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HUMAN CAPITAL: EDUCATION, THE ROLE OF WOMEN, NUTRITION AND HEALTH

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Introduction

This chapter focuses on human capital formation in developing countries, and discusses the effects of education, the role of women, nutrition and health on the process of economic and social development. For a poor country to experience a faster pace of economic and social development, it requires educated and literate people, an equitable participation of women and men in the labour force, and, above all, well-nourished, healthy people free from the debilitating diseases that adversely affect the lives and productivity of so many people in poor countries.

Investment in human capital takes many different forms, including expenditure on formally organized education (both public and private expenditure), on-the-job and institutional training and retraining, study programmes and adult education, publicly funded nutrition programmes to keep people healthy and productive during their working lives, and expenditure on health facilities for the prevention and treatment of illness.

First, we consider the participation in education at the primary, secondary and tertiary levels, and expenditure on education as a proportion of total government expenditure and gross domestic product (GDP). Primary school enrolment is virtually universal across regions of the world, but at the secondary level, enrolment is less than half the age group in low-income countries (particularly in sub-Saharan Africa), and tertiary enrolment is less than 10% of the age group. The ratios of educational expenditure to total government expenditure and GDP are similar across regions, but per capita expenditure is much lower in low-income countries: only $100 compared to nearly $7,000 per head in high-income countries.

Second, we look at the rates of return to education and show that the private returns exceed 10% for males and even higher for females (because the opportunity cost of education is lower). The highest returns come from investment in tertiary education. Third, we show the different ways in which the contribution of education to economic growth can be measured. With regard to the role of women in the development process, we highlight how women are disadvantaged as far as educational and employment opportunities are concerned, and the discrimination and burden they face in many developing countries.

Finally, we focus on nutrition and health, and highlight the link between poor nutrition and poor health. Evidence is provided on the benefits of improved nutrition in terms of improved productivity and reduction in the number of working days lost, and on how poor health hurts the functioning of economies. The three major 'killer' diseases in poor countries are malaria, tuberculosis and HIV/AIDS, and we discuss the various campaigns that exist to combat these and other diseases.

Education

The education of a population, male and female, from primary through secondary to tertiary education can overcome many of the characteristics of the labour force that act as impediments to social and economic progress, such as illiteracy, fear of change, unreceptiveness to new knowledge, a lack of incentive, and immobility. Improvements in the education and skills of labour can considerably increase the productivity and earnings of labour, and may be preconditions for the introduction of more sophisticated, advanced technology applied to production. The capacity to absorb and use physical capital may be limited by, among other things, investment in human capital. It is in this respect that there may be a close association between education and the mainsprings of technical progress.

Table 7.1 Education for All 2000–15: goals and their assessment

Goal	Assessment
Goal 1: Expanding and improving comprehensive early childhood care and education, especially for the most vulnerable and disadvantaged children	Progress in early childhood care and education was rapid but from a low base and highly inequitable
Goal 2: Access to and complete free primary education of good quality	Universal primary education was not reached in 2015
Goal 3: Equitable access to appropriate learning and life skills programmes	More adolescents received secondary education but measuring skill acquisition among youths and adults remains limited
Goal 4: Achieving a 50 per cent improvement in levels of adult literacy by 2015, especially for women, and equitable access to basic and continuing education for all adults	Progress in adult literacy was below the target
Goal 5: Eliminating gender disparities in primary and secondary education by 2005, and achieving gender equality in education by 2015, with a focus on girls' full and equal access to and achievement in basic education of good quality	Many countries have not achieved gender parity and obstacles to equality remain
Goal 6: Improving all aspects of the quality of education and ensuring excellence of all so that recognized and measurable learning outcomes are achieved by all, especially in literacy, numeracy and essential life skills	There has been increased attention to issues of quality

Source: UNESCO, 2015.

Two main international bodies have recognized education as a basic human right: the UN's **Convention on the Rights of the Child** in 1989 and UNESCO's **World Declaration on Education for All** in 1990. Then, in 2000, representatives of the international community met at the World Education Forum in Dakar, Senegal, under the auspices of UNESCO, and produced what is called the **Dakar Framework for Action**, comprising six goals to be achieved by 2015. The goals, and a brief assessment of each of these, are presented in Table 7.1. It can be seen from Table 7.1 that some progress has been made towards the goals set down, but still some poor countries have been unable to guarantee primary education to all school-age children, gender disparities still exist, and progress in adult literacy has been below target. The poor quality of education has effects on the well-being of children, their families and communities.

Table 7.2 shows clearly the underprovision of educational facilities and opportunities in many poor countries, and the low rate of literacy in the poorest countries. In low-income countries, the secondary school enrolment rate is less than 50%, and the tertiary enrolment rate is only 9%. The figures mirror the statistics for sub-Saharan African countries, which constitute the majority of low-income countries. Literacy rates are correspondingly low in low-income countries and Africa, barely reaching 50% for females. Note that for primary education, the enrolment ratio exceeds 100% in all regions. This is because the ratio is *total* enrolment, regardless of age, as a percentage of the population of the age group that corresponds to that level of education. So, the primary school age group may be 5–11 years, but children older than that are attending. Also note that the enrolment rate is not the same as the completion rate, which is only 71% in low-income countries, and 69% in Africa. Moreover, enrolment and completion do not necessarily mean receiving a good education. For economic development, it is not just the quantity of education that is important, but also its quality. Case example 7.1 provides a study of primary education in India, which highlights this fundamental difference.

Table 7.2 Participation in education, 2010 and 2013

	School gross enrolment ratio % of relevant age group			Adult literacy rate % ages 15 and older	
	Primary 2013	Secondary 2013	Tertiary 2013	Female 2010	Male 2010
World	108	75	33	80	89
Low income	107	45	9	54	68
Middle income	109	77	29	78	88
Lower middle income	106	67	23	62	79
Upper middle income	116	92	37	92	96
Low and middle income	109	71	26	75	86
East Asia and Pacific	118	85	30	92	97
Europe and Central Asia	102	99	55	97	99
Latin America and Caribbean	105	93	43	92	93
Middle East and North Africa	110	76	35	70	85
South Asia	111	66	21	50	73
Sub-Saharan Africa	100	43	9	51	68
High income	102	104	73	–	–

Source: World Bank, 2010, 2013.

Case example 7.1

Primary education in India

During the period 2005–15, 350,000 new primary schools were built in India. Today, over 95% of villages have a state primary school and enrolment is universal. A 2002 constitutional amendment established primary education as a 'fundamental right' for every child aged 6–14. However, teaching and learning standards are very poor. Although the facilities have been provided, the quality of the teaching and learning process has been neglected. Over the past decade, 100 million children completed primary school but without attaining basic reading and maths skills. Many rural primary schools have just one or two teachers running mixed classrooms, with students of all ages and competency levels sitting together in a single room. Most teachers end up focusing on the students best able to keep pace, while the rest are left behind. Pupil and teacher absenteeism is very high. Children leave school during the harvest season, when they have to help their families. Whatever they have learnt, they forget. Attendance at government primary schools averages about 70%, but it is less than 35% in many states. Also, high teacher absenteeism (15–25% of appointed teachers are absent on any given day) hinders the performance of pupils. State governments request teachers for large-scale tasks such as surveys and elections.

The difference between the targets and the results is a consequence of an ambitious national curriculum. It expects that students will read fluently by the end of the first year of school, without considering their limited exposure to books or written material. Teachers are expected to transfer vast quantities of factual information to students, regardless of their comprehension.

This situation in Indian education acts as a serious constraint on the performance of individuals and on Indian society. Most newly created jobs are in services, which require basic literacy and numeracy. Young people who lack these fundamental skills are likely to get jobs that don't pay enough to raise them out of poverty.

Table 7.3 Public spending on education, by region and income level, 1999 and 2012

Region	Public education spending				
	% of GNP		% of government expenditure on education		Per capita, primary education, PPP constant 2011 prices, US$
	1999	2012	1999	2012	2012
World	4.5	5.0	13.8	13.7	1,337
Low Income	3.2	4.0	14.7	14.9	100
Lower middle income	4.4	4.9	15.0	15.6	467
Upper middle income	5.0	5.1	14.8	14.9	–
High income	4.9	5.4	12.4	12.3	6,805
Arab States	5.3	–	16.9	–	–
Central and Eastern Europe	4.4	4.9	12.7	11.7	4,478
Central Asia	4.0	3.4	–	13.0	–
East Asia and the Pacific	5.1	3.4	13.8	17.5	–
Latin America and Western Europe	4.5	4.9	14.8	–	1,187
North America and Western Europe	5.2	6.0	12.3	12.5	7,943
South and West Asia	3.6	3.9	16.6	12.6	240
Sub-Saharan Africa	3.9	4.9	14.8	18.4	136

Source: UNESCO, 2015.

Developing countries neglect educational provision at their peril. Research shows a strong association across countries between levels of human capital formation, growth performance and poverty reduction. For example, Baldacci et al. (2005) find, using a panel dataset of 120 developing countries over the period 1975–2000, that an increase in education spending of 1% of GDP is associated, on average, with three years of extra schooling and an increase in annual GDP growth of 1.5 percentage points after 15 years. This reduces the poverty head count by 17%.

Table 7.3 gives information on educational spending as a proportion of total government expenditure and GDP.

It can be seen that these ratios of educational expenditure in poor countries are not much different from rich countries, but because government expenditure and GDP are much lower in poor countries, the expenditure per capita is much less. In sub-Saharan Africa and South and West Asia, expenditure is particularly low, which is reflected in the very poor educational facilities for teaching and learning; large class sizes; lack of equipment; lack of books and other learning media; and often the poor quality of teachers. Moreover, it is clear from comparing figures between 1999 and 2012 that not much progress, if any, has been made in shifting resources towards education.

Estimating the rate of return to education

The main way of estimating the private rate of return to education is the method originally adopted by Mincer (1974), where the log of earnings (Ln w_i) is regressed on the number of years schooling (S_i), controlling for the potential experience of an individual (X_i)

(estimated as $age_i - S_i - 6$) and potential experience squared $(X_i)^2$ (to allow for the diminishing returns to experience). Therefore:

$$\text{Ln } w_i = a + b_1 (S_i) + b_2 (X_i) + b_3 (X_i)^2 + \mu_i \quad (7.1)$$

where μ_i is a random disturbance term reflecting unobserved abilities and b_1 is the average monetary return to years of schooling.

This earnings function method can be used to estimate returns to different levels of schooling by converting the continuous years of schooling variable (S_i) into a series of dummy variables, say D_P, D_S, D_T, where D_P is primary schooling, D_S is secondary schooling, and D_T is tertiary education, that is:

$$\text{Ln } w_i = a + b_p (D_{Pi}) + b_S (D_{Si}) + b_T (D_{Ti}) + b_2 (X_i) + b_3 (X_i)^2 + \mu_i \quad (7.2)$$

The returns to primary (r_p), secondary (r_s), and tertiary (r_t) education are then:

$$r_p = b_p / S_p; \quad r_s = (b_s - b_p)(S_S - S_p) \text{ and } r_t = (b_T - b_S)(S_T - S_S)$$

where S_P, S_S and S_T stand for the total number of years of schooling for each educational level.

