Challenges in water, sanitation, and hygiene within the 2030 agenda for sustainable development in the Republic of Serbia

Katarina Paunovic, Dragana D. Jovanovic

1Institute of Hygiene with Medical Ecology, Faculty of Medicine, University of Belgrade, Belgrade, Serbia
2Institute of Public Health of the Republic of Serbia „Dr Milan Jovanovic Batut“, Belgrade, Serbia

Corresponding author:
Katarina Paunovic
Institute of Hygiene with Medical Ecology, Faculty of Medicine, University of Belgrade
Dr Subotica Starijeg 8, 11000 Belgrade, Serbia
Phone: +381 11 3612762
Email address: katarina.paunovic@med.bg.ac.rs

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Abstract
The 2030 Agenda for Sustainable Development is a global strategic framework of seventeen goals to be achieved within a decade. The recent Progress Report shows that Serbia made steps toward reaching targets within the sustainable development goal (SDG) 6 related to the availability and sustainable management of water and sanitation for all. While 82% of the population in urban areas has access to safe drinking water, the country needs to regulate water supply systems and individual water sources in rural areas. Hygienically correct water is a prerequisite for preventing the transmission of fecal-oral diseases. The biggest challenge under the SDG 6 is safe sanitation management, available to 18% of the population. A national on-site study in Serbia identified issues with the containment, emptying, transport, and final disposal of excreta. The key actions must be connecting households to public sewers, regulating management of septic tanks, and investing in environmentally safe wastewater treatment plants. The Progress Report claims that 98% of the population has access to hand-washing facilities with soap and water within the household. This highlights the importance of providing hygienically correct water not only for drinking and sanitation, but for personal hygiene, hand washing, laundry, cleaning, and other household needs. Water, sanitation, and hygiene (WASH) are of prime importance in public institutions. Several studies in Serbia reported inadequate sanitary-hygienic conditions in schools and healthcare facilities in rural areas. WASH in schools and healthcare facilities not only contributes to reducing the spread of infectious diseases but also supports the healthy habits of pupils and patients and promotes the good health of the entire population. We propose the public health system ensure long-term supervision over water supply, sanitation services, and hygiene in households, schools, and healthcare facilities through continuous monitoring programs in line with the indicators and targets of the 2030 Agenda.

Key words: 2030 Agenda for Sustainable Development; drinking water; water, sanitation, hygiene (WASH); healthcare facilities; school facilities; public health.

INTRODUCTION
The 2030 Agenda for Sustainable Development is a universal strategy of the United Nations member states consisting of 17 Sustainable Development Goals (SDGs) and 169 targets related to the country’s social, economical, and environmental development [1]. The 2030 Agenda envisions sustainable development based on social inclusion, equality, and planet protection [1]. In the period from 2015 to 2030, the Republic of Serbia is dedicated to achieving the 2030 Agenda’s sustainable development goals and committed to eradicating poverty, fighting inequality, and responding to climate change [2]. Although all 17 SDGs are considered equally important, the country prioritizes goals related to socio-economic development (SDGs 1 and 2), education and gender equality (SDGs 4 and 5), work, economic growth, and industry (SDGs 8 and 9), and good health and well-being (SDG 3) [2].

The Statistical Office of the Republic of Serbia published the new Progress Report on the Implementation of the Sustainable Development Goals by 2030 in March 2022 [1]. It monitors the country’s progress using the Eurostat Methodology, which enables data validity, reliability, and comparability. The Progress Report presents findings related to all 17 SDGs across 107 indicators collected from 2017 to 2021 [1]. The official source of all data is the Statistical Office of the Repub-
lic of Serbia, which collaborates with other institutions, such as the Institute of Public Health of Serbia and the Serbian Environmental Protection Agency to calculate indicators related to good health and well-being (SDG 3) and clean health and sanitation (SDG 6) [1, 2, 3]

