Water quality surveillance and the role of information to ensure access

A vigilância da qualidade da água e o papel da informação na garantia do acesso

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ABSTRACT This article aimed to highlight the relevance of surveillance of water quality for human consumption in the context of access to safe drinking-water. To fulfill it plentifully, adequate information and communication to society is essential. Thus, public access to the qualitative component is a fundamental element to health assurance and so is the establishment of water quality surveillance regulation for human consumption in the world and in Brazil. Since the 1980's, water quality surveillance actions have been fundamental to guarantee the right to have access to water in Brazil. However, although communication actions of surveillance results are planned in the policy scope of surveillance, in order to empower users, there are some setbacks in information production and its communication that ends up compromising access, seen mainly in the perspective of availability and quality of drinking-water.

KEYWORDS Water quality. Drinking water. Surveillance.

RESUMO *Este artigo teve como objetivo destacar a relevância da vigilância da qualidade da água para consumo humano no contexto do acesso à água potável, com destaque à perspectiva informacional e de comunicação como elemento fundamental para sua completude. Para tanto, aborda a questão do acesso em seu componente qualitativo, elemento fundamental à garantia de saúde, e o estabelecimento da regulação de vigilância da qualidade da água para consumo humano no mundo e no Brasil. As ações de vigilância de qualidade da água no Brasil, pautadas desde a década de 1980, são fundamentais para garantir o direito ao acesso à água. Todavia, embora ações de comunicação de resultados estejam previstas no escopo da vigilância, no sentido de dar poder aos usuários, existe uma fragilidade na produção e na comunicação que acaba por comprometer o acesso, até então, visto prioritariamente sobre a perspectiva mais dura de disponibilidade e qualidade.*

PALAVRAS-CHAVE *Qualidade da água. Água potável. Vigilância.*

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Introduction

Access to sanitation is considered an imperative condition to human dignity and survival, as much as the adequate provision of water regarding quantity and quality. It is stated that the involvement of individuals in economic and social activities depends, primarily, on quality of life, which is made viable from the access to sanitation, housing, health and education[1,2]. Besides facilitating the access or increasing the coverage of water supply systems, it is fundamental to ensure that the water provided meets the quality requirements for the intended uses.

In Brazil, the Consolidation Ordinance No. 05/2017 of the Ministry of Health[3], in its Annex XX, regulates the 'control and surveillance of water quality for human consumption and its potability standard'. Among other objectives, it establishes that treatment procedures undertaken on supply systems meet the purposes, with the creation of the National Program of Surveillance of Water Quality for Human Consumption, known as Vigiagua, in which are included the actions of quality control and surveillance as fundamental elements to ensure the access to quality water.

Among the surveillance attributions, stands out the permanent and continuous diffusion of information on the quality of water for consumption and associated health risks; this is regulated by Federal Decree No. 5.440/2005, which 'instructs on the instruments for the diffusion of information to consumers on the quality of water for human consumption'[3-6]. The systematization and diffusion of data on the quality of the water to consumers is one of the levels of action of surveillance procedures; according to the Pan-American Health Organization (Paho) it has a higher complexity degree and depends on the success of the other stages, such as the monitoring[7]. In the context of information, difficulties range from data generation and its conversion into information, to its availability to society[4,8,9]. This paper presents the outcomes of a review research that aimed to point out the relevance of the surveillance of water quality for human consumption in the context of the access to drinking-water, highlighting the normalization and informational perspective as fundamental elements for its achievement.

Methodology

This study has an exploratory and descriptive character. The bibliographical and documental review was carried out to identify normative instruments and strategies for water quality surveillance, namely in the Brazilian context. The review and, thus, the discussion focus on the access, normalization of water quality surveillance, and information production, aiming at providing effective communication of outcomes to society.

Water, health and the regulation for human consumption

The relationship between water and health has been recognized since long: in Ancient Greece, Hypocrites, in his work 'Water, air and places', outlined the first systematic effort to present a cause-and-effect relationship between the physical environment and disease[10-13]. Although the relationship between health and water quality has been established since ancient times, the confirmation only occurred in the 19th century with the observations of the English physician John Snow in 1855. His studies verified the association between the water consumed by the population of Broad Street neighborhood, in London, and the incidence of cholera. Drawing on his studies, there were important advances in the understanding of the relationship between contaminated water and diseases: since then the quality of water became an issue of interest to public health[9,14].

