An introduction to the economic assessment of drinking-water improvements

Chris Edwards

2.1 THE NEED FOR PUBLIC SECTOR INTERVENTIONS, AND WHY AN ECONOMIC ASSESSMENT IS REQUIRED

The previous chapter set out the background to, and objectives of this publication. It pointed out that even if access to clean water is a constitutional human right as it is in many countries, it is likely that such improvements will only be provided if they are shown to be a good use of public funds in comparison with the whole cross-sectoral range of possible interventions. The primary purpose of this publication is to help policy makers and experts from a range of disciplines involved with drinking-water interventions understand the role economic assessments (see Box 2.1) can play in arriving at an informed judgement whether or not water supply improvements are a good use of public funds.
As we will see, there are three forms of economic assessment that can be usefully applied to estimate whether the public sector should finance (completely or in part) improvements in access to safe drinking water. The simplest is costing the proposed interventions designed to achieve a well specified improvement (a given improvement in quality for a particular population) and finding the Least Cost intervention (LCA). The second is cost-effectiveness analysis (CEA) which is more ambitious in its aims of seeking to compare costs of differing health interventions for different populations against some standard of physical improvement (in this publication we emphasise the WHO standard of savings in Disability-Adjusted Life Years (DALYs), but any physical measure of improvement (e.g. reduced episodes of diarrhoea) would be a candidate. The third approach is Social Cost Benefit Analysis (SCBA) which seeks to compare across all possible uses of public funds in terms of net benefits to society. Table 2.1 summarises the three forms of economic assessment.

Table 2.1: Forms of economic assessment

<table>
<thead>
<tr>
<th>Form of economic assessment</th>
<th>Characteristics</th>
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<tbody>
<tr>
<td>Least Cost Analysis (LCA)</td>
<td>Estimates the total costs of an intervention including initial capital investment plus operating and maintenance (O&amp;M) costs (it may also make risk estimates of impact of varying the engineering life of the intervention as sensitivity tests). Costs should be discounted back to their present value to allow comparisons of different forms of intervention to produce a given improvement in water</td>
</tr>
</tbody>
</table>

BOX 2.1: Forms of Economic Assessment

For the purposes of this publication, we have adopted a convention in terms of describing economic techniques used at different stages in the project cycle. Economic assessment is used as an umbrella term when no specific stage in the project cycle is implied. Economic appraisal refers to economic assessment carried out when possible interventions are being compared with to the objective of prioritising them for implementation. Economic evaluation takes place after interventions and usually attempts to capture their total impact with a view to learning lessons and guiding future priorities for public sector investment.
<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>Cost-effective analysis (CEA)</strong></td>
<td>Takes the costing and divides it by an estimate of a physical benefit to arrive at a cost per unit benefit. The physical benefit may be in terms of a simple directly observable indicator (such as number of episodes of an easily diagnosable illness or symptom prevented). Or it may be a more complex composite indicator such as the WHO’s DALYs (Disability-Adjusted Life Years).</td>
</tr>
<tr>
<td><strong>Social Cost Benefit Analysis (SCBA)</strong></td>
<td>May just convert the physical measure in a CEA into a monetary value (e.g. putting a value of time on a DALY such as annual National Income per capita. But it will usually extend the assessment to include indirect and non-health costs and benefits (e.g. monetary value of time saved in collecting water now used for other purposes). Shadow pricing of costs and benefits where market prices are absent or suspect may be done and sensitivity tests used to assess robustness of estimates of net benefits or internal rates of return. In principle, SCBA allows all forms of drinking-water interventions to be compared with ANY other intervention in any sector that claims to improve human well-being for any scale of population.</td>
</tr>
</tbody>
</table>

Before looking at these three forms in more detail in chapters 8, 9, 10 and 11, it is worthwhile answering the following questions, namely:

- why does the public sector have to be involved? why can the financing of water improvements not be left to the households themselves to finance?

A simple but wrong answer to these questions might be:
• the public sector does have to be involved because water facilities are public goods and as such should be financed by the public sector in order to ensure sufficient provision.