The progress in achieving targets and indicators within each SDG is estimated by monitoring the trend of changes and is presented in several progress assessment categories. For example, when an indicator increases in relation to the reference baseline, the trend is characterized as progress toward SDGs. Otherwise, when an indicator decreases relative to the reference baseline, the trend is characterized as the movement away from SDGs [1]. The Progress Report provides detailed criteria for categories of „progress towards SDGs“, „movement away from SDGs“, inconsistent trends, and impossible trend tracking [1]. The methodology of data collection and statistical guidance to measuring the achievement of the goals and targets of the 2030 Agenda is presented in extensive publications Road Map on Statistics for SDGs in English [4] and Serbian [5]. The Road Map is not only a tool for statistical purposes; it also supports establishing a reliable national information system through cooperation with data providers and users, such as public institutions, policymakers, academia, civil society, the private sector, and the media [4,5].

The Sustainable Development Goal 6 calls for availability and sustainable management of water and sanitation for all [1]. SDG 6 includes 8 targets monitored against 11 indicators, and the Republic of Serbia currently monitors 6 targets against 8 indicators [1]. The Progress Report on the Implementation of the Sustainable Development Goals by 2030 shows that the Republic of Serbia achieved at least five targets and demonstrates progress in reaching at least six indicators in 2021 [1]. Nevertheless, as some domains of SDG 6 stagnate in the short-term and show a negative trend in the long-term, there is a need to improve access to safe water and sanitation services at the national level.

In the Republic of Serbia, several national and regional studies from 2016 to 2019 examined water access and availability, water supply, and water quality in rural households and schools, as well as water supply and sanitation services in households, schools and healthcare facilities in urban and rural settlements. The studies showed many good aspects of the current situation in the field but also identified problems and challenges related to infrastructure, development, and public health threats. This review aims to present the existing national studies supporting the findings of the Progress Report on the Implementation of the Sustainable Development Goals by 2030 and to provide insight into challenges for reaching the targets and indicators of sustainable development goals in the Republic of Serbia in the future. Figure 1 shows the current progress toward achieving SGD6 of the 2030 Agenda.
WATER SUPPLY AND THE 2030 AGENDA

The Progress Report claims that „Moderate progress was made in relation to target 6.1, envisaging universal and equitable access to safe and affordable drinking water for all“ [1]. The observed progress results from an increase in the proportion of the urban population that uses drinking water from safely managed systems – 82% of the population. However, in rural settlements, only 67% of the population has access to safe drinking water, and there was no increase in the trend since 2010 [1].

A national survey „Rapid assessment of drinking water quality from the small scale water supply systems in rural areas of the Republic of Serbia“ was conducted in 2016 [6,7]. The survey design followed the World Health Organization (WHO) methodology, thus portraying a statistically representative picture of the prevailing conditions of rural water supply across the country [8]. The survey comprised 15% of the rural population at the time, including 435 thousand inhabitants supplied with drinking water from small-scale piped systems and about 2000 inhabitants supplied from individual supplies [6,7]. The two main sources of water supply were small-scale piped systems, defined as water facilities that supply more than five households or 20 inhabitants (supplying water to 78% of the target population), and individual supplies, defined as sources providing water to less than five households (supplying water to 12% of the target population) [6,7].

The study methodology included the assessment of sanitary risks regarding the sources and the networks of the water supply facilities, as well as water testing for chemical and microbiological quality [6,7].

Among both small-scale piped systems and individual supplies, the dominant sanitary risks were: unsatisfactory technical conditions in the construction of the water sources (inadequate fences, inadequate sealing of the walls, absent drainage channels, old pipes, unsanitary water reservoirs), exposure to pollution sources near the water catchment (pit latrines, sewers, animal breeding, cultivation, roads, rubbish), and risks related to inadequate management of the water facilities (unqualified facility managers, interruptions in water supply, dual water supply, irregular or absent water treatment, and chlorination) [6,7]. For these reasons, about one-third of the surveyed small-scale piped systems and 41% of individual water supplies require urgent improvement actions to prevent water contamination and protect public health in rural areas [6,7].