In recent decades, many epidemiological studies indicate the increase in life expectancy, reduction in child mortality rate, among other health benefits, due to the improvement of water supply services. In Brazil, Heller[11] produced one of the first systematic works on the relationship between sanitation and health, in a review of 256 epidemiological studies relating water-borne diseases and sanitation. The World Health Organization (WHO) estimates that low-quality water and the precarious sanitation and hygiene conditions cause the death of 200 persons per hour. Also according to WHO's statistics, 80% of diseases in developing countries are disseminated by water; be it directly, as diarrhea, or indirectly, as malaria, dengue, yellow fever, and others related to vectors that depend on water for their proliferation[15,16]. Thus, WHO estimates that investments in water and sewage could have an impact in approximately 9.1% of the global disease burden, i.e., on the premature mortality burden and years of life lost due to diseases[15,17,18].

Evidences produced from various studies along the years indicate that the close relationship between water supply and health is uncontestable. Water treatment process is a necessary condition to comply with the quality established by norms, and therefore improve the control of diseases[7]. However, it is noteworthy that the implementation and operation of treatment systems, when isolated, though relevant, are not capable of ensuring the quality of water distributed to the population. It is fundamental to establish combined actions of control and surveillance, structural measures, and conceptual, regulatory and institutional frameworks, such as potability norms that indicate safety and quality requirements for the supplied water[11].

The notion of potability is understood as a universal concept. However, the norms and standards vary among countries due to environmental aspects, such as the quality of the water that is cached, and social, cultural, economic, and technological aspects, which all together may reflect on the feasibility of norms application[19]. Each country should establish its own viable potability standards to be applied, monitored, controlled and surveilled, considering its particularities, epidemiological aspects, toxicological essays, and water quality assessment.

In the United States of America, the discussion on potability standards began in 1914 (*figure 1*), when the United States Public Health Service first referred to bacteriological contamination. However, the North American federal norm established a microbiological standard only for the water produced by a supply system that would be transported in ships and trains to other States[9,12,19]. In 1925, that norm went through its first process of revision in which recommendations were added about the protection of water sources and the effects of pollution on them. It was suggested, as a norm, that the water for consumption should be odorless, tasteless, and colorless, and should not contain soluble mineral substances. In the following years several other revisions were made; to be highlighted is the 1942 revision, in which were included sample spots for collection and bacteriological analysis in the distribution system, and limits for lead, copper, zinc and iron[12,19].

In 1974, the North American Congress passed the Safe Drinking Water Act – SDWA; it corresponds to the potability norm of the Brazilian Ministry of Health. The SDWA established maximum and minimum values for a series of organic and inorganic compounds in drinking-water; and as laboratory techniques were improved, new maximum values were established – the legislation indicates revisions every six years. Currently, SDWA is administered by the United States Environmental Protection Agency (Usepa), which has adopted two categories of potability standards: the National Primary Drinking Water Regulation (NPDWR), comprising standards referring to contaminants presenting risks to health, with a mandatory character,

