

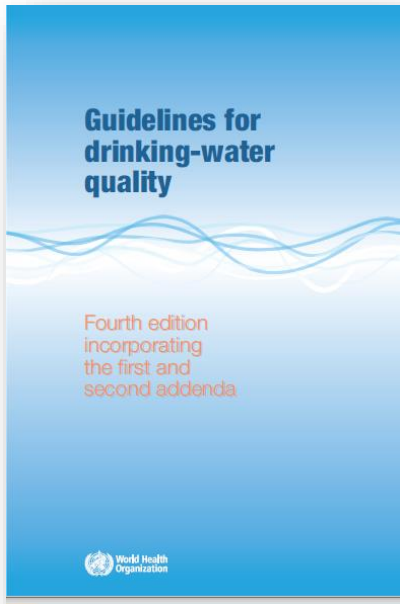
Workshop Series on Water Quality Monitoring

**WHO normative and monitoring
products for WQ**

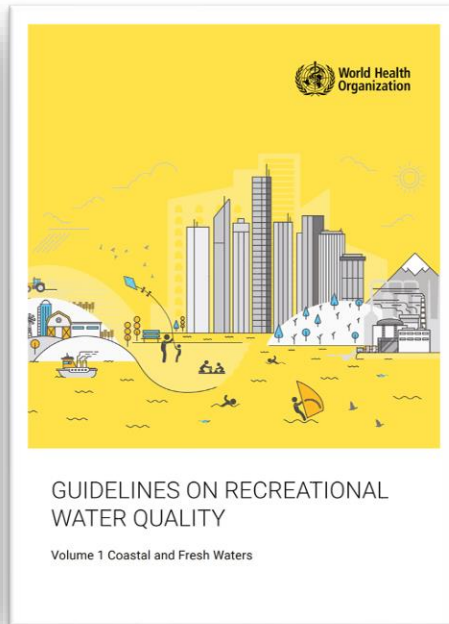
29-31 March 2022

Five main areas of work related to water quality

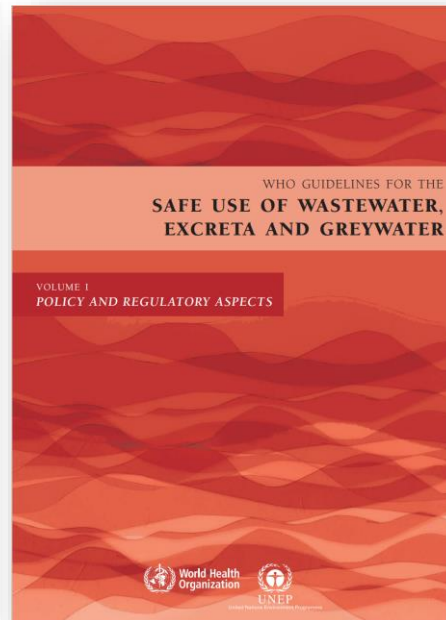
Drinking-water quality



Recreational water quality



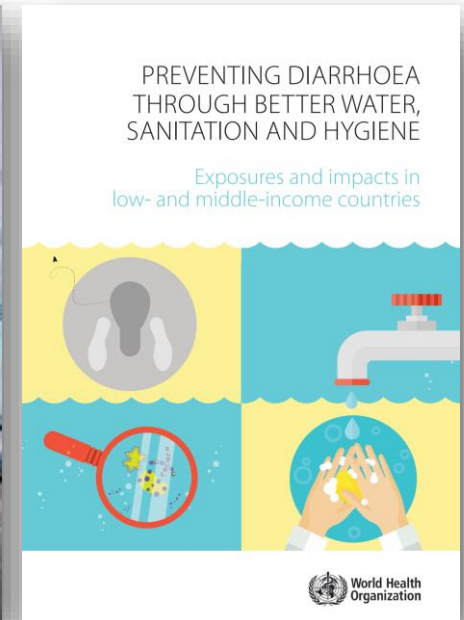
Irrigation water quality



SDG6.1 drinking-water



SDG3.9 water-borne disease



- **Normative guidelines**
(plus CODEX, Household water treatment, pharma pollution)

- **Global SDG monitoring**
(plus GLAAS monitoring; policy, HR, investment)

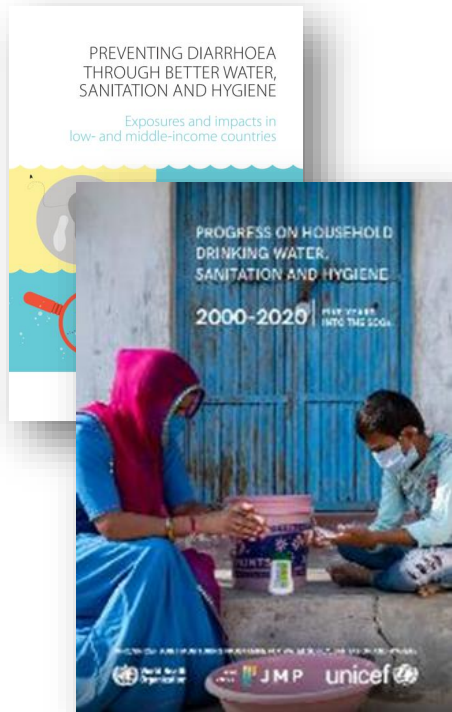


Common features – normative guidelines



- Water quality expert groups
- Health based targets (usually expressed as guideline values for microbiological, chemical, radiological parameters)
- Preventive risk management emphasising progressive improvement through water safety plans
 - System assessment
 - Monitoring
 - Management and communication
- Surveillance – via audits, WQ testing and water-borne disease
- Focal points MoH, utilities, municipalities
- WHO (HQ, regional and country offices) support for capacity building for:
 - updating national standards and regulations
 - local level implementation safety plans (including monitoring)
 - No routine data collection
- Development of supporting technical products

Common features – global monitoring



- Responds to SDGs – top line indicators and disaggregated by service levels, components and settings
- Draws on existing national data sets and academic studies (i.e. no primary data collection)
- National statistical offices are the primary focal point
- Promotes core questions into major data gathering instruments – Census, MICS, DHS, regulatory reports
- Applies a model to generate global, regional and country estimates
- Conducts country consultation for national estimates
- Publishes global reports every 2 years
- Revises methods periodically with expert groups and SAG

Update on the WHO Guidelines for drinking-water Quality

23 March 2022

A flagship normative publication of WHO



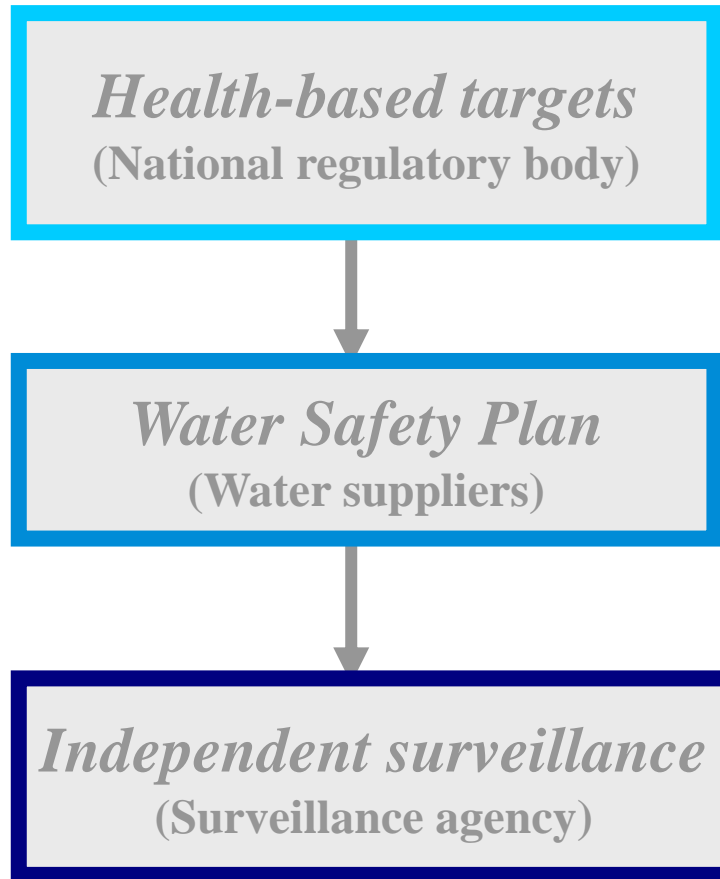
WHO International Standards for Drinking-water, 1st Edition, 1958

