Safe water, sanitation and hygiene for better health

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RésEAU

Editorial

Dear colleagues,

It is with great pleasure that we present the seventh edition of the RésEAU Brief series, a medium to share SDC's learnings from water-related projects and programmes at the global level. This edition addresses the **vital connection between water and health**.

Water, sanitation, and hygiene (WASH) are critical to our health. Deficits in these services impact quality of life, and lead to severe health issues and the **loss of lives** every year. Access to safe WASH services could save 1.4 million lives and 74 million disability-adjusted life years per year (WHO, 2023). Safe drinking water, proper sanitation facilities and good hygiene practices, especially handwashing, remove harmful germs and prevent contamination from human waste, reducing the **spread of infectious diseases** (ibid.). Better access to these services can also decrease **stress and anxiety** associated with daily needs, improve dignity through privacy and safety of facilities, and reduce hygiene related stigma and boost self-esteem (WHO, 2018; Young et al., 2024).

SDG targets 6.1, 6.2 and 6.3 seek to ensure **access to safe drinking water, sanitation, and hygiene for all** with the end of open defecation, along with the improvement of water quality and halving of the proportion of untreated wastewater by 2030. Despite notable progress, billions still lack these basic services. To meet the 2030 targets, progress must significantly increase: sixfold for drinking water, fivefold for sanitation, and threefold for hygiene. Efforts to reduce untreated wastewater are also lagging, with only 58% of household wastewater safely treated globally in 2022 (UN, 2023).

Switzerland actively contributes to these efforts, also in humanitarian emergencies (SDC, 2020; SDC, n.d.). This RésEAU Brief highlights **project experiences and tools** to improve water and health outcomes globally.

This edition presents solutions applied from the local to the global scale, from **transforming individual practices to laws and policies**, addressing communities, institutions such as health care facilities, and the specificities of humanitarian contexts. By highlighting innovative strategies and impactful interventions, we hope to provide practical insights and tools that can be adapted and implemented in various contexts. We invite you to explore the lessons learned from these projects and consider how these approaches might be applied in your own work.

We wish you a good read and welcome your feedback and comments!

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Your ideas matter!

We are committed to addressing the topics that matter most to you. If there's a subject you would like to see covered in future briefs or if you have insights to contribute, please reach out to us!

1. The vital connection between water and health

Water is a critical determinant of health, intricately linking the environment to human well-being (see Figure 1). Improvements in water supply, sanitation and hygiene (WASH) services **prevent diseases, and improve overall quality of life of communities** while sustaining ecosystems. In **emergency** settings, this becomes even more evident: water scarcity or contamination exacerbates **health crises**, leading to water-borne diseases, epidemics and increasing vulnerability (WHO, 2017).

Currently, at least 2.2 billion people lack safe drinking water, 3.5 billion lack access to safe sanitation, and 419 million practice open defecation (UNICEF and WHO, 2023).

In 2019, unsafe WASH services led to 1.4 million deaths, 89% of which in low- and lower-middle income countries (WHO, 2023). Water insecurity[1] affects **physical health** (hydration, diets, water contamination, communicable diseases, injuries) and **mental health** (stress, depression, violence) (Young et al., 2024). In 2022, 1.7 billion people worldwide relied on drinking water tainted by faecal matter. Contaminated water and poor sanitation can spread **diseases** like cholera, diarrhoea, dysentery, hepatitis A, typhoid, and polio. Diarrhoea alone causes around one million deaths annually. Water can also contain harmful chemicals like arsenic, fluoride, lead, and harmful organisms like parasitic worms (WHO, 2023).

