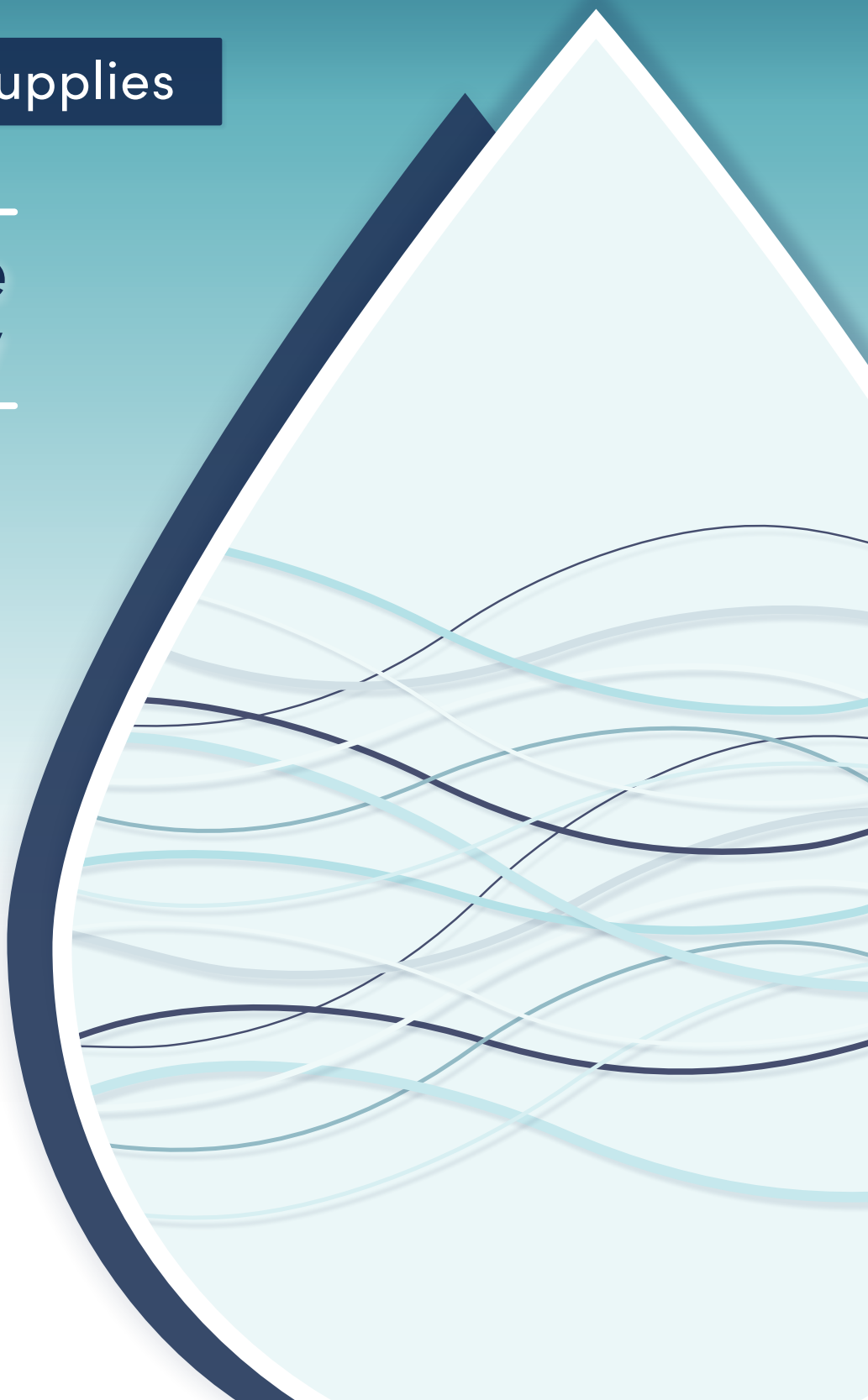
Guidelines for drinking-water quality

Small water supplies

Executive summary



World Health Organization

Executive summary

Need for these Guidelines

Providing access to safe and adequate drinking-water services is one of the most effective means to promote health and reduce poverty, and small water supplies have an essential role to play in meeting this need. For a significant proportion of the global population, drinking-water comes from small supplies that range from individual household wells to piped supplies serving entire communities. More than 40% of the global population lives in rural areas *(1)*, which are commonly served by small supplies. People living in small towns, peri-urban areas and urban areas may also rely on small water supplies. Small supplies are more likely to experience deficiencies related to water safety, which can result in water-related illness as well as adverse social and economic impacts *(2-5)*. Improving the safe management and performance of small water supplies therefore represents an important opportunity to make significant contributions to public health and well-being, address inequalities and improve livelihoods.

Ensuring the safety of drinking-water delivered through small water supplies requires explicit consideration in policies and regulations.

Although small water supplies are diverse, they tend to experience a common set of operational, managerial, technical and resourcing challenges that can affect their ability to sustainably deliver safe drinking-water. For many water supplies, these challenges are exacerbated by the impacts of climate change on water quality and quantity. Small water supplies therefore require explicit policy and regulatory consideration and associated support. These Guidelines, the *Guidelines for drinking-water quality: small water supplies* (or *GDWQ: small water supplies*) *(6)*, have been developed to address the needs and opportunities associated with small supplies to facilitate progressive improvement towards safe and sustainable drinking-water services for all.

Target audience

These Guidelines aim to help governments and practitioners improve the safety of drinking-water delivered through small supplies. The guidance is intended primarily for decision-makers at national and subnational levels with responsibility for developing and implementing drinking-water quality regulatory frameworks and associated programmes for risk management and surveillance. Other stakeholders involved in water service provision will also benefit from the guidance in this document, including nongovernmental organizations and community-based organizations that support the operations and management of small drinking-water supplies. The guidance is also important for small water suppliers, although most recommendations are directed at the institutions that regulate and support them.