Immediate and wide recognition as an essential aid to the improvement of water quality and treatment”

Guidelines for Drinking-water Quality, 3rd Edition, 2004

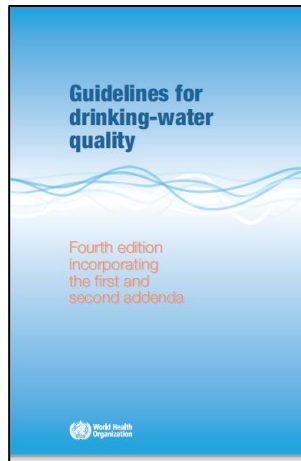
Guidelines for Drinking-water Quality, 4th Edition, 2011, 2017, 2022

Core Recommendations (the Framework)

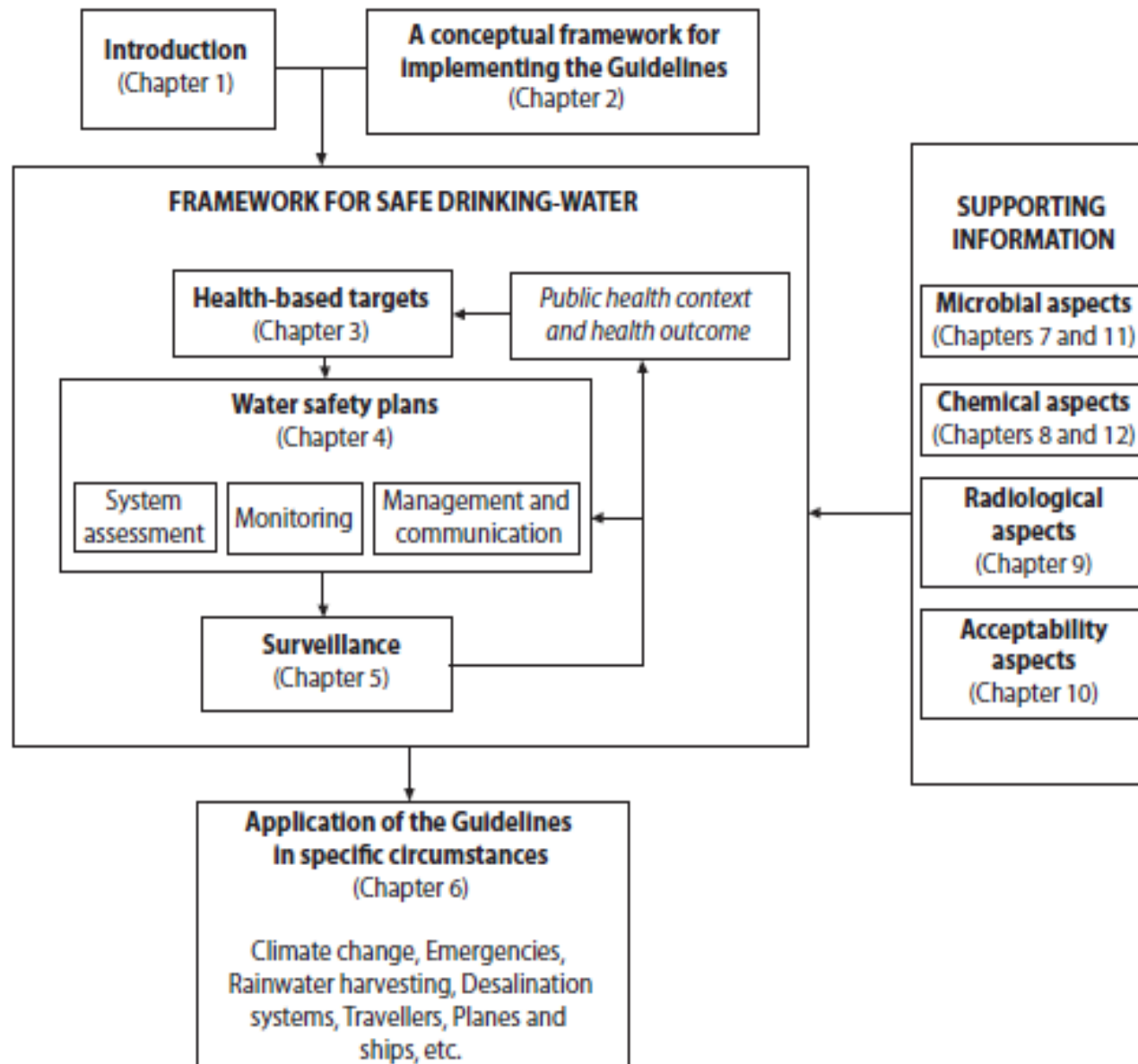
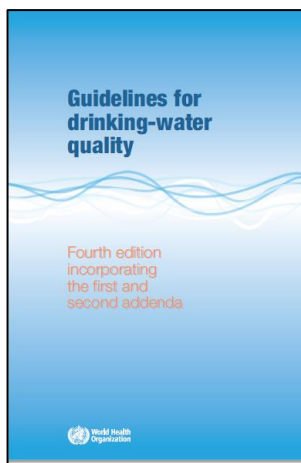


- Establish national water quality standards for relevant waterborne hazards
- Undertake site-specific risk assessments and establish management plans from catchment to consumer
- Verify water safety through independent tests and audits

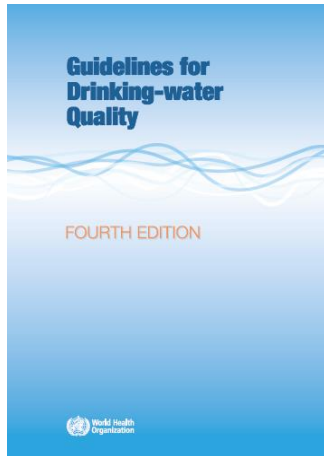
Key Message



- **Shift focus away from reacting (too late) to water quality test results or illness**
- **Concentrate on preventing contamination of water delivered to consumers**
 - identify risks
 - establish control measures
 - monitor performance



Recommendations on water quality



- **Microbial hazards, continue to be the primary concern in both developing and developed countries. Greatest risk from human and animal faeces.**
- **Guideline values are provided for a broad range of chemicals that can be found in water. Priority should be given to those chemicals for which presence in drinking water supplies represents a significant source of risk to public health**

