

# SUBREGIONAL WORKSHOP ON IMPROVING SMALL-SCALE WATER SUPPLIES FOR BETTER HEALTH IN EUROPEAN UNION COUNTRIES

Meeting report  
18–20 June 2018  
Dessau, Germany





**World Health  
Organization**

REGIONAL OFFICE FOR **Europe**

# Subregional workshop on improving small-scale water supplies for better health in European Union countries

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## ABSTRACT

In June 2018 a subregional workshop for European Union (EU) countries was organized in Dessau, Germany, by the German Environment Agency and the WHO Regional Office for Europe. Representatives of the national water and health sectors from Austria, Belgium, Croatia, Czechia, Finland, Germany, Hungary, Ireland, Italy, Lithuania, Luxembourg, Malta, the Netherlands, Romania and the United Kingdom of Great Britain and Northern Ireland came together to review their situations, share experiences and discuss challenges related to small-scale water supplies. In presentations and group work the main topics discussed were best practices to improve the situation of small-scale supplies (such as web-based tools, sanitary inspection forms and qualification programmes), surveillance and water safety plans in small-scale supplies and providing support for private wells. The workshop ended by defining future actions on guidelines, regulations and cooperation to further improve the situation of small-scale water supplies in the EU.

### Keywords

DRINKING WATER  
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## Abbreviations

DHPLG	Department of Housing, Planning and Local Government (of Ireland)
DWD	Drinking Water Directive
EC	European Commission
ECEH	European Centre for Environment and Health
<i>E. coli</i>	<i>Escherichia coli</i>
EPA	Environmental Protection Agency (of Ireland)
EU	European Union
HACCP	hazard analysis and critical control points
SDG	Sustainable Development Goal
SI	sanitary inspection
SSWS	small-scale water supplies
UBA	German Environment Agency
UNECE	United Nations Economic Commission for Europe
WSP	water safety plan

## Introduction

The WHO Regional Office for Europe and United Nations Economic Commission for Europe (UNECE) Protocol on Water and Health (hereafter “the Protocol”) (1) aims to protect human health and well-being through better water management and prevention of water-related diseases. The Sixth Ministerial Conference on Environment and Health in Ostrava, Czechia, in June 2017 recognized the Protocol as a practical framework for countries towards progressively implementing the water, sanitation and hygiene-related commitments of the Ostrava Declaration (2), as well as in attaining the aspirations of Sustainable Development Goals (SDGs) 3 and 6 to combat waterborne diseases and to achieve universal and equitable access to safely managed drinking-water and sanitation services for all.

Evidence from across the WHO European Region shows that small-scale water supplies (SSWS) in rural areas face a range of organizational, managerial and financial challenges that impede achievement of the principles of universality, equity and safety. Improving the situation of SSWS services and promoting their safe and efficient management are key priorities under the Protocol’s programme of work for 2017–2019 which was adopted at the fourth session of the Meeting of the Parties to the Protocol. Under the Protocol, data were gathered on the status of SSWS in the European Region, and tools and good practices for taking policy action to improve their situation were published (3, 4).

The European Commission (EC) also recognizes the importance of addressing challenges related to SSWS. Council Directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption, known as the EU Drinking Water Directive (DWD) (5), is an important driver to ensure high drinking-water quality across the European Union (EU). Monitoring data show, however, that data availability is relatively low for SSWS, and information is often incomplete; levels of compliance are also of concern.

In order to discuss the current situation regarding SSWS in EU countries, under the auspices of the Protocol’s programme of work for 2017–2019, the German Environment Agency (UBA) and the WHO European Centre for Environment and Health (ECEH) conducted a subregional workshop at UBA headquarters in Dessau, Germany, on 18–20 June 2018. This was the third subregional workshop on SSWS after others held in Minsk, Belarus, for Baltic and eastern European countries and in Belgrade, Serbia, for south-eastern European countries (6, 7).

The purposes of the workshop were to share country experiences; to introduce tools that had been developed, presented by representatives of various health agencies, ministries and organizations from EU countries; and to promote internationally recognized good practices for improving SSWS. Attendees included 27 participants from 15 EU countries (Austria, Belgium, Croatia, Czechia, Finland, Germany, Hungary, Ireland, Italy, Lithuania, Luxembourg, Malta, the Netherlands, Romania and the United Kingdom of Great Britain and Northern Ireland), as well as representatives from the EC, WHO Regional Office for Europe, WHO headquarters and academia (see Annex 1 for a list of participants). Owing to travel problems, participants from Sweden could not attend the workshop but sent country information related to SSWS to be presented and included in the report. This report summarizes the case studies presented and discussed, best practices, the results of group work and follow-up notes.

## **Opening session. The SSWS situation in Germany and the WHO European Region**

Ingrid Chorus of UBA welcomed delegates and introduced UBA and its activities. WHO ECEH made opening remarks and provided an overview of SSWS in the WHO European Region. UBA introduced activities of the programme area on SSWS under the Protocol, which is co-led by Germany and Serbia, and the EC outlined how such systems are regulated in the EU.

A third of the population in the European Region lives in rural areas, and 23% of people are served by SSWS. As there are hundreds of thousands of small supplies, a common challenge for European countries is the lack of compiled data at the national level providing details on these systems. One issue that makes the situation even more difficult is a lack of a standardized definition of what constitutes a small water supply – for example, according to the number of people served, volume of water supplied, management type (private, community, public) or technical specification (centralized, decentralized).

Provision of safe drinking-water for all and in all settings is an important target under SDG 6. To date, however, data on safely managed drinking-water services disaggregated by rural and urban areas are lacking for the entire European Region. SSWS managed unsafely may pose a health risk to the population, and although data on health impacts from these systems are limited, studies have shown that, for example, in Nordic countries 35% of notified waterborne outbreaks were linked to single-household water supplies, and in England and Wales, United Kingdom, 36% of outbreaks were linked to private supplies.

Momentum is currently high for forging stronger links between EU legislation and the Protocol, as well as WHO recommendations on risk-assessment and risk-management approaches to provision of safe drinking-water. This has been driven by the proposed revision of the EU DWD (the basis for related legislation in EU countries) and the SDG call for the provision of safely managed services for everyone. In response to the Right2Water initiative, the EC also aims to reduce inequalities in access. The recitals of the draft revised Directive specifically call for a reduction of inequalities between urban and rural populations. Ensuring equitable access to safe drinking-water is essential, and the Protocol is an important tool to promote equitable access in EU countries.

To address the challenges of SSWS and increase consumer protection, the EC's 7th Environment Action Programme to 2020 includes several tools to boost efforts and foster implementation of the DWD, in particular for SSWS. These include a Commission report and fact sheets for SSWS, published guidance for the implementation of a risk assessment for SSWS in the EU and a Framework for Action for the management of small drinking-water supplies, which aim to help closing the compliance gap between large and small water supplies, recognizing that all citizens should receive a safe and wholesome supply (8–10). Discussion continues about whether to make the voluntary risk-based approach laid down in Commission Directive (EU) 2015/1787 (11) mandatory also for small suppliers under the new DWD.

## Session 1. The SSWS situation in EU countries

This session facilitated exchanging views and sharing information about the situations and challenges of SSWS. Each representative gave a short overview of the numbers, regulations and main issues with SSWS in their countries and regions.

Common challenges of small supplies were researched via a survey in the WHO European Region (3); the results were reconfirmed by the country statements during the workshop. Most participants mentioned that major challenges are:

- unqualified staff in SSWS and a lack of technical knowledge of water supplies by surveillance agency personnel;
- financial constraints for monitoring, maintenance, training, remedial action and improvements, among others, paired with relatively greater costs for investment and operations than larger systems;
- a lack of sufficient monitoring and surveillance by mandated authorities (including frequency and scope of inspections);
- lower levels of compliance with regulations than in larger water supplies;
- polluted raw water caused by poor source protection, agriculture and geogenic factors, despite – typically – a lack of alternative supplies;
- fluctuations in water consumption, including seasonal fluctuations, leading to compromised water safety;
- water scarcity – already or expected to become an issue;
- a lack of data, specifically on raw water quality and private wells;
- unclear ownership/illegal operation of SSWS;
- large numbers and a wide spread of systems in remote rural areas, making surveillance difficult;
- a lack of adequate treatment.

Definitions, categories and numbers of SSWS reported by EU countries vary, making comparability between countries challenging. In addition, geographical allocations vary significantly between countries. For example, in Romania only 65% of the population are connected to centralized drinking-water systems, whereas other countries including the Netherlands and Malta have high connection rates to centralized systems and low numbers of decentralized systems.

Not all EU countries have available information on numbers of SSWS and the safety of water provided from them at the national level, particularly for private wells. For example, in Sweden results from voluntary testing of very small supplies are maintained in a register kept by the Geological Survey of Sweden, but it is far from complete.

### Overview of SSWS in individual countries

Of the population of **Austria**, 68% are supplied by large suppliers. The country has 271 suppliers providing over 1000 m<sup>3</sup>/day, 4123 providing between 10 and 1000 m<sup>3</sup>/day and 16 367 providing 10 m<sup>3</sup>/day or less (data not available for all regions). The Austrian Drinking Water Regulation



covers all water suppliers: large regional corporations, communities, associations of communities, registered cooperative companies and private collaborations or people placing water on the market (houses used by more than one family), as well as food operators with their own water supplies (direct marketing farmers, bed and breakfast locations). Small suppliers are obliged to present the results of water samples once a year to relevant authorities, to construct and maintain the water system according to technical standards, to inform the people supplied about water quality and to attend training for small supply providers. Groundwater quality results indicate only slow recovery from nitrate and pesticide pollution. In some areas the presence of uranium and arsenic is an issue, as well as microbiological exceedances after rainfall. All parts of the waterworks – from abstraction to treatment, storage and distribution – are controlled by relevant authorities according to a national risk-based plan. Challenges include a lack of alternative supply options in rural regions and potential water scarcity in the future due to climate change.