Links to other WHO publications

These Guidelines are based on the principal recommendation in the World Health Organization's (WHO's) *Guidelines for drinking-water quality* (GDWQ) *(7)* – that is, the framework for safe drinking-water (see Fig. E1) – and they provide guidance on applying that recommendation to small water supplies in particular. The framework for safe drinking-water comprises three elements, namely:

- developing regulations and standards that include **health-based targets** (e.g. water quality targets);
- undertaking **water safety planning**, which is a comprehensive and proactive risk assessment and risk management approach that includes all steps in the water supply chain (from catchment to consumer); and
- carrying out independent **surveillance** to ensure risk management practices are effective and health-based targets are being met.

Fig. E1 • WHO's framework for safe drinking-water

Source: adapted from the GDWQ *(7)*.

GDWQ: small water supplies (6) is complemented by WHO's 2024 *Sanitary inspection packages – a supporting tool for the Guidelines for drinking-water quality: small water supplies* (or *Sanitary inspection packages*) *(8)*. Sanitary inspection (SI) is a simple, on-site evaluation that is traditionally performed using a checklist to identify risk factors that may lead to contamination of a water supply, and it is an important tool to support risk management (including water safety planning) and surveillance activities.

Together, *GDWQ: small water supplies* and *Sanitary inspection packages* update and supersede WHO's 1997 *Guidelines for drinking-water quality. Volume 3: surveillance and control of community supplies (9)*. Key changes reflected in *GDWQ: small water supplies* include:[1]

- a greater focus on preventive risk management, namely by addressing water safety plans (WSPs);
- tailored guidance for a broader range of small water supplies, including supplies managed by households, communities and professional entities; and
- guidance targeting decision-makers.

Small water supplies covered

Globally, a wide variety of supplies fall under the label of "small water supplies". These supplies may serve one household or a number of premises (e.g. households, businesses, schools and health care facilities) in rural areas, small towns, peri-urban areas or urban areas. They may be non-piped supplies (e.g. dug wells, springs, rainwater collection systems or other point sources), or piped supplies that deliver water to communal access points and private household connections. They may or may not involve water treatment, and they may be used year-round or seasonally. They may be managed by individual households, groups of households (a community), community-based organizations, private operators, local governments, public or private water utilities, or a combination of actors.