The costs of education at different levels are the opportunity cost of not earning, tuition fees (if any), and expenses incurred in going to school.

The traditional consistent findings on rates of return to education when extra earnings and costs are considered are:

- private returns are positive, averaging 10% a year
- returns are higher in low- and middle-income countries than high-income countries
- returns are higher for primary schooling than for secondary education
- returns are higher for women than for men
- returns to education have declined slightly over time because, despite rising levels of average school attainment, the supply of schooling and educated people has responded to demand.

A new meta-study by Montenegro and Patrinos (2014) for the World Bank confirms all these conclusions, except that they find that the return to tertiary education is now the highest, and not the return to primary education. The new study uses data for 139 countries, with a total of 819 harmonized household surveys over the period 1970–2013 (with 75% of estimates coming from the period 2000–13), covering 92% of world population.

The basic earnings functions in equations (7.1) and (7.2) are first applied to three different groups: the total sample, males, and females. The results are shown in Table 7.4. The average private rate of return to another year of schooling is 10.1%. For males, the return is 9.6%, and for females it is higher at 11.7%. The returns are also estimated for levels of schooling, as shown in Table 7.4. The rate of return to primary education is 10.6%, while for secondary education it is 7.2% and for tertiary it is the highest at 15.2%. At all stages of education, the return for females is higher than for males because foregone earnings (opportunity costs) are less.

Montenegro and Patrinos also calculate rates of return to education across different regions of the world. Table 7.5 shows the results, and also the average years of schooling in different regions.

The returns do not differ much across regions, but are clearly highest in sub-Saharan Africa for both males and females. This is also true when the rates of return are estimated according to the level of education, shown in Table 7.6. The returns to primary, secondary and tertiary education in

Table 7.4 Summary statistics of the returns to schooling

Variable	Mean (%)	Standard deviation	Number
Years of schooling total	10.1	(3.3)	819
Years of schooling male	9.6	(3.2)	819
Years of schooling female	11.7	(3.3)	819
Primary schooling total	10.6	(6.4)	547
Secondary schooling total	7.2	(3.6)	619
Tertiary schooling total	15.2	(5.8)	762
Primary schooling male	10.0	(6.6)	543
Secondary schooling male	7.1	(3.8)	614
Tertiary schooling male	15.2	(5.8)	745
Primary schooling female	10.9	(7.6)	519
Secondary schooling female	8.7	(4.6)	607
Tertiary schooling female	16.8	(6.1)	738

Source: Montenegro and Patrinos, 2014.

Table 7.5 Average returns to schooling (latest period for each country)

Region	Average returns to schooling (%)			Average years of schooling			
	Total	Male	Female	Total	Male	Female	N
High Income economies	10.0	9.5	11.1	12.9	12.7	13.1	33
East Asia & Pacific	9.4	9.2	10.1	10.4	10.2	10.7	13
Europe & Central Asia	7.4	6.9	9.4	12.4	12.2	12.7	20
Latin America & Caribbean	9.2	8.8	10.7	10.1	9.5	10.9	23
Middle East & North Africa	7.3	6.5	11.1	9.4	9.2	11.0	10
South Asia	7.7	6.9	10.2	6.5	6.5	6.4	7
Sub-Saharan Africa	12.4	11.3	14.5	8.0	8.1	8.1	33
All economies	9.7	9.1	11.4	10.4	10.2	10.8	139

Source: Montenegro and Patrinos (2014).

Africa are higher than in many other regions. There is only one conclusion, which is that there is massive underinvestment in education in Africa – the poorest continent on the planet.

Finally, we can look at the rates of return to education over time. Since 1980, there has been a big expansion in school attainment. In the early 1980s, the average years of schooling was only 6.6 compared to 11.6 in 2011–13. As schooling increases, the return to schooling tends to decrease, as Table 7.7 shows. In the period 1980–85, the return was 13.3 and fell to 10.0 in 2011–13. The returns have declined by 3.3 percentage points over a 30-year period; in other words, another year of schooling leads to a reduction in the returns to schooling by 0.1 percentage point.

The statistics and discussion above relate to the private return to education. The return to society, or social return, also depends on the costs to government of providing schools and teachers,

Table 7.6 Average returns to schooling by levels

Region	Total (%)			Male (%)			Female (%)		
	Primary	Secondary	Tertiary	Primary	Secondary	Tertiary	Primary	Secondary	Tertiary
High Income	4.9	6.6	11.1	3.3	7.5	10.7	7.2	5.2	12.3
East Asia	13.6	5.3	14.8	12.6	5.8	15.0	9.5	6.4	15.8
Europe/Central Asia	13.9	4.7	10.3	12.1	4.2	9.8	11.9	6.4	12.2
Latin America	7.8	5.4	15.9	7.9	5.3	15.7	8.7	6.5	17.4
Middle East/N. Africa	16.0	4.5	10.5	12.7	4.3	10.2	21.4	7.4	13.5
South Asia	6.0	5.0	17.3	4.7	3.9	16.6	4.8	6.2	23.3
Sub-Saharan Africa	14.4	10.6	21.0	12.5	10.1	21.0	17.5	12.7	21.3
All economies	11.5	6.8	14.6	10.1	6.7	14.4	13.2	8.2	16.1

Source: Montenegro and Patrinos (2014).

Table 7.7 Returns to schooling and average years of schooling by period

	Returns to schooling (%)	Average years of schooling	Number of surveys
1980–85	13.3	6.6	12
1986–90	12.7	8.1	23
1991–95	11.0	8.0	58
1996–2000	10.1	8.8	109
2001–05	9.9	10.1	228
2006–10	9.6	10.9	238
2011–13	10.0	11.6	149

Source: Montenegro and Patrinos, 2014.

and on the positive externalities to society that education provides. There are two main types of positive benefits or externalities that can be distinguished:

1. the effect of human capital on current productivity (static externalities)
2. the effect of learning and technological change (dynamic externalities).

The primary static human capital externality is that an individual's human capital enhances the productivity of other factors of production, such as physical capital and the human capital of others. The main dynamic externalities relate to learning by doing and the adoption of new technologies being more effective at higher levels of education. Whether the social return to investment in education is higher or lower than the private return depends on the balance between the costs to governments of providing educational facilities and the various static and dynamic externalities. Empirical evidence is scarce, but an early study by Pascharoupolos (1994) shows social returns to primary, secondary and tertiary education lower than private returns but still positive.

Likewise, Ram (1996) has fitted the Mincer equations (7.1 and 7.2) to pooled time-series and cross-section data for 45 countries using real GDP per worker (not earnings) as the dependent variable, so that the coefficient on the years of schooling per person variable measures the social returns to education rather than simply the private returns. Separate regressions are run for the

full sample of countries – developed, developing low-income and middle-income countries. The average rate of return is 13%, which is higher than the private returns estimated by Montenegro and Patrinos (2014). The highest social return is 16.2% in the middle-income countries.

Measuring the contribution of education to economic growth

There are three main ways in which education can improve growth performance:

1. Education improves the quality of labour, and also the quality of physical capital through the application of knowledge.
2. Education has spillover effects (externalities) on other sections of society, which offset diminishing returns to physical capital.
3. Education is one of the most important inputs into R&D and for attracting FDI.

There are three main methods of estimating the contribution of education to growth:

1. Measuring the contribution that education makes to the difference in earnings of individuals.
2. The production function approach.
3. The use of macrodeterminants of growth equations.

The first method involves constructing a quality-weighted index of the labour force, where quality is measured by the contribution that education makes to the difference in the earnings of individuals as a measure of productivity. The approach, pioneered by Denison (1962), involves two steps. The first entails gathering information on the distribution of the labour force by amounts of schooling at different dates. The second step involves collecting information on income differences between education cohorts with different amounts of schooling embodied in them, which are then used as weights to derive an index of the improvements in the *quality* of labour due to education, on the assumption that a certain percentage of differences in earnings is due to differences in the amount of education.

Suppose, for instance, that the earnings differential between those with eight years' schooling and those with ten years' schooling is 20%, that one-half of the difference is assumed to be due to the extra two years' schooling, and that a person with eight years' schooling is treated as one unit; then the person with ten years' education counts as $1 + (0.5 \times 0.2) = 1.1$ units. The growth of the quality of labour due to education over a given period can then be estimated and its contribution to measured growth calculated. For example, suppose that the growth in the quality of labour is estimated to be 1% per annum, the elasticity of output with respect to labour is 0.7, and the annual average growth rate of the economy is 3%. This gives a contribution of education to measured growth of 23%, that is, $(0.7 \times 1.0)/3.0 = 0.23$.

The approach is not without its difficulties. The proportion of earnings differences assumed to be due to differences in the amounts of education between individuals is arbitrary, and if the figure is too high, this will give an upward bias to the contribution of education. On the other hand, there are other reasons why the approach underestimates the contribution of education:

- The methodology employed ignores the role of education in maintaining the *average* quality of the labour force.
- No allowance is made for improvements in the quality of education.
- There are the externalities or 'spillovers' from education to consider, such as the contribution of education to knowledge and its diffusion throughout society.

The second method for estimating the contribution of education to growth, and also the rate of return to educational expenditure, is to use the production function approach outlined in Chapter 4 (see equation (4.22)). All that is required is a measure of education expansion to include in the production function. The contribution of education to measured growth is then the rate of growth of the education variable multiplied by the elasticity of output with respect to the education variable. In estimating form, the production function with the growth of education included is written as:

$$r_y = r_T + ar_k + \beta r_L + \gamma r_E. \tag{7.3}$$

where r_E is the rate of growth of education, and γ is the elasticity of output with respect to education. Suppose, for example, that the growth of educational expenditure ($r_E = \Delta E/E$) is 10% per annum and the elasticity of output with respect to education (γ) is 0.01, then the contribution of education to measured growth would be (10)(0.01) = 0.1 percentage point. If the average growth of GDP is 2% per annum, the contribution of education to economic growth would be 0.1/2 = 5%.

The average social rate of return to education can also be measured independently using equation (7.3). Since $\gamma = (\Delta Y/Y)/(\Delta E/E)$, we can write:

$$\frac{\Delta Y}{\Delta E} = \gamma \frac{\overline{Y}}{\overline{E}}. \tag{7.4}$$

where $\overline{Y}$ and $\overline{E}$ are the mean levels of output and the education variable, respectively. For example, suppose that the mean level of output over a period was £100 million, the mean level of expenditure on education was £5 million, and the elasticity of output with respect to education (γ) was 0.01. The rate of return would then be 0.2 or 20%, that is, (0.01)(100/5) = 0.2 or 20%.