Three groups of SSWS are defined in the region of Flanders in **Belgium**: small public water supplies (providing less than 1000 m<sup>3</sup>/day), of which none are present in Flanders; small private water supplies (providing less than 1000 m<sup>3</sup>/day in the context of commercial or public activity – examples include schools, hospitals and campsites); and individual wells (providing less than 10 m<sup>3</sup>/day or used by fewer than 50 people, where the water is not supplied to users in the context of a commercial or public activity). In the region of Wallonia small supplies are categorized as small public water supplies (providing less than 1000 m<sup>3</sup>/day), small private water supplies (providing less than 100 m<sup>3</sup>/day in the framework of a public, commercial or tourist activity) and individual wells. All suppliers are required to report to and register with the relevant authorities as soon as they produce water for human consumption. They must draw up a monitoring programme, report on the checks carried out and report any nonconformity. The owners of individual wells are not required to perform analysis, but it is recommended. In practice, some of the very small water suppliers do not succeed in adhering to the drinking-water legislation; therefore, the register of small water suppliers is inadequate, controls are lacking and Flanders also lacks local authorities to ensure compliance with legislation.

Both public and local water supplies are present in **Croatia**: 87.8% of the population are served by public water supply systems, 1.6% by small community water supply systems and 10.6% by individual wells. In the period 1992–2015 a total of 30 waterborne outbreaks occurred, mostly related to small community water supply systems. Monitoring is financed by the counties, and the application of hazard analysis and critical control points (HACCP) principles is required for water supplies (implementation of water safety plans (WSP) will be required for large and small supplies in the future). Required sampling frequencies are higher than those required in the EU DWD. The samples are taken by local public health authorities, water suppliers are obliged to publish all information on the drinking-water quality on their websites and, if needed, provide all test results directly to food business operators. Every food operator has to establish an annual plan on drinking-water. Enforcement of legal requirements is found challenging: there is a need to improve legal powers to conduct independent surveillance, especially in private supplies and small community water supplies; these often have no legal entity managing them, meaning that they are not registered and effectively not covered by the legislation. The idea of larger utilities operating the small community water supplies in the future is being considered, and the number of local water supply systems has been reduced in recent years.

**Czechia** is a country with a high number of SSWS and commercial/public wells. SSWS (supplying fewer than 5000 inhabitants) represent 93.4% of a total of 4097 water supplies, and a

total of 2611 public and commercial wells were recorded in the Czech official database. New versions from 2018 of Czech ordinances on the health protection and hygiene requirements for drinking-water include mandatory risk assessment, its evaluation and a specific programme of monitoring (also for SSWS), to be in place within the next six years. Major challenges include a lack of expertise and technical capacity among small system operators, lack of political attention (including local authorities) and worse water quality in comparison to bigger systems.

**Finland** has over 1400 water supplies but does not consider the number of SSWS in itself to be a problem. Existing legislation applies to all supplies providing over 10 m<sup>3</sup>/day. Furthermore, a separate legal act for private wells and guidelines for SSWS exist, as well as a groundwater protection guide. For the application of WSPs, one common protocol applies to all supplies, including small ones, and a web-based tool for creation and use of WSPs and risk assessment is available. Typically, the small groundwater supplies do not apply disinfection or other water treatment. Challenges include the vulnerability of small supplies using groundwater, inadequate financial and human resources and a lack of knowledge on water safety issues among engineering personnel.

About 89% of the population in **Germany** are served by large supplies (for 5000 people and over); 11% are served by small supplies (for fewer than 5000 people) and 0.7% are served by non-public supplies. Water quality, which has to be reported for supplies for 5000 people and over, regularly reaches 99% compliance levels, but as no such regular reporting is required of private wells (providing less than 10 m<sup>3</sup>/day or serving fewer than 50 people), a lack of data is one of the challenges in Germany. Others include the lack of information on raw water quality, differences between the water laws of each federal state and the high numbers of supplies in some districts, which overstrain the capacity of authorities responsible for surveillance. A German drinking-water ordinance regulates SSWS. All supplies (including SSWS) are monitored, applying the same limit values for water quality. Authorities are able to deviate from the scope of parameters for private wells without commercial public activity if the assumption can be justified that a parameter is not expected to occur in a water supply zone at concentrations that would jeopardize compliance with the limit value. The frequency of surveillance depends on the size of the supplies, and an optional risk-based approach for surveillance has recently been introduced, including for small public supplies and private wells with commercial or public activity. Regular reporting of drinking-water quality in SSWS at the national level started in 2013, and data on private wells lie with the local authorities.

In **Hungary** the majority of the population (95%) are served by public water supplies; only 3% are served by small public supply systems and 2% by individual wells. Quality control of private well-water is compulsory under the law, but most wells (estimated to be 90%) are operated illegally without any supplier knowledge of water quality. Compliance for microbial parameters and a number of chemical parameters is generally lower in small than in large water supply zones.

The national utility in **Ireland** runs 883 public water suppliers; they are subject to risk assessment, irrespective of their size. The Environmental Protection Agency (EPA) regulates 450 group water schemes, and 406 private group water schemes are run by communities; the local authorities regulate these, as well as 1896 commercial small supplies. 170 000 household wells, serving 10% of the population, are unregulated – thus, no surveillance is in place for these. Private well owners do not need to register, so the local authority has to find them. To improve the situation a private well grant is available; however, one challenge is to “get the information on it out there”. Having a WSP in place is a prerequisite for receiving the funding. In the future,

group schemes are required to have mapped protection zones; generally, more information is available on group supplies than on commercial ones. In 2016, 34% of all private water supplies were not tested for *Escherichia coli* (*E. coli*), whereas a lack of testing does appear to be a lesser issue in group schemes. Compliance rates were 94.8% in small private supplies, 98% in group water schemes and 99.9% in public water supplies. The Department of Housing, Planning and Local Government (DHPLG) is responsible for legislating water services in Ireland and has provided a number of financial tools to support small supplies. The group water scheme sector can apply for the Multi-annual Rural Water Programme, which is administered by local authorities: they submit plans for upgrades or maintenance and are awarded money on a case-by-case basis. An annual subsidy per house is also available to group schemes for the operational cost of providing domestic water. A grant is also available every seven years for small private supplies; this is also legislated for by the DHPLG and administered by local authorities. The DHPLG has recently initiated a Rural Water Review Group to look at how water services are managed in Ireland.

The **Italian** water sector is characterized by a strong fragmentation, with 2857 water supplies, 83% of which are SSWS providing water to up to 5000 people. These supplies are divided into three categories: those providing up to 100 m<sup>3</sup>/day, up to 400 m<sup>3</sup>/day and up to 1000 m<sup>3</sup>/day. Provisions transposing the EU DWD to the national context are applied to all water supplies, irrespective of their dimensions or the population covered. Compliance of water quality with the regulatory standard is monitored by both water suppliers and the local health authorities and is communicated to the Ministry of Health. Financial resources allocated to water supplies are inadequate, leading to poor performance of small supplies.

Current policies and regulations in **Luxembourg** are effective and determine the frequency of sampling. However, the frequency required for the majority of suppliers, as also stipulated in the EU DWD, is a minimum of four routine samplings and one comprehensive sampling per year, which is considered to be rather low. For many suppliers, a risk-based approach would increase sampling for susceptible infrastructures and after incidents like flood events, whereas other parameters could be reduced in sampling. Major challenges include a lack of personnel and inadequate management of SSWS. While the public sector is trying to persuade and motivate the municipalities to join forces at the local level to form networks to manage the drinking-water supply successfully, motivation to do so and acceptance among the small municipalities is low.

In **Malta** 99.9% of the population is supplied with drinking-water by the Water Services Corporation, which is the only water utility in the country. There are approximately 45 registered private water suppliers – these are mainly major hotels situated on the coast that have a seawater reverse osmosis producing drinking-water for their own use. Private water suppliers are registered with the Superintendence of Public Health. A small group of registered private water suppliers supply drinking-water by water tankers, mainly to merchant ships and cruise liners, and to a smaller extent to small hotels. Those providing bottled water (which also has to comply with the EU DWD) abstract water from private groundwater boreholes, which is then treated through reverse osmosis plants. All these bottlers have a HACCP plan in place. In addition to the analyses carried out by the public water suppliers, environmental health officers carry out inspections and take samples for analysis to verify the results sent by post. Major issues include the high cost of testing due to heavy reliance on an accredited laboratory, having the results sent to the national level on a regular basis, subcontracting of risk assessment and high costs of treatment of seawater (in registered private water suppliers, which are mainly large hotels).