This answer is analytically flawed as water improvements are not public goods in a strict economic sense. For a rigorous economist, public goods are those goods which, even if consumed by one person, can still be consumed by others. An example of a public good is a lighthouse on a dangerous coast. If the light is shining then ‘consumption’ of that service by one ship does not reduce the consumption available to another ship. This non-rivalry of consumption means that it is impossible to exclude anyone from consumption except at a prohibitive cost. As a result, for the economist public goods are characterised by non-rivalry and non-excludability in consumption.

By contrast, water services are usually (but not always) private goods even if not supplied right into the household. If water is provided to a village standpipe, one household’s consumption is likely to reduce the amount available to other households – while one container is filling, another cannot be filled. And the less the water available, the more likely there is to be rivalry in consumption and the more likely it is to be a private good.

Thus, water services are generally private goods, though they may have positive externalities in terms of preventing epidemics of infectious diseases, which may justify an element of subsidy. Similarly if adding additional households onto a scheme can be done at low incremental/marginal cost then again an element of subsidy for all households in the scheme may be economically justified.

But generally water can be basically bought and consumed exclusively by households, even if an element of public sector subsidy is offered. So the next question is; why, if water services are private goods, can households not finance their own facilities?

To answer this, we need to ask two further questions;

• firstly, how much do poor rural households spend on water?, and
• secondly, is this enough to finance improved water supplies themselves?

Whittington and Hanemann 2006 showed that amounts (converted to US$ per month) paid by households to vendors for water in 1998 ranged from 4.4 in Ghana to 6 in Nicaragua to 7.5 in Pakistan to 13.9 in Cote d’Ivoire. In 2007, prices this range would be equivalent to between US$6 and US$18 per month.

Is this enough to finance improved supplies? As long ago as 1975, Okun, an experienced water supply engineer, thought so, when he said that; “if daily expenditures made to a water carrier were invested in a proper piped supply, a
far more economical and better water service could be provided" (Okun 1975).

One objection to this is that poor people do not, in general, get the whole of
their water from vendors. They cannot afford to. However there are indications
that the poor do spend a significant proportion of their income on water.

The UNDP’s 2006 Human Development Report pointed out that; “The
poorest 20% of households in El Salvador, Jamaica and Nicaragua spend on
average more than 10% of their household income on water”. The UNDP report
was referring to 2004 figures. In that year, the average annual income per capita
of the poorest 20% in these three countries was (according to official statistics)
about US$430 or about US$36 per month. This means that, in spending more
than 10% of this on water, poor households spent about US$3 to US$4 per
month on water.

Is this enough to finance water supply improvements? To answer this, we
need to know the investment costs of water supply improvements.

Unfortunately information on the investment costs of water facilities is not
available for El Salvador, Jamaica and Nicaragua. For Eastern European and
Central Asian countries, the capital cost of protected dug wells serving 100
people is given as about 4,000 Euro in 2005 (see EAP 2007, page 3-8)
equivalent to about US$5,000 or US$50 per capita. This compares with an
estimate of US$48 per capita given in figure 41.1 of Jamison et al. (2006b). The
match is quite good considering that the estimate in Jamison et al. is at year
2000 prices and some allowance needs to be made for price increases between

The annual income of a poor household of six people in El Salvador, Jamaica
and Nicaragua is the per capita income of US$430 multiplied by six or about
US$2,580 for the household. Therefore the capital cost of a dug well (at
US$5,000) is equal to almost two years of total household income for the
poorest 20% in El Salvador, Jamaica and Nicaragua and equivalent to almost 20
years of water expenditure (at 10% of total income).

This is likely to be far too much for one poor household to finance even if the
household manages to borrow the money. To see this, assume that the dug well
lasts for five years without major maintenance. To repay the cost of US$5,000
over 5 years at an interest rate of 5% per annum would mean an annual payment
of US$1,155 per annum\(^1\), whereas at an interest rate of 20% per annum the

\(^1\) This compares with a per capita average income for the total
population of the three countries in the same year of about US$2,000

\(^2\) The amount repayable can be calculated using capital recovery
tables. The capital recovery factor is the annual payment that will
repay a US$1 loan over (in this case) five years with interest on the
unpaid balance. The capital recovery factor for 5 years and at 5% pa is
0.230975 (rounded in table 2.1 to 0.231). Therefore the amount
repayment (including interest) would be US$1,670 per annum. As Table 2.2 below shows, both these payments are many times the household’s annual expenditure on water of about US$258. And so the dug well is not affordable by one poor household alone.

