individuals from working at full capacity and incurs a loss of income; 2) Diseases at a young age adversely impact the entire life-cycle development of an individual; 3) A high death rate for children induces a high fertility rate, leading to very low levels of investment per child in health, nutrition and education; 4) Treating diseases incurs a direct cost on already limited household budgets.
- A virtuous spiral is where disease control raises income, and this higher income leads to further improvements in health. The role of public health policies is to create this upward spiral of health and wealth. The steps to achieve this are: 1) Implement a primary health system for all that is responsive to the specific challenges of the community; 2) Help poor communities achieve better nutrition; 3) Invest in local infrastructure (safe drinking water, sanitation, power, roads and communications). Locally trained health workers such as Community Health Workers (CHWs) can be instrumental actors in promoting good health.
- Public health is a highly effective specialty and can be very systematic in practice. It starts with the epidemiology of disease, which is the analysis of both the disease burden in a particular population and the transmission mechanisms of the main diseases affecting the population. The second stage is to examine the feasible interventions, both within the health sector and in the closely related sectors of nutrition, agriculture, and infrastructure. The third stage is systems design, which consists in creating a way to deliver these interventions properly and effectively. The fourth stage is financing: it is estimated that the total cost of a basic primary health system that addresses most communicable diseases as well as pregnancy-related conditions might be no more than \$60–90 per person per year (in 2013 dollars). A poor country cannot reach this level of financing on its own and official development assistance (ODA) must play a key role. Since 2000, ODA for health has increased and the burdens related to malaria, AIDS and tuberculosis have come down.
- Ten recommended steps to health for all in the poorest countries are: 1) Rich countries should contribute 0.1% of their GNP towards health assistance for poor countries in order to close the financing gap of the primary health system; 2) Half of that allocated money should be channeled through a global health fund; 3) Low-income countries should allocate at least 15% of domestic revenues to the health sector and domestic and external funding should total to at least \$60 per

person per year; 4) The world should adopt a plan for comprehensive malaria control, with an end of malaria mortality by 2015. The estimated cost is about \$3-4 billion per year; 5) The G8 should fulfill the commitment to universal access to antiretroviral medicines (ARVs) for individuals infected with HIV; 6) The world should fulfill the Global Plan to Stop Tuberculosis, and close the financial gap of \$3–4 billion a year; 7) The world should fulfill the funding for access to sexual and reproductive health services by 2015; 8) The global health fund should establish a financing window for controlling neglected tropical diseases; 9) For health systems, mass training and the deployment of 1 million CHWs in Africa should be included by 2015; 10) The world should introduce primary health care for non-communicable diseases in the areas of oral health, eye care, mental health, cardiovascular disease, and metabolic disorders.

- The U.S. health system remains far more expensive than other systems that rely more on regulated prices and less on private, unregulated health providers. The U.S. system is characterized by substantial fraud, excessive care, waste, and monopoly power of local health providers.
- It is the mistaken reliance on the private market system that explains America's overpriced system. The health care market is characterized by an asymmetry of information: patients generally do not know what is best for them and must rely on their doctors. This violates one of the basic assumptions of the proper functioning of a free-market economy. Another problem is that health care requires insurance because of the possibility of expensive health care costs in the event of a serious disease. This can lead to an "insurance death spiral" wherein premiums are raised by insurers and only very sick people would buy the insurance, thereby inducing a market collapse.
- The health sector in the U.S. is politically powerful, so it is able to resist effective regulation. The lobbying outlays of the health industry exceeded those of every other industries, and the health sector was number five on the highest campaign contributions list in 2011–2012.
- Reform options include moving to a single-payer system where the government covers most costs of health care; an all-payer system where payments still come from private employers, but regulations would prevent the exercise of monopoly power in pricing; and capitation where health care providers receive a fixed amount of money per patient per year, irrespective of the specific services that need to be provided during the year.
- Finally, technology can bring about lower costs, through information technology, smarter systems, and even patients monitoring their key vital signs at home.

REVIEW

Concepts and Definition

Can you define or explain the significance of these concepts?

