



Photo: Anna Nordström

# Water Quality: The Basis for Healthy Living

Water quality – often more correctly water safety – is rising on the agendas of policy makers, practitioners and water consumers and carrying with it a series of challenges for practice, policy and science. Its basic parameters seem straightforward – water needs to be safe for the various uses that humankind puts it to and we need to account for changes in quality of water resources and how they impact on associated ecosystems. In practice it is not so simple at all.

## In aqua sanitas

Drinking-water safety is the most immediate and tangible link between water quality and human health. The relationship has been recognised for millennia: the ancient Roman philosopher Gaius Plinius Secundus (Pliny the Elder) opined ‘in vino veritas, in aqua sanitas (in wine there is truth, in water there is health) and the disciplines of modern scientific thinking have been applied to water safety for around 150 years.

Because drinking water sometimes causes outbreaks of disease it occasionally attracts media and public attention. Recent examples have included the Walkerton outbreak in Canada, where a series of management failures led to contamination of local drinking water from animal excreta that made hundreds sick and killed seven in a town of only 5,000 inhabitants. In the developing world, such outbreaks undoubtedly occur but are less reliably detected and are often ‘lost’ in background rates of endemic disease. Tragic exceptions include Hepatitis E – which has an exceptionally high fatality rate among pregnant women – among refugees in southern Sudan. All indications suggest that such outbreaks are truly the tip of an iceberg – with most water-borne disease remaining unrecognised.

Transforming knowledge about drinking-water quality and health into effective policies and good practices has occurred in fits and starts. In the early 20<sup>th</sup> century, the introduction of chlorination to the water supplies of major cities in the United States and Europe led to dramatic health

benefits. It also catalysed a shift in thinking. Water safety was now seen as a ‘basic’ health risk that could be fixed by economic development. Nearly a century after the initial benefits of simple chlorination, even these are not available to the majority of humankind.

## Access is not enough

Given its potential to protect and improve health, it is no surprise that water safety appears in the global development policy compact – the Millennium Development Goals (MDGs). While progress on the MDG for drinking-water appears – arguably – to be on track, this is a misleading simplification. The MDG target to “reduce by half the proportion of people without sustainable access to safe drinking water” will only be met because the indicator used is ‘access’ to an improved water source. While the use of the indicator is a practical compromise based on availability of representative information, it is too often over-interpreted as a measure of the actual situation. In fact, there is extensive evidence to show that much water

from 'improved sources' is contaminated with excreta either at the source or before it is consumed. If water safety were accounted for, then the 1990 MDG baseline for coverage would have been far lower, the work to be achieved far greater and slow progress far more alarming. And the target would have been consistently off-track since MDG monitoring efforts began.

So despite a long history of successful water safety management, progress in extending its benefits to all has been agonisingly slow. Why? In part because it is seen to be both difficult and a secondary concern to securing 'access'. And in part because of a disconnect between many developed world practitioners and the realities of much of our planet. In the most developed nations, where water access is largely secured, generations of engineers, policy makers and managers have a professional orientation on maintaining service quality – including water quality. The result is an under-appreciation of issues surrounding water access and perception of water quality as an isolated issue.

### Safety first

Water safety has historically been miscast as a luxury on the development agenda. It has been considered as a "nice-to-do add-on" to drinking water supply instead of as a complementary and highly beneficial tool in the water-health-development arsenal. Two recent advancements, 'Water Safety Plans' and 'Household Water Treatment and Safe Storage', are helping to turn the tide.

Water Safety Plans are the systematic application of common sense to prevent water-borne diseases. At heart, they are based on recognition that no amount of testing will prevent contamination. Instead, they focus on the measures that protect water safety rather than on identifying what went wrong after contaminated water has been consumed. Available evidence suggests that water safety plans are effective in both low and high resource settings. The reason for the early success is simple: they do not centre their investment and time on laboratories and testing. Instead, they focus on improved management to keep water clean that can be cost-effective in large and small systems alike.

While Water Safety Plans offer an attractive way to squeeze more health and better water services from established systems and sources, today's reality is that large populations – probably somewhere between 3.5 and 6 billion people – have unsafe drinking-water and many of them will continue to have unsafe water for the foreseeable

future. It is precisely these under-served populations who carry the greatest burden of WASH-related disease. These are not all 'un-served' in MDG monitoring terms because water safety is an issue for large populations that consume contaminated water from 'improved sources', including piped systems. For decades the unstated tactic in development was to leave such populations to 'wait in line' for access to an improved source or subsequently piped supply. In the 1990s, studies started to appear that suggested household water treatment coupled with safe storage in the home as a viable interim measure to reduce consumption of



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contaminated water. This also empowered those 'waiting in line' to take charge of their own situation. Household water treatment and safe storage (HWTS) is now widely recognised as a tool in the public health arsenal. It does not resolve the fundamental need for access to water, but it does offer both empowerment and the availability of a rapidly-deployable and targetable action of benefit to a large proportion of the world's population.

### Breaking false dichotomies

With good reason, the 'classical' diseases such as cholera and typhoid associated with water pollution from faeces are treated as diseases of under-development. This leads to the dangerous misconception that water-borne disease are irrelevant in developed countries. Regrettably, we are learning that we may be over confident in our assumptions. A number of studies now suggest that water which meets regulatory requirements may in fact be associated with a significant burden of diarrheal disease. Uncovering which bugs are the cause and what is needed to control them bring forward a new raft of challenges. And water safety challenges extend far beyond infectious diarrhea: while reliable estimates are not available, there may be tens of millions of people with fluorosis, including crippling skeletal fluorosis, caused by excessive fluoride in their drinking water. Perhaps the greatest challenge to advancing water safety is overcoming the habit of putting it in a box on its own – as a problem disconnected from securing reliable access to sufficient water for human needs and to be tended by a discrete group of experts.

Water safety is not a separate issue to be tackled once water supply is assured. We cannot cut corners. Water access and safety are essential and complementary contributions to fulfill one of humankind's most fundamental needs: clean water.

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### Further Reading

- Improving on haves and have nots. Bartram J. *Nature* Vol 452 No 20 pp 283 – 284, March 2008.
- Safer Water, Better Health. A, Bos R, Gore F and Bartram J. World Health Organization, Geneva, 2008.
- World Health Organization. Guidelines for Drinking-water Quality Third Edition Volume 1. WHO, Geneva Switzerland.
- Water Safety Plan Manual – step by step risk management for drinking-water suppliers. Bartram J, Corrales L, Davison A, Deere D, Drury D, Gordon B, Howard G, Rhinegold A and Stevens M. World Health Organization, Geneva, 2009