Table 2.2 Can poor households afford improved water supplies?

<table>
<thead>
<tr>
<th></th>
<th>$US per capita</th>
<th>$US per household of six people</th>
<th>Dug well</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Annual income of poorest 20% of households</strong></td>
<td>430</td>
<td>2580</td>
<td>Capital cost of a dug well serving up to 100 people or about 17 households</td>
</tr>
<tr>
<td><strong>Capital cost of a dug well serving up to 100 people or about 17 households</strong></td>
<td>$US 5000</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Annual expenditure on water at 10% of income</strong></td>
<td>43</td>
<td>258</td>
<td>Repayment factor per annum over 5 years</td>
</tr>
<tr>
<td><strong>Repayment factor per annum over 5 years</strong></td>
<td>At 5% pa 0.231</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Repayment factor per annum over 5 years</strong></td>
<td>At 20% pa 0.334</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Repayment costs for a dug well</strong></td>
<td>$US at 5% pa 1155</td>
<td>$US at 20% pa 1670</td>
<td>Repayment cost per annum</td>
</tr>
<tr>
<td><strong>Piped water</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Annual repayment cost for a dug well (see opposite)</strong></td>
<td>1155</td>
<td>1670</td>
<td>Capital cost of piped water serving up to 5000 people (or 833 households)</td>
</tr>
<tr>
<td><strong>Capital cost of piped water serving up to 5000 people (or 833 households)</strong></td>
<td>$US 1600000</td>
<td></td>
<td></td>
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</tbody>
</table>

Repayment each year is 0.231 multiplied by US$5,000 or US$1,155, as shown in the table.
The dug well can, however, provide water for up to 100 people. The next question is; if the 100 people (or 17 households) join together to finance the dug well, does it then become affordable? The answer is – almost certainly – yes, because even at a high annual interest rate of 20%, the annual repayment cost of US$1670 is only about four-tenths of the annual amount being spent on water by the 17 poor households.

A small-scale water improvement such as a dug well may, therefore, well be affordable but only if the poor households pool their resources.

Is a larger-scale scheme such as a piped water scheme likely to be affordable? The answer is - probably not. According to EAP 2007 (page 3-13), the cost of a piped water scheme is given as about US$1.6 million³. Even

<table>
<thead>
<tr>
<th>Repayment factor per annum over 5 years</th>
<th>At 5% pa</th>
<th>At 20% pa</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.5</td>
<td>6.5</td>
<td></td>
</tr>
<tr>
<td>For 1 household</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.3</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>For 17 households</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Repayment costs for piped water</th>
<th>$US at 5% pa</th>
<th>$US at 20% pa</th>
<th>Repayment cost per annum</th>
<th>$US 369600</th>
<th>$US 534400</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual repayment cost for piped water (see opposite)</td>
<td>$US 369600</td>
<td>$US 534400</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Repayment cost divided by household water expenditure:</th>
</tr>
</thead>
<tbody>
<tr>
<td>For one household</td>
</tr>
<tr>
<td>For 833 households</td>
</tr>
</tbody>
</table>

³. This is equivalent to US$320 per capita. This estimate compares with one of US$144 per capita for Latin America given on page 772 of Jamison et al 2006b. Thus the estimate of US$320 per capita may be on
though this serves up to 5,000 people (or 833 households of six people), it is not likely to be affordable at least without the poor households spending at least 1.7 times as much as they currently spend on water (see table 2.1 above)\(^4\).

This 1.7 multiple assumes that they can borrow the money at 5% per annum. If they have to pay a real interest rate of 20% per annum (not unusual in an informal credit market), they would have to spend 2.5 times what they currently spend. That is instead of spending 10% of their income on water, they would have to spend 25% of their income on water supplies.