Universal Declaration of Human Rights

Merit good

Life expectancy at birth (LEB)

Excess mortality

Under-5 mortality rate (U5MR)

Maternal mortality rate (MMR)

Disability-adjusted life years (DALYs)

Community health workers (CHWs)

Vicious spiral

Virtuous spiral

Malaria

Global Fund to Fight AIDS,
Tuberculosis and Malaria (GFATM)

Communicable diseases

Public health science

Single-payer system

All-payer system

Capitation system

Check your facts

- 1) In what year was the Alma-Ata declaration adopted?
- 2) What is the difference in LEB between the beginning of the industrial revolution and today?
- 3) Approximately, what is the gap in LEB between high-income countries and LDCs?
- 4) Approximately, what are typical values of U5MR in both developed and developing countries, and LDCs?
- 5) Approximately, how many children die each year before their fifth birthday worldwide at present?
- 6) Approximately, what are typical values of MMR in high-income countries and sub-Saharan African countries?
- 7) What is the estimated total cost per person per year of a basic primary health system that addresses most communicable diseases as well as pregnancy-related conditions, in 2013 dollars?
- 8) What is the typical range of public spending for health care per person per year in high-income countries?
- 9) By how much have malaria deaths of children under 5 years of age declined since the year 2000?
- 10) What is the total need per year of ODA in health?
- 11) What percentage of their GNP must rich countries devote to health assistance for poor countries?
- 12) What percentage of their domestic revenues should poor countries allocate to the health sector?
- 13) What was the percent increase in US national income spending on health from 1980 to 2009?
- 14) What percent of U.S. national income did waste, fraud and abuse in the health care system amount to in 2013?

Answers: 1) 1978; 2) 35 vs. 70, it has roughly doubled; 3) 20 years; 4) developed: 7/1000, developing: 57/1000, LDCs: 99/1000; 5) 6 million; 6) High-income: 16/100,000, Africa: 500/100,000; 7) \$60-90 per person per year; 8) \$3,000-4,000; 9) by around 50 percent; 10) \$40 billion per year; 11) 0.1%; 12) 15%, 13) 50% increase, it doubled from 9% to 18%; 14) 5% or \$750 billion.

Review questions

- What are notable global efforts to improve health worldwide?
- Which diseases does the international agenda focus on?
- Which of the MDGs relate to health and what do they state?
- Has there been significant progress since 2000? What has helped?
- Why can health be considered a merit good?
- What is the difference between LEB and life expectancy?
- How does GDP per capita correlate with LEB?
- Describe the evolution of life expectancy since the 50s. How can we explain it?
- What is the significance of nutrition in regards to health?
- How does the disease burden in low-income countries compare with the one in high-income countries?
- How can poverty lead to poor health?
- How can poor health lead to poverty?
- What can we do to break the vicious spiral of poverty and poor health?
- Why is ODA important to achieve good health outcomes in poor countries?
- How should primary health systems be designed?
- Why are CHWs so critical to achieve better health outcomes?
- What are examples of critical tools used in public health?
- Name several "neglected tropical diseases"?
- What the ten recommended steps to achieve health for all in the poorest countries
- What are some of the challenges of health coverage in rich countries?
- Why does the health care sector not satisfy the assumptions of an efficient, competitive marketplace?
- How is the U.S. health care system different from health care systems in other high-income countries?
- What are some of the suggested reforms to the U.S. health care system?

DATA ACTIVITIES

EASY

A. Under-five mortality rates (U5MR)

Explore the interactive chart on under-five mortality rates around world using the World Health Organization's Global Health Observatory Data Repository:

http://gamapserver.who.int/gho/interactive_charts/MDG4/atlas.html

- 1) In 2013, which of the following countries had an U5MR greater than 100: Somalia, Guinea-Bissau, Pakistan, Chad, Saudi Arabia, or Thailand?
- 2) In 1990, which country had the highest U5MR and how high was its U5MR?
- 3) In 2013, how many countries had a U5MR higher than 200?
- 4) In 2013, which country had the highest U5MR and how high was it?
- 5) In 2013, which country had the lowest U5MR and how low was it?
- 6) What was the U5MR in 1990 of the country with the lowest 2013 U5MR?

Answers: 1) Somalia, Guinea-Bissau, and Chad; 2) Niger with 327/1000; 3) Zero; 4) Angola with 167/1000; 5) Luxemburg and Iceland with 2/1000; 6) Iceland 6/1000 and Luxemburg 9/1000;

EASY

B. Global health financing flows

Learn about the flows of global health financing using interactive chart on the Institute for Health Metrics and Evaluation's website: <http://vizhub.healthdata.org/fgh/>

Tips: click on the various flows or names to learn more about them. Click on "reset" to go back to the initial page.

- 1) What is the largest source of funds for global health financing?
- 2) Which health focus area receives the most funding?
- 3) Through which channel is the fight against malaria mostly funded?
- 4) What is the health focus area that the Bill & Melinda Gates Foundation (BMGF) contribute the most to?