When it comes to water quality, the national survey demonstrated that only about one-third of water samples taken from piped systems and individual supplies were in compliance with the National standards on hygienic correctness of drinking water [9]. The major problem was physical and chemical water characteristics. Namely, about half of the tested water samples did not comply with the National standards concerning turbidity, color, odor, conductivity, pH value, ammonia, nitrate, manganese, and arsenic [6,7]. The second issue was the contamination with Escherichia coli, reported in one-third of the tested water samples [6,7]. The survey identified the above-named inadequate sanitary conditions of the water sources, the lack of proper water treatment and disinfection, and unprofessional water management as the three possible causes of poor water quality in rural areas [6,7].

Nevertheless, one must bear in mind that rural areas experience several additional challenges. First, the problem of ownership over water supply facilities must be resolved. So far, only one in ten of the investigated piped systems is owned and managed by legal entities such as public utilities, while the others are property of municipalities, schools, churches, nongovernmental organizations, citizen associations, or private owners [6,7,10]. Water facilities of unresolved ownership face more issues with chemical and microbiological water contamination than water systems owned and managed by public utility companies [6,7,10]. We consider it essential to enable authorized public utilities to manage small-scale piped water supplies in rural areas, to establish regular drinking-water quality monitoring and sanitary surveillance, and to invest in their improvement [6,7,10]. Second, water quality monitoring and water supply sanitary surveillance must be supported at the local, regional, and national levels. Local self-governments should develop strategies to continuously and systematically reconstruct the existing small-scale water supply systems and individual supplies, reduce contamination risks, and improve water quality [6,7,10]. To help achieve this, we propose owners implement water safety planning for small-scale water supply systems. Water safety planning is a comprehensive risk assessment and risk management approach to providing and delivering safe drinking water to the population in line with SDG target 6.1 for achieving safely managed water supply services [6,7,10]. Water safety planning is a step-by-step process from source to tap, including hazard identification, health risk assessment, control measures, improvement plans, supporting programs, verification, monitoring, and revision [6,7,10].

Third, the specific aspects of rural areas should be taken into account, such as the hydrological and geological characteristics of the water catchment, water quality at the source, the choice of adequate technology for water catchment, and the choice of adequate technology for water treatment and disinfection. The national survey pointed out the differences in water quality across the country, with the highest health concern regarding microbiological contamination observed in West and East Serbia, and great concern regarding chemical water properties in Vojvodina [11]. For example, in mountain areas, water samples had...
excellent chemical quality, but were microbiologically unsafe due to contamination risks and lack of chlorination [11,12]. On the other hand, water samples taken in plain rural areas contained high levels of some natural chemicals (arsenic, manganese, ammonia) but were microbiologically safe thanks to systematic disinfection practices [11,13]. The source of the problem of inconsistent water disinfection in rural areas could be related to the ownership and management of water supply facilities, as well as to many socio-economic, infrastructural, demographic, and cultural parameters [6,7,10,11,12,13]. Finally, we must not forget one of the greatest threats in rural areas in Serbia, i.e., the depopulation trend. Namely, in 2021, there was a negative rate of population growth to the previous year, implying a decline in the population by nine people per 1000 inhabitants [14]. Depopulation tendencies with negative growth and negative natural increase started in the late 1980s and early 1990s, and a comparable trend is projected for the next thirty years [14]. We can reasonably assume that the scarcer and older population in rural areas will be socially, economically, and occupationaly vulnerable, which could endanger their water and sanitation supply, public health, and individual well-being.