In the **Netherlands**, all the 250 SSWS (mostly at campsites and recreational parks) use groundwater, and SIs are regularly conducted for these systems by the inspectorate. A public supply network is always nearby, so the SSWS sometimes seasonally add water from these grids. Further, some industries produce their own drinking-water, which is mainly used for food production. One of the challenges is that production of drinking-water is not the core business of the small supplies, and knowledge and expertise varies among them. A status review undertaken in 2011 led to establishment of a requirement for SSWS to have approved monitoring plans. For small supplies, the inspectorate can reduce the number of parameters to be monitored, and for some parameters a preliminary risk assessment exists at the national level to advise whether they need to be monitored. Risk assessment is done during a visit of the inspectorate at least every three years, based on a questionnaire and available monitoring data. Furthermore, a risk assessment (mainly of distribution) has to be done for *Legionella* prevention, according to legislation. The national risk-assessment methodology for small supplies is being updated.

One third of the population of **Romania** is not connected to centralized drinking-water supply systems, and access in rural areas is only approximately 30%. Small-scale water supply areas are defined as rural areas supplying up to 5000 people and up to 1000 m<sup>3</sup>/day. The 2530 small water supply areas are divided into three categories:

- those supplying between 400 and 1000 m<sup>3</sup>/day (242 systems, 9.56%)
- those supplying between 100 and 400 m<sup>3</sup>/day (1082 systems, 42.77%)
- those supplying between 10 and 100 m<sup>3</sup>/day (1206 systems, 47.67%).

15% of the total Romanian population is supplied by these small systems. Current policies and regulations are partially effective for both small and large drinking-water systems, but need improvement. The Ministry of Health requires the active involvement of other authorities, ranging from local public authorities to authorities responsible for funding systems. Main improvement needs are addressing the specifics of small systems in national policies and regulation, better raw water monitoring and increase financing for monitoring and remedial actions for small systems.

Approximately 2000 registered municipal waterworks, 3600 “other” registered waterworks and 450 000 private wells exist in **Sweden**. The most significant issues with respect to SSWS relate to private wells. The EU DWD requirements are not applied to very small supplies: advice is provided and recommendations are given regarding the scope of the parameters, with fewer recommended than those included in the DWD. Owners of very small supplies can voluntarily send in their analysis results, and these are maintained in a register which contains information on the location of wells, depth of wells, dimensions, water capacity, water levels and what the wells are used for; however, the register is far from complete. Data included mainly contain information on wells drilled in rock provided by well drillers, who are required by law to provide this information to the Geological Survey of Sweden, which is responsible for the register.

The situation with respect to SSWS in the **United Kingdom** is reportedly similar in all regions. In England and Wales private supplies serve 1% of the population, and the compliance rate in private supplies is 95% as compared to 99.6% in public supplies. Owners and users of the supplies are responsible for their operation, and the systems are regulated by the local authorities. Authorities conduct risk assessments for private supplies (approximately one third have been achieved so far). The current regulations, which came into force in 2009, introduced a risk-based approach to monitoring and the requirement for all supplies apart from single

domestic dwellings to be risk assessed. While the regulations state that local authorities must take action where there is a risk to human health by serving a notice, this course of action is not regularly taken in practice, as local authorities can be reluctant to go down the enforcement route. The Drinking Water Inspectorate responds to various enquiries from local authorities, identifies those of concern and visits and supports them. A report including case studies is published annually.

Over 99% of the population of Northern Ireland are provided with water by one public water supplier; the remainder are served by private water supplies. Nevertheless, many more people are exposed to these small private water supplies through their use in both commercial activities and public buildings. Challenges include identifying the operators of SSWS who sometimes do not want to pay for the public supply, identification of premises using private water supplies, a lack of understanding by the owners and users of private water supplies of the risks associated with their use and the need for the ongoing management of these risks and the absence of adequate simple-to-use and affordable treatment solutions for small-scale private water supplies. The Drinking Water Inspectorate works closely with local authorities to identify potential users of private water supplies, include the systems in a register of supplies for risk assessment and monitoring, and provide advice and guidance to supply owners. A web-based application has been developed for risk assessment of private water supplies. The output is designed to encourage small-scale private water supply users to take responsibility for their supplies by improving their understanding of the risks and to assist them with continued management of their water safety.

Scotland has a large number of small public supplies and approximately 23 000 private water supplies, ranging from private wells to supplies serving several thousand people. Although risk assessments have driven improvements at the local level, overall compliance with microbiological parameters has not significantly improved over the years. A government grant scheme is in place, but no significant effect has yet become visible; investments tend to be focused on initial grant-related capital expenditure and do not necessarily accompany robust ongoing maintenance. The grant scheme is being reviewed and may require WSPs as a prerequisite in the future. Scotland is working to greatly enhance risk assessments to improve consistency and encourage the implementation of a full drinking-water safety plan approach.

## **Session 2. Country approaches and best practices in improving the situation of SSWS**

In this session participants shared experiences of and good practices for addressing the common challenges faced by SSWS in the EU. The session opened with two country case studies on Finland and Ireland, and several other representatives provided detailed information on the situation in their countries.

Group discussions on good practices focused on education, qualifications and certification requirements for small-scale water supply operators; registration of such supplies; technical standards, guidelines and practical tools to support private well operators; and the use of social media and web campaigns developed to reach even very small-scale suppliers and provide support. EU countries and regions have developed many tools, projects and best practices, and a growing number of electronic and web-based tools have been developed to overcome the number and remoteness of SSWS.

Only about half of the participating countries and regions have mandatory qualification requirements, and/or certification programmes for operators working in different types of SSWS. The programmes are built very differently – for example, some countries distinguish different requirements and target groups by field or size of supply; some provide workshops and classes for sampling and/or risk assessment. **Finland** has established qualification requirements for staff working in water supplies, including small ones, and a competency testing scheme (see Box 1).

**Box 1. Qualification requirements for waterworks staff in Finland**

In 1994 the Finnish Health Protection Act set out competence and reporting requirements for the qualification of waterworks staff. Since 2006 regular tests have also been required to prove competence concerning water treatment technology from source to distribution, monitoring, legislation and water hygiene. The tests are obligatory for supplies providing more than 10 m<sup>3</sup>/day or serving more than 50 people, but are voluntary for smaller supplies.

The authority responsible for the testing system is the National Supervisory Authority for Welfare and Health, which also approves the organizations that provide the tests on site. Operator competence is tested through a series of 30 questions (20 general and 10 specific) chosen at random from a set of approximately 600, with the option to select specialist areas (treatment in waterworks or distribution networks). The certificate of competence, which is valid for five years, has already been granted to more than 52 000 people. The overall positive results are regularly trained staff, improved knowledge among employees and workers paying more attention to their methods.

In most countries with qualification certification programmes, regular tests are required to renew the qualification. All workshop participants supported the idea of establishing programmes to improve expertise; they discussed many different concepts of how they might be established, such as using TV spots, online tools and YouTube videos to reach owners of very small supplies and provide them with information. To address funding issues and motivate suppliers to qualify their staff, participants recommended subsidized courses. They also agreed that local authorities should be trained to a higher level of skill in specialized courses. Some participants raised the point that operators may need more health-related information, while local health agencies may need more information on technical issues.

In many of the participating countries and regions, specific technical standards for SSWS are in place, whereas in others they apply generally, irrespective of the system size. Most commonly, technical standards focus on sampling. Participants raised suggestions to make them more specific by addressing relevant topics such as source/wellhead protection, risk-assessment, treatment technologies and storage.

A common challenge regarding SSWS is the lack of data. Mandatory registration can help to increase data availability. Some countries have established registers, but these may not cover all kinds of small supplies (for example, they do not include private wells in **Croatia** and **Germany** or supplies not used for drinking-water in **Malta**). Some countries (such as **Austria** and **Luxembourg**) share registry data between the water and health sector. **Belgium** mentioned that individual well operators are resistant to paying taxes; consequently, they do not register. **Romania** is planning to establish a national register of SSWS at the National Institute of Public

Health and Ministry of Health. In **Italy** a register of large and small supplies is required by a decree (see Box 2).

### Box 2. Registry of water supplies in Italy

The Italian decree DM 26/3/1991 requires the maintenance of a water supply register. This includes both small and large water supplies, and is managed according to the following criteria.

- Water suppliers are required to provide municipalities and regional authorities with data concerning territorial mapping of the drinking-water chain from catchment to the private household supply.
- Regional authorities are responsible for collecting data on water supplies, updating the register and sending it to the Ministry of Health.

Management of the register and the information exchanges among water suppliers, local, regional and central authorities may not currently be adequately flexible and dynamic, and the registers may suffer from inadequate updating as a result.

The register of all water sources and installations of water supplies covers:

- documentation concerning authorization to use the water sources;
- comprehensive descriptions of the water resources;
- infrastructure, including catchment, treatment, storage and distribution networks;
- a technical report on the structural characteristics and history of construction of the water supplies; and
- data concerning the annual flow and number of users served.

A lack of knowledge among operators of small systems is another issue that concerns more small than large suppliers. Specially adapted information for small suppliers is important to improve this situation. Many EU countries already publish such material: for example, **Austria** has published online booklets for private wells and checklists and templates for small system operators, **Germany** has created a practical handbook for small supplies, including private wells, and **Italy** and **Luxembourg** have produced awareness-raising booklets for SSWS. **Ireland** provides a handbook to support the implementation of regulations for all types of SSWS, as well as checklists, templates and guidance for construction and maintenance of private wells. Furthermore, guidelines on producing WSPs for small supplies and training for local authorities are available on request. The **United Kingdom** has detailed guidance for owners and local authorities on the operation of private supplies.