Answers: 1) The United States; 2) HIV/AIDS; 3) Global fund; 4) Child health

EASY

C. Disability-adjusted life-years (DALYs)

Read the information provided by the World Health Organization (WHO) about DALYs:

http://www.who.int/healthinfo/global_burden_disease/metrics_daly. We should note here that the standard life expectancy at birth, based on life tables, is set at 80 years for men and 82.5 years for women. You can also consult the disability weights for diseases and conditions in the WHO report "Global Burden of Disease 2004 update":

http://www.who.int/healthinfo/global_burden_disease/GBD2004_DisabilityWeights.pdf?ua=1.

- 1) What would be the corresponding years of life lost (YLL) if a woman dies at age 65?
- 2) If a man develops Alzheimer's at the age of 70, but lives to be 80 years old, how many YLL and years lost to disability (YLD) would this be?
- 3) A woman lives to be 90 years old, but experienced moderate depressive episodes throughout her life. The total length of time spent with her depression is estimated at 40 years. How many DALYs does this case contribute to the global burden?
- 4) A man has a number of episodes of malaria over the course of his life to 80. The total length of time spent sick with malaria is about 8 years. In addition, there is a child that dies at age 5 from malaria. How many DALYs are contributed to the global disease burden from these two cases?

Answers: 1) $YLL = 82.5 - 65 = 17.5$; 2) $YLL = 0$, $YLD = 10 * 0.666 = 6.66$, $DALYs = 6.66$; 3) $DALYs = YLD = 0.35 * 40 = 14$; 4) $DALYs$ from the man = $YLD = 0.191 * 8 \text{ years} = 1.528$ / $DALYs$ from the child = $YLL = 75 \text{ years}$ / Total $DALYs = 76.528$

MEDIUM

D. Global Health Burden

Explore the data visualization for the global disease burden on the Institute for Health Metrics and Evaluation website: <http://vizhub.healthdata.org/gbd-compare>. The website allows to compare different countries, regions, diseases, groups or years by using the top chart and the bottom chart. The small icon with a "lock" will give you full flexibility as to what you can display on the top and bottom charts. Varying the level of depth will help you understand the type of diseases that is represented by each color.

- 1) Explain how the health burden in developing countries differs from the one in developed countries in the latest year available.
- 2) Look at the health burden in developing countries and in developed countries for different years. Do you notice any particular changes or trend? Is there evidence of an "epidemiological transition"?

- 3) Look at some of the poorest countries (e.g., Niger). Look at the rate of change in the color-coding and describe.

Explore the data visualization for the global disease burden cause patterns on the Institute for Health Metrics and Evaluation website: <http://vizhub.healthdata.org/gbd-cause-patterns>.

- 4) Look at the cause patterns of DALYs for developed countries for both genders. Describe.
- 5) Compare how different it is from the cause patterns of DALYs for developing countries.

MEDIUM

E. Convergence in Life Expectancy

Use the World Bank indicators database through the World DataBank:

<http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators>. The interface allows you to precisely choose the data you want to download. You can choose the database and the series you are interested in, and you can download data for all countries as well as for geographic or income group aggregates (e.g., "Arab World" or "High income").

- 1) Download data on life expectancy at birth for the longest time series possible to explore the extent to which life expectancy has converged across countries in the past decades. You might want to plot the life expectancy throughout time in some selected countries, in the different geographic regions of the world and/or in different income groups. Describe any patterns and major outliers. Support your findings with appropriate graphs. Conclude whether the claim of convergence in life expectancy is supported by the data.
- 2) Download data on income per capita for the longest time series possible to explore the extent to which life expectancy correlates with income per capita. Produce scatter plots of per capita income vs. life expectancy in 1970, 1990 and 2010 and discuss your findings.
- 3) Optional: Use a statistical software such as R to add a best fit line and discuss how the best fit line changes over time.

HARD

F. Ebola Case study

Write a 10-page memorandum on the 2013 Ebola virus epidemic and include substantive technical, political, and long range policy considerations. Your memorandum should include an assessment of the strengths and weaknesses of the international response, and conclude with lessons for the future.

HARD

G. Policy memo

Select a policy, program or project related to public health that has been already implemented or in the process of being implemented. Write a paper (about 15 pages) to analyze the project. You will first briefly introduce the project: the target population, the intended impact on health and economic implications. Then, spend most of the paper evaluating strengths and weaknesses.

DISCUSS AND DEBATE

- 1) Discuss why a costly vaccination may result in a health poverty trap and discuss some of the policy implications.
- 2) Using the case study below, discuss the role of Community Health Workers.

- 3) Discuss the possible obstacles in achieving the ten recommendations for achieving universal health.
- 4) What is the best way to close the health gap between low and high-income countries? Who are the main actors involved, and how should the world push these actors to act as soon as possible?
- 5) Discuss the challenges of the U.S. healthcare system. Which of the following three reform paths do you find the most compelling to fix the current system and explain why: a single-payer system, an all-payer system, or capitation?

