

A global overview of national regulations and standards for drinking-water quality

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Abbreviations and acronyms

Bq/l	Becquerel per litre
BSS	Basic Safety Standards
cfu	colony forming units
EU	European Union
Euratom	European Atomic Energy Community
GDWQ	Guidelines for Drinking-water Quality
GL	Guidance level
GV	Guideline value
HBV	health-based value
ICRP	International Commission on Radiological Protection
µg/l	micrograms per litre
mg/l	milligrams per litre
mSv/year	milli Sieverts per year
NTU	Nephelometric turbidity unit
PAHO	Pan American Health Organization
pCi/l	pico Curie per litre
RegNet	WHO International Network of Drinking-water Regulators
TCU	true colour unit
WHO	World Health Organization
WHOPES	WHO Pesticide Evaluation Scheme

Role of the WHO Guidelines for Drinking-water Quality

The Guidelines for Drinking-water Quality (GDWQ) are one of the longest-standing normative publications of the World Health Organization (WHO), with the first edition published in 1958. The GDWQ are an international reference point for the establishment of national or regional regulations and standards for water safety. They are addressed to water and health regulators, policy-makers and their advisors, mainly to assist them in the development of national standards. The GDWQ are also used by many others as a source of information on water quality and health and on effective management approaches.

The GDWQ include an assessment of the health risks presented by the various microbial, chemical, radiological and physical contaminants that may be present in drinking-water. Where applicable, they derive maximum concentration guideline values for these hazardous constituents. Through a Framework for Safe Drinking Water, the GDWQ support the development of health-based targets, implementation of preventive risk management strategies (through water safety planning), and independent surveillance. Health-based water quality targets define drinking-water that does not represent any significant risk to health, generally over a lifetime of consumption. These numeric targets include 'guidance levels' (GL), 'guideline values' (GV) and 'health-based values' (HBV) for constituents in drinking-water or indicators of water quality (Box 1).

Box 1. Guidance levels, guideline values, and health-based values

The term 'guidance levels' is used for radiological parameters, while 'guideline values' or 'health-based values' is used for all other parameters. Generally, health-based values have been established for some chemicals in the GDWQ, rather than a formal guideline value, in order to provide guidance to Member States when there is reason for local concern. Establishing a formal guideline value for such substances may encourage Member States to incorporate a value into their national standards when this may be unnecessary.

In the case of manganese, a health-based value was established rather than a guideline value as manganese is not of health concern at levels normally causing acceptability problems in drinking-water (e.g. staining of laundry). However, there are circumstances in which manganese can remain in solution at concentrations of health concern in some acidic or anaerobic waters, particularly groundwater. It may therefore be appropriate to incorporate manganese in national standards under these circumstances and to consider both aesthetic as well as health aspects when confirming the acceptability of drinking-water.

In addition, a number of provisional guideline values have been established based on the practical level of treatment performance or analytical achievability (Box 2). In these cases, the guideline value is higher than the calculated health-based value.

Recognizing the benefits of a risk management approach, the GDWQ are not promoted as mandatory international standards, but as guidance that should be adapted to the specific circumstances, needs and resources of countries. Therefore, national or regional drinking-water quality regulations should only include a subset of the values included in the GDWQ and may have different parameter limits than what is specified in the GDWQ.

Many countries use the GDWQ directly or indirectly in setting national drinking-water quality standards. To better understand the extent to which the GDWQ are used and reflected in these standards, a global review of various country regulations and policies was

conducted. This report summarizes information from 104 countries and territories on values specified in national drinking-water quality standards for aesthetic, chemical, microbiological and radiological parameters. The aim of the report is to enable regulators and other key stakeholders to access and compare data when setting or revising national drinking-water quality standards, although comparison should be approached with caution. The report is not intended to provide guidance on selecting appropriate parameters and parameter limits for drinking-water quality standards. The separate publication, *Developing Drinking-water Quality Regulations and Standards* (WHO, in press) should be consulted for such guidance.