The third method for estimating the contribution of education to growth comes from new growth theory, discussed in Chapter 4, in which the stock of education (measured by enrolment rates, or number of years of schooling) is included as a variable to explain differences in growth rates between countries using large samples of countries. A simple cross-section estimating equation would be of the form:

$$g = a + b\,(PCY) + c\,(education). \tag{7.5}$$

where g is the average growth rate of countries over, say, a 20-year period; *PCY* is the initial level of per capita income of countries, and (*education*) measures the proportion of the age group enrolled in primary or secondary schools in each country, or the average years of schooling. The coefficient, c, then measures the contribution of a 1 percentage point difference in school enrolment rates, or years of schooling, to the difference in growth rates between countries. Barro's (1991) pioneer study using this approach, and adopted by others (see Table 4.5), suggested that each additional year of schooling was associated with a 0.3 percentage point faster growth of per capita income over the period 1960–85. These so-called 'macrodeterminants of growth' studies also include a number of other variables, and the contribution of education to growth sometimes remains a significant variable and sometimes not. The fast growth of the East Asian economies in recent decades is often attributed to their heavy investment in education.

But highlighting the role of education in the growth process predates new growth theory. In the postwar years, it was Denison and T.W. Schultz (1961), in his presidential address to the American Economic Association in 1961, who first drew attention to the importance of education for growth with quantitative evidence. According to Schultz, the stock of education in the USA rose by approximately 850% between 1900 and 1956 compared with an increase in reproducible capital of 450%. He acknowledged the difficulties of estimating the rate of return to education, but argued that even when every conceivable cost is considered, and all expenditure is treated as investment and none as consumption,[1] the return on investment in education is at least as high as, if not higher than, the return on investment in non-human capital. Denison estimated a contribution of education to the growth of per capita income of 40%.

It is the apparent importance of education in the historical growth process of developed countries that has invoked the response that investment in human capital may be as important as investment in physical capital in developing countries. The empirical evidence seems to support this view. A World Bank (1980) survey concluded that 'studies have shown that economic returns on investment in education seem, in most instances, to exceed returns on alternative kinds of investment, and that developing countries often have higher returns than the developed ones'. The figures presented in Tables 7.4–7.6 certainly suggest that investment in education yields a rate of return as high, if not higher, as investment in alternative assets. This is, of course, in addition to the intrinsic satisfaction to the individual of education itself.

The role of women in economic development

Women play a vital role in the development process as mothers, workers, entrepreneurs and agents for change; but in many poor developing countries, their role is not fully utilized and appreciated, and they face discrimination in many areas of life, such as in education, in the workforce and in the ability to express their voice. **Gender equality** should be an integral part of the process of economic development. Gender equality can enhance the overall productivity of an economy, improve development outcomes for future generations, and make institutions more representative. Both men and women benefit when women's welfare is improved. Women now account for 40% of the global labour force. However, the increased participation of women in the labour market has not been accompanied by equal employment opportunities or earnings with men. Women are more likely than men to engage in low-productivity activities, and, on average, women earn 10–30% less than men for the same work/responsibilities. There exists a serious gender pay gap. Likewise in the field of education, there are far fewer women in secondary and tertiary education, which is reflected in much lower literacy rates for females than men. Many factors explain the discrimination against women in poor countries, which differ from country to country, but the major factors would include: cultural traditions and the perception of women's role in everyday life; gender differences in time use; unequal access to credit and assets; and institutional discrimination in the private and public sector (see Klugman et al., 2014; UN Women, 2015).

The World Bank's (2012) *World Development Report 2012* was devoted to the topic of gender equality. The report is evidence-based, drawing on qualitative field research covering over 4,000 men and women in 98 communities from nineteen developing countries, exploring how gender affects the everyday lives of women, as well as their aspirations, education, job choices, decision-making, and other aspects of welfare. The report argues that gender equality matters for

two types of reasons. First, it matters *intrinsically* because it gives equal freedom to both women and men, and freedom is the ultimate goal of development (Sen, 1999). Second, it matters *instrumentally* because it contributes to economic efficiency and the achievement of other development goals. Three main channels are identified through which gender equality promotes development:

- A more efficient allocation of resources by reducing barriers to women accessing education and skills, thereby raising productivity.
- Improving women's opportunities, human capital and voice has positive externalities for children by increasing investment in their health, nutrition and education.
- Improving women's voice can improve the quality and effectiveness of institutions that benefit the economy and society as a whole. For example, where women have greater power, there is less corruption in public life. Giving power to women often increases the supply of public goods such as water supply and sanitation.

Some gender gaps have shrunk in recent years, but others have not. Most progress has been made in the following areas:

- Life expectancy is now as high for women as it is for men in all regions of the world.
- Fertility has declined dramatically (see Chapter 11).
- Primary school enrolment rates are equal for girls and boys.
- Participation of women in the labour force has increased.

But many gender gaps still persist and are rooted in deeply entrenched gender roles and social norms relating to who is responsible for the household, and what it is acceptable for girls and women to study. In general, the poorer the country, the greater the gender gap. Forms of horizontal inequality such as ethnicity, race, religion and disability all adversely affect gender equality.

There are three main areas in which gender inequality still exists:

1. The mortality rate for girls and women is higher than for men. This gap is often referred to as the **missing girls and women**. Globally, it is estimated that 4 million females below the age of 60 are 'missing': 40% are never born (because of the preference for males); 20% go missing in infancy and childhood; and 40% go 'missing' in the 15–59 age group because maternal mortality is much higher in poor countries than in rich.
2. There is a serious gender gap in earnings and asset ownership. Women are still concentrated in low-productivity activities where earnings are lower. In agriculture, women tend to operate smaller plots of land. In more dynamic sectors of the economy, there are fewer females in positions of responsibility and fewer entrepreneurs. Household duties still predominate for most women. Women have less access to credit because they lack collateral, and they possess far fewer assets. The IMF addresses this issue of women and work in its 2015 Annual Report (see Case example 7.2).
3. Women have much less agency or voice; that is, they are less represented in politics, law and the judiciary. They also suffer domestic violence.

Gender inequality tends to get reproduced over time. Attitudes are passed on from generation to generation, or change only slowly. If women as mothers do not work outside the home, the daughters are less likely to work. All institutions have inertia, where norms, customs and traditions prevail.

Now let us consider in more detail the current situation with regard to the education and health of women.

Case example 7.2

Women and work

A crucial element of jobs and inclusive growth is the role of women in the workplace. Women make up more than half the world's population, but their contributions to measured activity, growth and well-being fall short of potential. This has serious consequences in terms of losses to an individual country's GDP.

Despite significant progress in recent decades, labour markets across the world remain divided along gender lines and progress towards gender equality seems to have stalled. In a keynote speech in Tokyo in September 2014 on 'The Economic Power of Women's Empowerment', Christine Lagarde, IMF managing director, described the barriers working women face worldwide: 'When women do participate, they tend to be stuck in low-paying, low-status jobs. Globally, women earn only three-quarters as much as men – this is true even with the same level of education and in the same occupation.'

Building on the Working Paper 'Can Women Save Japan?' (Steinberg and Nakane, 2012), analysis on women and work has expanded rapidly. Area departments of the IMF have put in place pilot assessments of the issues related to working women in the context of Article IV consultations across a range of countries, with the goal of building expertise, facilitating collaborations with other institutions and sharing knowledge.

Source: IMF, 2015.

Women's education

Women's education brings a wide range of benefits not only for women themselves but also for their families and communities, and hence for society at large. There are many positive externalities to female education. More educated women tend to be healthier, participate more in the formal labour market, earn more income, have fewer children, and provide better education and healthcare for their offspring. The **United Nations Girls' Education Initiative**, launched in 2000, was the first global partnership to specifically promote girls' education and raise awareness of gender equality issues in education. Providing essential educational infrastructure attracts girls to school. Building schools in underserved communities has helped overcome barriers to girls' education. For example, a study in Ghor, Afghanistan, where villages were randomly selected to receive a primary school building, found that girls' enrolment increased by 17 percentage points more than boys, eliminating an existing gender gap (Burde and Linden, 2012). Target 4 of the MDGs laid down in 2000 was to eliminate gender disparities in primary and secondary education, and Table 7.8 gives the data for enrolment in 2013 compared to 1990. It can be seen that substantial progress has been made, although there is still some disparity between boys and girls in secondary school enrolment in sub-Saharan Africa. Two of the new Sustainable Development Goals (SDGs: see Chapter 1), to be achieved by 2030, are 'Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all' (Goal 4) and 'Achieve gender equality and empower all women and girls' (Goal 5).

Table 7.8 Contrasting enrolment in primary and secondary schools between female and male pupils, 1990 and 2013

Region	Primary (%)				Secondary (%)			
	Female		Male		Female		Male	
	1990	2013	1990	2013	1990	2013	1990	2013
Arab world	74.9	96.1	91.7	103.2	45.1	68.7	60.3	73.4
East Asia and Pacific	115.1	117.1	124.9	118.3	34.4	85.6	43.6	84.6
Europe & Central Asia	100.7	101.8	104.5	102.2	82.4	98.0	87.9	100.3
Latin America and Caribbean	115.0	103.3	116.2	105.8	76.1	95.8	71.4	90.0
Least developed countries	59.3	101.2	75.3	108.5	13.5	39.1	23.0	44.5
South Asia	73.2	111.7	100.3	111.3	25.9	63.4	44.8	67.5
Sub-Saharan Africa	65.9	95.9	79.4	103.2	20.3	39.5	26.7	46.1
Small states	100.9	106.0	102.2	109.0	48.1	68.6	47.3	66.3

Note: Gross enrolment ratio can exceed 100% due to the inclusion of over-aged students relative to the age group of primary students.

Source: World Bank, 1990, 2013.