CASE STUDY

BRAC* trains village women as volunteer community healthworkers

**BRAC stand for Bangladesh Rural Advancement Committee*

Community health workers trained by BRAC are married, middle-age women eager to work for their communities. Only a few have any schooling. They are members of BRAC-organized village organizations, groups of poor women designed to advance their social and economic well-being. Village organization members select one of their own to be trained as the community health worker for their area. These workers receive no salary from BRAC, but they supplement their income through opportunities created and facilitated by BRAC. With small loans from BRAC, they set up revolving funds for drugs, which they sell at a small mark-up. They also sell selected health products, such as contraceptives, iodized salt, oral rehydration salts, soap, safe delivery kits, sanitary napkins, sanitary latrines, and vegetable seeds, at a profit. BRAC also provides them with small loans to undertake other income-enhancing enterprises. Community health workers receive four weeks of initial training, supplemented by one day refresher sessions every month. They are trained to treat common illnesses, such as diarrhea, dysentery, the common cold, scabies, anemia, gastric ulcers, and worm infestation. A subset of these workers has also been trained to provide directly observed therapy, short course (DOTS) for tuberculosis and to treat acute respiratory illnesses, particularly pneumonia (Chowdhury and others 1997). Each community health worker is assigned about 300 households, which she visits once a month. During household visits, she provides health education and treats illnesses. She also uses this opportunity to sell health products. When she encounters an illness she is not trained to manage, she refers the patient to government health centers or to BRAC facilities. While BRAC doctors and other trained health paraprofessionals provide professional supervision, the community health worker is accountable to her village organization and the community she serves.

Source: Millennium project task force on child Health and Maternal Health: Who's got the power? Transforming health systems for women and children, 2005. Box 2.1. <http://www.unmillenniumproject.org/documents/maternalchild-complete.pdf>

FURTHER READING

- **Healthcare**

This reports presents the most recent comparable data on key indicators of health and health systems across OECD countries.

Organization for Economic Co-operation and Development. 2011. "Health at a Glance 2011: OECD Indicators." <http://www.oecd.org/els/health-systems/49105858.pdf>.

In this seminal article, Arrow observes that the health sector cannot really operate like a competitive market sector because there is a fundamental information problem: patients generally do not know what is best for them medically.

Arrow, Kenneth. 1963. "Uncertainty and the Welfare Economics of Medical Care." *American Economic Review* 53(5): 941–973.

This article compares health care spending, supply, utilization, prices, and quality in 13 industrialized countries and concludes that higher spending in the United States is more likely due to higher prices and perhaps more readily accessible technology and greater obesity.

Squires, David A. 2012. "Explaining High Health Care Spending In the United States: An International Comparison of Supply, Utilization, Prices, and Quality." *Issues in International Health Policy* 10: 1–14.

- **SDGs**

This document details the goals related to education for the next two decades and provides recommendations as to how to achieve them.

Yoshikawa, H. (2013). *The future of our children: lifelong, multi-generational learning for sustainable development*. Sustainable Development Solutions Network.

This report, issued as preparation for the post-2015 UN development agenda, discusses the current status of global health and proposals for health SDG.

Sustainable Development Solutions Network Thematic Group on Health for All. 2014. *Health in the Framework of Sustainable Development: Technical Report for the Post-2015 Development Agenda*. New York: Sustainable Development Solutions Network. <http://unsdsn.org/wp-content/uploads/2014/02/Health-For-All-Report.pdf>

This factsheet provides an introduction to the "One million community health workers" initiative.

One Million Community Health Worker Fact Sheet http://1millionhealthworkers.org/files/2013/01/CHW_FactSheet_Final.pdf

- **Links between health and income**

This report details the links between health and economic development and argues for more investment in health in the world's poorest countries.

Investing in Health for Economic Development, Report of the Commission on Macroeconomics and Health. Executive Summary (20 pages) (2001). <http://whqlibdoc.who.int/publications/2001/924154550x.pdf>

This article discusses the links between health and income.

Bloom, D. E. & Canning, D. (2000). The health and wealth of nations. *Science*, 287 (5456).

This article shows that allowing for conditional convergence, exogenous improvements in health appear to have increased income levels.

Bloom, D. E., Canning, D., & Fink, G. (2009, July). Disease and development revisited. NBER Working Paper No. 15137.

This article uses microeconomic estimates of the effect of health on individual outcomes to construct macroeconomic estimates of the proximate effect of health on GDP.