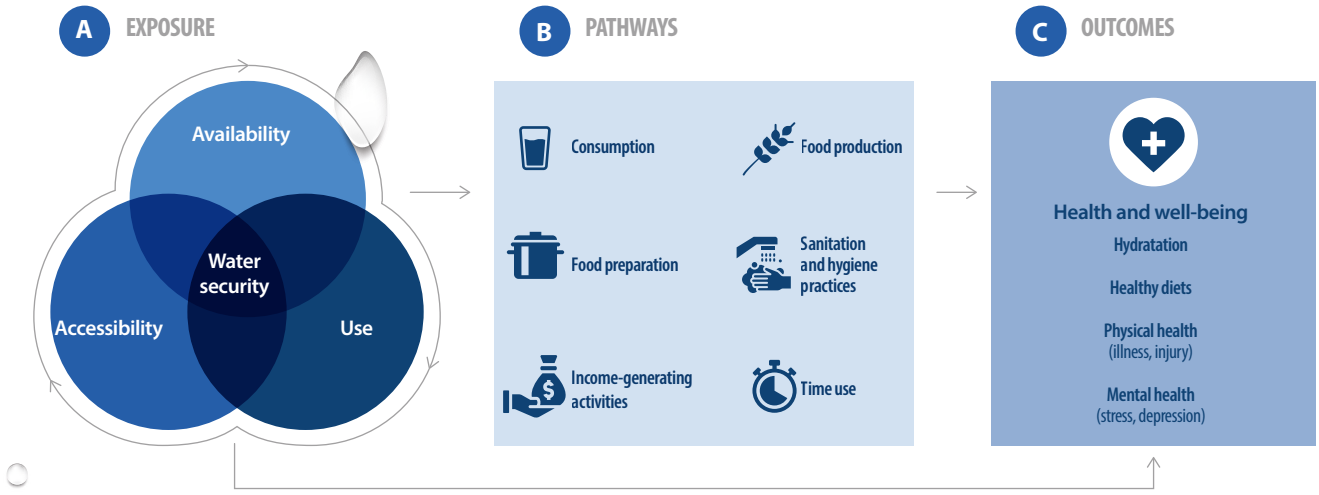


Figure 1. Direct and indirect influence of water security on health and wellbeing (Young et al., 2024).

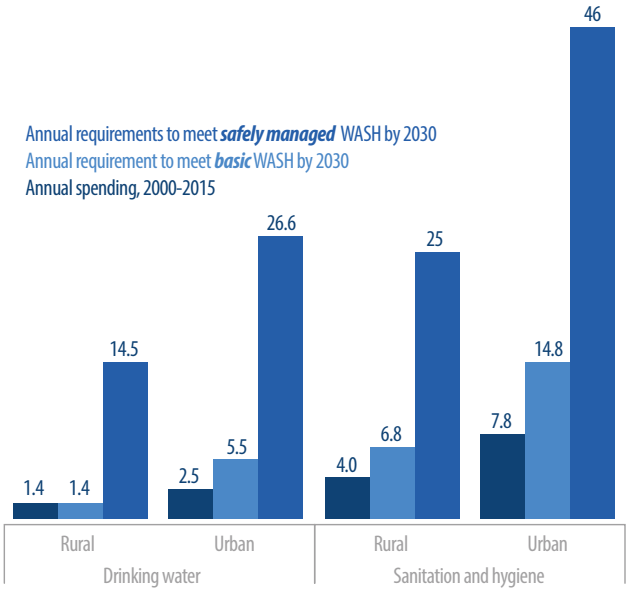


Figure 2: Global expenditures in WASH (in USD billion) versus resources needed between 2015 and 2030 to meet targets for basic and safely managed WASH services (World Bank and UNICEF, 2017).

Despite these gaps in access, **funding commitments** for access to quality water and sanitation **remain insufficient**. Reaching universal access by 2030 (SDG Targets 6.1 and 6.2) would require approximately USD 114 billion annually (see Figure 2).

Switzerland supports initiatives for secure water supply and sanitary facilities for all, emphasizing **cross-sectoral collaboration**, as these constitute part of health determinants (FDFA, 2022; SDC, 2022; SDC, 2020). To achieve set goals, SDC also recognizes the interlinkages needed between science, policy, and practice, supporting solutions such as behaviour change and treatment technology.