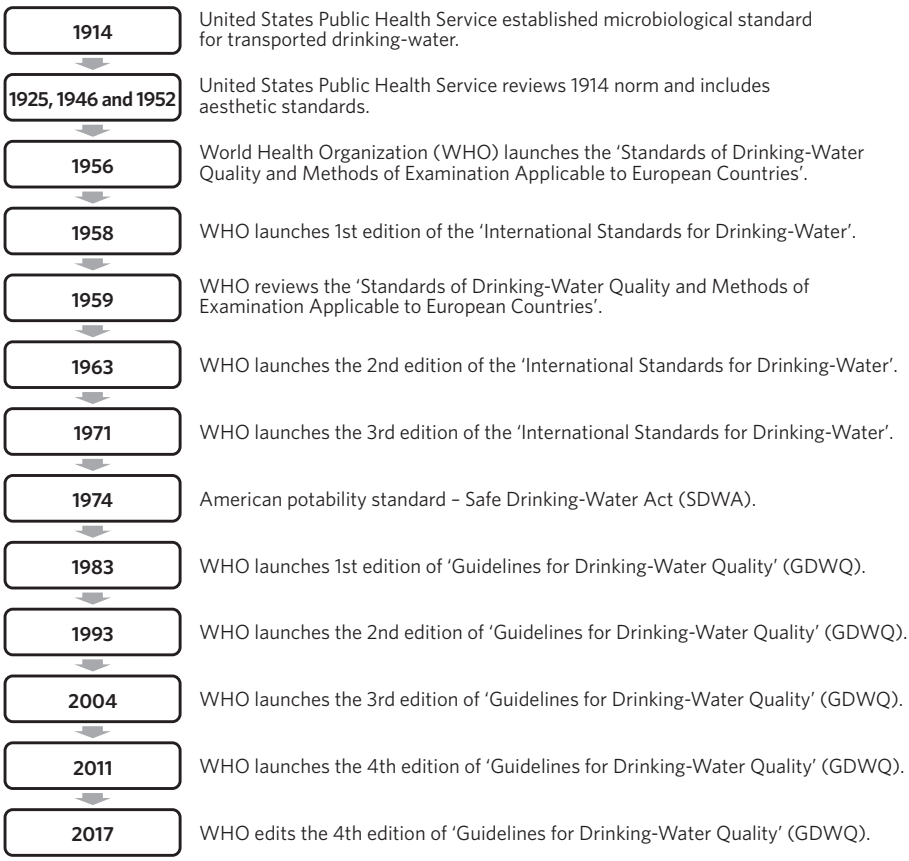
and to these parameters are added the establishment of techniques and treatment applicable to achieve the established values; and the National Secondary Drinking Water Regulation (NSDWR), which is not a mandatory normative standard, but rather guidelines about substances that can produce aesthetic and organoleptic impacts, and may or not be adopted as a recommendation by the States[9,19,20].

In the 1950s, WHO launched the first guidelines for the standardization of drinking-water quality. In 1956 the 'Standards of Drinking-Water Quality and Methods of Examination Applicable to European Countries' was published; it underwent the first revision in 1959. The work was the first WHO's initiative on the elaboration of guidelines regarding water potability and its aim was to standardize the diffusion of analytical data[19].

After the launch of the European standards, WHO published in 1958 the first edition of the 'International Standards for Drinking-Water', aimed at the other countries. The document established minimum quality standards for domestic supply, besides determining the adequate analysis methods. The strategy adopted by WHO was to stimulate other countries to improve the quality of supplied water. However, a distance was observed between the standards adopted as 'European' and the so-called 'international standards': the international standards established minimum standards that were feasible of being achieved, including by developing countries; whereas the European standards, due to the economic and technological apparatus, presented more rigorous standards. After three editions of the 'International Standards for Drinking-Water', in 1983 the international standards were substituted by the 'Guidelines for Drinking Water Quality' (GDWQ), which unified the recommendations for the quality of water for human consumption with no distinction between countries due to their economic and technological apparatus[19].

In 1993, ten years later, the second edition was published; in 2004 the third edition; and in 2011, the fourth and last edition was published, reedited in 2017. Besides establishing guidelines for microbiological, chemical, radioactive and organoleptic standards, it also established goals for health protection of populations, prioritizing aspects related to water quality management in view of climate changes and shortage situation[21,22].

Figure 1. Chronology of guidelines for water quality for human consumption



Source: Own elaboration.