Women's health

Women's health is best analysed according to their age group. The World Health Organization (WHO) refers to four main age groups and their main causes of ill health and the fatal consequences of deaths:

1. **Infancy and childhood (0–9 years)**: The main causes of deaths are birth asphyxia, infections and diarrhoea. Nearly half of deaths in children aged under five is attributed to malnutrition.
2. **Adolescent girls (10–19 years)**: This group suffers from depressive disorders, the leading cause of ill health. Globally, adolescent girls and young women are twice as likely to be at risk of HIV infection compared to young men in the same age group. Pregnant adolescents are more likely than adults to have unsafe abortions, leading to lasting health problems and maternal deaths. Alcohol and tobacco use endangers young women's health in later life. In half of the countries with available data, over a third of girls aged 16–19 years are anaemic. Girls and women are most vulnerable to anaemia due to insufficient iron in their diets, menstrual blood loss and growth spurts.
3. **Reproductive age (15–44 years) and adult women (20–59 years)**: Depression is the leading cause of ill health for women. Depression following childbirth affects 20% of mothers in low- and lower middle-income countries. Women who have been physically or sexually abused have higher rates of mental ill health, unintended pregnancies, abortions and miscarriages than non-abused women. For women aged 15–44, HIV/AIDS is the leading cause of death worldwide (see below). Maternal deaths are the second biggest killer of women of reproductive age. Tuberculosis is among the five leading causes of death. Cervical cancer is the second most common type of cancer in women. Due to poor access to screening and treatment services, more than 90% of deaths occur in women living in low- and middle-income countries. One-third of chronic obstructive pulmonary disease in women is caused by exposure to indoor smoke from cooking with open fires or inefficient stoves.
4. **Older women (60 years and over)**: This group is affected by cardiovascular diseases and cancers and, to a lesser extent, by chronic respiratory conditions. It is important to highlight that much of

Table 7.9 Maternal mortality ratio (number of deaths due to pregnancy-related causes per 100,000 live births)

Regions	2010
Arab states	164
East Asia and the Pacific	72
Europe and Central Asia	31
Latin America and the Caribbean	74
South Asia	202
Sub-Saharan Africa	474
Least developed countries	389
Small island developing states	195

Source: UNDP, 2014.

the poor health faced by women in older age is the result of exposure to risk factors in adolescence and adulthood, such as smoking, sedentary lifestyles and unbalanced diets. Older women experience more disability than men, reflecting broader factors contributing to poor health through their lifetime, such as the unequal treatment of women in the household and the workplace.

The state of women's health in poor countries is most clearly reflected in the maternal mortality rates across the world. Table 7.9 gives the maternal mortality ratios measured as the number of deaths due to pregnancy-related causes per 100,000 live births. It can be seen that the mortality rate is highest in sub-Saharan Africa, followed by the least developed countries (which includes many African countries) and South Asia. In countries such as Afghanistan, Chad, Guinea-Bissau, Liberia, Mali, Niger, Sierra Leone and Somalia, at least 1 out of every 25 women die from complications relating to pregnancy and childbirth. A larger fraction of women also suffer adverse long-term health consequences from giving birth. Target 6 of the Millennium Development Goals (MDGs; see Chapter 1) was to 'reduce by three-quarters between 1990 and 2015, the maternal mortality ratio'. The goal was not met. A number of measures can still be taken to improve the situation, including new maternity clinics, training more maternal health nurses and providing poor women with cash transfers conditional on seeking pre- and postnatal care. Transport facilities also need improving to facilitate the process of getting pregnant women to hospital.

Mothers' Index

State of the World's Mothers (Save the Children, 2015) shows that one of the worst places to be a mother is in an urban slum. Poverty, and the social exclusion that goes with it, leaves the urban poor trapped in overcrowded, makeshift or decrepit housing. Pregnancies occur too early in life and too often. Save the Children, a charitable organization, publishes a **Mothers' Index**, which assesses the well-being of mothers and children. Five indicators are taken into account to construct the index:

- maternal health – lifetime risk of maternal death
- children's well-being – under-five mortality rate
- educational status – expected number of years of formal schooling
- economic status – GDP per capita
- political status – participation of women in national government.

Table 7.10 Mothers' Index rankings, 2015

Top 10		Middle 10		Bottom 10	
Rank	**Country**	**Rank**	**Country**	**Rank**	**Country**
1	Norway	84	Iran	169	Haiti/Sierra Leone
2	Finland	85	Cape Verde	171	Guinea-Bissau
3	Iceland	86	Georgia/St. Vincent and the Grenadines	172	Chad
4	Denmark	88	Belize/Bolivia	173	Cote d'Ivoire
5	Sweden	90	Azerbaijan	174	Gambia
6	Netherlands	91	Namibia	175	Niger
7	Spain	92	Jamaica/Maldives/Sri Lanka	176	Mali
8	Germany	93	Dominican Republic	177	Central African Republic
9	Australia	96	Fiji	178	DR Congo
10	Belgium	97	Mongolia	179	Somalia

Source: Save the Children, 2015.

In 2015, 179 countries were ranked. The top, middle and bottom ten countries are given in Table 7.10. The Nordic countries of Norway, Finland, Iceland, Denmark and Sweden come top, where mothers and children attain very high scores in health, educational, economic and political status.

By contrast, the condition of mothers and children in the bottom ranked countries (all in Africa except Haiti) is grim. On average, 1 woman in 30 dies from pregnancy-related causes, and one child in eight dies before their fifth birthday. There are, however, interesting anomalies. Rwanda, for example, is the top country for political status, with the highest proportion of women in parliament (57.5%), yet it ranks only 121 when the other four indicators are taken into account.

Another measure of the gender gap is the **Gender Inequality Index**, published by the UNDP (United Nations Development Programme), which considers three indicators: maternal mortality ratio (deaths per 100,000 live births); adolescent birth rate (births per 1,000 women aged 15–19); and share of seats in parliament held by women. The top, middle and bottom ten are shown in Table 7.11, out of a total of 151 countries. Again, all the countries in the bottom ten are African.

Table 7.11 Gender Inequality Index rankings, 2013

Top 10		Middle 10		Bottom 10	
Rank	**Country**	**Rank**	**Country**	**Rank**	**Country**
1	Slovenia	63	Costa Rica	142	Mauritania
2	Switzerland	64	Kyrgyzstan	143	Cote d'Ivoire
3	Germany	66	Barbados	144	Central African Republic
4	Sweden	68	Chile	145	Liberia
5	Denmark/Austria	69	Turkey	146	Mozambique
7	Netherlands	70	Uruguay/Thailand	147	Congo
8	Italy	72	Mauritius	148	Mali
9	Norway	73	Mexico	149	Afghanistan
10	Belgium	74	Argentina	150	Chad
				151	Niger

Source: UNDP, 2014.

Policies to reduce gender gap

Let us now turn to policies that could be implemented to help reduce the gender gap. The *World Development Report 2012* (World Bank, 2012) argues for increasing women's individual and collective agency, that is, the ability of women to make choices and transform them into desired actions and outcomes. Empowering women as political and social actors can change policy choices and make institutions more representative. The report identifies five priority areas:

1. Reducing maternal mortality and closing education gaps where they remain.
2. Improving economic opportunities for women.
3. Closing earnings and productivity gaps between men and women.
4. Increasing women's voice and agency in the household and in society.
5. Limiting the transmission of gender inequality across generations.

Reducing maternal mortality requires not only more clinics and trained nurses, but also health-related policies, such as the provision of clean water at the point of use and sanitation, waste disposal and drainage; in other words, a cleaner, safer environment in which to live and raise a family. Closing the education gap requires getting girls into school and staying there. Conditional cash transfers can help. Evidence from a range of countries shows that increasing the share of household income controlled by women through cash transfers or their own earnings change spending in ways that benefit children. Policies that discourage child marriage and school-related, gender-based violence also need to be strengthened.

In terms of improving access to economic opportunities for women, and closing the earnings gap, female farmers and entrepreneurs have less access to land and credit than their male counterparts. It is necessary to improve the functioning of credit markets, in the way that some microcredit schemes have helped women to access small-scale credits and build up a track record of borrower performance (e.g. the Grameen Bank, see Chapter 13). Differences in access to opportunities for women also partly arise from differences in time available because women have responsibility for the care of children and housework. Anything that saves time for women will improve their economic opportunities.

Increasing women's voice and agency in the household and society requires a change in attitude towards women, and removing discriminatory laws and regulations. In over 120 developing countries, the law treats men and women differently, making it impossible, for example, for a woman to obtain independently an identity card or to own property and have access to credit. Control of fertility is also important, which requires family planning services to suit women.

Finally, limiting the transmission of gender inequality across generations must be addressed, and tackled early in life before ideas and norms of behaviour are moulded. The culture and education in households and schools must shift towards empowering women. Everyday tasks such as carrying water or caring can be redistributed within the family to give more time to women.

All these reforms and changes are more likely to succeed if there is broad-based support, particularly support from men. This is where the challenge lies. Discrimination against women is a waste of human capital.

Nutrition

For individuals to achieve their full potential and lead healthy and productive lives, they need the right nutrition from birth. The sad fact is, however, that millions of people in the poorest developing countries are malnourished and may have been from birth. This has serious consequences for

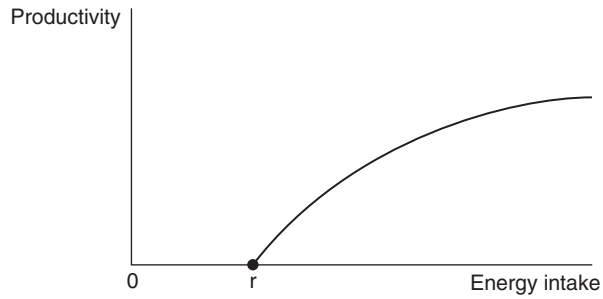
the individual and for society at large, which has to cope with the health consequences of malnourishment and proneness to disease. It has been estimated by the UN's Food and Agriculture Organization (FAO), which is based in Rome, that over 3 billion people worldwide suffer from various types of malnutrition, including over half the world's 1.5 billion children. One billion people suffer protein-energy malnutrition, 1.3 billion suffer from anaemia (iron deficiency), 1 billion people have iodine deficiency, and 30 million children have vitamin A deficiency, causing blindness and death. Nearly 1 billion people have no reliable access to safe drinking water, and nearly 2 billion people have no access to proper toilet facilities, including half the population of India (Drèze and Sen, 2013). Nearly half the population of poor countries suffer from water-related diseases. Diarrhoea caused by unclean water claims the lives of 1.5 million children a year. This weakens the body, and the weaker and more undernourished children are, the more prone they are to infection and disease; and the more infections, the greater the undernourishment due to loss of appetite, the difficulties of eating and the low absorption rate of food during digestion. Malnutrition among children is particularly serious because it stunts growth and mental development, and adds another twist to the vicious circle of poverty. Malnutrition is also a major cause of infant mortality, the rate of which is almost ten times higher in developing countries than in developed countries.

In his monumental, path-breaking book *An Inquiry into Well-Being and Destitution* (1993), well-known Indian economist Partha Dasgupta attempts to understand the common circumstances in which people are born in poor countries and in which they live and die in rural communities in these countries. He pays a lot of attention to the question of nutrition and its effects on health and work effort. The relation between low income and food intake is, of course, a two-way one. Low income is the major cause of malnutrition, which, in turn, is a cause of low income as it impairs work efficiency and productivity. Indices or measures of malnutrition can be based either on **nutritional requirements**, in terms of different kinds of food, or on **food energy**. Both affect labour productivity. The food requirements that nutritionists consider necessary for efficient working and healthy living are far greater than the levels achieved by the vast mass of the population living in developing countries. Calorie deficiency causes loss of body weight, tiredness, listlessness and a deterioration of mental faculties. Calories are also required for the absorption of protein: if the calorie requirement is met, the protein requirement is normally met too, but not always. Kwashiorkor – a condition associated with the bloated stomachs and staring eyes of the starving or malnourished children we often see on our television screens – arises from protein deficiency because the calorie intake is in the form of low-protein tubers such as cassavas and yams. Protein is particularly important for brain development in the first three years of life, during which time the brain grows to 90% of its full size. Maternal nutrition is crucial for the health of babies. Once babies are born, the damage that malnutrition does in the first 1,000 days of life is irreversible. According to research published in the *Lancet* (Utzinger and Tanner, 2013), malnourished children are less likely to go to school, less likely to remain at school, and more likely to struggle academically. The consequences go beyond school performance. They earn less than their well-nourished peers over their lifetime, marry poorer spouses and die earlier. Malnutrition is responsible for the deaths of some 3 million children a year (te Lintelo and Nisbett, 2015).