The following sections present SDC's project experience on the topic, covering access to WASH at the community level, in healthcare facilities, during humanitarian crises, and the knowledge and technology needed for improving drinking water quality.

1 Water insecurity can be defined as "the inability to reliably access and use water to meet basic domestic needs. It can be caused by problems with water availability, accessibility, acceptability, safety, or reliability" (Young et al., 2024).

2. Access to WASH at community level and its health impacts

Access to water and sanitation needs to be increased in three interrelated spaces: in **households and communities**, and in institutions such as **health care facilities and schools**, on which the most vulnerable populations rely for elementary services. This section focusses on how projects at the household and community level have improved their health through water.

2.1 Strategies for effective and sustainable rural sanitation

Tajikistan has the highest mortality rate attributed to unsafe WASH services in Central Asia (9 per 100'000 people) (WHO, 2022). This is largely due to lack of sewerage systems and wastewater treatment, especially in rural areas (Ali, 2022). The SDC supported **Tajikistan Water Supply and Sanitation (TajWSS) project** (2009-2022) addressed these issues by improving WASH access and service sustainability, with the last phase focusing on strengthening sanitation (SDC, 2024).

The TajWSS project introduced various alternative and improved sanitation systems, such as **Decentralised Wastewater Treatment Systems** (DEWATS), a cost-effective and flexible community-based alternative to conventional centralized plants, which takes better account of poor rural communities' conditions and needs. The decentralised systems (see Figure 3) are modular and use simple methods to collect, treat, and dispose of or reuse wastewater near its source such as houses or institutions, without chemicals or extensive maintenance. It has been piloted in two district hospitals (Ali, 2022).

Other solutions included improved latrines, faecal sludge management, and sanitation marketing (Igamberdyev, 2022). Over 7'000 children and 100 medical staff were trained on better practices, while staff of district authorities completed technical and managerial capacity training courses (SDC, 2021).

At the national level, the project contributed to the 2019 **Law on Drinking Water and Wastewater**, notably the integration of wastewater disposal. As the law leaves out the scarcity and cost of rural water-based sanitation systems, a comprehensive national effort to define suitable sanitation solutions for rural Tajikistan was called for, emphasizing affordability and sustainability, and joint investment by the government and development partners (Igamberdyev, 2022). Recommendations further include monitoring rural sanitation efforts, developing suitable models, creating state support mechanisms (subsidies, tax relief) but using public funds strategically, and promoting public-private partnerships (ibid.).

Figure 3. DEWATS has three main treatment steps and modules: primary treatment, secondary treatment, and advanced secondary treatment options. The figure shows a completed DEWATS with planted gravel filter, an advanced secondary treatment option (Ali, 2022).

2.2 Community promotion of hygiene practices for improved health

In Mozambique, 58% of households lack access to improved sanitation facilities, and 27% lack access to improved drinking water, especially in rural areas (WHO & UNICEF, 2022). The mortality rate attributed to unsafe WASH services is 45.6 per 100'000 (WHO, 2022). In Cabo Delgado, poor hygiene conditions lead to high rates of diarrhoea, skin infections, and annual cholera outbreaks.

The **Health Promotion in Cabo Delgado project**, funded by SDC (2017-ongoing), targets rural areas across seven districts, aiming to retain health promotion workers, increase their service delivery capacity, strengthen community participation in planning, budgeting and accountability and generate lessons for policy and strategy (Helvetas, n.d).

So far, the project has a) provided facilities and equipment with trainings for their proper management and maintenance, b) sensitized 270 communities (over 136'000 people) on good WASH practices and disease prevention and trained 174 water and sanitation committees through lectures and demonstrations on Community Led Total Sanitation (CLTS), and c) built district technicians' capacity in management and planning, and enhanced multisectoral coordination (Helvetas, 2022).