What's new in March 2022 update

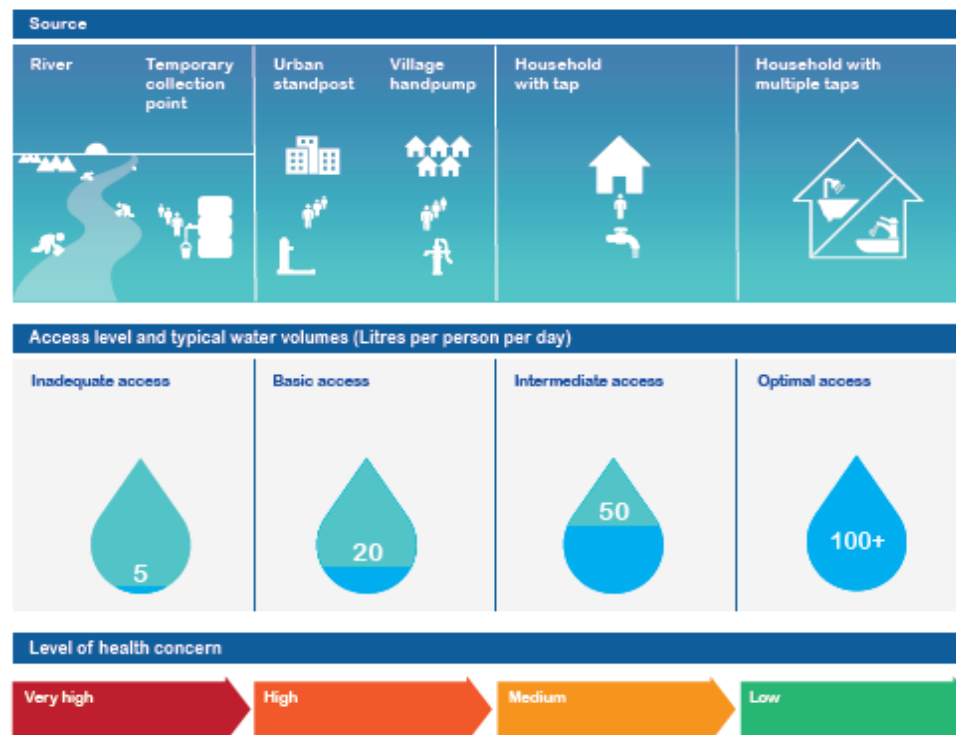
- Revision over 5+ years
 - Drawing on expert and end-user feedback
 - Consultations
 - Peer and public review
- Updates primarily based on information in supporting publications



What's new (cont.)

- Updated assessment on different access levels (chapter 5)
- New section on potable reuse (chapter 6)
- Updated information on climate change, emergencies and food production and processing (chapter 6)

Household water access, adequacy and health



From infographic on 2nd edition of Domestic Water Quantity, Service Level and Health. See summary in table 5.1 of GDWQ

What's new (cont.)

- **New or updated guidance for 14 chemicals:** anatoxins, asbestos, bentazone, chromium, cylindrospermopsins, iodine, manganese, microcystins, nickel, organotins, saxitoxins, silver, tetrachloroethene, and trichloroethene
 - Stronger message on not introducing new sources of asbestos and management of A/C pipes
 - Establishment of pGV for manganese of 0.08 mg/l (previously HBV of 0.4 mg/l)
 - Change in GV for tetrachloroethene to 0.04 mg/l (previously GV 0.1 mg/l)
 - Change in GV for trichloroethene to 0.02 mg/l (previously pGV of 0.008 mg/l)
- **Updated Cyanobacteria factsheet, update risk assessment for microcystins, New risk assessments for other cyanotoxins**
 - Microcystins: (pGV (lifetime) of 0.001 mg/L retained pGV 0.012 mg/l (short-term) established),
 - Cylindrospermopsins: pGVs of 0.0007 (lifetime) and 0.003 mg/l (short-term) established
 - Saxitoxins: GV (acute) of 0.003 mg/l established
 - Anatoxin-a: reference value (acute and short-term) of 0.03 mg/l established



Next steps

Short term

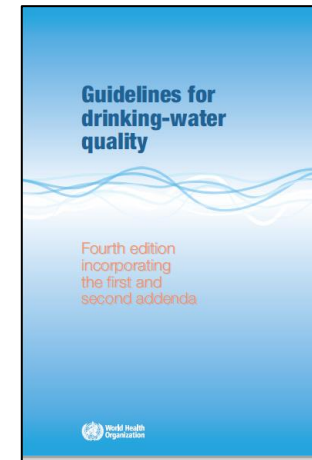
- Public webinar with interpretation

Medium term (Q2-Q4 2022)

- Update of micro treatment tables, micro fact sheets and development of PFAS fact sheet
- Update of small systems guideline
- Training/technical support

Longer-term

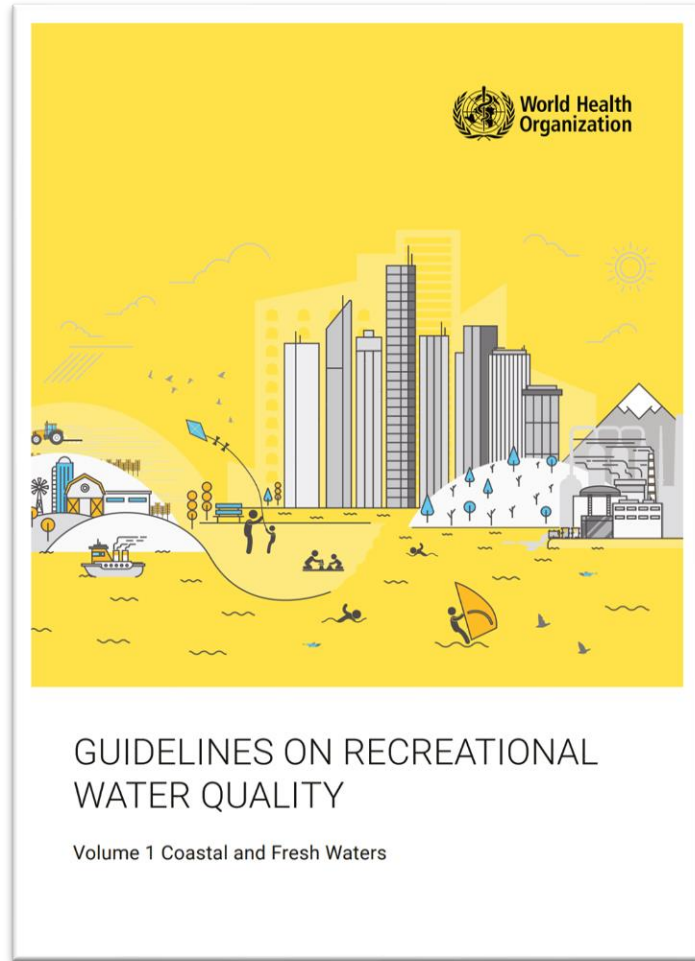
- Development of additional training packages
- GDWQ 5th edition



Update on the WHO Guidelines for recreational water Quality

23 March 2022

Overview



- Published 2020
- Updates the 2003 Guidelines on safe recreational water environments – Vol 1. coastal and fresh water
- Updated evidence and harmonize with the Stockholm framework.

Scope

- Key changes in this second edition are:
 - Emphasis on preventive risk management through site-specific recreational water safety plans
 - Exclusive focus on water quality (i.e. drowning; sun, heat and cold; and dangerous aquatic organisms out of scope)
 - Climate change, AMR and microplastics are dealt with as cross-cutting issues
- Swimming pools and spas addressed in Volume 2.
- Aim to protect health and maximize well-being (rest, relaxation, exercise, cultural and religious practices, and aesthetic pleasure) and economic benefits.
- Apply to the general population, for all types of use (direct water contact, inhalation of sea spray and beach use).
- Aimed at national and local authorities, and other entities with an obligation to exercise due diligence.
- Needs to consider and may be implemented in conjunction with targets and measures for ecosystems protection.