1 For a summary of key changes made to SI tools, refer to Annex 2 of *Sanitary inspection packages (8)*.

Collectively, small water supplies represent a wide range of sizes, technologies, skill sets, resources and support needs. To allow context-appropriate recommendations, these Guidelines have established a reference typology of small water supplies based on management model. Management model refers to the set of arrangements for the operation, maintenance and administration of a water supply, and it can be broadly indicative of the relative numbers of consumers served and/or levels of water supplier expertise, available resources and external support needs. Specifically, these Guidelines have defined three points on a broad spectrum of possible management models to support practical and risk-based guidance. These are:

- **household managed supplies**;
- **community managed supplies**, ranging from limited to more advanced management; and
- **professionally managed supplies**, including management by private operators, public utilities, local government and other formalized entities responsible for supplying drinking-water.

Users of these Guidelines will need to consider the various arrangements in their own contexts and decide how they relate to this reference typology and the associated guidance throughout the document.

Guiding principles

Fig. E2 presents 10 cross-cutting principles that are foundational to improving drinking-water safety in the context of small supplies. Concrete actions to apply these principles are presented in the next section.

Fig. E2 • Overview of principles foundational to the recommendations in these Guidelines

- Prioritize public health
- Engage water suppliers
- Take a risk-based approach
- Practise supportive regulation
- Progressively improve
- Approach WASH[a] holistically
- Adapt for context
- Provide equitable services
- Strengthen systems
- Build climate resilience

[a] Water, sanitation and hygiene

Recommended actions

The Guidelines' six recommendations to achieve safe services from small water supplies are given below, along with a summary of practical implementation guidance for each recommendation.

Chapter 2 • Assessing the enabling environment

Recommendation 1

Assess enabling environment conditions that affect small water supply service delivery to inform system strengthening.

Implementation actions

- **Review service levels and trends** → Trends in service level are a key indicator of the effectiveness of the enabling environment that supports small water supply service delivery. Basic service parameters to be reviewed include accessibility (or coverage), quantity, quality, continuity and affordability.
- **Review governance arrangements** → Successful drinking-water service delivery (including for small water supplies) relies on a clear vision for the sector that is set out in policy; a supporting legal framework for achieving that vision; formal regulatory mechanisms to ensure that policies and legislation are applied and enforced; and effective institutions with mandates, responsibilities and interactions between different institutions clearly defined.
- **Review financing** → To identify and address any imbalance between what is required and what is available to finance small water supply service delivery, it is important to review life-cycle costs, current sources of finance and strategies to reduce finance gaps.
- **Review capacity and human resources** → Individual and institutional capacities should be developed to build a strong, diverse and gender-balanced workforce.
- **Review monitoring frameworks and practices** → Monitoring frameworks and practices should account for small water supplies specifically (e.g. through dedicated metrics); be fully integrated into national and subnational systems and processes; and reflect the needs of target data users.
- **Develop a strategic plan to strengthen the enabling environment** → A comprehensive review of the enabling environment for small water supplies should inform outreach, advocacy and short- to longer-term action to progressively improve service delivery. Linking the assessment to formal processes of sectoral review and strategy development can help secure the necessary political support.

Recommendation 2

Establish regulations for small water supplies that promote risk management practice and define priority monitoring parameters and frequencies on the basis of risk.

Recommendation 3

Adopt regulatory approaches that promote a shift towards professionalized operation and management of small water supplies.

