Cost-effective outlays for better health outcomes

Amir Shmueli

The marginal return on health expenditure in high-income countries is low, whereas that in low-income countries is comparatively high. However, there is no clear evidence that higher health expenditure is the most cost-effective way of improving health in low-income countries; consideration should be given to the alternative of raising educational levels.

The choices that society faces concerning investment in health care, and the principal factors that have led to basic improvements in health, have been discussed at length by various authors (1–5). The question of cost-effectiveness is addressed below by examining World Bank data on infant mortality, life expectancy, and years of life lost prematurely in 27 low-income and 21 high-income countries (6).¹

Outlays and outcomes

Outcomes are considered in relation to per capita health expenditure and to educational levels. For the low-income countries, educational level is measured as the percentage of adult illiteracy, while in the high-income countries it is defined as the percentage of adults having undergone post-secondary education.

In the low-income countries a 10% rise in per capita GNP leads, on average, to a 10% rise in per capita expenditure on health. Health is regarded as being on the borderline between necessities and luxuries. The consumption of necessities changes little when incomes change, whereas that of luxuries changes by a relatively large amount under the same circumstances. A similar picture obtains in the high-income countries. It should be noted that OECD data suggest that health is seen as a luxury (7). However, the explanation may be that, in this case, income is measured as per capita gross domestic product instead of as per capita GNP.

For every additional US$ 1 spent on health per capita at the margin in the low-income countries there is a decrease of one death per 1000 live births, whereas in the high-income countries no improvement in infant mortality can be expected as a consequence of comparable expenditure. However, in the low-income countries the influence of educational

¹ Low-income countries: Bangladesh, Benin, Burkina Faso, Burundi, Central African Republic, Chad, Egypt, Ghana, Guinea, Haiti, Honduras, Indonesia, Kenya, Madagascar, Mali, Mozambique, Nepal, Niger, Nigeria, Pakistan, Rwanda, Sierra Leone, Sri Lanka, Togo, Uganda, Yemen, Zimbabwe.
High-income countries: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Israel, Italy, Japan, Netherlands, New Zealand, Norway, Singapore, Spain, Sweden, Switzerland, United Kingdom, USA.
levels on infant mortality is much more pronounced than that of health expenditure. A 1 percentage-point decrease in adult illiteracy can be expected to lead to a decline in infant mortality of 1.28 per 1000 live births. Provided that the cost of achieving such a decrease in adult illiteracy is less than $1.20 per capita, this way of reducing infant mortality is more efficient than that of direct expenditure on health.

In the low-income countries an additional expenditure of $1 per capita on health together with a 1 percentage-point decrease in adult illiteracy can be expected to cause an increase of about three months in life expectancy at birth; again, of course, one has to consider the cost of such a reduction in adult illiteracy. In the high-income countries, life expectancy is only very slightly increased by additional per capita health expenditure.

At the margin, $1 spent additionally per capita on health in the low-income countries produces a reduction of about 1.25 in years of life lost prematurely per 1000 population; educational level has a more marked effect than health expenditure per capita. In the high-income countries the years of life lost are hardly related to per capita health expenditure, probably because the main causes of most premature deaths are accidents and non-communicable diseases, for which prevention and cure are difficult.

**Relative efficiencies of countries**

For each country the differences between actual and predicted values were calculated for health expenditure per capita and health. Predicted health expenditure per capita was calculated on the basis of per capita GNP for the low-income countries and on that of per capita GNP, education, and the percentage of people aged 60 years and above in the population for the high-income countries. Predicted health outcomes were calculated on the basis of health expenditure per capita and educational level, the latter being assessed as the degree of adult illiteracy in the low-income countries and as the percentage of the population with post-secondary education in the high-income countries.

Fig. 1–5 indicate deviations in health outlays and outcomes. The countries in each income group are divided into the following subgroups.

- Relatively efficient countries with a negative deviation in health expenditure per capita and a positive deviation in health. These countries fall in the lower left quadrants of the diagrams indicating infant mortality and years of life lost (Fig. 1, 2, 5), and in the upper left quadrants of the diagrams indicating life expectancy (Fig. 3, 4).

- Relatively inefficient countries with a positive deviation in health expenditure per capita and a negative deviation in health. These countries fall in the upper right quadrants of the diagrams indicating infant mortality and years of life lost, and in the lower right quadrants of the diagrams indicating life expectancy.

- Countries with positive expected deviations, i.e., positive deviations in both health expenditure and health. The term “expected” is used because of the positive relationship between health expenditure and health; increased expenditure is expected to lead to improved health.

- Countries with negative expected deviations, i.e., negative deviations in both health expenditure and health.

The low-income countries named in the diagrams have deviations exceeding two standard deviations for either of the two variables. Among the high-income countries only Japan has a deviation of this magnitude.
Fig. 1
Infant mortality and health expenditure per capita in low-income countries

Fig. 2
Infant mortality and health expenditure per capita in high-income countries
Fig. 3
Life expectancy and health expenditure per capita in low-income countries

Fig. 4
Life expectancy and health expenditure per capita in high-income countries
Low-income countries

Haiti and Zimbabwe have exceptionally high expenditures on health in relation to their per capita GNPs but no remarkable level of health in either direction. Indonesia has exceptionally low expenditure on health and more infant mortality than expected. Madagascar and Mali have exceptionally high levels of infant mortality but only small deviations in health expenditure (Fig. 1). Relatively efficient in this connection are Bangladesh, Egypt, Nepal, Nigeria, Pakistan, and Sri Lanka.

With regard to life expectancy, Haiti and Zimbabwe have significantly higher health expenditures per capita and Indonesia has a significantly lower health expenditure. Madagascar appears to have a significantly lower life expectancy, considering the country’s expenditure on health and the level of adult illiteracy (Fig. 3). The relatively efficient countries are those mentioned above in relation to infant mortality.

In respect of deviations between actual and expected years of life lost, the most notable countries are Indonesia, with exceptionally low health expenditure; Haiti and Zimbabwe, with exceptionally high health expenditure; Sierra Leone, with exceptionally high years of life lost; and Nepal, with exceptionally low years of life lost (Fig. 5). Bangladesh, Egypt, Nepal, and Pakistan are relatively efficient for this health outcome.

No countries fall consistently in the relatively inefficient category, although Haiti and Zimbabwe might be expected to have better health outcomes than they do, given their high levels of health expenditure per capita.
High-income countries

Japan is relatively efficient to an exceptional degree among the high-income countries. Canada and Spain are relatively efficient in terms of infant mortality and life expectancy respectively. Australia and Ireland are relatively inefficient as regards both infant mortality and life expectancy. The most relatively inefficient country is the USA.

In the high-income countries the marginal return on health expenditure per capita, as measured by mortality, is negligible. This means that improvements in health and reductions in mortality can be expected to arise not from further increases in costs but from greater efficiency in the use of resources, more reliance on preventive measures, and advances in lifestyle, behaviour and medical technology.

In the low-income countries, on the other hand, health expenditure significantly reduces mortality: assuming adult illiteracy to remain constant, $1 spent additionally on health per capita can be expected to reduce infant mortality by one death per 1000 live births, to increase life expectancy at birth by three months, and to reduce by 1.25 the number of years of life lost prematurely. However, it is not clear that expenditure on health is the most cost-effective way of improving it: a major adverse effect is produced by adult illiteracy, reducing the cost of which should be examined.

References