Of the 40 nutrients people need, four are in chronically short supply: iron, zinc, iodine and vitamin A. Lack of vitamin A causes half a million children to go blind every year. Zinc deficiency impairs brain and motor function and causes some 400,000 deaths a year. Shortage of iron weakens the immune system and can badly affect women of childbearing age. Iodine deficiency causes goitre and mental retardation.

When it comes to the relation between nutrition and the capacity for physical effort, nutrition is generally defined in terms of the energy requirement. In this context, Dasgupta (1993)

Figure 7.1 Relation between productivity and energy intake



defines undernourishment as 'a state in which the physical functioning of a person is impaired to the point where she cannot maintain an adequate level of performance at physical work, or at resisting or recovering from the effects of any of a … variety of diseases'. The minimum amount of energy or maintenance requirement (r) is the daily calorie requirement when a person is engaged in the minimal activities of eating and maintaining essential hygiene, with no allowance for work and play. According to nutritionists, r is 1.4 times the basal metabolic rate. The relation between productivity and energy intake is shown in Figure 7.1.

The interesting thing in Figure 7.1 is that the slope of the line is decreasing, but it could be linear or even increasing over certain ranges. When Bliss and Stern (1978) surveyed the literature, they found the line to be linear in the region slightly to the right of r. More recent research confirms this (see Behrman, 1993, for a comprehensive survey) and shows substantial economic and social returns to investment in nutrition and health, in terms of increased productivity on the job, increased productivity of time spent in school, and cost savings from treating the consequences of malnutrition and poor health. The costs of treating various forms of malnutrition are trivial relative to the tangible benefits and the costs of treating the consequences. To prevent malnutrition in children from the age of six months to three years, which is a child's most vulnerable period, can cost as little as $100 at current prices. The annual cost of preventing malnutrition is no more than the daily cost of treating its effects. Vitamin A deficiency is a cause of blindness. The annual cost of supporting a blind person is at least 1,000 times the annual ingredient cost of the vitamin A needed for prevention. Iodine deficiency is a cause of hypothyroidism (goitre), which leads to cretinism and deaf-mutism. The cost of iodized salt to prevent this is less than $0.02 per person per year. And so one could go on. Prevention is better than cure not only for the individual but also in a very real economic sense for the welfare of society as a whole.

The FAO is the major international organization concerned with ensuring food and nutrition security for the people of the world. Case example 7.3 gives its mission statement.

Case example 7.3

Food and Agricultural Organization (FAO) mission statement

FAO's mission is to ensure food and nutrition security for all people, to improve diets and to combat micronutrient deficiencies and all forms of malnutrition. It works to protect, promote and improve food systems – the way we produce, collect, store, transport, transform and distribute foods – as the sustainable solution to hunger and

continued overleaf

Case example 7.3 **Food and Agricultural Organization (FAO) mission statement** – *continued*

malnutrition. It ensures that agricultural development is people-centred and leads to improve availability, access to and consumption of safe and diverse foods for better nutrition. To improve nutrition, the FAO:

- Facilitates high-level dialogue between sectors and nations seeking a common agenda on nutrition, agriculture, sustainable food systems and healthy diets.
- Helps countries to devise policies and run programmes that will improve nutrition.
- Shares knowledge to help implement food-based nutrition policies through nutrition education and consumer awareness.
- Reviews evidence, offers guidance and scientific advice on all aspects of nutrition.

Source: www.fao.org/nutrition.

The member states of the WHO have endorsed a comprehensive implementation plan on maternal, infant and young child nutrition, which includes six global nutrition targets to be achieved by 2025 (WHO, 2014a). The six targets are:

1. **Stunting**: 40% reduction in the number of children under-five who are stunted. Childhood stunting is one of the most significant impediments to human development, globally affecting approximately 162 million children under the age of five. Estimates indicate that stunting can reduce a country's GDP by up to 3% a year (see Case example 7.4).
2. **Anaemia**: 50% reduction of anaemia in women of reproductive age. Anaemia affects half a billion women of reproductive age worldwide. The highest prevalence of anaemia is in Asia and Central and West Africa. Improvements have been seen around the world; for example, Burundi (64.4% down to 28% in 20 years), Nepal (65% down to 34% in 8 years) and Nicaragua (36.3% down to 16% in 10 years).
3. **Low birth weight**: 30% reduction in low birth weight. It is estimated that 15–20% of all births worldwide have low birth weight. Affordable, accessible and appropriate healthcare is critical for preventing and treating low birth weight.
4. **Childhood overweight**: No increase in childhood overweight. The prevalence of childhood overweight is increasing in all regions of the world, particularly in Africa and Asia. It is predicted that the prevalence of overweight children under 5 years old will rise to 11% worldwide by 2025, up from 7% in 2012.
5. **Breastfeeding**: Increase the rate of exclusive breastfeeding in the first six months up to at least 50%. Exclusive breastfeeding has the single largest potential impact on reducing child mortality of any preventive intervention. Globally, only 38% of infants aged 0–6 months are exclusively breastfed. Sri Lanka, Cambodia and Malawi have all seen dramatic increases in rates of exclusive breastfeeding.
6. **Wasting**: Reduce and maintain childhood wasting to less than 5%. Wasting is a reduction of body weight in relation to height. It is estimated that 52 million children under 5 years old are wasted, with 17 million of those estimated to be severely wasted. The majority of wasted children live in Asia. India accounts for approximately one-half of the global burden of wasting.

There are links between the global nutrition targets. For example, stunting is linked with anaemia in women of reproductive age, low birth weight, childhood overweight, not enough exclusive breastfeeding and wasting.

Nutrition offers one of the best returns on investment. It has been estimated that every US$1 invested in nutrition generates US$138 in better health and increased productivity. Conversely, not investing in nutrition perpetuates economic losses, at an estimated cost of up to 11% of annual GDP in lost production. On average, governments and donors spend 1–2% of their budgets on nutrition. They need to double the resources devoted to improve nutrition if global nutrition targets are to be met by 2025 (IFPRI, 2015).

Case example 7.4

Childhood stunting

Stunting is an enormous drain on economic productivity and growth. Economists estimate that it can reduce a country's GDP by up to 3% a year. Among many other international organizations, the WHO has been making efforts to ameliorate the problems related to malnutrition. In 2012, the WHO's Assembly endorsed a comprehensive implementation plan on maternal, infant and young child nutrition, which stated six global nutrition targets for 2025. The first target is to reduce by 40% the number of stunted children under 5 years. Childhood stunting is one of the most significant impediments to human development. It has long-term effects on people, including: diminished cognitive and physical development; poor health and reduced productive capacity, and an increased risk of degenerative diseases such as diabetes. Currently, it affects about 162 million children under the age of 5 years, and the target is to decrease it to 100 million by 2025.

There is a suggested framework for action to achieve the stunting target, which focuses on tackling the causes of stunting. It focuses on the 1,000-day window from a woman's pregnancy to her child's second birthday. Policy-makers should consider the following actions:

- improve the identification, measurement and understanding of stunting and scale up coverage of stunting-prevention activities;
- enact policies and/or strengthen interventions to improve maternal nutrition and health, beginning with adolescent girls;
- implement interventions for improved exclusive breastfeeding and complementary feeding practices;
- strengthen community-based interventions, including improved water, sanitation and hygiene (WASH).

Bolivia, Brazil, India and Peru are examples of countries that have implemented successful multisectoral approaches to effectively address stunting; for example, education policies that keep girls at school throughout adolescence; laws curtailing the marketing of breast milk substitutes; labour laws that provide maternity protection in support of exclusive and continued breastfeeding; and agriculture and food policies designed to improve household food security.

Source: WHO, 2014b.

Some countries have made significant progress in reducing the incidence of malnutrition: examples are Bangladesh, Brazil, Colombia, Peru, Vietnam, Egypt, Ethiopia, Kenya and Tanzania. These countries have made progress by creating a political environment conducive to nutrition-improving action, investing in high-impact, cost-effective nutrition intervention, and adopting policies in a wide range of economic and social sectors.

Political commitment to reducing malnutrition is so important that the Institute of Development Studies at the University of Sussex now produces a **Hunger and Nutrition Commitment Index (HANCI)**, which ranks governments on their political commitment to tackling hunger and malnutrition. The HANCI compares 45 developing countries for their performance on 22 indicators relating to three areas of action: legal framework, policies and programmes, and public expenditure. In 2014, Peru topped the index followed by Guatemala. Sudan, Angola and Guinea-Bissau were at the bottom of the ranking (te Lintelo and Lakshman, 2015).

The MDG Target 1c of halving the share of the chronically undernourished of the world's population by the end of 2015 was almost met. Goal 2 of the new SDGs is to 'end hunger, achieve food security and improve nutrition, and promote sustainable agriculture', with the aim of ending malnutrition by 2030. Interestingly, out of the 17 goals, with 169 targets between them, this is the *only* one that mentions nutrition, with no reference to obesity at all. To downplay the role of nutrition is a mistake.

Water

Water is a basic 'nutrient', essential for human existence. Access to clean water at the point of use should be considered as a basic human right, yet three-quarters of a billion people are denied it. Fresh water is extremely important for health. The biggest single cause of child deaths is diarrhoea and other waterborne diseases. Acknowledging the importance of access to clean water for health and sanitation, one of the UN's MDGs was to halve by 2015 the proportion of people without sustainable access to safe drinking water and basic sanitation. In 2012, 748 million people remained without access to safe drinking water. Dirty water and poor sanitation kill over 500,000 children a year.

Women bear the brunt of providing fresh water for their families in many of the poorest countries of the world. In sub-Saharan Africa, only half of households are within 15 minutes of a water source. Women and girls are the primary water carriers for their families. Where rural water sources are distant, women may walk up to two hours a day to collect it. Where urban water is obtained from shared standpipes, they may wait in line for over an hour. Case studies from around the world show that water-related 'time poverty' translates into lost income for women and lost schooling for girls. Constantly fetching and carrying water in heavy containers also has severe health implications. In extreme cases, curved spines and pelvic deformities can result, causing problems in childbirth.