Roles to address multiple pollution sources

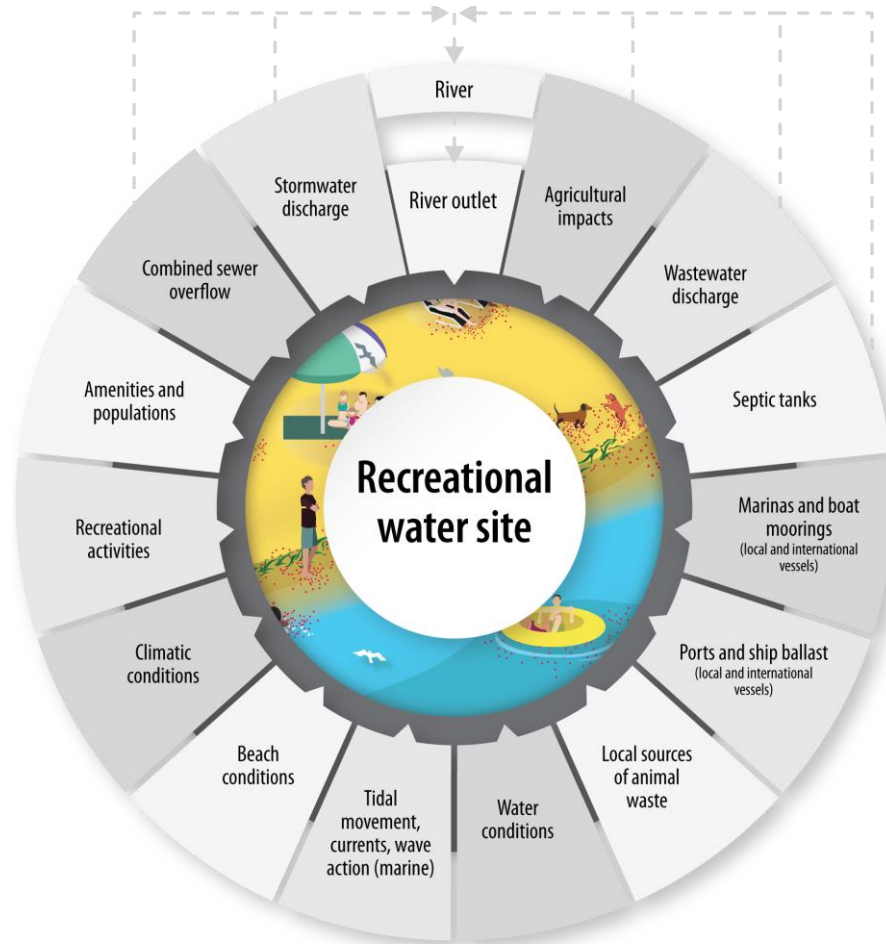


Fig. 3.1. Inputs into recreational water bodies

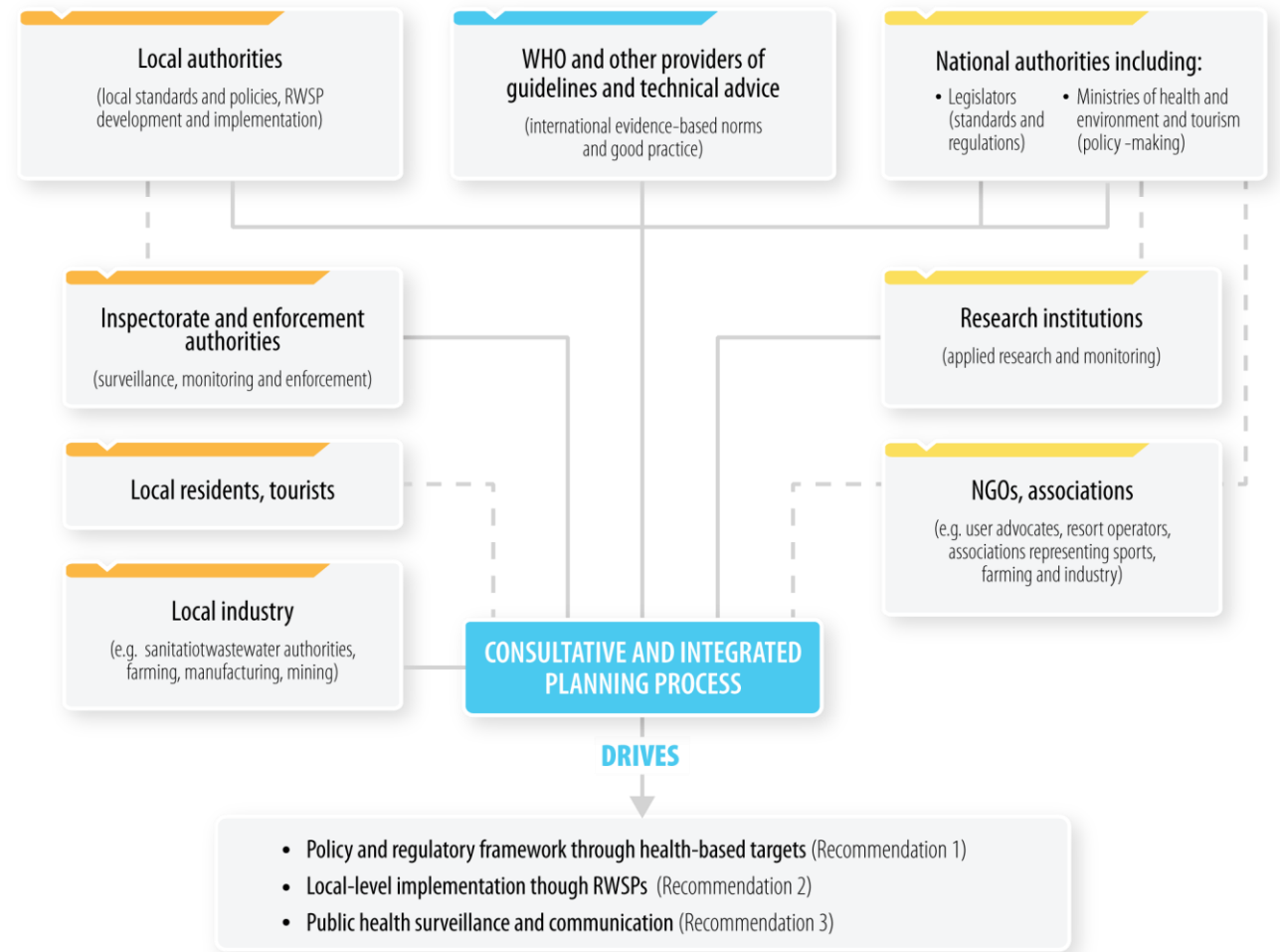
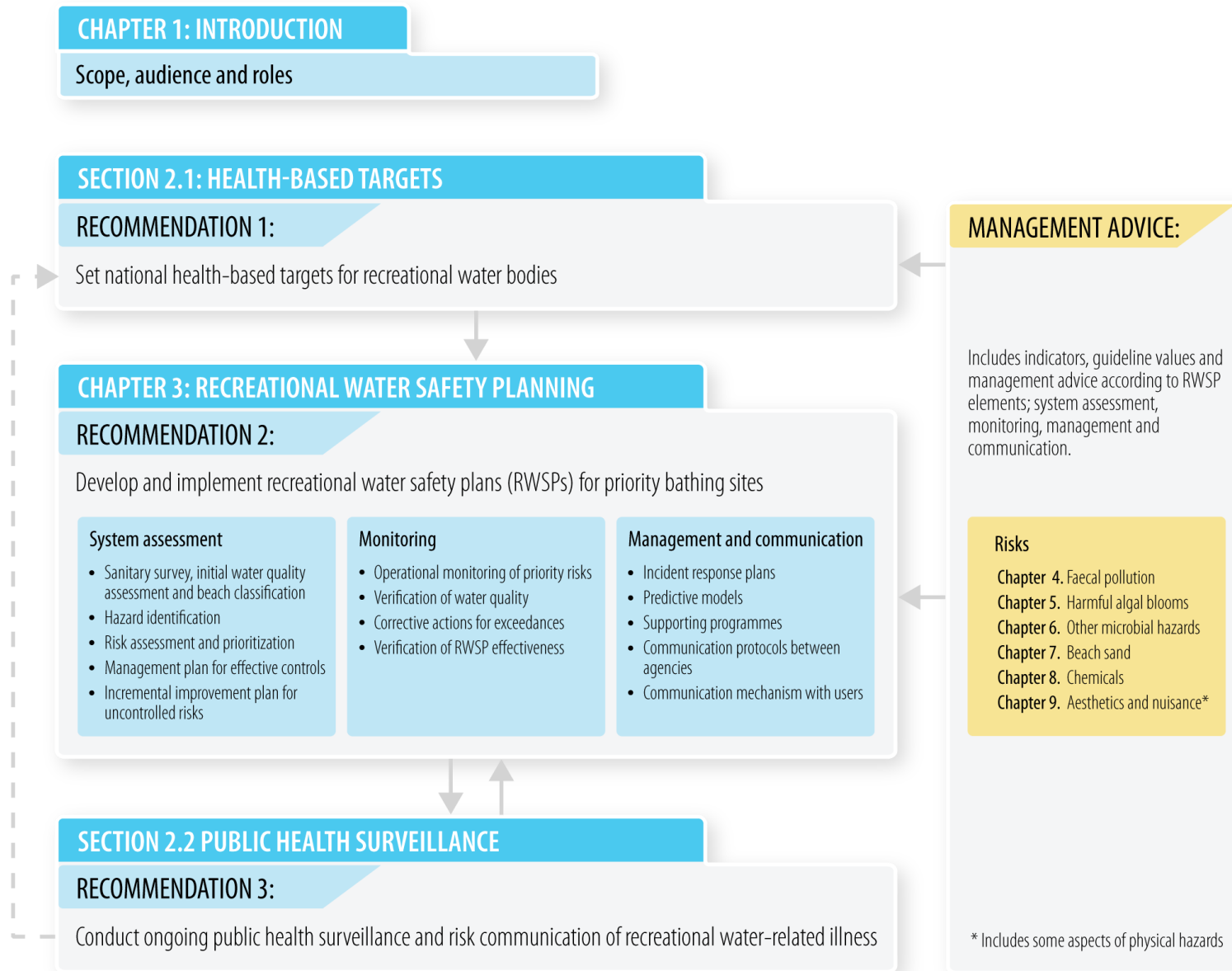