Clearly, on the basis of these figures, there are three problems that poor households will face in financing even small-scale improved water supplies:

- a loan is likely to be required to finance the improvement;
- even with a loan, there is a high element of risk involved; and,
- a great deal of coordination is required among the households.

Therefore, the poorest 20% of households are likely to face problems in financing even small-scale rural water supplies. As a comparison, cost is not necessarily the main barrier to low-cost sanitation improvements and Cairncross and Valdmanis (see Jamison et al. 2006b) argue against the use of subsidies for such improvements.

This is somewhat ironic given that there may well be a strong case for sanitation facilities being provided from public funds on the grounds that these investments are particularly important for environmental quality and health. Without public sector pressure or even financing, external diseconomies are likely to be commonplace, an external diseconomy being the costs imposed by one person (suffering disease from poor sanitation) on another (even though the latter may have adequate sanitation). For an illustration of the 'external diseconomies' from a lack of sanitation, see Box 2.2. In such a situation in which external diseconomies are common, a private market is likely to provide too little investment (see World Bank 1993, 55).

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\(^4\) This estimate may be pessimistic given that a life only five years is assumed. On the other hand, no allowance has been made for maintenance and operating costs.
Box 2.2  The lack of sanitation and ‘external diseconomies’ in Great Britain in the 19th century

In 1858 the stench of sewage from the River Thames in London forced Parliament to close temporarily. But relatively little was done about sanitation until the mid-1880s. As a result, between 1840 and the mid-1890s, average income in Great Britain doubled but child mortality slightly increased. Between the mid-1880s and the mid-1900s per capita investment by the public sector on sanitation increased by more than four times and infant mortality fell, during these two decades, from 160 per 1000 to less than 120 (UNDP 2006).

There still may be a case for public sector support for both water and sanitation improvements, though for slightly different reasons. For water improvements, support from the public sector (at the very least in the form of credit) is likely to be necessary because of the indivisibility of the investment. For sanitation improvements, public sector support is likely to be desirable on environmental grounds. As the UNDP 2006 puts it: “in countries with high levels of poverty among unserved [with water] populations, public finance is a requirement for extended access regardless of whether the provider is public or private” (UNDP 2006). Thus, it is likely that rural water facilities will have to be coordinated – even financed - from outside the households even though these households may be required (and able) to pay for a major proportion, if not all, of the annual costs.

If the public sector is to provide the finance and coordinate the investment, then two questions arise;

• do investments in water interventions give a higher rate of return (in social cost-benefit terms) than other investments and should they therefore have a greater priority in national and international budgets than they do at the moment? and,

• in a specific, poor, rural setting, how does it decide on the best investments in water interventions? And how does it attempt to justify them?

2.2  THE NEED FOR AN ECONOMIC ASSESSMENT

It is the job of economic assessment to answer these two questions. As we outlined above, there are broadly three methods that are advocated to do an economic assessment of water and sanitation improvements. These are as follows:
least-cost analysis (LCA)
• cost-effectiveness analysis (CEA);
• social cost-benefit analysis (SCBA)

Least-cost analysis (LCA) is a method of choosing the appropriate improvement by choosing the one with the lowest cost (see Carlevaro and Gonzales 2008). However, as Carlevaro and Gonzales admit:

“when the appropriate WS technologies present differences in the levels or quality of services, a least-cost choice will not necessarily be the one that is economically optimal, as some other appropriate technologies can have benefits that compensate their exceeding costs with respect to the least-cost solution. This is the most common situation, and costing analysis will not provide sufficient information to select the most appropriate technologies”

Thus LCA can be applied when the prioritisation decision is solely concerned with choosing between technical interventions offering a similar outcome in terms of improved access to safe drinking water for the same group of people.

Cost-effectiveness analysis (CEA) is widely used by national and international agencies, including the World Health Organization. In the health sector, cost-effectiveness analysis is used to select a health intervention which provides a given physical outcome benefits at the lowest cost or the maximum physical outcome benefits for a given budget. A physical (rather than monetary) indicator of output is chosen and the alternative which has the lowest cost per unit of output or maximum output for the budget is prioritised.