A key focus is on **menstrual health management**. Taboos and stigmatization associated with menstruation and good practices for menstrual hygiene are addressed through the **social and behavioural change campaign**, which includes awareness-raising activities and trainings of teachers and counsellors (see Figure 4) (Helvetas, 2022).

A **training manual** was developed for government health technicians to guide discussions with communities, teachers and counsellors (Simavi, 2019). The project also included the construction of **private bathrooms** friendly to menstrual hygiene management (Helvetas, 2022).

Today, perceptions have changed, enabling more open conversations about menstruation between men and women, and improving women's dignity and well-being (Helvetas, 2021).

2.3 A global, systemic public health approach to sanitation

Individual sanitation interventions often do not systematically cut disease transmission pathways and demonstrate health impacts (WHO, 2022).

A strong **systemic approach** with comprehensive, coordinated strategies, considering overall impacts on public health, and widespread capacity development, can strengthen these efforts (SDC, 2023). SDC supported the global uptake of the **WHO Guidelines on Sanitation and Health** and the related **Sanitation Safety Planning**[2] manual (SDC, 2021). The aim is **to turn these guidelines into policy and practice** within member states by engaging partners to conduct national level analyses and implement Sanitation Safety Planning at local level. In addition, SDC contributed to preparing learning materials and technical documents to support country-level implementation (SDC, 2023; SDC, 2021).

Figure 4. Campaign of social and behavioral change on menstrual hygiene, carried out in the district of Chiúre, Cabo Delgado, Mozambique (Helvetas, 2022).

2 Sanitation Safety Planning is a risk-based management tool for sanitation systems that: a) helps with systematically identifying and prioritizing health risks along the sanitation chain – that is, toilet, containment–storage/treatment, conveyance, treatment, and end use or disposal; b) guides management and investments in sanitation systems according to risk; c) identifies operational monitoring priorities and regulatory oversight mechanisms that target the highest risks; and d) provides assurance to authorities and the public on the safety of sanitation related products and services (WHO, 2022).

3. Access to WASH in health care facilities: addressing a critical gap

The 2022 JMP report on WASH in Health Care Facilities (HCF) highlights that **only half of HCF have basic hygiene services**, **and one in five lack basic water services**, exposing staff and patients to increased infection risks (WHO & UNICEF, n.d.). In low- and middle-income countries 15% of patients acquire infections during hospital stays (WHO, 2023).

Addressing unsafe conditions and inadequate infrastructure are essential to minimize **healthcare-associated infections** and improve **care quality**.

3.1 Improving WASH in HCF using WASH FIT

The **Swiss Water and Sanitation Consortium** (SWSC) supports local duty bearers in providing sanitary facilities and hygiene in HCF, schools, and communities to reduce disease transmission by ensuring sustainable access to clean water, toilets, and hand-washing facilities (SDC, 2023).

In health care facilities, the SWSC helps health authorities raise **awareness** among facility management committees and staff on the role of WASH to prevent infections. The SWSC supports health care stakeholders to lead **risk assessments** and develop, implement and monitor **improvement plans** using the **WASH Facility Improvement Tool** (WASH FIT) (see Figure 5). This effort involves all stakeholders at national and sub-national level (policymakers, health officers, hospital administrators, engineers, and users), promoting local ownership. The plans cover infrastructure, operation, maintenance, and staff behaviour and practice. They also inform governments and health authorities on **budgeting and resource allocation**.

To help policymakers monitor needs and progress, and allocate resources more effectively, SWSC **advocates** for further application of the WASH FIT. Key achievements include introducing WASH FIT in multiple countries, integrating it into Mali's COVID-19 strategy, and securing municipal funding for WASH improvements in HCF in Mali, Myanmar, and Nepal (SWSC, n.d.). Advocacy efforts by the Nim'Dora project in **Benin** have led the Ministry of Health to take the lead in implementing WASH FIT. The project

Figure 5: Five steps of WASH FIT (WHO, 2022).

organized training workshops at national level, contextualizing WASH FIT indicators for the country, and monitoring its implementation nationwide (Helvetas, 2023).

