Cost-Effectiveness Analysis of several Water Supply and Sanitation Interventions

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Objectives

The aim of this study was to estimate
• the costs,
• the health benefits,
• and the non health benefits
of a range of selected interventions to improve water and sanitation services.
In terms of burden of disease, waterborne and water-washed diseases consist mainly of infectious diarrhoea.
Estimating exposure for diarrhoeal diseases

The scenarios were defined on the basis of

• the type of water and sanitation infrastructure, and
• the load of faecal-oral pathogens in the environment
Estimating exposure for diarrhoeal diseases

I. Ideal, no disease transmission through water and sanitation

II. Regulated water supply

III. Improved water quality and/or Improved access to water and/or Improved hygiene

IV. Improved water supply, and basic sanitation

V. No improved water supply, no basic sanitation
   - Va. Basic sanitation, no improved water supply
   - Vb. Improved water supply, no basic sanitation

VI. Faecal-oral pathogen load in the environment
   - High
   - Low

Faecal-oral pathogen load in the environment

Improved water supply, no basic sanitation
Distribution of the population in scenarios, 2000

- Table

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<thead>
<tr>
<th></th>
<th>Scenario II %</th>
<th>Scenario IV %</th>
<th>Scenario Va %</th>
<th>Scenario Vb %</th>
<th>Scenario VI %</th>
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<td>6</td>
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<td>0</td>
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Interventions

- Halving population w/o improved WS
- Halving population w/o improved WS + S
- To provide disinfection at point of use
- To provide improved water supply and basic sanitation (98% coverage).
- To provide improved water supply and sanitation plus disinfection at point of use (98% coverage).
- To provide piped water to houses as well as sewage connection.
Estimating the Health impacts

• It requires an assessment of the fatal and non-fatal health outcomes in the same measure unit.

• Health benefits are presented in terms of healthy years gained or DALYs averted by the whole population.
WHO model POPMOD

- A 3 box population model is used
Estimating the Costs

Costs consist of all resources required to put in place and maintain the interventions. These are separated into:

- Recurrent costs
- Capital costs
Estimating the Costs

Assumptions used:
- Length of life of the equipment
- Operation and maintenance, surveillance and regulation costs.

Final results are presented in terms of costs per year, per capita, per intervention.
Annual funding per intervention world wide (billion of US$)

- Disinfection: 1.3
- Halve pop w/o access to WS: 1.4
- Halve pop w/o access to WS&S: 9.1
- Improved WS & Sanitation: 17.8
- Piped WS & Sewer Connection: 77.2
Estimating the Non Health Benefits

The benefits include:

- The avoided direct expenditures due to less illness.
- The avoided lost days from daily activities due to less illness.
- Time savings due to better location of the water and sanitation facilities.
Costs of interventions vs. healthy life years gained

1 - halve pop w/o WS
2 - halve pop w/o WS+S
3 - disinfection
4 - improved WS + S
5 - piped WS + S
Cost-Effectiveness ratios (US$ per DALY averted)