Implementation actions

- **Engage and support small water suppliers** → Small water suppliers should be engaged to ensure their knowledge and perspectives are considered. Regulatory requirements applied to small supplies should be balanced by programmes, measures and tools that enable and incentivize compliance. For small water supplies exempted from regulatory requirements, support is still needed to help ensure that safe water is delivered through these supplies.
- **Promote catchment-to-consumer risk management** → Regulations should promote or require water safety planning by water suppliers, who have primary responsibility for drinking-water quality control, as well as source water protection by relevant authorities.
- **Define priority water quality parameters** → Regulations should establish a set of priority parameters (water quality targets) for monitoring small water supplies that reflect public health risks and resource availability, and that are periodically reviewed and revised as needed for progressive improvement. Monitoring to ensure microbial water quality is the highest priority, followed by monitoring of priority chemical contaminants. Where resources are particularly constrained, free chlorine residual monitoring of chlorinated supplies (ideally combined with testing for turbidity and pH) will provide an indication of microbial water quality between *Escherichia coli* (*E. coli*) monitoring events.
- **Set protective and realistic parameter limits** → The aim should be to produce water where *E. coli* is not detectable in a 100 mL sample, although microbial grading schemes can be useful to distinguish between lower- and higher-risk sites to support prioritization where microbial targets are difficult to achieve. For chemical water quality, various regulatory approaches (e.g. interim limits, exemptions, derogations and locally determined safe limits) can serve to protect public health while navigating practical limitations in achieving the GDWQ guideline values where water treatment is inadequate (or absent).
- **Establish monitoring frequencies and locations** → Regulatory monitoring programmes should consider technical conditions (such as parameter concentration, point of introduction, stability and seasonal variability); size and vulnerability of populations served; logistics (e.g. site accessibility); and availability of resources (human, financial, technical) to undertake monitoring. Deviations from national or subnational monitoring requirements should be permitted as appropriate on the basis of local risk assessments.
- **Specify analytical requirements (including for field test kits)** → Regulations should allow the use of field test kits when performance has been validated. Field test kits offer an alternative to analysis in formal laboratory settings, and they often have the advantage of being simpler to use and less expensive than laboratory testing methods.
- **Establish reporting requirements and incident protocols** → Regulations should establish what, when, how and between whom information should be shared during normal operations and incidents (e.g. water quality parameter exceedances). Requirements for public reporting will contribute to transparency and may incentivize improvement action.
- **Define a risk-based surveillance programme** → Regulations should establish surveillance requirements that include WSP auditing and/or SIs; direct testing of water quality; and reviewing the results of compliance monitoring that is conducted by water suppliers. If enforcement of drinking-water regulations lies with another body, clear institutional arrangements should be defined to support timely action based on surveillance findings.
- **Establish suitable additional regulations** → Other regulatory requirements and/or associated frameworks (e.g. technical standards and codes of practice) to consider include treatment technology targets; performance targets for household water treatment; requirements for operator training and skills; and material safety standards.

Recommendation **4**

Promote and support WSPs, which should be implemented by water suppliers to most effectively manage risks from catchment to consumer.

Implementation actions

- **Understand the distinctions between risk management approaches** → It is important to understand the relationship and distinctions between SIs and WSPs as risk assessment and risk management approaches and tools.
- **Establish risk management requirements** → Where populations served are greater or more vulnerable (e.g. in health care facilities), and where water supplier capacity is more advanced, regulations should promote or require WSPs. Where populations served are particularly low or it is not feasible for the water supplier to develop and maintain a WSP, routine SIs and associated management action can be applied as an interim (or, in some cases, alternative) approach.
- **Consider a staged approach to risk management requirements** → Small water suppliers may require more time to comply with regulatory requirements for risk management practice as compared to larger suppliers.
- **Provide water suppliers training and guidance in risk management** → Small water suppliers require ongoing technical assistance to effectively and sustainably practise risk management, including training in WSP and SI approaches and tools, as well as guidance and support to address risks.
- **Provide water suppliers practical tools to support risk management** → Essential support for small water suppliers includes risk management guidance materials and tools that are tailored for different types of water supplies. Useful resources include guidance notes, infographics with pictorial representations of risks and locally relevant forms and templates.
- **Establish sustainable financing for risk management programmes** → Risk management programme support and oversight by national and subnational authorities require dedicated budget allocations. In addition, it is important to establish mechanisms that allow small water suppliers to access funding for improvement needs that require more substantial financial investment.
- **Link to other WASH initiatives** → Water safety planning should be approached as part of holistic WASH programming due to its strong linkages to sanitation and hygiene, and to climate-resilient and equitable WASH services.