Fig. 1.2. Stakeholders in recreational water environments

Structure and main recommendations



RECOMMENDATION 1:

Set national health-based targets for recreational water bodies

Sub- recommendations

- 1.1 **Express targets as microbial water quality standards** for sources of faecal contamination based on the guideline values in Table 0.1.*
- 1.2 **Develop additional water quality standards** for cyanotoxins or biovolume indicators from **harmful algal blooms** based on guideline values in Fig. 0.2.
- 1.3 **Consider additional standards** based on provisional guideline values for beach sand and chemicals, operational monitoring limits for other microbial hazards, and aesthetic and nuisance aspects **if justified by national or local risk assessment and resource availability** for monitoring and control measures.

*Where high-quality locally relevant epidemiological studies are available, national authorities may adapt Table 0.1 to develop nationally relevant health-based targets as described in section 2.1.2.

Table 0.1. Guideline values for microbial quality of coastal and freshwater recreational waters

Intestinal enterococci (95th percentile value per 100 mL [rounded values])	Basis of derivation	Estimated risk per exposure
≤40 A	This range is below the NOAEL in most epidemiological studies. Low risk or low probability of adverse effects.	<ul style="list-style-type: none"> • <1% GI illness risk. • <0.3% AFRI risk. • The upper 95th percentile value relates to an average probability of less than 1 case of gastroenteritis in every 100 exposures. The AFRI burden would be negligible.
41–200 B	The 200/100 mL value is above the threshold of illness transmission reported in most epidemiological studies that have attempted to define a NOAEL or LOAEL for GI illness and AFRI.	<ul style="list-style-type: none"> • 1–5% GI illness risk. • 0.3–1.9% AFRI risk. • The upper 95th percentile value relates to an average probability of 1 case of gastroenteritis in 20 exposures. The AFRI illness rate at this upper value would be less than 19 per 1000 exposures, or less than approximately 1 in 50 exposures.
201–500 C	This range represents a substantial elevation in the probability of all adverse health outcomes for which dose–response data are available.	<ul style="list-style-type: none"> • 5–10% GI illness risk. • 1.9–3.9% AFRI risk. • This range of 95th percentiles represents a probability of 1 in 10 to 1 in 20 of gastroenteritis for a single exposure. Exposures in this category also suggest a risk of AFRI of 19–39 per 1000 exposures, or approximately 1 in 50 to 1 in 25 exposures.
>500 D	Above this level, there may be significant risk of high levels of minor illness transmission.	<ul style="list-style-type: none"> • >10% GI illness risk. • >3.9% AFRI risk. • There is a greater than 10% chance of gastroenteritis per single exposure. The AFRI illness rate at the 95th percentile value of >500/100 mL would be greater than 39 per 1000 exposures, or greater than approximately 1 in 25 exposures.

Pass threshold

A–D: microbial water quality assessment categories (refer to section 4.3) used in the classification procedure; AFRI: acute febrile respiratory illness; GI: gastrointestinal; LOAEL: lowest-observed-adverse-effect level; NOAEL: no-observed-adverse-effect level.