Weil, D. N. (122). Accounting for the effect of health on economic growth. *Quarterly Journal of Economics*, 3.

- **Health poverty traps**

This article shows how integrating simple economic and disease ecology models can naturally give rise to poverty traps, where initial economic and epidemiological conditions determine the long-term trajectory of the health and economic development of a society.

Bonds, M. H., Keenan, D. C., Rohani, P., & Sachs, J. D. (2010). Poverty trap formed by the ecology of infectious diseases. *Proceedings of the Royal Society B*, 277.

This articles investigates the links between economic development and malaria.

Sachs, J. D. & Malaney, P. (2002). The economic and social burden of malaria. *Nature*, 415.

Bill and Melinda Gates discuss three myths that block progress for the poor: 1) poor countries are doomed to stay poor; 2) foreign aid is a big waste; 3) saving lives leads to over-population.

Bill Gates 2014 Annual Letter (25 pages) <http://annualletter.gatesfoundation.org>

- **Disease burden**

In this study, researchers calculate the global burden of disease and risk factors for 2001 and examine regional trends from 1990 to 2001.

Alan D. Lopez, et al. 2006. "Global and Regional Burden of Disease and Risk Factors, 2001: Systematic Analysis of Population Health Data." *The Lancet*. 367(9524): 1747–1757. doi:10.1016/S0140-6736(06)68770-9.

- **Early childhood**

This document argues that the foundations of lifelong health are built in early childhood.

National Scientific Council on the Developing Child and the National Forum on Early Childhood Policy and Programs. 2010. *The Foundations of Lifelong Health Are Built in Early Childhood*. Cambridge, Mass.: Harvard University Center on the Developing Child.

This article synthesizes the literature on the economics of child development and the economics of health.

Heckman, J. J. (2007). The economics, technology, and neuroscience of human capability formation. *PNAS*, 104 (33).

This article summarizes the evidence from diverse literatures on the importance of early life conditions in shaping multiple life skills

Heckman, J. J., & Mosso, S. (2014). *The economics of human development and social mobility* (No. w19925). National Bureau of Economic Research.

This article surveys the various risks preventing young children from attaining their developmental potential, as well as the protective factors.

Walker, Susan P., Theodore D. Wachs, Sally Grantham-McGregor, Maureen M. Black, Charles A. Nelson, Sandra L. Huffman, Helen Baker-Henningham et al. 2011. "Inequality in Early Childhood: Risk and Protective Factors for Early Child Development." *Lancet* 378(9799): 1325–1338.

This paper summarizes evidence on the effects of early environments on child, adolescent, and adult achievement.

Heckman, James J. 2006. "Skill Formation and the Economics of Investing in Disadvantaged Children." *Science* 31(5782): 1900–1902. doi:10.1126/science.1128898.

This paper discusses the role of cognitive and noncognitive ability in shaping adult outcomes, the early emergence of differentials in abilities between children of advantaged families and children of disadvantaged families, the role of families in creating these abilities, adverse trends in American families, and the effectiveness of early interventions in offsetting these trends.

Heckman, James J. 2008. "Schools, Skills, and Synapses." IZA Discussion Paper No. 3515. <http://ftp.iza.org/dp3515.pdf>.

This document summarizes the design, findings and conclusions of the High/Scope Perry Preschool experiment which has identified both the short- and long-term effects of a high quality preschool education program for young children living in poverty.

Schweinhart, Lawrence J., Jeanne Montie, Zongping Xiang, W. Steven Barnett, Clive R. Belfield, and Milagros Nores. 2005. *The High/Scope Perry Preschool Study Through Age 40: Summary, Conclusions, and Frequently Asked Questions*. Ypsilanti, Mich.: HighScope.

- **Human development**

The 2010 Human Development Report focuses on progress in education and health.

United Nations Development Program. (2010). *Human development report 2010. The real wealth of nations: pathways to human development*.

This article provides a theory explaining the transition in income, life expectancy, education, and population size as the endogenous outcome of a gradual process of development

Cervellati, M. & Sunde, U. (2005). Human capital formation, life expectancy, and the process of development. *American Economic Review*, 95 (5).

This article describes what the human population will look like in the next half century.

Cohen, J. E., Human population: the next half century (2003), *Science*, 302 (1172).

In their annual letter, Bill and Melinda Gates make a bet that, in the next 15 years, 1) child deaths will go down by half, and more diseases will be eradicated than ever before; 2) Africa will be able to feed itself; 3) better software will revolutionize learning; and 4) mobile banking will help the poor radically transform their lives.

Bill Gates 2015 Annual Letter <http://annualletter.gatesfoundation.org>