2.3 COST-EFFECTIVENESS ANALYSIS (CEA) AND THE CASES FOR AND AGAINST PRIORITISING DRINKING WATER IMPROVEMENTS

A controversy arose as the result of an article written in 1979 by two biomedical scientists, Julia Walsh and Kenneth Warren (Walsh and Warren 1979). Walsh and Warren claimed that prioritisation between different uses of health expenditure was an imperative – that is comparing between health interventions, which is a strength of CEA. They claimed that higher health spending was not always associated with better health outcomes and that health budgets could be spent more cost-effectively. Few disagreed with this view which was to be endorsed in the World Bank’s 1993 World Development Report (see box 2.3).
Box 2.3 Higher health expenditure does not mean better health

At any level of income and education, higher health spending might be expected to yield better health, but this is not the case. The World Bank’s 1993 World Development Report showed that there was no relationship between health spending as a percentage of Gross National Product and health (as defined by life expectancy) after allowing for levels of income and education. The World Bank pointed out that “China… spends a full percentage point less of its GNP on health than other countries at the same stage of development but obtains nearly ten years of additional life expectancy” and that; “Singapore spends about 4 per cent less of its income on health than others at the same level of development but achieves the same life expectancy”. By contrast; “… it is possible both to spend more than predicted on health care and still achieve unexpectedly poor results. The United States is an extreme case spending 5 per cent more of GNP than predicted to achieve several years less of life expectancy than would be typical for its high income and educational level” (World Bank 1993).

What was controversial about the Walsh and Warren 1979 paper was the case they made for a “selective primary health care” (SHPC) programme and the way in which that case was made. A year earlier, in 1978, a world-wide primary health care movement had been launched under the slogan of ‘Health for all by the Year 2000’ at a conference held by the World Health Organisation (WHO) and the United Nations Children’s Fund UNICEF) at Alma Ata in the, then, USSR (www.who.int/hpr/NPH/docs/declaration_almaata.pdf accessed 6 February 2008). In 1979 the Walsh and Warren paper was presented at a Rockefeller Foundation Conference in Bellagio, Italy (reported in Warren 1988). In it, the authors advocated a selective primary health care programme, and the paper was published in the New England Journal of Medicine.

Walsh and Warren argued that infant and child mortality could be reduced most effectively by ‘primary health care’, if it was selective in terms of types of interventions independent of local context. They claimed that the deaths from many of the most prevalent diseases could be best prevented by immunization, oral rehydration, breast-feeding and anti-malarial drugs for African children. In the following years, immunization programmes were adopted. The influence of this approach was reflected in the 1993 World Development Report in which the World Bank endorsed an Expanded Programme on Immunisation (EPI), stating that it could be enlarged still further to include supplements such as Vitamin A and iodine and other vaccines, particularly those for hepatitis B and yellow fever. The World Bank stated that; “in most developing countries, such an ‘EPI Plus’ cluster of interventions in the first year of life would have the highest cost-
effectiveness of any health measure available in the world today” (World Bank 1993).

The Walsh and Warren approach was widely supported by UNICEF and by a number of bilateral and multilateral donor agencies but it was also heavily criticised (see Social Science and Medicine, 1988). Given the widespread adoption of the SHPC package, why was it so heavily attacked?

The Walsh and Warren paper drew up priorities on the basis of cost-effectiveness calculations with health-promoting interventions being ranked in terms of their cost-effectiveness in achieving very specific, physical health outcomes, notably in terms of infant/child mortality. It was attacked on two grounds. John Briscoe of the School of Public Health in North Carolina was an important exponent of the group that criticized the paper.

Firstly it was argued that such specific physical indicators understated the general health benefits of water and sanitation programmes. Briscoe pointed out that a review of the health effects of water supply and sanitation programmes carried out in 1983 revealed that the reduction in the incidence of diarrhoeal episodes was typically between 30 and 40 per cent, many times greater than the 5 percent assumed for standpipe water in the Walsh and Warren paper (Briscoe 1984). This empirical claim suggested that health benefits were spread widely in the population benefiting from a drinking-water intervention, as well as more infant and child deaths being prevented.

