Is your drinking water safe?

Sam Godfrey

Does the monitoring of water quality ensure safe water? Or is the real risk poor understanding of the operation of water-supply systems? The new water-safety framework should help utilities and communities identify where contamination is arising, and show how to put problems right.

The WHO and UNICEF estimate that more than 1 billion people lack access to safe water.[1] ('Safe' water is defined by the WHO's *Guidelines*, described later.) In the year 2000 it was estimated that the global burden of disease associated with poor water supply equalled more than 2 billion cases of diarrhoea, with an annual death toll of 2.2 million.[2]

With this increasing number of people around the world falling ill due to water-related illnesses, the water and sanitation sector are looking at improved ways to control water quality. The key question is how to address the emerging number of microbial and chemical contaminants that are entering our drinking water supplies through man-made and natural pollution.

Microbiological pollutants

Even in developed countries, harmful micro-organisms can enter the water supply. Recent recorded outbreaks of emerging microbiological pathogens in drinking water supplies included the case of Walkerton, Ontario, Canada in May 2000, where 2300 people became seriously ill and seven died from exposure to microbially contaminated drinking water.[3]

Chemical pollutants

Concern over water safety is a global phenomenon. This includes:

- arsenic and fluoride contamination of groundwater in developed countries like the United States as well as in India and Mongolia.
- man-made sources of pollution from industry and agriculture, which cause pesticides, herbicides and hydrocarbons to enter drinking water supplies, and give rise to public concern over water safety in countries all over the world.[4]

Efforts to counteract this contamination in both developed and developing countries have included the batch monitoring of bulk water supplies by water utilities, adherence of ministries of health to water and environmental standards and the establishment of water-quality monitoring programmes by Non-Governmental Organizations (NGOs). Despite these efforts, the contamination of drinking water supplies continues to affect large populations in developing countries and therefore remains a priority due to the recognized adverse health effects.

A number of developments have occurred in developing countries over the last 20 years in the water and sanitation sector. These have included the development of portable field water-testing kits. There has also been an increased recognition of the importance of linking health surveillance to water quality, and there have been advances in microbiological analytical techniques.

The WHO's *Guidelines*

Central to all the work in this area has been the World Health Organisation's authoritative *Guidelines for Drinking-Water Quality* (*GDWQ*). The third edition of the *GDWQ*, which was launched in 2004, includes the use of 'water-safety frameworks'**.** The water safety framework aids effective assessment and management of both microbiological and chemical risk affecting both improved and unimproved water