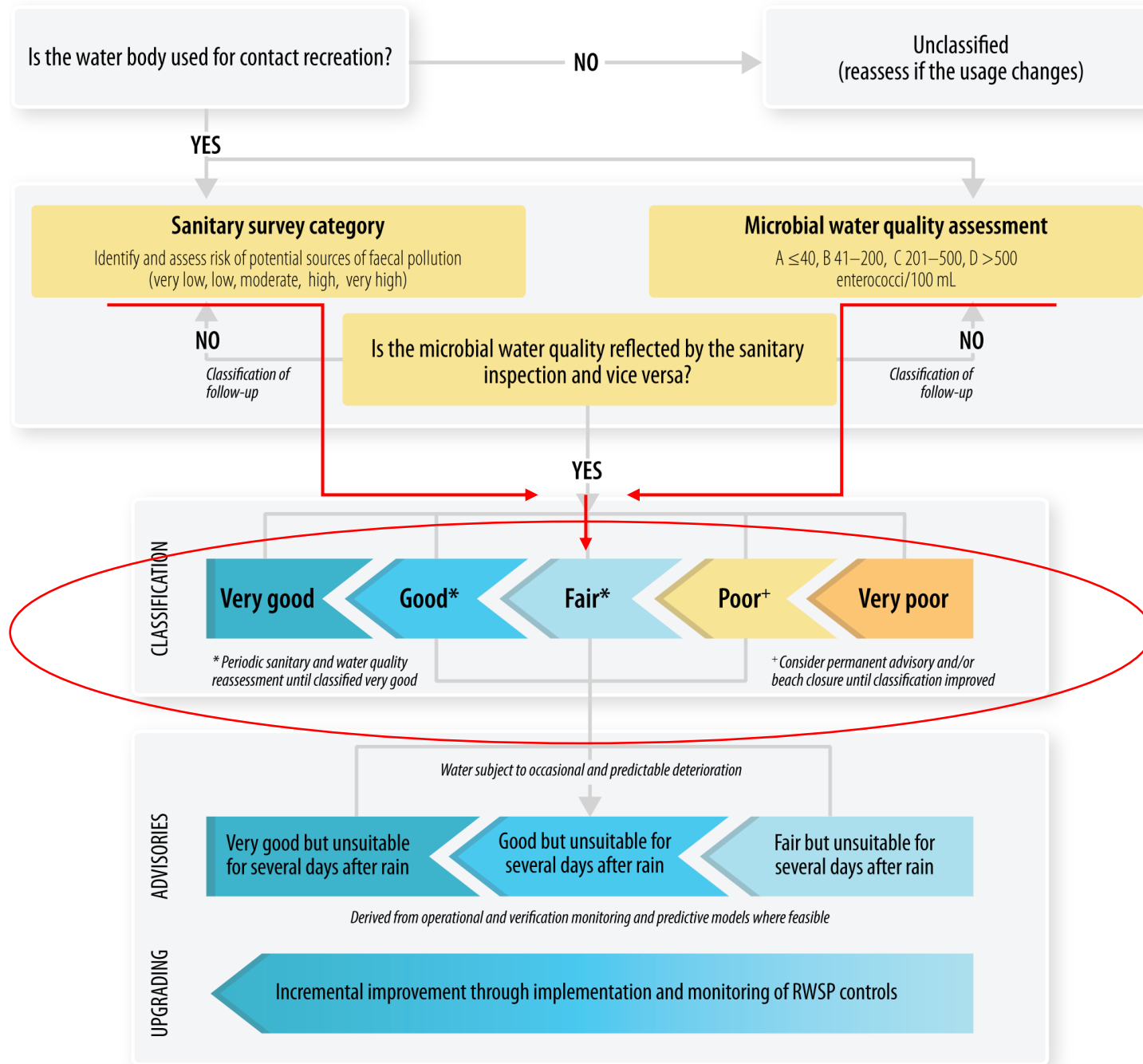


Fig. 0.3. Flowchart for assessing recreational water environments

Visual inspection

Laboratory analysis

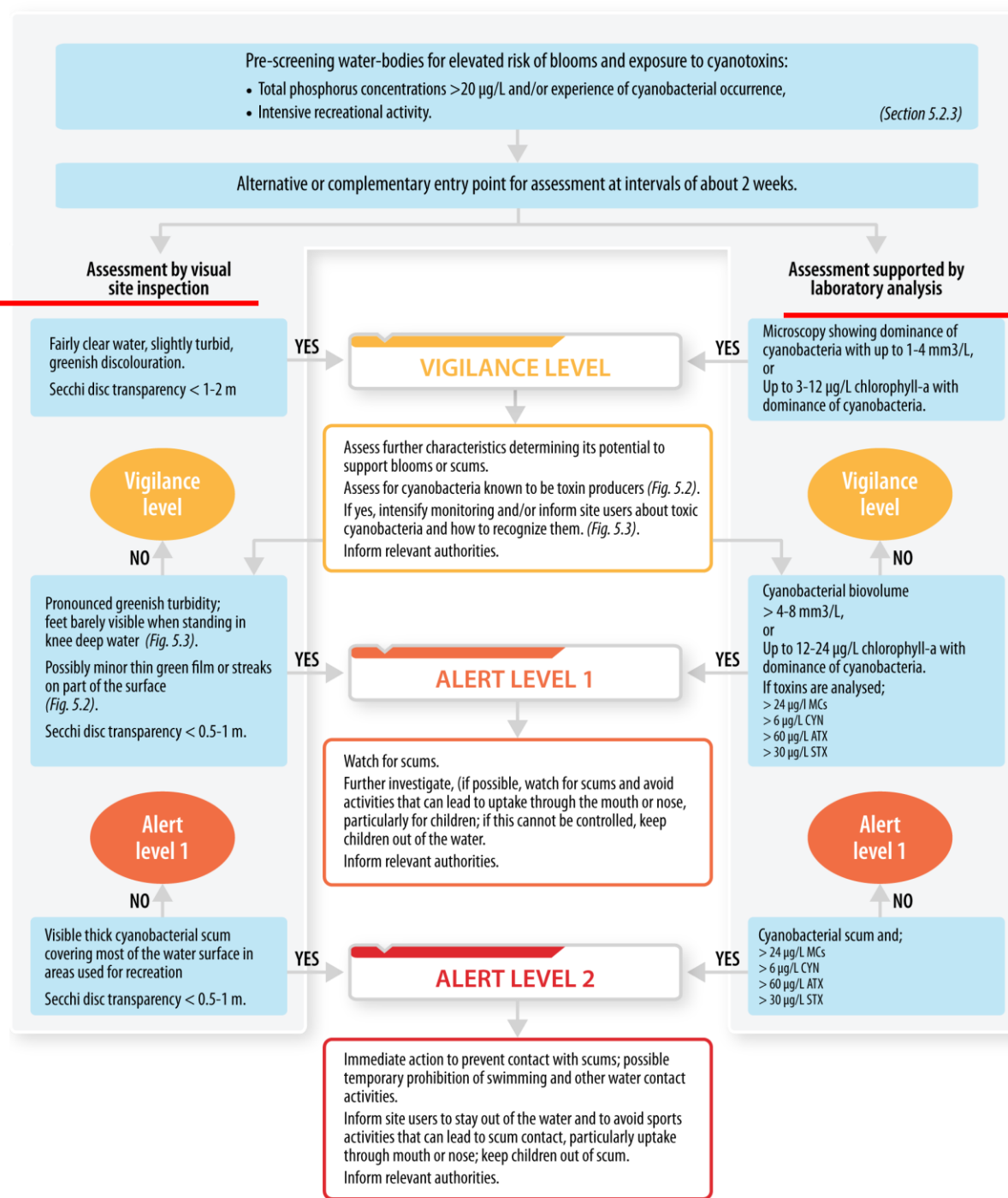


Fig. 0.2. Alert level framework for monitoring and managing cyanobacteria in recreational water bodies

Update on WHO UNICEF Joint Monitoring programme (JMP) – focus on WQ

How JMP works



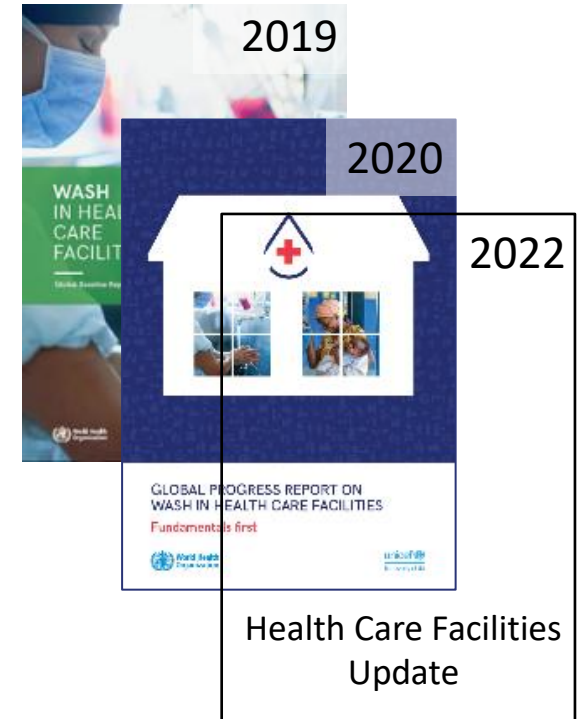
- Responds to SDGs – top line indicators and disaggregated by service levels and settings
- Existing national data sets
- National statistical offices are primary focal point
- Promotes core questions – Census, MICS, DHS, regulatory reports and others
- Applies a model to generate estimates
- Conducts country consultation
- Publishes global reports every 2 years
- Revises methods periodically with expert groups and SAG