SANITATION AND THE 2030 AGENDA

The Progress Report claims that „Stagnation is registered in terms of the use of safely managed sanitation services, in the short term, and the negative trend in the long term“ [1]. The observed movement away from the target 6.2 results from a decrease in the proportion of the population that has access to safe sanitation to 18% [1]. To understand this, one must keep in mind that safely managed sanitation services, as indicated in the SDG 6 targets, do not relate only to the access to toilets in households but to the whole fecal waste removal process [1,15]. Sanitation is defined as access to and use of facilities and services for the safe disposal of human urine and feces [15]. Sanitation prevents the spread of many infectious diseases, such as diarrhea, tropical, and vector-borne diseases, and is, thus, essential for human health [15]. A safe sanitation system separates human excreta from human contact at all steps of the sanitation service chain, starting from toilets, through containment, emptying, transport, treatment, until their final disposal [15].

A national survey on ensuring the safely managed on-site sanitation systems in Serbia was conducted in 2020 and 2021 [16]. The survey assessed small on-site sanitation facilities in households in rural and urban areas, as well as in school and health care facilities in rural areas in Serbia. The targets were urban and rural households using septic tanks and pit latrines and not connected to public sewer systems, as well as schools and healthcare facilities not connected to public sewer systems in rural areas [16]. The study revealed that 99% of households had improved toilets, such as flush toilets connected to piped water, dry toilets with toilet slabs without water flush, and pour-flush toilets with a manual flush from the bucket. In rare cases, households had no sanitation facilities (toilets) or used dry toilets without water flush and without toilet slab, which are considered unimproved [16].

The Joint Monitoring Program (JMP), managed by the WHO and United Nations Children’s Fund (UNICEF), sets criteria for basic sanitation services in households, schools, and healthcare facilities [17]. By definition, only households with improved sanitation facilities which are not shared with other households can be classified as providing basic sanitation services [17]. The national survey showed that 97% of the households met criteria for basic sanitation [16].

However, as previously mentioned, safe sanitation management requires additional standards related to the containment, drainage, emptying, transport, and disposal of fecal waste. In this regard, households across the country face several problems. First, septic tanks or pit latrines could be poorly constructed so that they do not contain fecal matter properly, causing overflowing, leaking or flooding of the surrounding premises [16]. Second, septic tanks are not emptied regularly, if at all [16]. Third, septic tanks are most often emptied by unauthorized private service providers, neighbors, family members, friends, or household members, and only one-fifth of households use public utility companies for emptying and transporting excreta [16]. Fourth, most households never treated fecal sludge from the septic tank or latrine pit on-site. Safe on-site treatment options would be planting a drying bed followed by liquid treatment, or self-purification using chemical substances [16]. Typically, households in rural areas use fecal sludge from the septic tanks as crop or vegetable manure, or disposed of it on land, in water bodies, or in a landfill [16]. Fifth, most households are unaware of the final off-site treatment and disposal of excreta after emptying and transport. Most likely, fecal sludge is unsafely disposed of on crop fields or in non-sanitary landfills, emptied into a public sewer, or transported to a sanitary landfill. Instead, the safest off-site treatment and disposal option would be in a wastewater treatment plant [16].

When all these factors are taken into consideration, only 10% of surveyed households provide safe management of sanitation services; 17% of urban households, and 8.5% of rural households [16]. This result is even less favorable than the findings of the latest Progress Report [1] and calls for immediate action to improve sanitation management to meet the indicators and target 6.2 set in the 2030 Agenda. We propose the country prioritise the construction of wastewater treatment plans in urban areas. The recent Progress
Report claims that 13% of the population is currently connected to wastewater treatment facilities; we, however, fear that many facilities are not operating. In the long run, wastewater treatment plants and safe sanitation management will enable progress in achieving target 6.3 within SDG 6, which is related to unpolluted water bodies with good water quality [1].

Furthermore, we must be aware that sanitation management is not sole responsibility of the citizens. It is reasonable to raise awareness of the importance of adequate sanitation so that households using septic tanks or pit latrines get informed on how to construct them properly, operate, and maintain them safely in collaboration with authorized professionals. Public utility companies and other legal entities should be trained in safe emptying, transport, and disposal of fecal matter; if possible, licensing should be mandatory for service providers. Local self-governments should establish registers of small-scale sanitation systems and incorporate them into local cadasters on pollutants [16]. The institutes of public health should develop indicators for sanitary surveillance of septic tanks in households, schools, and healthcare facilities in line with the indicators applied in the 2030 Agenda. Finally, national legislation on sanitation should clearly define roles and responsibilities of all parties, local self-governments, service providers, household members, citizens, and public health institutes, registering and reporting practices, procedures in emergency situations and public health threats, and financing the monitoring over safe sanitation management at local, regional, and national levels [16].