Singapore has been recognized as the best country in the world to manage its water. Little water is wasted. Used water is treated and then safely disposed of, reused for industrial purposes or air-conditioning, or mixed with reservoir water for drinking. Recycled waste and desalinated water are expected to meet 25–30% of demand. There are lessons to be learned from Singapore.

In Africa, the eThekwini and Sharm El-Sheikh Declarations in 2008 committed countries to spending 0.5% of GDP on sanitation and hygiene, but this has gone almost universally unobserved. Countries have a responsibility to provide fresh water for their citizens with the help of the international community.

Water Aid is a leading international charity committed to improve access to safe water, sanitation and hygiene for the poorest and most marginalized people and operates in 26 poor countries. In 2013–14, Water Aid provided 2 million people with safe water: 71% in rural areas, 21% in urban areas and 8% in small towns.

Water is not evenly distributed. Nine countries account for 60% of all available supplies, and among them only Brazil, Canada, Colombia, Congo, Indonesia and Russia have an abundance of

it. China and India, with over a third of the world's population between them, have less than 10% of the world's water. Africa has 35 of the 45 most 'water-stressed' countries.

Water is not only required for human survival but also for many activities, including farming, cattle breeding, manufacturing goods, and as a means of transport, among many others. Fresh water management represents a huge challenge, mainly due to its increasing demand by a growing world population and changes in the climate. Of all the activities that need water, agriculture uses almost 70% of the world's supply, while industry takes about 22%, and domestic activities account for 8%. There are options to overcome the growing demand for clean water. Desalination is one possibility. Although it is still an expensive alternative, there are various techniques and technologies available. The prospect is that solar power will make desalination economic in the future.

Health

Human survival depends not only on nutrition but also freedom from infection and disease. This brings us to the topic of the health of people in poor countries, the various diseases that poor people suffer from, and the effect that poor health has on the economies of developing countries in terms of work days lost through illness and low productivity.

Angus Deaton, the Nobel Prize-winning economist, argues in his masterly book, *The Great Escape: Health, Wealth, and the Origins of Inequality* (2013), that improvement in the health of humans is the most important measure of economic and social progress and that although mankind has experienced an improvement in health through time, many people have missed out – notably the poor. There is a vicious circle between poverty and ill health. Poverty leads to illness because of poor nutrition, lack of sanitation and clean water. Poor health then leads to poverty by reducing an individual's productivity and by the potential reduction of assets used to cover the cost of treatment. For Deaton, health is one of the most important components of well-being, and he believes that inequalities in health (between rich and poor countries and rich and poor people) are 'one of the greatest injustices in the world today'. He takes a moral stance when he says: 'those of us who are fortunate enough to have been born in the "right countries" have a moral obligation to help reduce poverty and ill health in the world'. Here, we are going to discuss the various diseases that are prevalent in poor countries, and which still kill millions of children and adults, and the international campaigns that exist to combat them. We shall also consider the research that attempts to measure the effect of ill health on the economic performance of countries.

Angus Deaton

Born in Scotland, 1945. Professor of Economics at Princeton University; one of the foremost economists working in development economics, with particular focus on the analysis of poverty, the consumption choices of poor people, and their nutrition and health. Latest book is *The Great Escape: Health, Wealth, and the Origins of Inequality* (2013). Awarded the Nobel Prize for Economics in 2015, with the citation: 'for his analysis of consumption, poverty and welfare'.

Killer diseases

There are three main killer diseases in poor countries that affect their development potential – malaria, tuberculosis (TB) and HIV/AIDS. These diseases are preventable, and the first two are curable. In 2013, together they killed over 3.5 million people. Their symptoms while people are alive include high temperature, weight loss, muscle pain and fatigue, all of which affect the quality of life and the ability to work productively. Goal 6 of the MDGs was to reverse and then halt the spread of malaria, TB and HIV/AIDS. At the international level, there is a **Global Fund to Fight AIDS, Tuberculosis and Malaria**.[2] This is a private foundation, which raises, manages and disburses private and public funding to support countries in their fight against the three diseases. The Global Fund is complemented by disease-specific targets set by UNAIDS, the WHO, the Stop TB Partnership and the Roll Back Malaria (RBM) Partnership. The Global Fund spent $8 billion between 2002 and 2013, and it is estimated that total eradication of these diseases by 2040 will cost $100 billion – but the total economic benefit would be $2 trillion, which is a very high benefit–cost ratio. Each disease has been assigned a day to raise international awareness: 25 April for malaria, 24 March for TB and 1 December for HIV/AIDS. Table 7.12 provides a summary of the number of people newly infected with malaria, TB and HIV/AIDS, deaths, and progress in prevention.

SDG 3 continues from MDG 6 and aims to 'ensure healthy lives and promote well-being for all at all ages'. Specifically, it aims to end the epidemics of malaria, TB and AIDS, and other contagious diseases, by 2030.

Malaria

Malaria is a preventable and treatable infectious disease transmitted by mosquitoes, which kills more than half a million people a year, most of them (90%) in sub-Saharan Africa, where malaria is the leading cause of death for children under five. The key interventions to prevent malaria – insecticide-treated nets (ITNs), insecticide spraying, and access to treatments – are well known, but eliminating the disease requires a broader range of actions. Efforts to improve housing and infrastructure development, sanitation, agricultural practices, mobility, and nutrition are also needed.

Malaria transmission continues to affect 97 countries and territories worldwide, inflicting a tremendous burden on countries. Nearly 300 million people in sub-Saharan Africa still lack access to a protective ITN, and at least 15 million pregnant women do not receive the protective treatment they need to keep themselves and their unborn child safe. The Democratic Republic of

Table 7.12 Comparing malaria, TB and HIV/AIDS

	People newly infected	Mortality	Prevention
Malaria	198 million cases in 2013	584,000 people in 2013; 90% of malaria deaths occur in sub-Saharan Africa and 78% in children under five years	49% of at-risk population had access to an insecticide treated net in 2013 compared to 3% in 2004
TB	9 million cases in 2013	1.5 million people in 2013; 45% decline between 1990 and 2013	37 million lives saved between 2000 and 2013 through effective diagnosis and treatment
HIV/AIDS	2 million people infected with HIV in 2014	1.5 million people in 2013; 35% fewer than when the number peaked in 2005	143,000 health facilities in 2011 provided HIV testing and counselling, 21% increase from 2007

Source: Based on WHO, www.who.int/en.

the Congo and Nigeria account for over 40% of global deaths from malaria. In Southeast Asia, the second most affected region of the world, India has the highest malaria burden, followed by Indonesia and Myanmar.

Malaria takes a high toll on households and healthcare systems, and impedes economic development in endemic countries. A cross-country regression analysis for a 25-year period (1965–90) estimated annual rates of economic growth to be 1.3% lower in countries with a serious malaria burden than in countries with less malaria (Gallup and Sachs, 2001). Malaria also discourages foreign investment, increases people's out-of-pocket spending on healthcare, and impairs children's ability to learn for those who survive the illness.

The **Roll Back Malaria (RBM) Partnership** was launched in 1998 by WHO, UNICEF, UNDP and the World Bank in an effort to provide a coordinated global response to the disease. The RBM and UNDP convened a Consultation on Developing a Multisectoral Approach to Malaria in July 2013. Participants agreed on the development of an action framework and a roadmap to identify ways forward for better addressing the socio-environmental determinants of malaria and to engage agencies from non-health sectors. The **Multisectoral Action Framework for Malaria** was launched alongside the 68th Session of the UN General Assembly in New York in September 2013 (RBM and UNDP, 2013). The year 2015 marked a turning point in the treatment of malaria. A global framework **Action and Investment to Defeat Malaria** (2016–30) organized by RBM placed the management of the disease as a development issue. It complements the WHO's **Global Technical Strategy for Malaria 2016–2030**. Today, malaria can be diagnosed, treated and prevented with a combination of available tools. However, global estimates indicate that US$4.2 billion is needed each year to fully fund the fight against malaria. There is hope for the future. Scientists working on the global genome project have unlocked the genetic code of the malaria parasite and the mosquito species that transmits it. This paves the way for a new generation of vaccines, insecticides and repellents to combat malaria – provided, of course, that it is profitable for drug companies to develop them.

Tuberculosis

Tuberculosis (TB), like malaria, is also preventable and curable. TB is transmitted by air, through coughing and sneezing. Persons with weak immune systems, such as those living with HIV, malnutrition or diabetes, or people who smoke tobacco, have a much higher risk of getting infected. TB remains a leading cause of death among people living with HIV, accounting for one in five AIDS-related deaths globally. Over 95% of cases and deaths are in developing countries. Brazil, Russia, India, China and South Africa account for almost 50% of global TB cases.[3] In 2013, there were an estimated 9 million new TB cases and 1.5 million TB deaths (including 400,000 people with HIV). Although most TB cases and deaths occur among men, the burden of the disease among women and children is also high. In 2013, there were an estimated 3.3 million cases and 510,000 TB deaths among women, and 550,000 cases and 80,000 deaths among children. Although the TB mortality rate has decreased by 45% since 1990, it is still regarded as serious, given that most deaths are preventable if people can access healthcare for diagnosis and treatment.

Access to TB care has expanded substantially since 2000. Between 2000 and 2013, 37 million lives were saved through effective diagnosis and treatment. However, there remains a huge gap in services. Of the nearly 9 million people who developed TB in 2012, 3 million of them were not diagnosed and thus not treated. Diagnosis can be difficult, particularly in cases of multidrug resistant forms of the disease. Treatment is also difficult; standard TB involves six months of daily medication, whereas multidrug-resistant (MDR) TB requires up to two years of treatment.

Table 7.13 The post-2015 global TB strategy

Vision	A TB-free world: zero deaths, other diseases and suffering due to TB
Goal	End the global TB epidemic
Milestones for 2025	75% reduction in TB deaths (compared to 2015) 50% reduction in TB incidence rate (less than 55 TB cases per 100,000 people) No affected families facing catastrophic costs due to TB
Targets for 2035	95% reduction in TB deaths (compared with 2015) 90% reduction in TB incidence rate (less than 10 TB cases per 100,000 people) No affected families facing catastrophic costs due to TB

Source: WHO, 2014b.

The cost per patient treated for drug-susceptible TB in 2013 was in the range US$100–500. The cost per patient treated for MDR TB ranged from an average of US$9,235 in low-income countries to US$48,553 in upper middle-income countries. Many TB-endemic countries cannot afford to treat their patients; their national healthcare systems are overburdened with the disease, and the infrastructure necessary for TB treatment is extremely costly. The World Bank estimates that, for some countries, the loss of output attributable to TB is 4–7% of their GDP.

The Millennium Development Goal to reverse the tuberculosis epidemic by 2015 was achieved globally. In 2013, the TB mortality rate had fallen by 45% compared to 1990. The WHO has developed a post-2015 global TB strategy – **The End TB Strategy**. Its goal is to end the global TB epidemic by 2035, with corresponding global targets for a 95% reduction in the number of TB deaths and a 90% reduction in the number of cases compared with the baseline of 2015 (see Table 7.13).