Progress on drinking water, sanitation and hygiene: five years into the SDGs

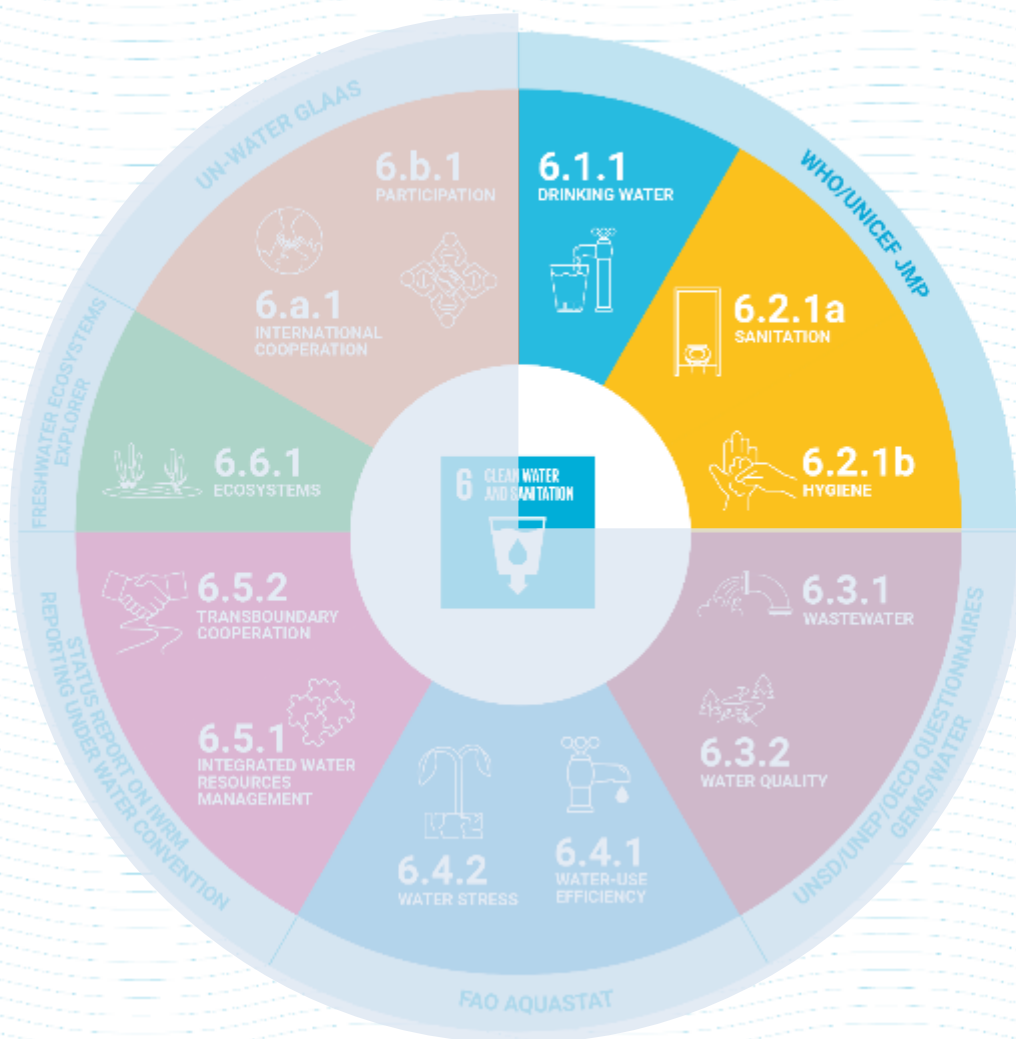
WASH in Households in odd years



WASH in Schools and Health Care Facilities in even years



UN Water Integrated Monitoring Initiative for SDG 6



INDICATORS	CUSTODIANS
6.1.1 Proportion of population using safely managed drinking water services	WHO, UNICEF
6.2.1 Proportion of population using (a) safely managed sanitation services and (b) a hand-washing facility with soap and water	WHO, UNICEF
6.3.1 Proportion of domestic and industrial wastewater flows safely treated	WHO, UN-Habitat, UNSD
6.3.2 Proportion of bodies of water with good ambient water quality	UNEP
6.4.1 Change in water-use efficiency over time	FAO
6.4.2 Level of water stress: freshwater withdrawal as a proportion of available freshwater resources	FAO
6.5.1 Degree of integrated water resources management	UNEP
6.5.2 Proportion of transboundary basin area with an operational arrangement for water cooperation	UNECE, UNESCO
6.6.1 Change in the extent of water-related ecosystems over time	UNEP, Ramsar
6.a.1 Amount of water- and sanitation-related official development assistance that is part of a government-coordinated spending plan	WHO, OECD
6.b.1 Proportion of local administrative units with established and operational policies and procedures for participation of local communities in water and sanitation management	WHO, OECD



6.1.1 Drinking water

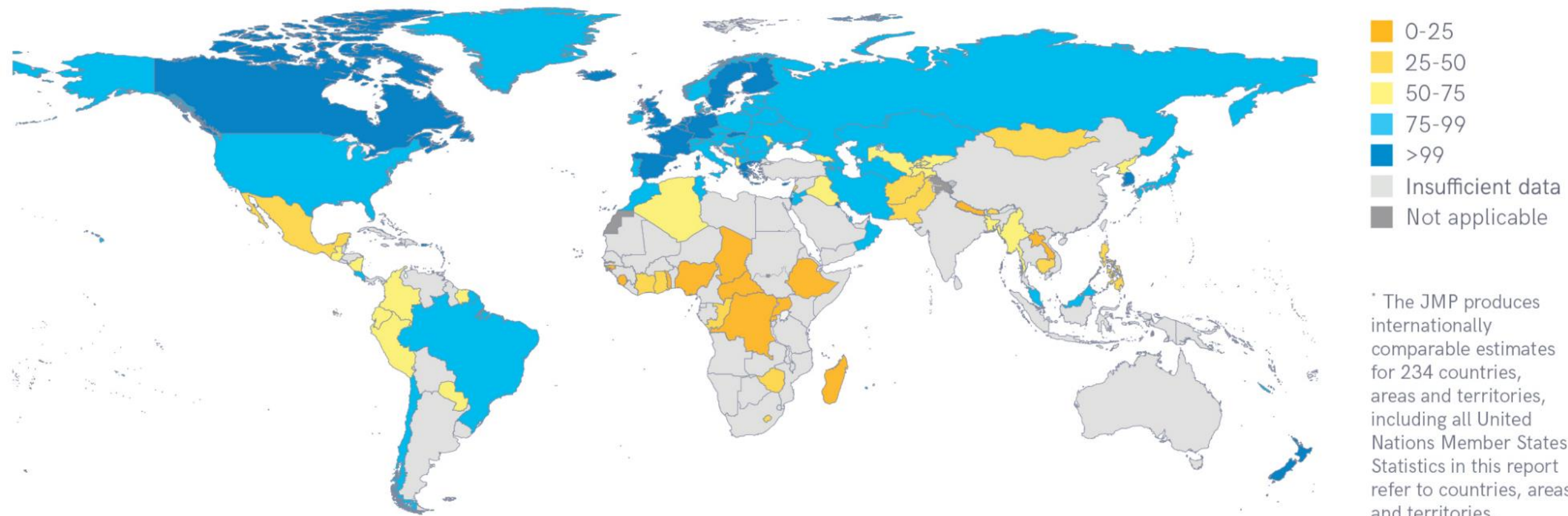
SERVICE LEVEL	DEFINITION
SAFELY MANAGED	Drinking water from an improved source that is accessible on premises, available when needed and free from faecal and priority chemical contamination
BASIC	Drinking water from an improved source, provided collection time is not more than 30 minutes for a round trip, including queuing
LIMITED	Drinking water from an improved source, for which collection time exceeds 30 minutes for a round trip, including queuing
UNIMPROVED	Drinking water from an unprotected dug well or unprotected spring
SURFACE WATER	Drinking water directly from a river, dam, lake, pond, stream, canal or irrigation canal



FIGURE 25 SDG ladder for drinking water services

Note: Improved sources include: piped water, boreholes or tubewells, protected dug wells, protected springs, rainwater, and packaged or delivered water.

138 countries had estimates for safely managed services in 2020



* The JMP produces internationally comparable estimates for 234 countries, areas and territories, including all United Nations Member States. Statistics in this report refer to countries, areas and territories.

Accessibility, availability and quality of drinking water varies widely between countries and regions