The SWSC also measures and monitors **users' experience** with the **Water Insecurity Experiences (WISE) scales**, a set of 12 questions on water consumption, hygiene, and psychological manifestations of water insecurity (see Figure 6). Currently, this measurement tool is being adjusted to health care institutions. The institutional WISE scales aim to assess whether WASH services in healthcare settings are safe, accessible, and satisfactory for the needs of patients, staff, and visitors across diverse settings. The WISE scales complement global water indicators, which focus on physical availability and accessibility, but not experiential water insecurity. They can be used for cross-country comparisons, tracking changes over time, reveal gender disparities and more (Young et al., 2024).

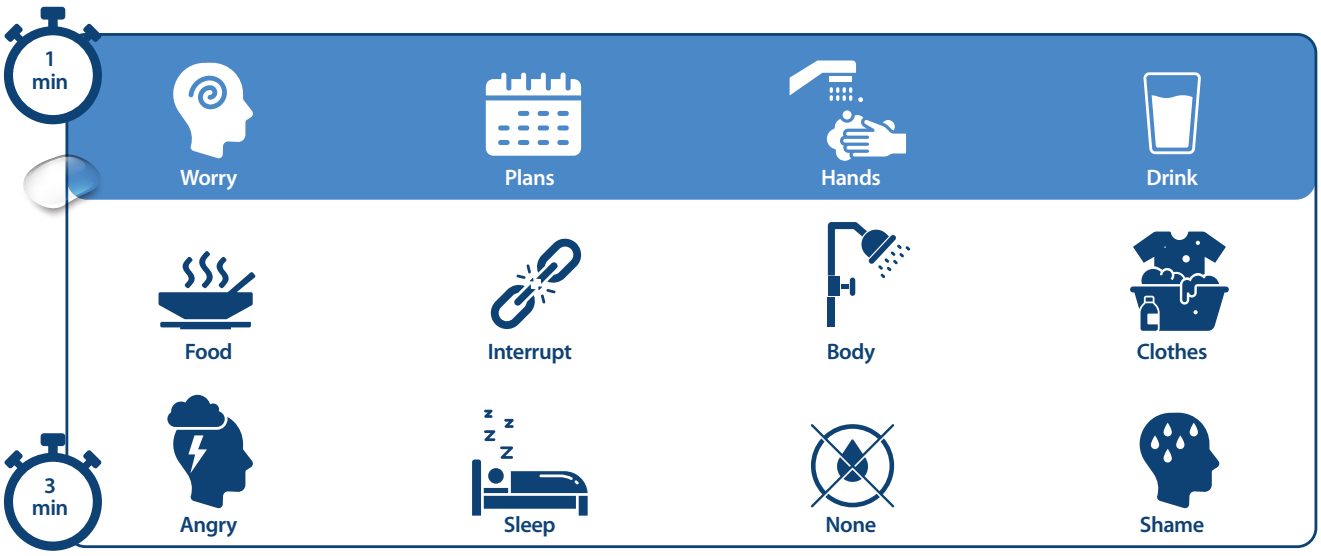


Figure 6: The 12 items of the WISE scales. Questions can be directed at the household (HWISE scale) or individual (IWISE scale). Each item is phrased in a survey question to capture experiences someone has had in the last four weeks. All full WISE scales worksheets are available in open access and in multiple languages here (Young et al., 2024).

3.2 Changing hygiene behaviours in HCFs

Current hand hygiene interventions sometimes have limited effect, due to their often fragmented approaches focussed on infrastructure and technology, without considering target groups' needs and long-term behaviour change (SDC, 2023).