HYGIENE AND THE 2030 AGENDA

The Progress Report claims a „Stagnation in the proportion of population using safely managed sanitation services including a hand-washing facility with soap and water: basic hand-washing facilities on premises”, within target 6.2 [1]. According to the available data, 98% of the population has access to hand-washing facilities on the premises (within the household), with running water and soap available [1].

The previously-mentioned national survey on safely managed on-site sanitation systems in Serbia also covered hand hygiene practices in households [16]. The study reported that 98% of the surveyed households enable proper hand-washing practices through hand-washing taps placed in the toilet or within 5 meters away from the toilet [16]. This is in line with the JMP criteria for basic hygiene services in households, which require that households have a hand-washing facility with soap and water available on-premises [18].

The situation with hand hygiene is slightly less favorable in rural schools and healthcare facilities, as 6% had no hand-washing facilities for pupils or patients [16]. Another regional study exploring water, sanitation and hygiene (WASH) in rural schools in Serbia was conducted in 2016 [19]. In summary, 93% of the examined schools in Sumadija and Pomoravlje provided basic hygiene services, with only 6% of schools without running water or soap at the time of the survey [19]. The major problems regarding school hygiene were that hand-washing facilities were not accessible to younger children and children with physical disabilities [19].

WHO claims that WASH services in schools are of prime importance for children’s health, growth and development, physical and mental well-being, cognition and learning and dignity [20]. Our study shows that most rural schools in Sumadija and Pomoravlje provide all three services – water, sanitation, and hygiene – at the basic level [19]. Nevertheless, regardless of the good WASH conditions, pupils reported not drinking water from the tap at school (one in seven), not using school toilets daily (more than half of pupils), and not washing their hands at school (more than one-fourth) [19]. In addition, as many rural schools fail to provide facilities for the disposal of menstrual products in toilets (covered bins, and hand-washing facilities within the toilet cubicle), female pupils may fail to maintain proper menstrual hygiene practices [21].

Such risky hygiene-related behaviors at school may have long-term consequences on children’s personal hygiene, the spread of water-borne and fecal-oral diseases, and other public health issues. One of the possible explanations is the lack of mandatory education on personal and menstrual hygiene at schools [19,21]. We support the maintenance of WASH conditions in schools, and at the same time we strongly advise teachers and health professionals to teach pupils the basic principles of promoting health and preventing diseases through water, sanitation, and hygiene in schools.

Adequate water supply, sanitation services, and hygiene in healthcare facilities are essential for patients and employees, the healthcare system, and the whole population [22]. The implementation of WASH services in healthcare facilities not only helps decrease the rate of many diseases; it also increases patients’ satisfaction with the provided health services, increases employees’ satisfaction at work, improves the overall health culture and public health, and promotes health of the whole population [22].

A national survey on water, sanitation, and hygiene in healthcare facilities in Serbia was conducted in 2019 [23]. It comprised a representative sample of urban and rural healthcare facilities across all levels of healthcare (primary, secondary, and tertiary) [23]. The survey showed that hand hygiene stations were often missing in common areas, patient rooms, and outside toilets, posing a risk for the spread of infectious diseases among patients, healthcare staff and visitors [23,24].
The observed finding call for urgent action to provide hygiene services in healthcare facilities primarily in primary healthcare centers in rural areas across the country [23,24]. The proposed measures are not limited to providing water, soap, and hand sanitizers; moreover, facilities should provide posters at points of care, in toilets, waiting rooms, and common areas to promote good hand washing and hand hygiene practices among staff and patients [23,24]. We also advise all health professionals to undergo regular structured training regarding WASH-related standards and procedures so that they can implement them in their everyday practice [23,24].