Workshop participants reported the need to make adapted methodological guidance for the practical application of the WSP approach available for SSWS, including guidance for prioritizing monitoring parameters. This should be produced in simple language to accommodate different literacy levels of users. Guidance on implementing legal requirements should also be made available to support the regulatory push for WSPs. Existing international guidance could be adapted for the national and local context. **Ireland** has developed a web-based tool to support operators of private wells with the self-assessment of risks in their supplies (see Box 3).

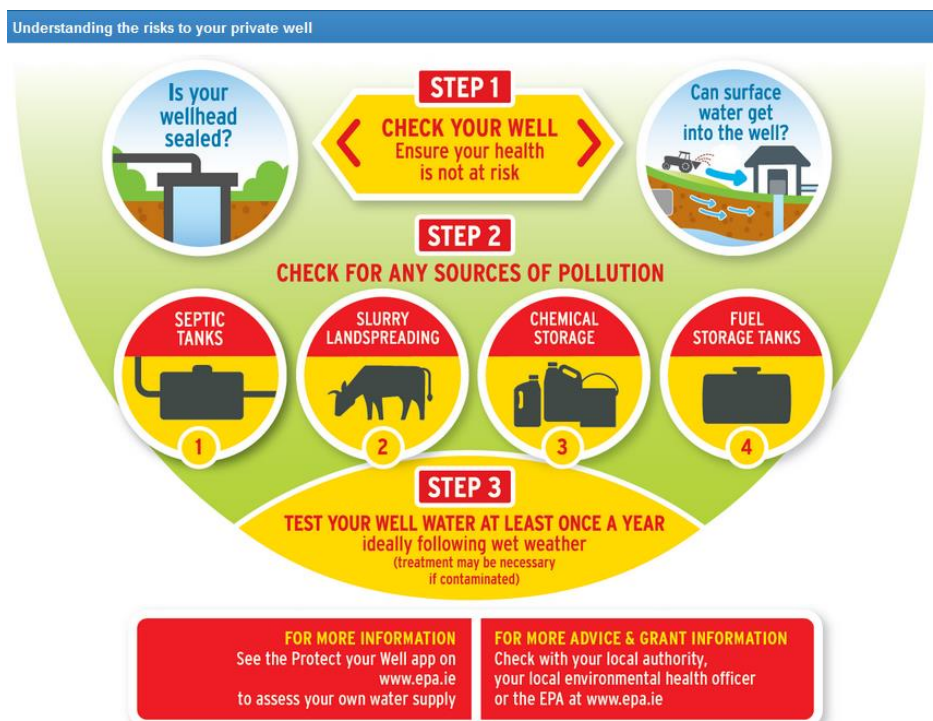
### Box 3. Web-based risk self-assessment tool and activities to support private well operators in Ireland

Like many countries, Ireland faces challenges with the lower quality of drinking-water from small supplies that attain only 94% compliance with threshold values. To reach suppliers of private wells, the EPA started a campaign that includes a website, a web application (see Fig. 3.1), guidance notes, videos, infographics, TV contributions, social media and leaflets/posters, as well as an advice note on borehole construction and wellhead protection (12). With the aim of addressing the limited knowledge of suppliers, the web application highlights the main risks, includes seven simple multiple-choice questions and produces a tailored report based on the answers chosen. General statistics are gathered by the EPA to assist future work on private wells, but no personal or location data are collated. The EPA receives approximately five queries per week from operators through the web application.

The EPA has also produced a number of guidance documents for private water supplies as part of its advocacy role, including a handbook for private water supplies, which explains Ireland's drinking-water regulations in detail and provides best practice for complying with them, and advice notes published on the EPA website (13–14).

Further, a national advocacy and advice group, the National Federation of Group Water Schemes, runs training courses and provides guidance documents and onsite assistance to its group water scheme members.

Fig. 3.1. Image from the EPA's Protect your Well assessment application



Source: EPA (12).

Another important topic raised by workshop participants was the need for good personal interaction and communication in supervising supplies and providing advice for improvement. Central focal points for queries by operators of small supplies could support sharing of



knowledge and experience, disseminate materials and give individual advice. Targeted advocacy and promotion materials for local authorities and schools and development of training modules for operators and local authorities were recommended. Furthermore, more systematic formal coordination and guidance, with the support of local authorities, would increase the effective management of SSWS. Given the major problem of lack of ownership and of legal entities, however, reaching the target group is challenging, and a focus on general awareness-raising, dissemination and use of materials is needed to support the safe operation of SSWS. Adaptation to the national context and regular updating are further success factors to support the application of guidance materials.

Activities to address the challenges of SSWS in **Germany** showed that collaboration agreements (for instance, between water supply and agriculture) and cooperative arrangements (for instance, between municipalities for both water and wastewater operations) can improve the situation for suppliers and authorities. In contrast, **Luxembourg** reported some resistance to merging small autonomous municipalities to facilitate more effective operation of water supplies. **Germany** highlighted the benefits of making available technical standards at a reduced price for SSWS (compared to the price for larger supplies).

A first important step for improvement actions is to conduct a baseline analysis and gain knowledge of the number and status of systems in a country. This is also promoted by the EC's Framework for Action for the management of small drinking water supplies (10), which stipulates the duty to keep and maintain a register of water supplies and to record certain information in the register. The Framework identifies the lack of national reporting and of transparency about small supplies as a key barrier to implementing the EU DWD, which is why a formal duty for national reporting on all supplies, small and large, has been put in place.

### **Session 3. Water safety planning in SSWS**

This session addressed the WSP approach and provided opportunities to exchange ideas and best practice on the status of WSP application in SSWS, reported benefits and support needs. Presentations were given on WSPs in the WHO European Region and sanitary inspections (SIs) to support risk-based surveillance and WSP development. Country presentations on the application of the WSP approach in SSWS were given by Croatia, Germany, Hungary and Luxembourg.

The WSP approach is a risk-assessment and risk-management approach, which is recommended by the WHO Guidelines for drinking-water quality (15) and broadly recognized internationally. It has been adopted in many EU countries; its benefits include health gains, a reduction in water-quality incidents, fostering of due diligence, improved cooperation between stakeholders, identification of short-term improvements and mapping of needs for long-term investment.

The WSP approach builds on HACCP principles from the food sector, and experience with WSPs may be higher in contexts where drinking-water is regulated as a foodstuff, or where the HACCP approach has already been applied in the drinking-water sector (see Box 4).

#### **Box 4. Improving WSP implementation based on the HACCP approach in Croatia**

The 2017 Croatian law on water intended for human consumption requires WSP implementation for both large and small water supplies. To date, all large water supply systems have an HACCP principles-based risk-assessment system in place, as do 62% of small public water systems. Small community water supply systems do not apply the HACCP approach at all, however.

The HACCP approach was found to be easily applicable in the process of water treatment but more difficult in the catchment area and distribution system. Furthermore, it was not clear to what extent this approach was compatible with requirements of WSPs. Therefore, a questionnaire asking respondents to compare the two approaches was sent to drinking-water suppliers; the results showed that all major elements required by WSPs (as described in the Croatian technical standard HRN EN 15975-2:2013) are recognized in the HACCP approach, although some gaps exist with respect to WSP requirements on hazard identification, risk assessment and prioritization, and materials in contact with water.

Challenges expected with the future implementation of WSPs in Croatia are related to implementation in the 26 small public water supply systems (supplying less than 1000 m<sup>3</sup>/day) that have no experience with risk assessment. For small community water supply systems that do not apply the HACCP approach, it will be necessary to prepare simple sanitary checklists and materials and to motivate residents to cooperate. Preparation of Croatian guidelines for WSP implementation is in progress; regional workshops for drinking-water suppliers to improve their knowledge of the HACCP approach are scheduled for October/November 2018 and January/February 2019; and a train-the-trainers workshop on WSPs for health agencies is scheduled for September 2018.

According to a recent global status report (16), WSPs are being implemented to varying degrees in 93 countries globally, including in many EU countries, with nearly 75% of countries also implementing WSPs in rural areas. The level of legally required WSP implementation is lower, however: only 46 countries have policy or regulatory instruments in place that require the application of the WSP approach.

Limited data show that systematically managed piped water results in a reduction in diarrhoeal diseases (17). WSPs can be applied for all types and sizes of supply, and to facilitate the application of WSPs by small suppliers, WHO published a WSP field guide, based on experience in the European Region (18). It is important that such guidance is provided in non-academic language that is easy to understand; it should be available in the national language. The guidance and templates should be hands-on and feature practical checklists.

Countries with legal requirements for WSP implementation in EU countries and related implementation dates include the following:

- **Croatia:** from 2022 (large suppliers); from 2027 (small suppliers);
- **Czechia:** from 2018; latest 2024 (six years to implement);
- **Finland:** from 2017 (small and large suppliers);
- **Hungary:** from 2009 (large suppliers); from 2013 (small suppliers); latest date 30 November 2017;

- **Italy:** from 2017;
- **Luxembourg:** from 2021 (all suppliers);
- **Romania:** from 2021 (large suppliers; optional for small suppliers);
- **United Kingdom** – England and Wales: from 2014;
- **United Kingdom** – Northern Ireland: from 2010 (except single private wells).