The **hands4health** consortium, led by the University of Applied Sciences and Arts Northwestern Switzerland (FHNW), develops, tests, and scales up water-efficient **hand washing technologies** in HCFs and schools, adopting a holistic approach to hand hygiene, water quality and sanitation (SDC, 2023). In **HCFs**, the consortium and its partners conduct evaluations, install hand-washing stations, implement WASH FIT, and provide trainings on water chlorination (see Figure 7).

To establish safe and frequent **hand hygiene behaviours** the **RANAS approach** is used. This approach is based on health and environmental psychology and helps target five key behavioural factors: risk, attitude, norm, ability, and self-regulation. Local partners are trained to become certified RANAS experts, and an easy-to-use **RANAS behaviour change toolkit** is being created to customize HCF hand hygiene campaigns (hands4health, n. d.).

Figure 7: Chlorination training at a HCF in Burkina Faso. The poster in the background states "All staff commit to washing their hands with soap to protect everyone's health", a message derived using the RANAS approach. © Terre des hommes (hands4health, 2024).

4. Access to WASH in humanitarian crisis: towards a nexus approach

The frequency and duration of humanitarian crises caused by conflict and extreme natural events are rising globally (OCHA, 2018). Ensuring access to WASH in these crises is crucial for people's survival and dignity. Ideally, humanitarian support should also pave the way for a return to a long-term development path. An effective **nexus approach** integrates immediate humanitarian aid, long-term development, and peacebuilding efforts, ensuring a seamless transition from emergency response to sustainable development.

SDC's commitment to this nexus approach (SDC, 2022; SDC-SHA, 2022) is made operational in its humanitarian response efforts in linking water and health, illustrated by two initiatives in Mozambique.

4.1 Cholera Response Mozambique 2023

In 2022-23, Mozambique faced a severe cholera outbreak, triggered by a series of cyclones and widespread flooding, causing damage to infrastructure and disrupted access to clean water and sanitation facilities. The strained health system's response capacity and close to 600.000 Internally Displaced People (IDPs) in the northern provinces increased the risk of spreading (IOM, n.d.; WHO, n.d).

SDC's **Cholera Response contribution** aimed at containing the spread of the outbreak through infection and prevention control measures, and medical treatment of people affected in the Niassa and Cabo Delgado provinces (SDC, n.d.). Three outcomes were sought:

a. **Preparedness**: prevent the spread of cholera by people's access to information on how to protect themselves and others from infection with better WASH behaviours;
b. **Early, rapid response**: people have better access to WASH supplies and to diagnosis and treatment; and
c. **Coordination**: authorities and actors involved in response, target and coordinate their actions (SDC, n.d.).

The WASH development programs in this region (GoTAS and the Cabo Delgado Health promotion) foresaw **crisis modifier funds** to support the government's cholera emergency response, an example of nexus in praxis.

On the **global policy level**, SDC also supports the Global Task Force on Cholera Control, in the implementation of the global cholera prevention strategy, and its Country Support Platform, which supports national efforts to control and eliminate cholera (SDC, 2022; IFRC, 2023).

4.2 Preparing Water Supply for IDPs

The Cabo Delgado province has received the largest share of IDPs on the move because of armed conflict. This puts a heavy burden on existing water supply and sanitation systems in the host areas, with increased risks for cholera spreading further.

For this reason, SDC supports the **rehabilitation** of the N'tamba Water Supply System Network, to ensure basic WASH services for internally displaced and resident populations (SDC, n.d). The project works **across the nexus**: it provides emergency water supply for underserved crisis affected population, and it supports the rehabilitation and operation of the N'tamba water supply system. The NGO Solidarités international and the public water supply body (FIPAG) rehabilitated the water network in the Mueda district, serving over 100,000 people (Solidarités International, 2023).

Figure 8: A community health worker demonstrating the process of water chlorination. © Ricardo Franco, SolidarMed, 2024 (Vandamme, 2024).