There have been considerable improvements in analytical techniques

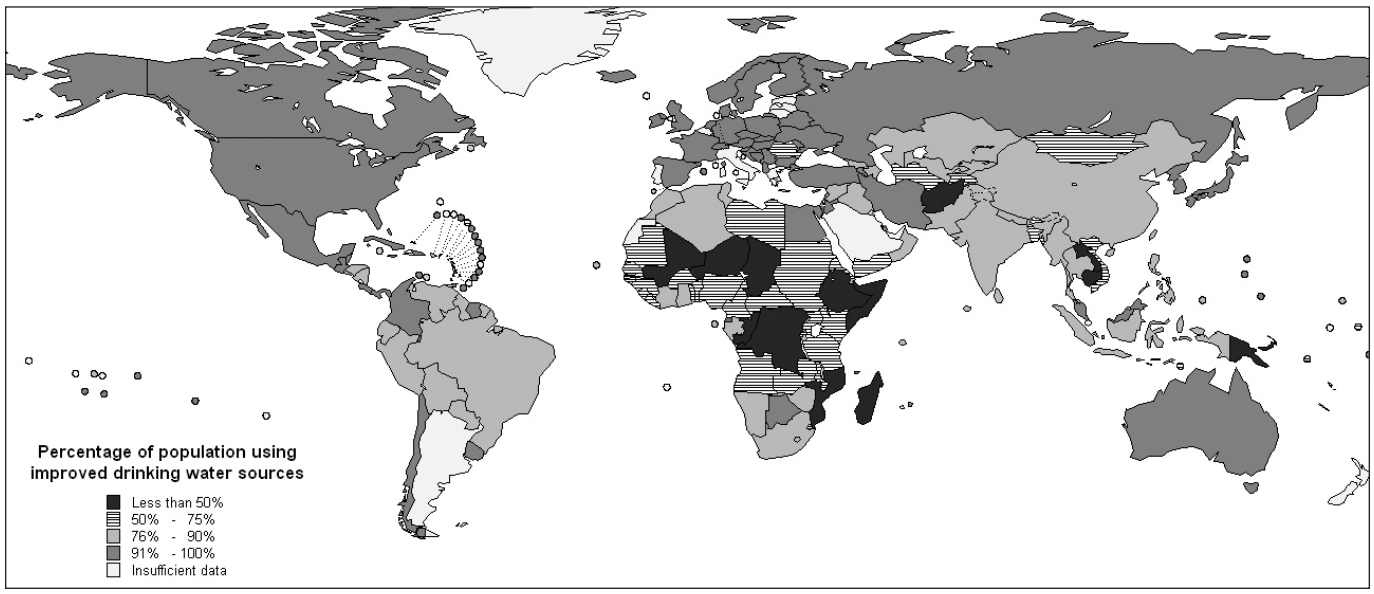

Figure 1 Percentage population served by safe water, 2002

supplies as defined in the WHO's Joint Monitoring Programme. The *Guidelines* are described by Michael Rouse, Chair of IWA as 'the most significant water-related public health development since the introduction of chlorine. The *Guidelines*' requirement for drinking-water safety plans should be incorporated into regulations across the world'.

This edition of *Waterlines* is dedicated to the development and application of the new water-safety frameworks outlined in the third edition of the WHO *GDWQ*. Examples are given from action research undertaken in Bangladesh, India and Uganda between 2001 and 2004. Findings gained from the research not only resulted in improvements in water-quality monitoring in each country but also provided an evidence base for the development of the WHO *GDWQ*.

The first paper provides the scientific rationale for the water-safety framework of the *GDWQ*. Guy Howard and Jamie Bartram outline the three critical areas of the approach, namely: health-based targets, water-safety plans and surveillance activities. How these three components fit together in practice is then illustrated by an example of the application of the water-safety framework in Bangladesh, described by Shamsuddin et al. An important first stage in the framework is carrying out a risk assessment relating to the pathogens and chemicals that are found to cause disease in Bangladesh. This risk assessment results in an estimation of levels of both incapacity and death within a population resulting from unsafe water, and is then useful for prioritizing action.

Tibatemwa et al. write about applying the second critical part of the framework – water-safety plans (WSPs) – in Uganda. The paper presents findings from the Ugandan National Water and Sewerage Corporation (NWSC) as it implemented water-safety plans in the principal cities of Kampala and Jinja. The paper highlights the difficulty of the *human factor* in WSPs. Training and motivating staff can be a challenge, but the strength of the interdisciplinary WSP approach is that operations staff are more involved in monitoring and they are therefore able to respond more quickly to problems and leakages identified in the system. Finally, Godfrey et al. outline how to develop water-safety plans and surveillance activities in piped urban systems where data on the system are limited, based on the example of Guntur, Andhra Pradesh, India. Using the local knowledge of engineers to identify areas in the network where there may be physical hazards to the pipework, and sections of the pipework that are likely to be vulnerable, this information is combined in a risk model with estimates of where low-income populations live who may be more susceptible to disease. The model then identifies high-risk points in the system where monitoring and control measures are particularly critical.

Summary

The launch of the third edition of the World Health Organisation *Guidelines for Drinking-Water Quality* is a significant step towards assuring more globally applicable processes of water-quality risk assessment and management. Read on and find out how the *Guidelines* are applied.

About the author

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