In **Belgium** the operator of the public water distribution network is required to guarantee the quality of the production and distribution process and the water supplied. This is done by carrying out the necessary controls and implementing a risk-assessment and risk-management strategy in line with WSP requirements, although a WSP is not enforced by law. Act No 252/2000 and Decree No 252/2004 of **Czechia** include risk assessment, its evaluation and a specific programme of monitoring mandatory for all operators (of both small and large water supplies). **Hungary** has made the implementation of WSPs mandatory for all supplies, including small ones (see Box 5).

#### **Box 5. WSPs as a mandatory requirement for all supply types in Hungary**

In Hungary, WSP implementation is obligatory for operators of water distribution systems serving more than 50 inhabitants. The WSPs are subject to approval by the public health authorities. The legal requirement does not cover small individual water supply systems or private wells, but development of a methodology for the risk-based operation of private wells is planned.

Hungary's experience of WSP implementation, especially for small supplies, is immense: a WSP has been mandatory for the 155 large suppliers since 2009 and for all other supplies (serving more than 50 people) since 2013. Nevertheless, issues remain with the system description and assessment, as information is often missing about resource protection measures, raw water quality, monitoring wells and system maps, and contradictions exist with the data in the national database. Information about the distribution system is also often missing, as are analysis of sensitive or seasonal customers and assessments of consumer connections. Undertaking the hazard identification and risk assessment is the main challenge for the suppliers.

To address these issues, more assistance, external expertise and financial and technical support are needed. As implementation is still in a relatively early phase, suppliers need to improve continuously and realize that a WSP is a rolling process. Many advantages have been documented since WSP implementation, however:

- better knowledge and understanding of the system
- improved data handling and procedures
- targeted investments
- improved water quality
- improved continuity of supply.

According to the recent **Italian** Ministerial decree of 14 June 2017, all water suppliers (including the small ones) are obliged to adopt a process of risk assessment and risk management. Risk analysis is required, according to Italian guidelines, transposing the WHO WSP manual (19) into the national context. A national WSP roadmap is under development in Italy, including the extension/strengthening of legislation on WSP implementation and approval, training programmes and similar. In England and Wales, **United Kingdom**, all supplies were required to be risk assessed by 2014, according to water supply regulations; however, in 2016 only 66% of supplies had been assessed, and completion of the remaining 34% by the authorities was still outstanding.

During the group discussion about two thirds of countries and regions reported experience with WSP application in small systems. The lessons learned mostly relate to apparent improvements in system understanding among suppliers and local authorities, quality of the documentation and increased safety awareness. As WSPs are easier to implement with qualified staff, small supplies face greater difficulties.

To support the implementation of WSPs, several guidance documents and tools are already in use in participating EU countries, and a number of countries have taken action to support WSP application, particularly in SSWS, even without a legal obligation. Some have developed special risk-assessment tools for small suppliers, such as **Ireland** and all regions of the **United Kingdom**. Others, including **Romania** and **Germany**, have published handbooks and guidelines especially for small suppliers (see Box 6).

#### **Box 6. Pilot WSP project and tools for small supplies in Germany**

To support the implementation of the German technical standard on WSP (DIN EN 15975-2) in small supplies, UBA and the Water Technology Centre carried out a pilot project with water suppliers and health agencies. This included:

- extensive initial training
- development of a training manual and detailed templates
- technical support through site visits
- remote consultations and workshops.

The experiences of the project partners and expert interviews were evaluated afterwards. A key outcome of the project was a WSP handbook for small suppliers (also usable by large suppliers) that contains a worked example, graphics and checklists for all WSP steps. To address the challenges experienced by suppliers (including the lack of a methodological approach and the subjective nature of instructions leading to difficulties and inconsistent risk assessments), UBA is developing training materials for workshops about risk assessment that address suppliers as well as health authorities.

Web-based tools to support implementation, particularly in SSWS, were also developed in **Finland, Ireland** and **Luxembourg** (see Box 7).

#### **Box 7. Towards application of the LuxWSP tool in Luxembourg**

Luxembourg has developed a pioneering web-based tool for implementing WSPs and simplifying risk management for all water suppliers to improve the qualitative and quantitative situation of drinking-water infrastructures across the country, scheduled for launch in September 2018 (20). In article 14 of the drinking-water ordinance, modified in 2017, suppliers are required to apply the LuxWSP tool by 21 December 2021. Furthermore, every water supplier had to draft a so-called “dossier” by 2005: a technical inventory of all drinking-water infrastructure. All suppliers drafted the dossier; 30% of suppliers had undertaken risk assessment before release of the tool, which will be available for application in the future.

Use of the LuxWSP tool is optional but suppliers will be motivated by several outputs (using a “name-and-shame” approach). The tool asks small water suppliers to answer a pool of questions for every installation (sources, reservoirs, pressure reduction facilities, pump stations, treatment facilities and so on), and uploading various attachments depending on their chosen answers. The output of the risk analysis is based on the traffic light system (red, yellow, green), highlighting risks ranging from high to low. Finally, the system creates a risk-based approach and resulting to-do list for the supplier and a report for the authorities.

For suppliers the tool functions as an overview of all risks and as a to-do list creator to enable prioritization of measures and actions and budget planning. For the authorities it can be used to evaluate all water supplies.

A challenge is the adaptation and practical application of available guidance in national contexts. Nevertheless, checklists and forms help to provide standardized inspections, to identify problems and risks and to define improvement actions. Especially for small suppliers, forms can be a great help and a very useful practical tool. Use of forms standardizes inspection procedures and supports data collection; suppliers and authorities get a better overview of the situation. SI forms (which support onsite evaluation of all conditions, components and practices in the water supply system that pose an actual or potential risk to public health) can be an entry point to WSP implementation and can support the application of this approach. If risk assessment and risk management are required in national legislation, this could promote the use of SI forms (see Box 8).

**Box 8. SI forms to support risk-based surveillance and WSP development**

WHO, in cooperation with the University of Surrey, United Kingdom, is updating the SI forms in the context of recasting volume 3 of the Guidelines for drinking-water quality on surveillance and control of community supplies (21) to align them better with the WSP approach. The SI forms can be used as an introductory or a basic WSP, and the revised SI forms include a “basic” and an “advanced” version for each supply technology, a technology advice sheet and a management advice sheet.

The list of water supply technologies to be addressed by SIs and management advice is being adjusted. The recast also includes the most relevant, scientifically valid risk factors. The illustrations accompanying the new forms improve their user-friendliness and make them more practical for small suppliers. The forms allow easy and fast identification of hazards and hazardous events, areas where improvements are required and priorities of actions, and are adaptable to all types of supply.

Nevertheless, supporting information and explanatory notes to explain the SI questions (outlining why the questions are included and the potential health risks associated with the risks) are indispensable to ensure that SI forms can be applied by operators with varying levels of knowledge. These need to come in a simple, easily accessible format, which can be used by people with low literacy levels or with no access to the Internet.

While countries report limited experience of using the WHO-recommended SI forms (18, 21), several participating countries shared their experiences with similar SI forms and other checklists. For example, **Austria** provides checklists for SI for the fields of food and water as part of a quality management system. The **Netherlands** and Scotland, **United Kingdom**, also provide SI-adapted checklists. **Hungary** and **Malta** have special checklists for Legionella inspections/controls in buildings (hotels, hospitals). **Croatia** uses SI forms within the HACCP checklists; **Finland** uses general WSP risk-assessment checklists; and **Belgium** and **Lithuania** plan to provide such forms. In **Germany** SI forms are used for simple risk assessments in private wells. **Hungary** uses SI forms as part of mandatory WSP approach. **Romania** uses an SI form with 11 questions to create a risk score for wells, and updated forms (with 100 questions) are used by suppliers. England and Wales, **United Kingdom**, have a comprehensive risk-assessment checklist, but this is not necessarily equivalent to an SI form.

Participants identified the following recommendations for concrete actions and steps needed at the country level, considering national needs and conditions, to implement WSPs for SSWS in legislation and practice.

- Providing a regulatory push is a strong driver for uptake of WSPs in small systems: set regulatory requirements for WSP implementation and promote uptake in practice, allowing for different degrees of complexity in implementation.
- Provide financial incentives/assistance to water supplies (rewarding and supporting WSP activities rather than using WSPs or risk assessments to reduce monitoring costs).
- Establish training programmes and capacity-building activities to increase technical competence (such as training of trainers, targeted training for public health specialists, local authorities and water operators, field training, mentoring and peer learning).
- Promote the approach by using social media and webpages, among others.

- Provide guidance documents and practical tools for application in the field.
- Secure the buy-in and involvement of all stakeholders and improve communication and coordination, advocating benefits.
- Share best practice examples to inspire policy-makers in other countries and to support scale-up of implementation in settings where the approach is not legally required.

## **Session 4. Risk-based surveillance in SSWS**

This session gave an overview of the requirements for risk-based surveillance in SSWS and the related experiences and challenges in EU countries. WHO provided presentations on translating the WHO Guidelines for drinking-water quality into the national context, risk-based surveillance of SSWS in the updated WHO guidelines for small systems and key principles of risk-based surveillance of drinking-water quality. Country presentations on the application of risk-based surveillance approaches in SSWS were given by Finland, Romania and England and Wales, United Kingdom.

A risk-based approach was introduced in Annex II of the EU DWD in 2015, allowing member states to derogate from established monitoring programmes provided credible risk assessments are performed; these may be based on the WHO Guidelines for drinking-water quality (15). The rationale behind introducing this new risk-based approach was that experience had shown that for many physicochemical parameters the concentrations present in drinking-water would rarely result in any breach of limit values, and that therefore monitoring and reporting of such parameters would have limited practical relevance while causing significant costs; thus, flexibility in monitoring would lead to more beneficial use of resources.