On the other hand, healthcare facilities face additional challenges in providing WASH services [23,24]. First, facilities can improve their basic water services by implementing water safety plans, i.e., specific written procedures and protocols for preventing and controlling risky situations regarding water supply on the premises. More specifically, WSPs comprise water protection measures in cases of water scarcity, emergencies, and unexpected chemical and microbiological water pollution; protocols for water supply surveillance, water treatment, and disinfection, water quality monitoring, etc. [25]. Second, healthcare facilities will have to make great technical and financial investments to provide basic sanitation for patients, staff, and persons with disabilities [23,24]. Third, facilities may find the provision of sanitation services according to WASH criteria financially, technically, and logistically demanding. For that reason, local health authorities would be in a difficult position to decide which facilities to prioritize, given the limited resources in the healthcare system and the lack of clear roles and responsibilities of all stakeholders within the system [23,24]. Fourth, facilities’ managers will have to undertake concrete actions to implement, operate, and maintain WASH services, allocate responsibilities among healthcare staff, and increase awareness through education and training in this domain [23,24].

A recently published WHO publication is a practical tool for assessing WASH services in healthcare facilities [22,26]. This structured checklist provides detailed instructions for sanitary surveillance over healthcare facilities in all WASH domains and instructions for data collection, analysis, and calculation of WASH indicators and service levels. The publication results from the authors’ experience conducting studies on water, sanitation, and hygiene in Serbia and across the European region [22,26,27]. Using this practical tool is a good opportunity for health professionals in preventive medicine and public health to understand the concept of WASH, to plan and conduct sanitary surveillance over water supply, sanitation, hygiene, waste management, and cleaning in healthcare facilities on their own, and to expand their practical knowledge on risk assessment through WASH [22,26,27]. Moreover, we expect this checklist to help managers and health authorities ensure the establishment of WASH services across healthcare facilities, which will promote the provision of health services, increase the esteem of the institutions, and ensure more benefits. Finally, WASH in healthcare facilities will help the country advance toward achieving universal access to healthcare services and progress in reducing the mortality rates from many diseases, which is in line with indicators and targets of the SDG 3, calling for healthy lives and well-being for all at all ages.

CONCLUSION

Based on the recent report of the country’s progress toward achieving the goals of the 2030 Agenda for Sustainable Development and on the results of national studies on water supply, sanitation services, and hygiene in Serbia, we can anticipate the following challenges for future improvements in this domain. First, we expect safe water supply and good drinking water quality to be challenging only in rural areas and we appeal for continuous surveillance and management of water supply in public institutions. Second, schools and healthcare facilities should undertake actions to ensure hygiene provisions for pupils and patients through low-cost measures such as posters and education. Third, we fear that schools and healthcare facilities will struggle to invest in basic sanitation services to meet the strict WHO criteria and we call for stronger financial support by local self-governments and national authorities, regular WASH surveillance by public health institutions, and continuous health promotion by education boards. Finally, the greatest task for the country will be to provide safe sanitation in households by investing in safely managed sanitation facilities, public sewers, and wastewater treatment plants. To the authors’ knowledge, considerable investments in this field are inevitable but necessary for ensuring environmental and public health protection. Nevertheless, we expect that the Republic of Serbia will demonstrate additional progress and achieve the remaining targets of the SDG 6 of the 2030 Agenda for Sustainable Development in the near future.

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REFERENCES


Izazovi u snabdevanju vodom, sanitaciji i higijeni u okviru agende održivog razvoja do 2030. u Republici Srbiji

1Katarina Paunovic, 2Dragana D. Jovanovic

1Institut za higijenu sa medicinskom ekologijom, Medicinski fakultet, Univerzitet u Beogradu, 11000 Beograd, Srbija
2Institut za javno zdravlje Srbije „Dr Milan Jovanović Batut“, 11000 Beograd, Srbija


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