The second and more important criticism was that the large non-health benefits generated by water and sanitation improvements were ignored in the Walsh and Warren cost-effectiveness approach. Briscoe claimed that if these non-health benefits (notably time savings in collecting water) were deducted from the costs, the net economic cost of water supply improvements would be much smaller than the gross cost and the picture would be very different (Briscoe 1984).

As a result, Briscoe argued; “it is apparent that the cost-effective calculations of the SPHC approach are fundamentally flawed when dealing with community water supplies” (Briscoe 1984) and he complained that:

“the SPHC approach in general and the downgrading of water and sanitation, in particular, seem to have been accepted implicitly by many development agencies”.

Briscoe pointed out that:

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5. There were other, broader criticisms focusing on issues of organisation and power. Smith and Bryant suggested that the attention “given to the delivery of ‘selective’ packages of interventions has often diverted energy and resources from the essential task of developing comprehensive, efficient and effective health services” (Social Science and Medicine 1988, 909).
“just three years after the proclamation of the International Drinking Water Supply and Sanitation Decade by the United Nations General Assembly, the Decade is being pronounced ‘dead’ in some quarters” (Briscoe 1984)

This example shows the significance of CEA for deciding between interventions in terms of both conceptualisation of indicators of benefits (e.g. mortality, incidence of diarrhoeal episodes, time saved in collection) and specifying data to be empirically collected and identifying disagreements on the estimates of indicators made from that data. This publication is concerned both to extend the conceptual range used in CEA and to improve the quality of data being collected, especially for smaller scale drinking-water interventions.

### 2.4 SCBA AND THE UNDP’S 2006 HUMAN DEVELOPMENT REPORT

More than 20 years later, the point made by Briscoe was to be dramatically endorsed in studies carried out by Hutton, Haller and Bartram (see Hutton and Haller 2004 and Hutton, Haller and Bartram 2006). These studies claimed high ratios of monetary valued benefits to monetary valued costs for water and sanitation investments. These high benefit-cost ratios were highlighted in the 2006 UNDP Human Development Report. The Hutton, Haller and Bartram studies seem to support the Briscoe claim that the non-health benefits of water and sanitation improvements are very large indeed when converted into their monetary equivalents. Indeed, in the Hutton, Haller and Bartram study, the non-health benefits (especially time savings) formed the vast majority of the total, as shown in Table 2.4 below.

Table 2.3. benefits and costs for sub-Saharan Africa from meeting the year 2015 MDG targets for water and sanitation.

<table>
<thead>
<tr>
<th></th>
<th>Water</th>
<th>Sanitation</th>
<th>Sources (a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of people getting improved water and/or sanitation (millions)</td>
<td>207</td>
<td>315</td>
<td>14</td>
</tr>
<tr>
<td>Annual costs ($USbn)</td>
<td>0.48</td>
<td>2.19</td>
<td>14</td>
</tr>
<tr>
<td>Annual benefits (all$USbn)</td>
<td>0.12</td>
<td>0.31</td>
<td>17, 18</td>
</tr>
<tr>
<td>- health system and patient costs saved</td>
<td>0.11</td>
<td>0.45</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-----</td>
<td>-----</td>
<td>----</td>
</tr>
<tr>
<td>value of time saved from less</td>
<td>0.27</td>
<td>0.72</td>
<td>20</td>
</tr>
<tr>
<td>illness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>value of access time saved</td>
<td>0.84</td>
<td>12.88</td>
<td>21</td>
</tr>
<tr>
<td>Total benefits ($USbn)</td>
<td>1.34</td>
<td>14.36</td>
<td>13</td>
</tr>
<tr>
<td>Benefits-costs ratio</td>
<td>2.8</td>
<td>6.6</td>
<td>11</td>
</tr>
<tr>
<td>Percentage of total benefits</td>
<td>63</td>
<td>90</td>
<td></td>
</tr>
<tr>
<td>from access time saved</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: a table numbers in Hutton et al., 2006.

It is clear that according to the Hutton, Haller and Bartram study, most of the benefits from water and sanitation improvements do not come from improvements in health (for example from a reduction in illness or death) but from a saving in time in accessing water sources and sanitation facilities. Table 2.2 shows that for water supply improvements in sub-Saharan Africa, 63 per cent of the annual benefits come from time savings and only 37 per cent from savings associated with a reduction in illness.