The WHO Guidelines for drinking-water quality are the point of reference for regional and national drinking-water legislation and regulations. Volume 3 of the guidelines specifically addresses the surveillance and control of community supplies (21), and is currently under revision, driven by the call for support to achieve SDG 6 and the large existing gaps between coverage of safely managed services in large and small systems, as well as the need to integrate WHO's framework for safe drinking-water, including WSPs and risk-based surveillance (15). The aim is to have two parts in the future: guidelines for small drinking-water supplies as an overarching policy framework and a guide to fieldwork related to small drinking-water supplies, addressing not only community supplies but also private wells and professionally managed (public/private) small water supplies. As SSWS are often operated by untrained or undertrained staff, surveillance agencies may need to take on a supporting role giving guidance on safe operation of the systems, rather than focusing only on strict enforcement of legal requirements.

WHO guidelines need to be translated into the national context, and WHO published guidance on developing drinking-water quality regulations and standards in 2018 (22). When incrementally improving the surveillance systems for small supplies, it is important to set realistic goals for progressive improvements and to allow for progress over time as resources and capacities permit, taking into account staff to undertake monitoring activities, laboratory capacities, logistics and available budgets.

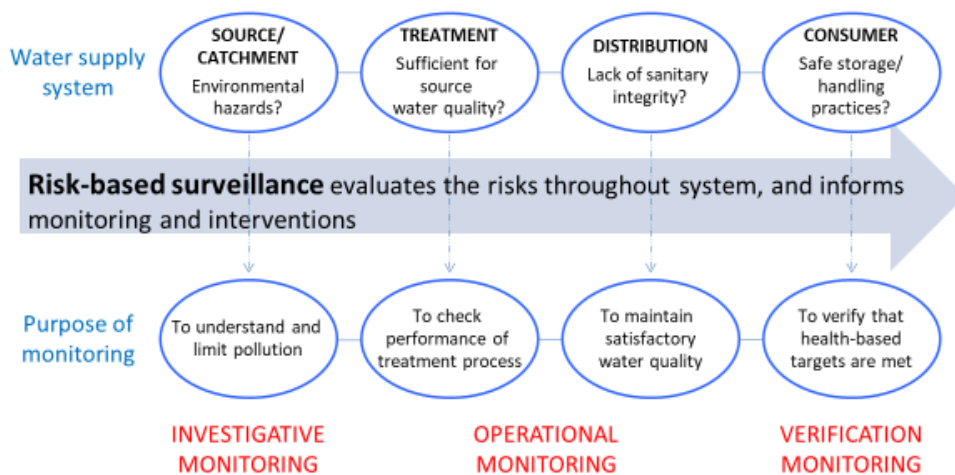
Considerations for ensuring compliance of small systems with drinking-water quality standards include:

- grace periods according to time needed for compliance
- exceptions/exemptions based on feasibility of compliance
- derogations based on feasibility of returning to compliance
- parameter limits that allow for feasibility issues, such as interim limits.

The risk-based aspect may be integrated into surveillance strategies for SSWS, focusing on different aspects.

- SSWS are often located in remote areas and exist in large numbers, making it unrealistic to analyse all parameters at the same frequencies as in large supplies, and to visit them in short intervals as part of independent surveillance. Therefore, sampling and inspection frequencies can be staggered according to the system size, as stipulated in the EU DWD and consequently in EU countries' national legislation. Even before the changes to Annex II of the EU DWD in 2015, it allowed exemptions for individual supplies providing less than 10 m<sup>3</sup>/day or serving fewer than 50 people, and from which water is not supplied as part of a commercial or public activity.
- Risk assessments may be promoted by regulations; they can identify priority parameters and be the basis for stipulating frequencies of sampling based on the nature of hazards and the risk rating. Focus may be given to priority issues, especially those with health impacts (such as microbial pathogens and priority chemicals).
- Surveillance activities may also be informed by the outcomes of risk assessments: SSWS that show significant risks can be prioritized, while frequencies may be reduced for supplies with lower risks and previously satisfactory results.
- Risk-based surveillance has strong links to the WSP approach, which includes monitoring activities for different purposes – this contributes to in-depth knowledge of water supply systems. Where WSPs are implemented, surveillance can shift from assessing results of drinking-water testing towards auditing of WSPs (see Fig. 1).

**Fig. 1. Links between WSP-related monitoring and risk-based surveillance**





Risk-based surveillance may apply tools – including, for example, sanitary surveys – that can partially compensate for a lack of dedicated laboratory facilities and can improve overall water-quality monitoring efforts where resources are limited. Strategies for effective communication at all levels is an integral element of surveillance.

Workshop participants discussed risk-based considerations embedded in surveillance of SSWS, the key challenges in the application of risk-based approaches and how surveillance data are reported and used at the national and local levels. Approximately half of the participating countries and regions could report on risk-based considerations embedded in SSWS surveillance. Some had differing requirements depending on the type of system – based, for example, on different frequency and scope of monitoring, points of sampling (random versus fixed), risk assessments and accreditations and on the type of use (commercial versus public). In settings where it is not mandatory for suppliers to apply a risk-based approach to target monitoring, there appears to be a lack of legal power; this may, however, receive a boost with the proposed revision of the EU DWD.

Several countries mentioned that local and national capacities should be strengthened, and actions taken to support water suppliers in implementing risk-based surveillance – for example, by providing (free) training and advocacy for local authorities and utilities and peer-to-peer learning, promoting cumulative knowledge in the form of networks, developing guidance tools on how to conduct risk assessments or applying national standards. Users should be informed about the process at an early stage.

Surveillance data from EU countries shows that, overall, drinking-water quality is good in most EU countries; however, compliance levels are typically lower in small systems than in larger ones, and waterborne outbreaks are still common and particularly linked to SSWS. **Finland** has established a system for surveillance of SSWS and compulsory notification of waterborne outbreaks (see Box 9).

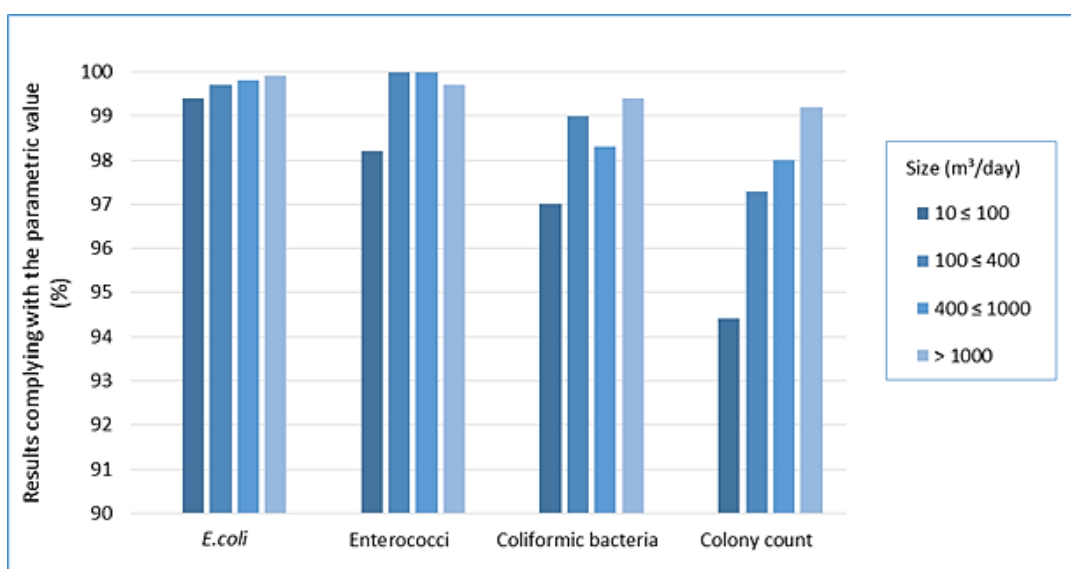
The transfer of data from local to national level is an obstacle in many countries and is often inadequate. Obtaining all required data takes a lot of time. Collating data through information technology or databases, especially for very small supplies, remains difficult. Specific challenges for risk-based surveillance include a lack of knowledge of locally prevailing hazards, hazardous events and risks; capacity to acquire and use data effectively; and a lack of skilled experts at national and local levels, including a need to train operators on risk-based approaches. Operational monitoring is also frequently found to be limited. These challenges support the need to strengthen the links between risk-based surveillance and the application of risk-assessment and risk-management approaches such as WSPs in SSWS.

Several countries mentioned the limited capacity of local authorities due to lack of knowledge on risk assessment and risk-based surveillance, as well as financial constraints. The switch of thinking from compliance testing to an approach that aligns monitoring activities based on risk assessment and risk management in each individual water supply requires more awareness-raising and advocacy to build a better understanding of the approach. Capacity is limited, however, owing to a lack of personnel and training.

### Box 9. Surveillance data on SSWS in Finland

Surveillance data from Finland confirm that, generally, levels of compliance for both microbial and chemical parameters are lower the smaller the supply size, as shown in data from 2010 (see Fig. 9.1).

