

A Manual for Economic Assessment of

Drinking-Water Interventions





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WHO acknowledges the efforts of Dr John Cameron and Professor Paul Jagals to produce this Manual; the views expressed in this publication do not necessarily reflect WHO policies or positions, and Dr Cameron and Professor Jagals are responsible for the views expressed in this publication.

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Objective of the manual

This manual describes a practical technique for appraising or evaluating small-scale interventions that seek to provide safer and more accessible drinking-water to rural people.

The strength of such economic assessments is that they permit drinking-water interventions to be compared with a wide range of health and non-health interventions aimed at improving human well-being though creating opportunities for more productive livelihoods.

Target audience of the manual

The manual is primarily aimed at experts who are involved in advising on the most appropriate drinking-water interventions to install in small-scale, mainly rural, settings. These experts may be working in any of the disciplines relevant to drinkingwater. They include health professionals, engineers and economists.

The manual presents practical techniques in a way that will satisfy the expert yet also be accessible to the non-expert.

Why this manual was written

The making of this manual was inspired by the Millennium Development Goals for 2015, in particular Target 10 under Goal 7 which aims to "halve by 2015 the proportion of people without sustainable access to safe drinking-water and sanitation".

If connections to safer sources for drinking-water between 2004 and 2015 match the rate achieved between 1990 and 2004, then the target of halving the proportion of people not reaching the standards set by the Millennium Development Goals will be reached for the global population. But achieving the target is not a given.

Many of the 800 million people still without access to safe drinking-water live in small and remote rural settlements. This makes them increasingly hard to reach in engineering terms and costly to reach in economic terms.

In this challenging context, the World Health Organization (WHO) provides this manual as an economic assessment tool to evaluate safe drinking-water interventions. The aim is to put such interventions on a level playing field with all other developmental activities.

Outline of the manual

This manual sets out a practical method for doing an economic assessment of a drinking-water intervention in the following five logical steps:

- assessing the situation in terms of placing drinking-water interventions in people's livelihoods;
- costing feasible interventions and assessing cost efficiency;

- identifying and measuring the benefits in physical terms and assessing cost-effectiveness;
- putting values on benefits and undertaking a social cost-benefit analysis;
- conducting sensitivity tests on four social cost-benefit scenarios to take account of:
 - possible inaccuracies in variables;
 - risks and uncertainties around engineering and institutional management of the intervention;
 - o demographic changes and associated incremental challenges;
 - o aspirational changes and sequencing interventions.

This manual follows these five steps section by section seeking to provide a practical set of tools that can be applied to any small-scale drinking-water intervention in any economy.

This manual is designed to complement a book edited for WHO by John Cameron, Paul Hunter, Paul Jagals and Katherine Pond.¹ The book gives an overview of the steps required to undertake economic assessments of small-scale drinking-water interventions, incorporating the knowledge and expertise of public health and engineering specialists. It was commissioned in an effort to ensure that drinking-water interventions designed to improve access to safe drinking-water (in the words of the Millennium Development Goals) would be accorded priority in line with their potential to contribute to improving human well-being.

A case study to illustrate the economic assessment

In this manual, to give a sense of how the assessment method is applied in practice, a particular case-study is discussed at each step.

The case-study concerns an intervention to provide a drinking-water system for a cluster of villages in the north-east of the Limpopo province of South Africa close to the Zimbabwe and Mozambique borders.

This case study is not offered as typical or representative. Rather, it offers a range of characteristics that are more challenging than might be expected in the context of considering a small scale drinking-water intervention. The case study results should therefore not be taken as indicative of parameters or results for small scale drinking-water interventions in general.

Data for the case study were collected by researchers from the University of Johannesburg in South Africa. The field data were collected by environmental health and civil engineering experts and their graduate students, as well as by economists, over a period of two years for a variety of research purposes.

¹ Cameron J et al., eds. Valuing water, valuing livelihoods: Guidance on social cost-benefit analysis of drinking-water interventions, with special reference to small community water supplies. Geneva, London, World Health Organization/IWA Publishing, 2011.

Some of the data were collected in areas adjacent to the case study site, and related to similar water schemes that opened at different times. Secondary data for most small scale schemes in South Africa were available from government sources and proved very valuable. Also some estimates of variables were synthesized using global conventions widely accepted in the public health and engineering fields.

The case study was unusually well informed – arguably over-informed. This manual has, however, been robustly designed for a much lower threshold of available evidence. The special strength of the method set out in this manual is that it can be used to make an appraisal even when future uncertainties require "guesstimates" of many variables.

Though the design is robust and the economic assessment could be conducted sitting at a desk, we would urge any agency planning a drinking-water intervention to spend time in the field with the target population collecting primary data.

The primary data for the case study were collected using a variety of techniques:

- questionnaire-based surveys;
- direct expert field observation (a very important source);
- semi-structured focus groups (which proved a very cost-effective technique for collecting the kind of broad parameters we needed);
- group conversations at communal taps where people were collecting water or washing clothes.

To understand the local context, we suggest that primary data be collected in this way by any agency planning or evaluating a small scale water intervention.

For the purposes of this manual, we have cited only the final parameters we derived from the primary and secondary data. We have not described in detail how the derivation was actually made. That seemed appropriate for our purposes here, because our aim is to show how such parameters can be used for economic assessment.

In the following sections of the manual, we derive robust conclusions consistent with the likely inaccuracies in our primary data. In the final section of the manual we emphasize the vital importance of sensitivity tests to assess tipping points in terms of decision-making. Some of those tipping points are attributable to data inaccuracies.

It is worth mentioning that the case study intervention was actually in the early stages of operation at the time when much of the data were collected. This had the advantage of giving a sense of grounded reality to the case study, even though we did not wait for the final impact to be visible. For example, we would have had to wait years to see what happened when children advantaged in schooling by the intervention became adults.

Though we were neither appraising a proposed intervention nor conducting an impact evaluation, the techniques described in this manual are - we claim - applicable to any stage in the project cycle. So we have purposely written the manual in ambiguous terms in regard to whether it is intended for use in appraisal or evaluation. It is intended to be used for both.

Assessing the situation in terms of placing drinking-water interventions in people's livelihoods

The first step in any economic assessment of the impact of a drinking-water intervention is to describe the context in which the intervention is being introduced. There are quantitative as well as qualitative dimensions to such a description.

The quantitative dimension involves identifying the demographic scale of the target group of local people who will be primarily affected by the intervention.

In areas where local or municipal demographical data are not available, the starting point will often be to a construct a map or other form of layout of the proposed or current intervention area (for example, a water supply scheme within a village). The map will show all the dwellings, taps and water sources within the area. Making such a map is a common entry point for participative activities, and it starts with an open invitation to local people to come to a meeting. Constructing a map together is usually uncontroversial and fun, and can easily lead to wider but necessary discussions on subjects such as livelihood patterns, relative wealth and social interactions.

Alternatively, a household census (with a house to house survey) can establish a more precise description of the demographic characteristics of the target population, especially where complex patterns of intra-household migration are involved. In areas where formal addresses do not exist, a global positioning system (GPS) address can be allocated to a household.

But whether participative or household survey methods are used, it is important to be aware of people who may be considered marginal, vulnerable to strangers, or socially embarrassing, and who may therefore be missed. People who may be missed (unless there is some specific probing) include:

- the very young;
- seasonal migrants and refugees;
- young women (especially if betrothed);
- people with physical impairments considered likely to hamper marriages of siblings.

For this reason the would-be assessor should make sure that local permission (from

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