Recommendation **5**

Practise risk-based surveillance, including verifying risk management practice by water suppliers and applying limited resources to address priority public health concerns.

Implementation actions

- **Define minimum frequencies for surveillance activities** → The surveillance agency should visit small water supplies periodically to perform SIs and/or WSP audits, and generally to conduct water quality testing. Specified frequencies should consider risk as well as available resources and other practical considerations, including the number and locations of water supplies and the number of trained surveillance personnel.
- **Progressively expand surveillance activities** → Where surveillance agencies are unable to fully implement surveillance programmes, strategic judgments must be made about how to carry out limited surveillance activity for the greatest public health benefit (e.g. prioritizing sites according to risk, monitoring a subset of priority parameters or focusing on SIs and WSP audits). Alternative water quality testing options (including field test kits) can also be considered.
- **Invest in training and tools for surveillance staff** → Surveillance staff play an important role in providing technical assistance to small water suppliers, and they require comprehensive training and well designed tools and templates to support their work.
- **Establish sustainable financing for surveillance** → Surveillance costs can be relatively high for small water supplies owing to the number of supplies and their geographical spread, and these costs must be adequately financed to support safe and sustainable drinking-water service delivery. Costs associated with the management, collation and review of surveillance data to inform programming must also be covered.
- **Jointly analyse risk management scores and water quality** → Combined analysis of risk management scores (from SIs or WSP audits) and microbial water quality data is important to verify the continuous safety of a water supply, particularly in the case of small water supplies, where infrequent testing may miss contamination events and analytical results alone may create a false sense of security.
- **Share surveillance findings promptly and clearly** → The practice of sharing surveillance findings with water suppliers before leaving the site creates an opportunity for discussion that can strengthen a water supplier's technical understanding, contribute to prompt corrective action where needed and help to build relationships and rapport. Findings should also be shared with authorities to ensure corrective actions are undertaken by the water suppliers as needed and to inform programming.
- **Strengthen surveillance-driven remedial action** → Linking surveillance findings to specific recommendations for improvement action (where needed) can be especially important where small water suppliers' technical knowledge and access to external expertise are limited. Systems for following up recommendations for remedial actions should be formalized and records should be kept.
- **Address parameter exceedances** → When water quality testing reveals non-compliance with regulations, investigative and possibly corrective action should be taken to ensure the protection of public health, with priority given to *E. coli* exceedances. It is important that findings of non-compliance are addressed with a view to supporting progressive improvement rather than only enforcing standards, especially in the case of lower-capacity supplies.

Recommendation **6**

Strengthen systems of data sharing and use to inform decision-making and action at all levels.

Implementation actions

- **Assess factors that contribute to effective data use** → It is valuable to assess systems and practices that support the use of data to inform decisions and action to improve small water supplies, including consideration of what decisions need to be made, by whom, what data are required to make those decisions, and what tools are in place to aid reporting and use of data.
- **Progressively strengthen data use** → The highest priority use of water supply data is to address any immediate threats to user health, in particular preventing waterborne disease. After these needs are met as the top priority, a stepwise approach can be taken to support the use of additional data to inform planning and improvement action.
- **Harmonize data collection and management** → Harmonization of data collection tools and approaches (including SI and WSP audit forms) is critical to avoid fragmentation of data sets and help ensure that data can be readily compared nationally and subnationally. Shared data platforms should be considered where multiple stakeholders are collecting and using related data.
- **Prepare timely and fit-for-purpose reports** → To support evidence-based prioritization and decision-making at national and subnational levels, data from across sites and regions should be collated, interpreted and presented in reports that are fit for purpose and delivered at optimal times. This encourages the review and use of data by target data users.
- **Systematize data use in decision-making processes** → Consistent use of data requires that clear processes and platforms for data collation and review are embedded in all relevant planning and funding cycles. Decision-making processes that should involve a systematic review of available data include those related to site improvements, training programmes, funding allocations, strategic planning and operator licensing renewal.

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