HIV/AIDS

In 2014, 1.2 million people died from **Human Immunodeficiency Virus (HIV)**-related causes. Although there is no cure for HIV, there are effective treatments that can control the virus so that infected people can still lead healthy and productive lives. The most advanced stage of HIV is **Acquired Immunodeficiency Syndrome (AIDS)**. HIV/AIDS has destroyed families, communities and affected the economy of entire nations. As Kofi Annan, former secretary-general of the UN, said when addressing the International AIDS Conference in July 2004 in Bangkok, Thailand: 'AIDS is far more than a health crisis. It is a threat to development itself.' Since 2000, when the outlook was dire, the AIDS epidemic has been taken seriously. The Millennium Development Goal 6 played a crucial role in targeting the epidemic. In 2015, the world achieved the AIDS targets of MDG 6 – halting and reversing the spread of HIV – according to a comprehensive report published by the Joint United Nations Programme on HIV/AIDS (UNAIDS, 2015). In 2000, fewer than 700,000 people were receiving antiretroviral medicines; in 2015, 15 million accessed them. Over the same period, new HIV infections declined by 35%. Table 7.14 summarizes three aspects of HIV/AIDS – people living with HIV, new HIV infections, and AIDS-related deaths, for seven regions in 2014.

New HIV infections declined steadily between 2000 and 2014. The number of newly infected people in 2014 was 35% lower than in 2000. Likewise, since 2004, when the number of AIDS deaths peaked, the annual number of AIDS-related deaths declined by 42% (see Figure 7.2). In 2014, an estimated 1.2 million people died of AIDS-related causes globally. However, the number of people living with HIV continues to increase. This is because more people have access to antiretroviral treatment and as a result are living longer, and there is still a high number of new HIV infections each year.

The most significant gains in reversing the epidemic have been among children under the age of 15. Since 2000, new HIV infections among children have declined by 58%; however, still in 2014, 2.6 million children were living with HIV (see Table 7.14 for a regional breakdown). The epidemic

Table 7.14 Regional HIV/AIDS data, 2014

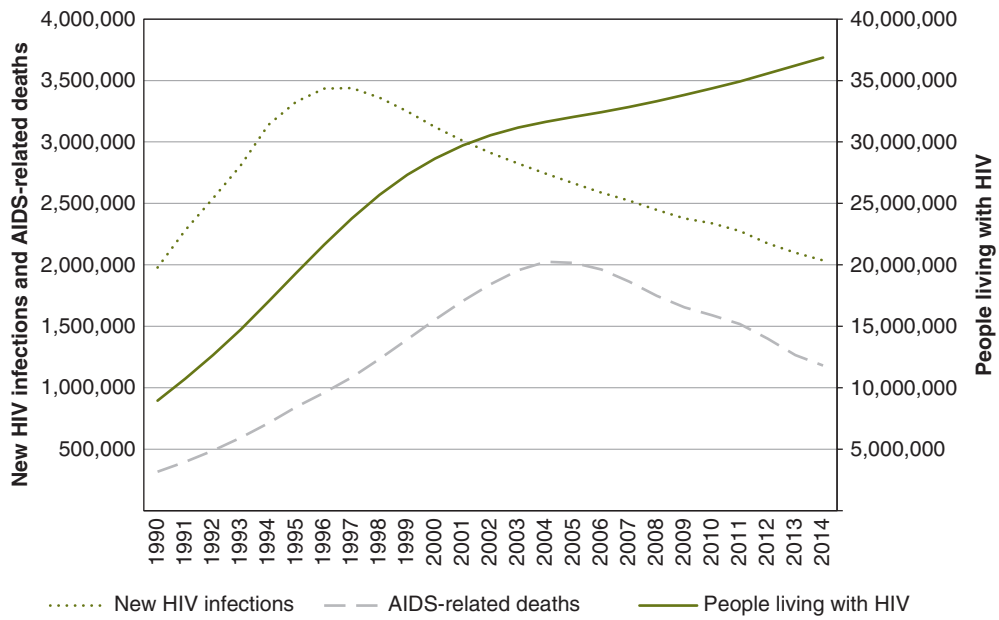
Region	People living with HIV		New HIV infections		AIDS-related deaths
	Total	Children	Total	Children	Total
Sub-Saharan Africa	25.8 million	2.3 million	1.4 million	190,000	790,000
Asia and the Pacific	5.0 million	200,000	340,000	21,000	240,000
Latin America	1.7 million	33,000	87,000	2,000	41,000
Caribbean	280,000	13,000	13,000	<500	8,800
Middle East and North Africa	240,000	13,000	22,000	2,400	12,000
Eastern Europe and Central Asia	1.5 million	17,000	140,000	1,200	62,000
Western and Central Europe and North America	2.4 million	3,300	85,000	<500	26,000
Global	36.9 million	2.6 million	2.0 million	220,000	1.2 million

Source: UNAIDS, 2015.

among children stems from HIV transmission during pregnancy, childbirth or breastfeeding. In 2015, Cuba became the first country to be certified by the WHO as having eliminated new HIV infections among children and ending mother-to-child transmission.

Although 70% of people living with HIV live in only 17 countries, the HIV epidemic remains global, affecting virtually every country in the world and adding substantially to health burdens. Sub-Saharan Africa has been the most affected region, with 25.8 million people living with HIV. In 2014, South Africa alone accounted for 18% of all the people living with HIV in the world; followed by Nigeria (9%), Zimbabwe (4%), Mozambique (4%), Tanzania (4%), Uganda (4%) and Kenya (4%).

Figure 7.2 People affected by HIV/AIDS (all ages), 1990–2014



Source: AIDSinfo, http://aidsinfo.unaids.org/#.

When countries are ranked by the incidence of HIV (ratio of people living with HIV to the country's population), in 2014, the following sub-Saharan countries came top: Botswana (18%), South Africa (13%), Zimbabwe (11%), Zambia (8%), Malawi (7%), Mozambique (6%), Uganda (4%), Kenya and Tanzania (3%), and Ivory Coast and Nigeria (2%).

The global response to HIV is estimated to have averted 30 million new HIV infections and nearly 8 million AIDS-related deaths since 2000, when the MDGs were set. Everyone living with HIV needs access to HIV treatment: this is the promise that world leaders committed to in 2015 with the Sustainable Development Goal to end the epidemic by 2030. Two success stories against AIDS are highlighted in Case example 7.5.

Case example 7.5

Two success stories against AIDS: Senegal and Rwanda

Senegal

In 2014, Senegal registered 2,400 AIDS-related deaths and 44,000 people living with HIV. It has made major efforts in the past five years to scale up access to HIV prevention, treatment, care and support services for its population, with a focus on key, higher risk groups. It is one of the few countries in the western and central African region that has collected robust data on hard-to-reach populations, such as sex workers, men who have sex with men and people who use drugs. The country has scaled up access to antiretroviral therapy, and treatment is now widely available in many parts of Senegal. The number of people receiving antiretroviral therapy increased from 5,500 in 2006 to nearly 18,000 in 2011. The combination of efforts is having positive results. According to UNAIDS, HIV prevalence among the general population remains stable at 0.7%, while HIV prevalence among sex workers has decreased from 19.8% in 2006 to 18.5% in 2011, and new HIV infections among youth have decreased. The Global Fund highlights Senegal as a model for the response to HIV in the western and central African region.

Rwanda

AIDS-related deaths of all ages in Rwanda have decreased significantly since a peak in 2002–03, when there were 21,000 deaths, compared to 3,000 in 2014. The number of people living with HIV has fallen moderately from 270,000 in 1999 to 210,000 in 2014. The government of Rwanda continues to scale up HIV services: by the end of 2013, 493 out of 495 health facilities in the country provided testing and counselling services, 488 provided services to prevent mother-to-child transmission, and 465 provided antiretroviral therapy. TB-related deaths among people living with HIV declined by approximately 45% between 2000 and 2010, accompanied by a 70% decline in child mortality and a 60% decline in maternal mortality. This achievement provides a sound example of the way that the benefits of investment in AIDS prevention and other chronic diseases can extend far beyond the treatment of AIDS itself. Rwanda is piloting an innovative financing mechanism in partnership with the Global Fund, where grant funds will be used to implement Rwanda's National Strategic Plan for HIV (2013–18) and TB/HIV.

Source: UNAIDS, 2015.

Other diseases and health expenditure

Apart from the big killers of tuberculosis, malaria and AIDS, there are many other tropical diseases that continue to disable tens of millions of people in tropical Asia, Africa and Latin America, such as leprosy, river blindness, Chagas disease and lymphatic filariasis. With modern medicine

and antibiotics, there is now the opportunity to eliminate these diseases. The global registered prevalence of leprosy at the beginning of 2013 stood at 189,018 cases. During 2014, 22 countries reported that more than 112 million people were treated with ivermectin to treat river blindness (onchocerciasis), which is transmitted to humans through bites of infected blackflies. Infected people live in 31 sub-Saharan Africa countries and in some particular places in Latin America and Yemen. Chagas disease is spread by bloodsucking bugs and infects 6 to 7 million people worldwide, mostly in Latin America. Lymphatic filariasis, commonly known as 'elephantiasis', is a neglected tropical disease, and 1.1 billion people in 55 countries remain threatened by the disease and require preventive chemotherapy to stop the spread of this infection. In addition, there are waterborne diseases, which include cholera, dysentery, typhoid and worm infection. There are about 1.7 billion cases of diarrhoeal disease every year. It kills around 760,000 children a year under the age of five (for all diseases, see WHO, *Global Health Observatory data*, www.who.int/gho/database/en).

Table 7.15 presents some health-related statistics for 2013, including total expenditure on health as a percentage of GDP, health expenditure per head of the population, life expectancy at birth, and the infant mortality rate. Notice the colossal difference in health expenditure per capita in rich and poor countries. While in high-income countries, expenditure is $4,456, in the low-income countries it is only $37. The low expenditure and lack of access to basic health facilities in poor countries is reflected in the much lower life expectancy of only 61 years in low-income countries (and 58 years in Africa) compared to 79 years in high-income countries. There is also a big difference in infant mortality rates, with 53 deaths per 1,000 live births in low-income countries compared with only 6 deaths in high-income countries. Baldacci et al. (2005) calculate that an increase in health expenditure of 1% of GDP is associated with an increase of 0.5 percentage points in the survival rate of children under 5 and a 0.5 percentage point increase in per capita income growth.

Table 7.15 Health indicators

	Health expenditure		Life expectancy at birth	Infant mortality rate
	Total	Per capita		
	% of GDP	$	years	per 1,000 live births
	2013	2013	2013	2015
World	10	1,042	71	32
Low income	6.4	37	61	53
Middle income	5.8	256	70	31
Lower middle income	4.2	82	67	40
Upper middle income	6.3	466	74	15
Low and middle income	5.8	235	69	35
East Asia and Pacific	5.3	293	74	15
Europe and Central Asia	5.9	413	72	18
Latin America and Caribbean	8.1	729	74	16
Middle East and North Africa	6	258	72	21
South Asia	3.9	56	68	42
Sub-Saharan Africa	5.7	101	58	56
High income	11.9	4,456	79	6

Source: World Bank, 2015, Tables 2.15 and 2.21.