Fig. 9.1. Drinking-water quality in different waterworks



Compulsory notification of waterborne outbreaks was introduced in Finland in 1997. Most occur in SSWS that tend to use groundwater: during 1998–2018 there were 33 outbreaks with 409 cases of illness in very small waterworks (serving fewer than 50 customers), 33 outbreaks with 5071 cases of illness in small waterworks (serving 50–5000 customers) and 29 outbreaks with 24 379 cases of illness in large waterworks (serving more than 5000 customers).

In **Belgium** all public water suppliers are required to guarantee water safety, including application of risk assessment and risk management for large supplies. This includes the risk-based monitoring concept according to Annex II of the EU DWD. The small private water suppliers are only obliged to carry out a risk assessment according to Annex II of the EU DWD, although in the Wallonia region an inspection is planned for very small water supplies. In **Hungary** a national survey is planned to assess the role of water safety monitoring and risk reduction by 2019, and to develop a methodology for the risk-based operation of private wells. **Romania** has established a national programme for gathering information on drinking-water monitoring in small systems (see Box 10).

**Box 10. National programme to gather information from SSWS in Romania**

Water-quality monitoring data from small public water supply systems have been collected in Romania since 2011. The number of analysed parameters varies between systems; reporting includes information on percentages of non-compliant results, non-compliance situations for certain water-quality parameters and the remedial measures taken.

The National Institute of Public Health also coordinates a national programme that includes water-quality screening of public wells and springs and surveillance of the quality of drinking-water distributed by small systems. Objectives are established biannually according to the problems identified. This programme is different from the standard monitoring required of operators, and includes analyses of parameters:

- in a screening system, based on certain inclusion criteria; or
- that require high costs and performance equipment (meaning that these parameters are usually not analysed by small water operators).

Future challenges and activities include addressing non-compliance with chemical parameters of water distributed by SSWS (especially nitrate, nitrite and arsenic) by establishing a derogation procedure and assessment of the risks for consumers. If derogations are granted, this will lead to an increase in sampling frequencies.

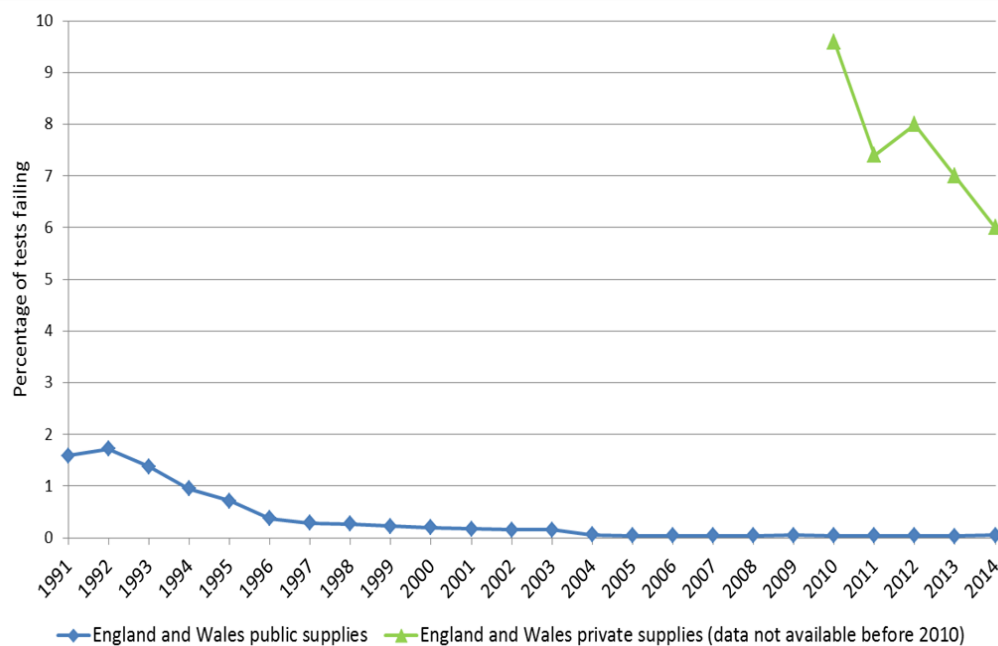
In England and Wales, **United Kingdom**, data show that compliance levels in drinking-water supplies have improved since the introduction of a requirement for risk assessments of systems (see Box 11).

**Box 11. Introduction of risk assessments improves compliance in England and Wales, United Kingdom**

The risk-based approach was introduced in England and Wales, requiring risk assessment and risk management of public water supplies from December 2007 and risk assessment and risk-based monitoring of private water supplies from 2010.

Although SSWS had already been regulated since 1991, data gathered since new legislation was introduced show that a significant number of small supplies remained unsafe; however, a reduction in the percentage of tests failing in private supplies can be seen in recent years (see Fig. 11.1).

**Fig. 11.1. Tests failing drinking-water standards in public and private supplies**



While risk assessments are required every five years for large supplies and supplies that are part of a commercial activity (such as hotels) or supply to the public, as well as for smaller supplies and those that supply only to households, frequency of monitoring is lower for these smaller supplies. For single domestic dwellings, there is no requirement unless testing or risk assessment is requested by the operators.

Principles and experiences of risk-based surveillance are already in place in a lot of settings, but more systematic implementation is often desirable. Collection of data at local and national levels is necessary, as is rational use of data for feedback and improvement. The current situation in many countries and regions is that data are mostly collected at a regional level – for example, in **Austria** (only exceedances), **Belgium** (small supplies with commercial activities), **Germany** (supplies serving fewer than 50 people), **Italy** and **Romania** (small public supplies). In **Austria**, **Czechia**, **Germany**, **Hungary**, **Ireland**, **Luxembourg**, **Malta**, **Romania** and Scotland and Northern Ireland, **United Kingdom**, data on small public supplies are collected at the national level. In **Croatia** all information needs to be reported to the national level. Data are mostly used to assess levels of compliance and to initiate follow-up action in the case of threshold exceedances in all countries.

Data on private wells are very sparse at all levels, collected by only a few countries and regions – such as **Ireland** and Scotland, **United Kingdom**.

Epidemiological data, including for SSWS, are collected in **Croatia, Finland, Ireland** and **Lithuania** at the national level and are mostly only used in cases of outbreaks.

Collected data can be used for a number of purposes. In **Finland** surveillance data are used in cases of emergency as a basis for urgent action and to inform consumers; in **Croatia** epidemiological data are matched to the water supply in cases of outbreaks. **Belgium** uses compliance information if there are policy questions. In Ireland and Scotland, **United Kingdom**, compliance data initiate visits of councils and supplies, and drive investments and audits in cases of non-compliance. In **Austria** connection to public supplies is initiated for areas of concern.

## **Session 5. Private wells**

As private wells are particularly challenging compared to other sizes of supply because of a lack of information at the national level and a lack of supplier expertise, the workshop gave participants the opportunity to discuss the topic in a separate session. Ideas and experiences for guidance, monitoring and requirements were discussed.

UBA presented on private wells in the WHO European Region, giving a situation assessment and overview of best practices. Country presentations on the situation of private wells were provided by the United Kingdom and Germany. As the participant from Sweden could not physically participate in the workshop, the Swedish presentation was made available to workshop participants.

According to the survey on SSWS under the Protocol (3), 7% of the population of the WHO European Region is served by private wells. Of the 26 responding EU countries, 14 had information available on the numbers of private wells and/or the population served by private wells, but only five EU countries provided information on the drinking-water quality in private wells, showing that the lack of baseline data is an important issue for these systems. Many of the other challenges that SSWS face are even more pronounced in private wells, including, for example, a lack of training and expertise; large numbers and geographical spread of wells, making surveillance challenging; financial restraints; higher levels of non-compliance; and a lack of raw water protection. To address these challenges, a number of EU countries have taken initiatives (see Box 12).

### Box 12. Improving drinking-water quality in private water supplies in Scotland, United Kingdom

Scotland expends a lot of effort to support the rural economy, growth and development, and to meet the challenges of private wells, as many are considered to present a risk to health (with more than 10% of private wells containing *E. coli* and more than 20% containing coliforms). Further, compliance levels are not improving and there is a lack of choice for rural consumers.

To address suppliers of private wells, new regulations were introduced in 2017. The Scottish Government is responsible for supervision and reporting; it supports local authorities through guidance, advice and a new risk-assessment tool. A grant scheme that has been in place for 12 years could provide financial support and improvement to thousands of suppliers. It is designed to contribute to basic treatment and is considered a “conversation opener” for local authorities. Challenges of the grant scheme include the difficulty of demonstrating improvement in quality, a budget that is hard to predict as the system is demand-led, a lack of expertise among installers and the fact that it could have been more effective if it had been linked to a requirement for a WSP and maintenance plan. To address these challenges in the future, plans include better quantification and communication of risks; embedding of the risk-assessment tool and provision of training; development of maintenance and support, offered for a fee; and giving consideration to working on accreditation for equipment installers.

To overcome the challenges with private wells, best practices include development of hands-on tools that do not require too much background information and guidance in easy-to-understand language, as done by **Sweden** (see Box 13) and **Germany** (see Box 14).

### Box 13. Practical guidance for private well operators in Sweden

The Swedish National Food Agency provides guidance to operators of private wells – for example, on where to place the well; risk assessment; procurement of drillers, installers and plumbers; frequency of monitoring; guidance on parameters; and possible causes of problems (see Fig. 14.1).

The operators of private wells, who are also responsible for systems maintenance, and local authorities can receive support from the National Food Agency and the Geological Survey of Sweden.