Box 2. Provisional guideline values

For several chemical parameters, the GDWQ suggest guideline values which may be provisional for the following reasons:

- A: provisional guideline value set at the achievable quantification level;
- P: provisional guideline value because of uncertainties in the health database;
- T: provisional guideline value set at the practical treatment level); and
- D: provisional guideline value set considering possible health effects and the need to maintain adequate disinfection. Adequate disinfection of drinking-water remains paramount.

For some chemicals, GVs are designated with a “C”. This indicates that the concentration of the substance at or below the guideline value may affect the appearance, taste or odour of the water, which may lead to consumer complaints.

Data sources and methods

The data reviewed in the report were obtained from members of the WHO International Network of Drinking-water Regulators (RegNet)¹, WHO regional and country office contacts, through internet searches or purchased from the relevant standards organizations. Data were collected for 104 countries and territories (Figure 1) up to 2015, and were reviewed and validated. The data validation entailed an online public review, as well as review by WHO regional and country office contacts, and RegNet members, who were asked to clarify inconsistencies and provide data updates wherever relevant.

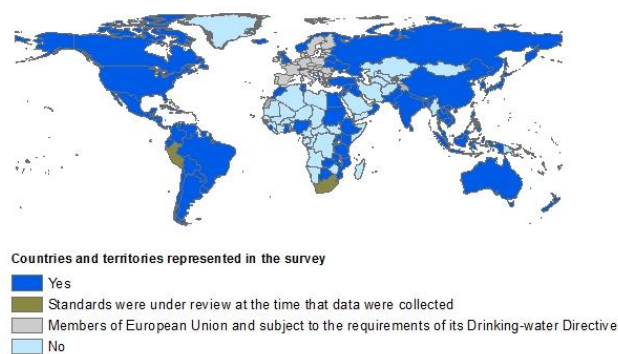


Figure 1: Countries and territories represented in the survey

These countries and territories have a total population of approximately 6.5 billion people, representing approximately 89 % of the world population². Countries that are members of the European Union (EU) are subject to the requirements of its Drinking-water Directive and European Atomic Energy Community (Euratom) which specifies radionuclide requirements. However, all these countries have their own regulations, some of which differ from the

¹ Information about RegNet can be found at the following link:
http://www.who.int/water_sanitation_health/water-quality/regulation/regnet/en/

² Based on mid-year population estimates for 2017: United Nations, Department of Economic and Social Affairs, Population Division (2017). *World Population Prospects: The 2017 Revision. Wallchart*

Directive with more stringent requirements or include additional parameters. In addition, it is understood that the following countries and territories use the standards specified in the GDWQ without currently publishing separate documentation listing regulatory parameters and values at the time that data for this report were collected: Burkina Faso, Kiribati, Kuwait, Mali, Nauru, Senegal, Solomon Islands, Tonga and Tuvalu.

Countries and territories specify parameter values for drinking-water quality in a variety of formats; regulations, standards, specifications, laws, decrees, requirements and norms. For the purposes of this report these are all referred to as standards. The drinking-water quality standards specified by countries and territories for inorganic chemicals, organic chemicals, aesthetic and microbiological parameters were compared to the GV or HBV; and radiological parameters were compared to the GL of the fourth edition of the GDWQ (WHO, 2011)³.

This report does not include detailed background information on the parameters, including derivation and adaptation of guideline values and appropriate risk management strategies; the report should be read in conjunction with the GDWQ to provide this information. The report also does not include the extent and effectiveness of compliance monitoring by national regulatory authorities against national standards, including information on how many samples are required or taken for each parameter; or whether drinking-water quality in each country and territory meets the values specified.

Documentation and the report

According to the documentation reviewed, the oldest specifications of values for drinking-water in current use date back to 1978. Fourteen countries and territories' values, (42 including the members of the European Union (EU) through the European Drinking-water Directive) date to the 1990s. However, many EU Member States have implemented the Directive through more recent documentation but these have not been included in the survey because they differ

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