5. Knowledge and technology for water quality improvement

Next to improved infrastructure, users' awareness and behaviour change in hygiene practices, **knowledge coupled with technological innovation** can further improve **water quality** management for human health, at greater scale and with more resource efficiency. SDC supports Swiss research institutes and other private sector and civil society partners for research and development on technologies to improve global access to safe drinking water.

5.1 Research and outreach on water and sanitation technologies

Eawag, the Swiss Federal Institute of Aquatic Science and Technology and leading research institution on water and sanitation, undertakes **applied research** and develops, compiles, and shares innovative technologies relevant for rural poor and marginalized urban populations. SDC support this work under the Water, Behaviour Change and Environmental Sanitation (WABES) program (SDC, n.d.).

The program seeks two major outcomes: 1) assessing technical and management **solutions for safe water** in marginalised and poor rural and urban settings, and evaluating their impact, and 2) developing and validating guidelines and solutions for improved access to **environmental sanitation** considering resource recovery and circular economy (SDC, 2023; Eawag, 2024).

With support from this program, Eawag has contributed technical information to key **reference publications** for practitioners working in both development and humanitarian response settings:

- Compendium Drinking Water Systems and Technologies from Source to Consumer (forthcoming)
- Compendium of Sanitation Systems and Technologies (Tilley et al., 2014).
- Compendium of Water Supply Technologies in Emergencies (Coerver et al., 2021)
- Compendium of Hygiene Promotion in Emergencies (Gensch et al., 2022)
- Compendium of Sanitation Technologies in Emergencies (Gensch et al., 2018).

Further research will focus on the interactions between the water, sanitation, and solid waste management sectors. Despite spillover effects from one sector to the other, there have been few attempts to **holistically plan and integrate** the provision of these services (Narayan et al., 2021).

5.2 Removing heavy metals using novel technology in Peru

The contamination of drinking water with heavy metals as arsenic and lead poses severe health risks worldwide, particularly in South Asia, Africa, and the Americas. Effective monitoring and removal technologies are essential. SDC supported the validation of a **new**, cost-effective, low energy and scalable **technology** for the removal of heavy metals from drinking water. The technology was developed by BluAct Technologies (an ETH Zurich spin-off) and consists of cellulose membrane filters, activated carbon and milk protein fibers.

To **validate** this technology, the NGO SABAvida conducted a study in four departments of Peru where the population consumes water with arsenic and lead exceeding the permissible limits (0.01 mg/l per WHO, 2024). Field tests demonstrated that BluAct filters significantly reduce arsenic and fluoride levels in drinking water in field operation conditions. The technology is cost-efficient, adapted to household and community systems, making it ideal for rural populations, and can be retrofitted into existing infrastructure (SDC-BluAct Technologies-SABAvida, 2023).

Improved water quality enhances community appreciation and willingness to pay for water services. Government support is crucial for scaling up these technologies, as is market availability for widespread adoption. These positive outcomes from pilot projects in Peru and India indicate significant potential for mitigating the health impacts of heavy metal exposure.

6. Lessons in a nutshell

Water is crucial for health, linking the environment to human well-being. Access to safe water, sanitation, and hygiene (WASH) prevents diseases, **especially in emergencies** where scarcity or contamination worsens health crises. Over 2.2 billion people lack safe drinking water, and 3.5 billion lack sanitation. Unsafe WASH services cause millions of deaths, especially in low-income countries, and contaminated water spreads diseases like cholera and diarrhoea. Switzerland supports global initiatives for secure water and sanitation, **promoting cross-sector collaboration and integrated solutions**.

At the **community** level, project experiences include rural community-based sanitation solutions like decentralized wastewater treatment systems or community hygiene promotion by trained public health staff and water committees, including social and behavioural change for menstrual health management. Common ingredients for success include local capacity-building, and ultimately integrating solutions proven affordable and sustainable into **national policies**, as well as promoting the **global uptake** of WHO Guidelines on Sanitation and Health.