The provision of education, nutrition, health services, water supply, housing and sanitation came to be known in development circles in the 1970s (and supported by the World Bank) as the **basic needs approach** to economic development. The rationale of the approach was that the direct provision of such goods and services was likely to relieve absolute poverty more immediately than alternative strategies, which would simply attempt to accelerate growth or rely on raising the incomes and productivity of the poor. Five arguments were used to support this change in strategy:

1. Growth strategies usually fail to benefit those intended.
2. The productivity and incomes of the poor depend in the first place on the direct provision of health and education facilities.
3. It may take a long time to increase the incomes of the poor so that they can afford basic needs.
4. The poor tend not to spend their income wisely, and certain facilities such as water supply and sanitation can only be provided publicly.
5. It is difficult to help all the poor in a uniform way in the absence of the provision of basic needs.

The basic needs approach has lost none of its rationale in the direct fight against poverty and disease in the world's poorest countries.

The impact of ill health on growth and development

There are several channels through which better health may impact on the economic growth and development of countries:

- Healthier people are more productive. They can work harder, longer and they can think more clearly.
- Health improves educational outcomes through better attendance at school and improved cognitive functioning.
- Lower mortality and higher life expectancy encourage savings for retirement and release resources for investment.

Cole and Neumayer (2006) have conducted a major study of the impact of poor health on total factor productivity growth (TFP), taking a panel of 52 developed and developing countries over the period 1965–95. They estimate TFP from a standard neoclassical production function (see equation 4.22) and then relate differences between countries to malnutrition, malaria and waterborne diseases. Malnutrition impacts on productivity by sapping the energy of workers and making them more susceptible to infection and disease. Malnutrition used as a causal variable in the analysis is measured by the percentage of the population undernourished. Malaria similarly makes workers feel weak, and impairs cognitive ability. Malaria is measured by an index, which combines the percentage of land area affected and the percentage number of malaria cases. Waterborne diseases are a great health risk in poor countries and include dysentery, cholera and typhoid fever. This also impacts on energy at work, and on school attendance. This is measured for empirical analysis by the percentage of the population without access to safe water. The function estimated is therefore:

$$\text{TFP} = a + b_1\,(\text{incidence of malnutrition}) + b_2\,(\text{incidence of malaria}) + b_3\,(\text{lack of access to safe water}) + \varepsilon \qquad (7.6)$$

where the coefficients b_1, b_2 and b_3 measure the effect of these three health variables on the growth of TFP across countries, and ε is an error term. The results are significant and striking. The

coefficients on all the health variables are negative. Malnutrition reduces TFP growth by 0.17 percentage points (p.p.), malaria by 0.58 p.p. and lack of access to safe water by 0.1 p.p.

Another way of estimating the effect of poor health on the macroeconomic performance of countries is to calculate the number of working days lost through ill health. This is the preferred approach of the World Health Organization (WHO, 2008), which calculates what they call **disability-adjusted life years (DALYs),** which adds up the number of years lost as a result of poor health or disability, and is measured as the difference between an individual's current health status and an ideal health situation where the entire population lives to an advanced age, free of disease and disability.[4]

Table 7.16 gives the 20 leading causes of work years lost through ill health. Heart disease (which is not infectious) comes top, but malaria, TB, HIV/AIDS and waterborne disease also figure prominently. Once total DALYs have been calculated for each country, they can be included in a cross-country growth regression of the form:

$$y = a + b_1 (DALY) + b_2 X + \varepsilon \tag{7.7}$$

Table 7.16 Leading causes of DALYs, 2012

Rank	Cause	DALYs (000s)	% DALYs	DALYs per 100,000 population
0	**All Causes**	**2,743,857**	**100.0**	**38780**
1	Ischaemic heart disease	165,717	6.0	2342
2	Lower respiratory infections	146,864	5.4	2076
3	Stroke	141,348	5.2	1998
4	Preterm birth complications	107,210	3.9	1515
5	Diarrhoeal diseases	99,728	3.6	1409
6	Chronic obstructive pulmonary disease	92,377	3.4	1306
7	HIV/AIDS	91,907	3.4	1299
8	Road injury	78,724	2.9	1113
9	Unipolar depressive disorders	76,500	2.8	1081
10	Birth asphyxia and birth trauma	74,600	2.7	1054
11	Diabetes mellitus	59,258	2.2	838
12	Malaria	55,111	2.0	779
13	Back and neck pain	53,920	2.0	762
14	Congenital anomalies	52,532	1.9	742
15	Iron-deficiency anaemia	47,627	1.7	673
16	Tuberculosis	43,650	1.6	617
17	Falls	42,466	1.6	600
18	Neonatal sepsis and infections	39,646	1.4	560
19	Self-harm	39,358	1.4	556
20	Trachea, bronchus, lung cancers	38,535	1.4	545

Source: WHO, 2012.

where y is the growth of per capita income and X is a vector of control variables. The coefficient b_1 measures the impact of days lost through ill health on the growth of living standards. Murray and Lopez (1996) estimate the per capita disability-adjusted life years (DALYs) lost in various regions of the world in 1990 due to premature mortality and years lived with disability adjusted for severity. The estimated impact on per capita income is lower in developed countries at about 0.17 p.p. The impact ranges from 0.2 to 0.4 p.p. in various regions of the developing world, and reaches close to 0.6 p.p. in sub-Saharan Africa. Specific disease variables can also be included in equation (7.7). Malaria, for example, has a strong negative effect of 0.36 p.p. (similar to that found by Gallup and Sachs, 2001).

Summary

- The economic and social development of poor countries requires educated and literate people; an equitable participation of men and women in the labour force; and well-nourished, healthy people free from the debilitating diseases that affect work effort and productivity.
- Investment in human capital takes the form of expenditure on formal education; on-the-job and institutional training; study programmes and adult education; nutrition programmes; and expenditure on health facilities.
- There is serious underprovision of education facilities and opportunities in many poor countries – particularly with regard to secondary and tertiary education. Literacy rates are low.
- Private rates of return to education are high in poor countries, averaging 10%.
- Investment in education can add substantially to the growth performance of countries.
- There is serious discrimination against women in developing countries. Gender equality in education, employment opportunities, voice in society, and access to credit should be an integral part of the development process.
- Women's health has been neglected in poor countries and needs urgent attention.
- For individuals to achieve their potential and lead healthy and productive lives, they need the right nutrition from birth – but millions remain malnourished throughout their lives.
- The WHO has a comprehensive plan to tackle maternal, infant and young children malnutrition, targeting child stunting; anaemia; low birth weight; child overweight; breast feeding; and wasting.
- Good health requires clean water, but three-quarters of a billion people lack access.
- There is a vicious circle between poverty and ill health. Ill health means incapacity to work effectively, and low productivity means poverty.
- The three killer diseases in poor countries are malaria, TB and HIV/AIDS, plus various waterborne diseases such as cholera, typhoid and dysentery.
- There are many international campaigns, such as the Global Fund, to eradicate malaria, TB and Aids –and their eradication is one of the Sustainable Development Goals to be achieved by 2030.
- Health expenditure in poor countries is rudimentary, and needs to be given greater priority.
- Ill health has an adverse effect on the growth of total factor productivity of countries and the growth of per capita income when individual diseases are considered or total working days lost through ill health (DALYs).

Chapter 7 **Discussion questions**

1. What are the main forms of human capital formation?
2. Why is human capital formation essential for the economic and social progress of countries?
3. What is the specific role of education in the growth and development process?
4. How can the rate of return to education be measured, and the contribution of education to economic growth?
5. What form does gender inequality take in many poor countries?
6. Why are women discriminated against in education, employment and participation in civil society?
7. What policies might be implemented to reduce the gender gap?
8. What is the importance of nutrition for economic and social progress?
9. What are the major health challenges confronting poor countries?
10. How does poor nutrition and health impact on the growth performance of countries?

Notes

1. The greater the proportion of expenditure treated as consumption, the higher the rate of return on the investment component.
2. The Global Fund relies on voluntary financial contributions from all sectors of society – governments, private sector, social enterprises, philanthropic foundations and individuals. The Bill & Melinda Gates Foundation has been a key partner of the Global Fund, providing cash contributions, active participation on its board and committees, and substantial funding to related advocacy and fundraising efforts. To date, the foundation has contributed or pledged a total of US$1.4 billion to the Global Fund.
3. The WHO classifies 22 countries as high TB burden countries: Afghanistan, Bangladesh, Brazil, Cambodia, China, D.R. Congo, Ethiopia, India, Indonesia, Kenya, Mozambique, Myanmar, Nigeria, Pakistan, Philippines, Russia, South Africa, Thailand, Uganda, Tanzania, Vietnam and Zimbabwe.
4. DALYs for a particular disease or health condition are calculated as the sum of the years of life lost (YLL), which corresponds to the number of deaths multiplied by the standard life expectancy at the age at which death occurs. So, YLL = N × L, where N is the number of deaths and L is the standard life expectation at age of death in years.

Websites on education, women, nutrition and health

Education

UNESCO www.unesco.org
World Bank Education Data www.worldbank.org/education/edstats/
UNICEF Girl's Education www.unicef.org/girlseducation/

UNESCO eAtlas of Out-of-School Children http://tellmaps.com/uis/oosc/
Barro-Lee Educational Attainment Dataset www.barrolee.com/
UN Girls Education Initiative www.ungei.org
Global Partnership for Education www.globalpartnership.org

Women

UN Women www.unwomen.org/en
International Center for Research on Women www.icrw.org
UNDP Women's Empowerment www.undp.org/content/undp/en/home/ourwork/womenempowerment/overview.html
UN Gender Statistics Manual http://unstats.un.org/unsd/genderstatmanual/
UN Girls Education Initiative www.ungei.org/

Nutrition

United Nations System Standing Committee on Nutrition www.unscn.org
Food and Agricultural Organization (FAO) www.fao.org
International Food Policy Research Institute www.ifpri.org
World Food Programme www.wfp.org
Hunger and Nutrition Commitment Index www.hancindex.org

Health

World Health Organization www.who.int/en
AIDS www.unaids.org; www.who.int/hiv/en
Pan American Health Organization www.paho.org
The Micronutrient Initiative http://micronutrient.org/
The Global Fund to Fight AIDS, Tuberculosis and Malaria www.theglobalfund.org
Roll Back Malaria www.rollbackmalaria.org
Malaria No More www.malarianomore.org
World Health Organization, Tuberculosis www.who.int/tb
Stop TB www.stoptb.org/
TB Alliance www.tballiance.org/