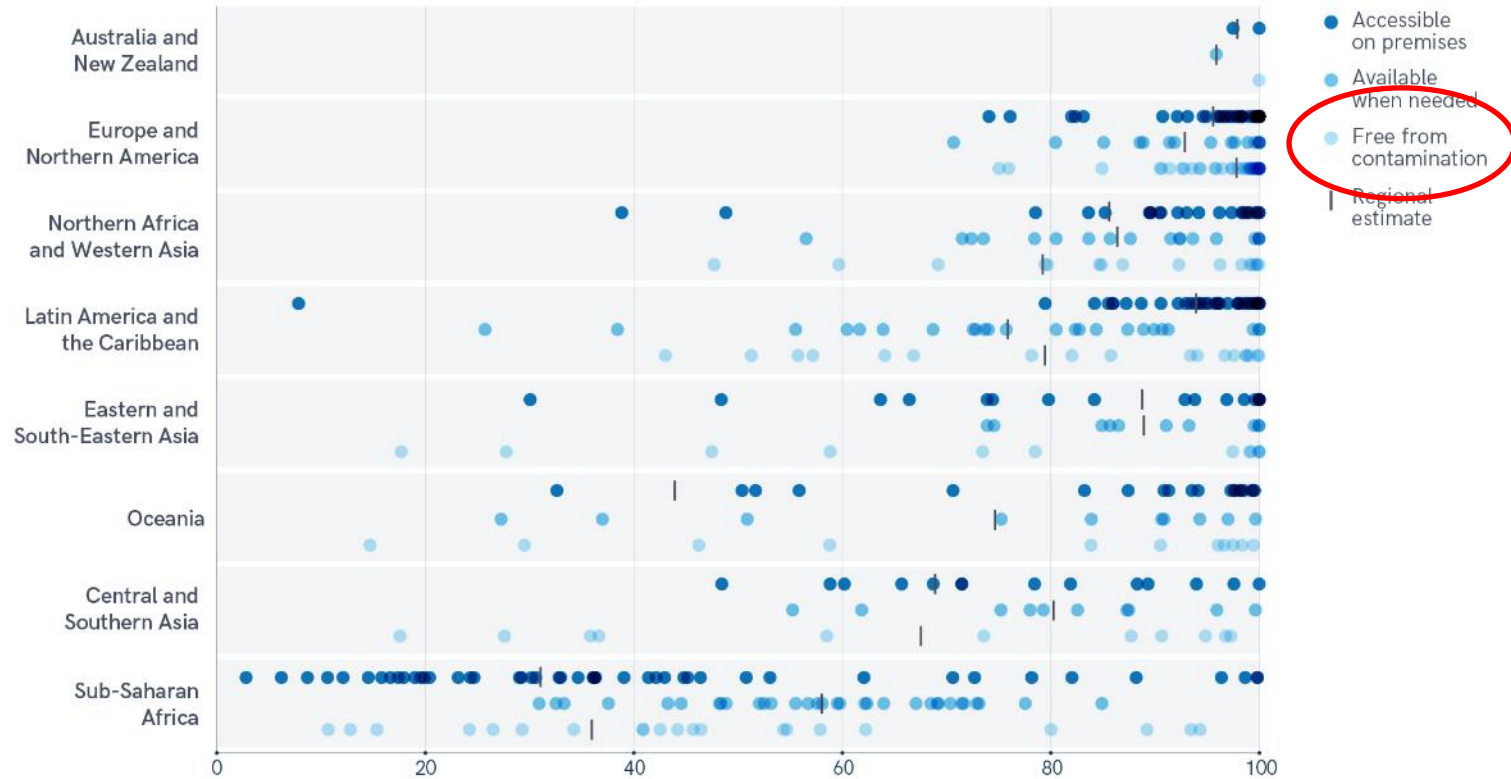


FIGURE 32 Population using improved sources accessible on premises, available when needed, and free from contamination, by country and SDG region, 2020 (%)

Note: Some regions do not have enough data to produce a regional estimate.

Water quality testing in household surveys reveals high levels of faecal contamination in many countries

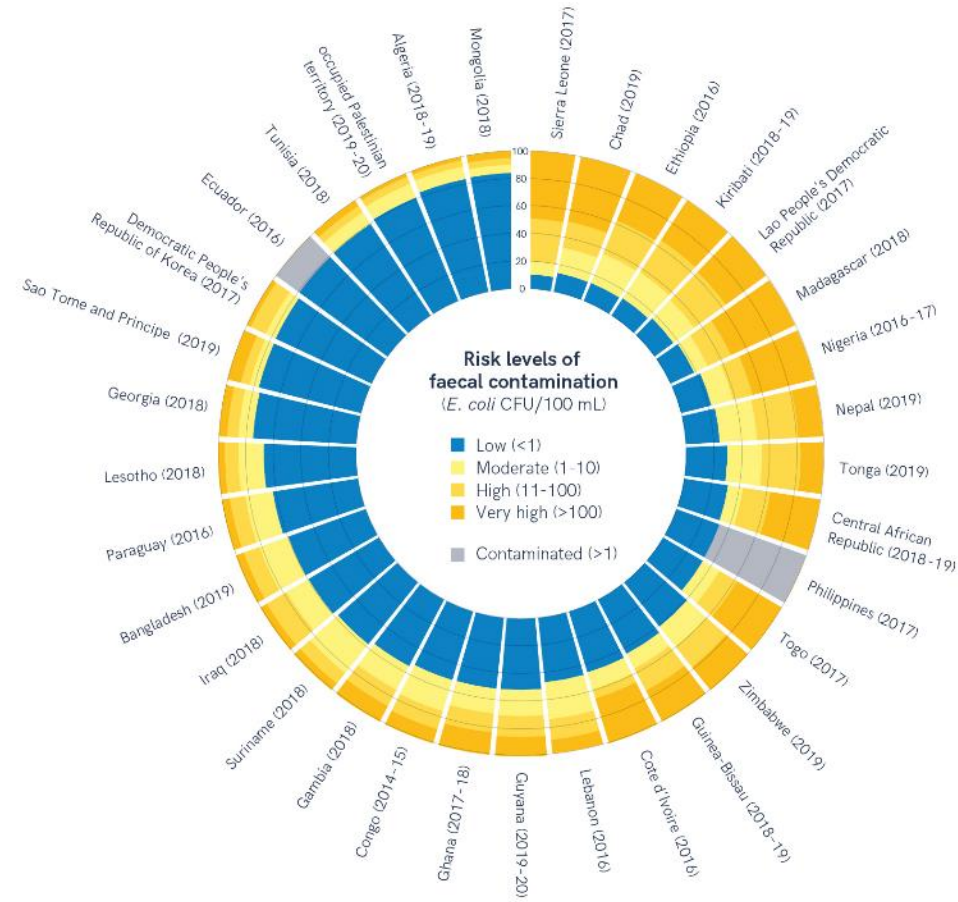


FIGURE 37 Population using drinking water sources by risk of faecal contamination, selected surveys, 2014-2020 (%)

PLOS ONE

RESEARCH ARTICLE

Optimizing household survey methods to monitor the Sustainable Development Goals targets 6.1 and 6.2 on drinking water, sanitation and hygiene: A mixed-methods field-test in Belize

Shane M. Khan*, Robert E. S. Bain*, Karsten Luzzo*, Turqay Usman*, Bo Bechtemel-Pedersen*, Tam Szymanski, Richard Johnson*, Attilia Hancicglu*

Abstract

Background

The Sustainable Development Goals (SDGs) require household survey programmes such as the UNICEF-supported Multiple Indicator Cluster Surveys (MICS) to enhance data collection to cover new indicators. This study aims to evaluate methods for assessing water quality, water availability, emptying of sanitation facilities, menstrual hygiene management and the acceptability of water quality testing in households which are key to monitoring SDG targets 6.1 and 6.2 on drinking Water, Sanitation and Hygiene (WASH) and emerging issues.

Methods

As part of a MICS field-test, we interviewed 429 households and 267 women age 15-49 in Stann Creek, Belize in a split-sample experiment. In a concurrent qualitative component, we conducted focus groups with interviewers and cognitive interviews with respondents during and immediately following questionnaire administration in the field to explore their question comprehension and response processes.

Findings

About 88% of respondents agreed to water quality testing but also desired test results, given the potential implications for their own health. *Escherichia coli* was present in 36% of drinking water collected at the source, and in 47% of samples consumed in the household. Both questions on water availability necessitated probing by interviewers. About one quarter of households reported emptying of latrines and septic tanks, though one-quarter could not provide an answer to this question. Asking questions on menstrual hygiene was acceptable to respondents, but required some clarification and probing.

Conclusion

Optimizing household survey methods to monitor the Sustainable Development Goals targets 6.1 and 6.2 on drinking water, sanitation and hygiene: A mixed-methods field-test in Belize. <https://doi.org/10.1371/journal.pone.0218000>

OPEN ACCESS

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Data Availability Statement: All research data are with the paper and its Supporting Information File.

Funding: Funding for this study was provided to WHO/UNICEF JMP by the Ministry of Health, Belize. The authors would like to thank the Government of Belize, the Ministry of Health, Belize, for their support and assistance in conducting the survey. The authors would like to thank the Ministry of Health, Belize, for their support and assistance in conducting the survey. The authors would like to thank the Ministry of Health, Belize, for their support and assistance in conducting the survey.

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Integrating water quality testing into household surveys

WHO/UNICEF JOINT MONITORING PROGRAMME FOR WATER SUPPLY, SANITATION AND HYGIENE

unicef WHO UNICEF JMP World Health Organization