Health Care Facilities (HCF) are critical spaces where safe WASH services need to be ensured, yet they are often underserved: only half of HCF have basic hygiene services, and one in five lack basic water services, exposing staff and patients to increased infection risks. The Swiss Water and Sanitation Consortium promotes the use of **WASH FIT to guide health authorities** in improving WASH services, focusing on infrastructure, maintenance, and staff behaviour. The hands4health consortium focuses on **hand hygiene** in healthcare, using the **RANAS approach**. This method helps to foster safe, consistent hand hygiene practices among health staff, alongside training and water chlorination interventions. Engaging all stakeholders, Swiss partners support policy integration and resource allocation at national levels.

In **emergency** settings, a **nexus approach** ensures a smooth transition from immediate aid to sustainable solutions. For instance, SDC's cholera response in Mozambique focused on prevention, treatment, and infrastructure rehabilitation, addressing not only immediate needs but also strengthening water systems for the inclusion of Internally Displaced People. Key actions included preparedness (promoting appropriate WASH practices), rapid response (providing supplies and treatment), and coordination (aligning efforts with local authorities and other partners).

At global sector level, improving water quality for human health requires broad access to **knowledge and technology**. SDC supports research, validation and dissemination of known and innovative water and sanitation technologies, through partners such as Eawag.

Resources

Ali, O., 2022
Decentralised Sanitation Solutions in Tajikistan: Decentralised wastewater treatment systems (DEWATS) in peri-urban and urban areas in Tajikistan, WASH Learning Reports, Oxfam. 22pp.

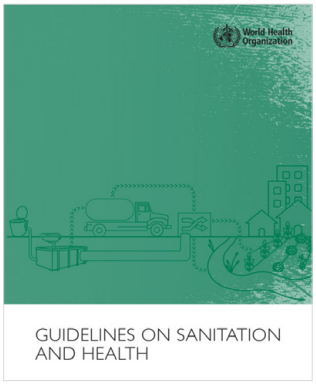
SDC, BluAct Technologies, SABAvida, 2023
Heavy metals in drinking water: proposal for their removal [Publication], Lima, Peru. 28pp. Webinar recording, webinar summary report, webinar slides.

WHO, 2022
Water and Sanitation for Health Facility Improvement Tool (WASH FIT): a practical guide for improving quality of care through water, sanitation and hygiene in health care facilities, second edition. WHO, Geneva. 128pp.

WHO, 2023
Burden of disease attributable to unsafe drinking-water, sanitation and hygiene, 2019 Update. WHO, Geneva. 84pp.

Young, Sera L., Joshua D. Miller, and Indira Bose, 2024
Measuring human experiences to advance safe water for all. Institute for Policy Research, Northwestern University, Evanston, Illinois. 27pp.

Further reading



The WHO Guidelines on Sanitation and Health (2018) offer essential advice for maximizing the health benefits of sanitation systems, from infection prevention to social well-being. They provide evidence-based recommendations and practical guidance for developing and implementing effective sanitation policies at international, national, and local levels.

The WHO's Sanitation Safety Planning (SSP) Manual (2022) provides step-by-step guidance to implement these guidelines. It applies to all sanitation systems, helping ensure they meet health objectives. Additional training materials and resources are available at the SSP learning hub.

Consult the Compendia on Sanitation Systems and Technologies (Tilley et al., 2014). And for emergency settings, the compendia on Water Supply Technologies (Coerver et al., 2021), Hygiene Promotion (Gensch et al., 2022) and Sanitation Technologies in Emergencies (Gensch et al., 2018).

Explore the RANAS user platform to find useful resources on systematic behaviour change, such as courses and publications.

SIMAVI's Menstrual Health Information and Guidance Manual (2022) manual integrates knowledge, experience and the organization's track record on menstrual health, translated into key messages and best practices.

Impressum

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Section Water

Cover photo:
Midwife using handwashing facilities in Kodougoumi, Barouéli, Segou region, in Mali, supported by the Swiss Water and Sanitation Consortium, 2022
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