Thus, whereas the study by Walsh and Warren in 1979 had provided decisions-makers with reasons not to go ahead with drinking-water improvements, a quarter of a century later the UNDP’s *Human Development Report* was pointing to the high benefit-cost ratios to be obtained from such investments — and thereby giving good reasons to go ahead with water improvements prior to many interventions in other sectors of the economy — which SCBA is able to do as all benefits and costs are converted into monetary equivalents.

As the 2006 Hutton, Haller and Bartram report put it: “these results give to water and sanitation advocates a powerful basis for arguing for increased water and sanitation investments” (Hutton, Haller and Bartram 2006)

As a result, the UNDP’s *Human Development Report* estimated that the investment outlay needed to reach the MDG targets for water and sanitation with low-cost sustainable technology would amount to about US$10 billion a year and yet the monetary equivalent benefits would be well over this, or about US$38 billion a year (UNDP 2006). When the costs are spread over their economic life, the economic return is high with every dollar spent yielding a return of about $8 in costs averted and productivity gained (UNDP 2006).

Moreover, the UNDP claims, these figures probably underestimate the gains from water investments since they do not capture the benefits from education, from...
empowering women, from human dignity or from the reduced anguish and suffering associated with lower child death rates.

In its 2006 Human Development report, the UNDP stated that: “Ultimately the case for public action in water and sanitation is rooted in human rights and moral imperatives. At the same time, cost-benefit analysis suggests that economic common sense makes a powerful supporting case” (UNDP 2006).

The valuation of costs and benefits are examined in more detail in later chapters but it is clear that the fact that water investments give a mix of benefits is something of a political disadvantage. In 1984, Julia Walsh said that;

“A health planner, faced with the charge of improving health with the few resources available, may decide not to make capital investment in water supply and sanitation a top priority…. Possibly it would be more appropriate for the agricultural, or public works, or planning and development department, with collaboration from the health sector, to invest in an improved water supply and sanitation because all these sectors will benefit” (Walsh 1984, 1167)

Clearly given the mix of health and other benefits from water supply improvements, they are at a disadvantage with water and sanitation falling across a number of government departments and ministries.

2.5 THE WAY FORWARD

Perhaps as a result of the domination of debates on drinking water by public health and engineering experts, few social cost-benefit analyses (SCBAs) seem to have been made of improvements to such facilities. If they have, they have not made their way into the public domain.

Cost-effectiveness Analyses (CEAs) are more widely used by national and international agencies, including the World Health Organisation. In the health sector, CEA is used to select a health intervention which provides a unit of physical output at the lowest unit cost. Thus a physical rather than monetary indicator of output is chosen and the alternative which has the lowest cost per unit of output is preferred. Thus there is an important role for CEAs in comparing different health interventions. The basic benefits data is often easily derived from standard health statistics and calculations and interpretations can be made by non-economists. Therefore, CEAs have been widely applied in analysing different drinking water interventions. One of the most comprehensive of the cost-effectiveness studies is that of Clasen et al, 2007 and this book includes a discussion of that study.

Extending CEA into more comprehensive SCBA is a primary aim of this publication. As stated above, the primary merit of SCBA is it breaks out of the health sector and offers comparisons with any intervention claiming to improve human well-being. This is important for making claims for better funding of
drinking water interventions from the general public purse – whether they be to improve lives of smaller groups of currently underprovided people in richer economies or financing general improvements to achieve the health Millennium Development Goal (and assist achievement of other MDGs) in poorer economies. The drawback of SCBA is that it does lead towards more technical economics concepts that require economists – a profession generally not admired for its lucidity and communication skills.

2.6 REFERENCES


Jamison et al. 2006b. Disease Control Priorities in Developing Countries, World Bank, Washington


Social Science and Medicine, 1988; Special issue; selective or comprehensive health care? Vol 26 No.9, 101 pp

UNDP 2006. Human Development Report; Beyond scarcity: power, poverty and the global water crisis, United Nations Development Programme


Warren K 1988; “The Evolution of Selective Primary Health Care”, Social Science and Medicine, Vol 26, No 9, 891-898


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