Fig. 14.1. Examples of guidance developed by the National Food Agency and Geological Survey of Sweden



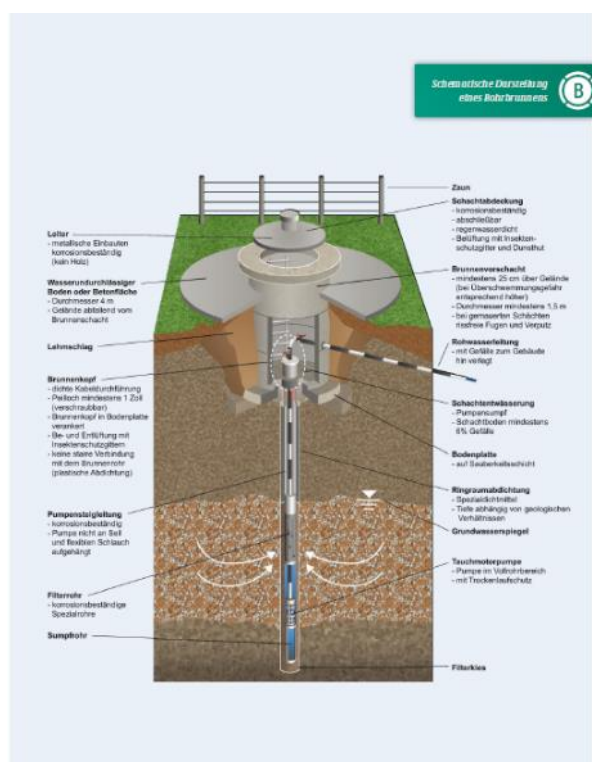
Source: National Food Agency (24).

### Box 14. National working group to improve private wells in Germany

The number of private wells varies greatly between the 16 German federal states. Lower frequency of testing has led to limited information on the quality of services provided by these systems: independent surveillance needs to address a large requirement for advice for operators, which may be given when local health agencies conduct site visits with operators.

To address the challenges related to management and surveillance of private wells, an interinstitutional working group was established to exchange experiences in regular meetings. The goals of the members – representatives from all 16 federal states and other experts – are mainly to review evidence on private wells, provide advice and support improvements. The working group has developed and provided support for operators of private wells and local health authorities through booklets and guidelines. These include a guideline for surveillance of private wells that addresses health authorities and a handbook for private well owners (23). Through its use of colour codes, ready-to-use templates and many graphics and photographs, the handbook is also easy to use for non-experts (see Fig. 13.1).

Fig. 13.1. Cross-section of a drilled well



Source: UBA (23).

Risk-assessment and risk-management approaches have proved to be applicable to all supplies, including very small private wells where a starting-point may be the application of SI forms. These approaches may significantly contribute to the safe operation of these supplies, especially as end-product testing is typically rare compared to larger supplies. Providing simple tools and guidance is also the key to facilitating the application of this approach in private wells, as has been done in England and Wales, **United Kingdom** (see Box 15).

### **Box 15. Risk-assessment tool in England and Wales, United Kingdom**

In 2012 the United Kingdom's Drinking Water Inspectorate developed an Excel-based risk-assessment tool for small supplies (25). Several tools with different scopes are available. The full tool covers all types of sources, treatments and distribution systems, while the "risk assessment lite" tool is especially developed for common simple supplies.

Two specific types of risk-assessment tool are available, addressing supplies that comprise only a distribution system and systems used only for toilet flushing. To keep the assessments simple for users, severity scales are already preset and the level of risk is calculated automatically. As a result, the tool creates a report and an action plan for users. It is regularly updated and is used widely by local authorities.

## **Conclusions**

Improving the situation of management of SSWS is a recognized priority in EU countries. A wealth of experience on how to improve SSWS exists within the EU, and the workshop showed that diverse actions have been taken already. This section sets out the conclusions of the workshop.

### **Legislative aspects**

- With the proposed revision of the EU DWD – the basis for respective legislation in EU countries – and SDG 6's call for the provision of safely managed services for all, there is increased momentum for linking EU legislation more strongly with the Protocol and WHO recommendations for safe management and effective surveillance of small-scale drinking-water supplies.
- To address the initiative Right2Water inequalities should be reduced: to this end the recitals of the draft EU DWD calls for a reduction in urban–rural disparities. Ensuring equitable access to safe drinking-water is essential; the Protocol is an important tool to promote equitable access in EU countries.
- A number of countries are taking action to strengthen the legal and regulatory framework to address SSWS through both soft, supportive and hard approaches to enforcement. Continued efforts should be made towards incremental improvements and enforcement of existing regulations.
- There is increased uptake of risk-assessment and risk-management approaches, including WSPs, for SSWS in national legislation in EU countries.

### **Persisting common challenges and best practices**

- The qualifications and expertise of operators of SSWS (who may have limited expertise on the health aspects of water supply) and local health agencies (who may have limited expertise on the technical aspects of water supply) need continuous improvement. Providing guidance and advocacy materials, tools and awareness-raising activities for operators and surveillance personnel can address this challenge. Experience of supporting education and training of operators of SSWS is available in several EU countries.



- More attention needs to be paid to adaptation of guidance materials, tools and best practices that are available in many EU countries to the local/national context, and to their better dissemination.
- Operators of private wells are hard to reach as a target audience as they are typically not connected to any established networks. As they are mostly not drinking-water experts, targeted information materials and easy-to-use tools need to be developed for them.
- Not all EU countries have set up and maintain an up-to-date registry of all types of small-scale system at the national or subnational levels, which is a crucial basis for improvement action. Data sharing between different administrative levels could also be improved in many settings.
- Across EU countries there are different types of SSWS, for some of which the ownership or legal entity is unknown. Solving the legal status of supplies is crucial for enforcing improvement actions by mandated authorities.
- In many countries no financial mechanism is in place targeting SSWS. Some countries report positive experiences with financial support schemes for small-scale suppliers; however, there remains a lack of data on finance needs and finance allocation for regular operation, maintenance and monitoring surveillance activities, for example.
- Many countries have legislation and technical standards for SSWS, but enforcement mechanisms are challenging or lacking.

## **WSPs**

- WSPs are a benchmark for public health protection and have been proved to be effective management tools for small systems, including in EU countries.
- Whereas in some countries WSPs are required by regulations, many EU countries have developed tools and guidance for the application of risk assessment and risk management in small systems even in the absence of legal requirements, showcasing country-driven initiatives for bottom-up approaches to WSPs.
- There is also tangible progress in strengthening national legislation and regulations on WSPs, and several EU countries have put in place mandatory requirements for WSP application, including for SSWS. Countries that have not established legal regulations on WSPs should consider integrating them into legislation; this could be supported by respective requirements at the EU level.
- International and national tools and guidance materials are available on risk assessment and risk management and there is a need for promotion – including of best practices – at the local and regional levels, as well as broad dissemination and adaptation of tools, mentoring and peer-to-peer learning, taking into account national mechanisms.

## **Risk-based approaches to surveillance**

- The revision of Annex II of EU DWD in 2015, allowing for a flexible approach in adapting monitoring frequencies and parameters on the basis of a risk assessment, serves as a strong push to incorporate the risk-based approach in legislation on surveillance practice.
- A risk-based approach to surveillance of SSWS can ensure the optimal use of limited resources by, for example, reducing the frequency of onsite visits and prioritizing site selection.

- For SSWS risk-based surveillance may entail identification of monitoring and inspection frequencies according to sizes of supplies and their riskiness, identify priority parameters and be the basis for stipulating testing frequencies. Risk-based surveillance also links well to the WSP approach.
- Main challenges in the application of risk-based surveillance include a lack of understanding of the importance and benefits of the risk-based approach by local authorities and operators of SSWS, and a lack of water supply-related (technical) knowledge among public health specialists.
- With increased WSP uptake, surveillance may shift emphasis from monitoring of water quality towards auditing of WSPs.
- Evidence from some countries shows a reduction in threshold exceedances after the introduction of a risk-assessment approach in SSWS.
- WHO invites participating countries to provide feedback from the EU perspective on the draft revised SI forms.
- WHO recommends that countries develop new or adapt their existing SI forms, taking into account the revised WHO forms, and embed them into existing tools in accordance with national surveillance procedures and practices.

### **Private wells**

- In many EU countries, available information on private wells is limited (compared to that on small public supplies), and fewer legal requirements typically apply to these systems. Data gaps relate to the number and location of such supplies, water quality and prevailing sanitary risks, among others.
- Numbers of private wells vary widely across EU countries, and not all have established legal requirements on private wells and enforce action on them. Building an inventory is a basis for planning improvements on the status of private wells.
- Generally, the challenges faced by SSWS are more pronounced the smaller the supply, particularly in private wells.
- For private well owners, water supply is (mostly) not their main “interest”. Inadequate knowledge among operators of private wells is even more pronounced than in small public water supplies.
- A variety of best practice examples exists among EU countries, including financial support, incentives and grant schemes and providing web applications and hands-on tools for owners of supplies. The establishment of national coordination groups has been proved to help in gathering baseline data and tackling challenges related to private wells in a systematic fashion.

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## The WHO Regional Office for Europe

The World Health Organization (WHO) is a specialized agency of the United Nations created in 1948 with the primary responsibility for international health matters and public health. The WHO Regional Office for Europe is one of six regional offices throughout the world, each with its own programme geared to the particular health conditions of the countries it serves.

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