The normalization of water quality for human consumption in Brazil

In Brazil, the existing potability norms basically follow the standards recommended by WHO as presented in the 'Guidelines for Drinking Water Quality'. The Federal Decree No. 7.9367, of March 9, 1977, attributed the competence to the Ministry of Health to produce norms and standards of water potability for human consumption. The first potability norm was established that same year by Ordinance No. 56[23] of the Ministry of Health, defining the maximum limits for several physical, chemical and biological characteristics inherent to consumption water. Until then, the quality of water in Brazil was guided by the recommendations of the United States Public Health Service, together with WHO's guidelines[5,9,12]. Although Ordinance No. 56 determined that those responsible for water supply systems should comply with the norms, not all states in the country accomplished the effective control to verify the compliance with the normalized standards. In order to stimulate the health state secretariats to accomplish surveillance actions, in 1986 the Ministry of Health created the National Program of Surveillance of Water Quality for Human Consumption[9,24].

In January 1990, the Ministry of Health published the Ordinance No. 36, increasing the number of parameters and restricting some of the limits. Due to these restrictions, the implementation of this norm was postponed until 1992,

following demands of public agencies involved in the administration of water supply systems in the country[12,23]. The Ordinance No. 36/1990 innovates by dividing the potability standards in three categories: one refers to physical, organoleptic and chemical categories; one refers to bacteriological categories; and one to radioactive categories[7]. Oliveira Junior and collaborators[25] add that the ordinance was a landmark for the establishment of an important tool in the context of information: it launched the bases for the conception of the first version of the Information System of Surveillance of Water Quality for Human Consumption, known as Sisagua. It became available only in the year 2000, when, after the deadline for the revision established in the norm, the Ordinance No. 1.469 was published, and it was implemented in January 2003. In the same year there was a structural change: the Health Surveillance Secretariat (SVS) was created with the attributes of the former National Health Foundation (Funasa); the previous ordinance was revoked by the Ordinance No. 518, of March 2004[12,24].

The Ordinance No. 518/2004 categorizes microbiological parameters according to the treatment phase. This ordinance considers the following standards: microbiological standard, including the turbidity standard for water post-filtering and post-disinfection; standard for chemical substances that represent health risk; radioactivity standard; and standard of acceptance for human consumption[7]. For chemical substances posing health risks, the ordinance categorized them as inorganics, organics, pesticides, disinfectants, and secondary disinfectant products. It is worthy of note that the pesticides were not characterized as organic substances, but rather as a specific typology of substances due to their persistence in the environmental matrices and their relevance in the context of public health at that time.

The following edition was established by Ordinance No. 2.914/2011. This was the fifth ordinance since 1977; it was the most democratic and participative, having had the involvement of several segments that participated in the control and surveillance of the quality of water for human consumption[26]. It adjusted the maximum and minimum values for various substances based on the approach of quantitative evaluation of chemical risk. The more rigorous microbiological standard followed the methodology of quantitative evaluation of microbiological risk, which guided the definition of turbidity standard of filtered water, as indicator of protozoan removal, and the parameters for disinfection control, indicators of inactivation of bacteria, viruses and protozoans[26]. The number of chemical substances that represent health risk, the organoleptic standard and the characteristics of the water were between 74 and 87. Also, the more rigorous control of turbidity standard as part of the microbiological standard, from 1 uT to 0,5 uT, should be stressed. The ordinance explains the procedure for the control of organoleptic standards, which are to be measured in terms of the maximum intensity of perception through standardized techniques of sensorial evaluation. The microbiological standard maintains the mandatory analysis of *E. coli*, considered as gold standard for fecal contamination. A requirement was included for the periodical analysis of Giardia cysts and *Cryptosporidium* oocysts in water sources with high occurrence of *E. coli*[6,26].

Recently, the Ministry of Health published the Consolidation Ordinance No. 5, of September 28, 2017; in its article 8640, subsection CXXXIII, it revoked the Ordinance No. 2.914/11[3]. The contents referring to the National Program of Surveillance of Water Quality for Human Consumption became part of Annex XX of the new ordinance. The ordinance consolidated the norms of actions and all health services provided by the Brazilian Unified Health System (SUS). From the legal perspective, in theory the consolidation did not materialize changes in the range of the consolidated instruments or in their normative force; it only integrates norms in one sole legal statute.

Chart 1 presents aspects of changes in the ordinances along the years. It is observed that from the first ordinance to the current one, new definitions have been incorporated and

the number of parameters to be monitored has increased significantly due to the improvement of technological support. Moreover, it is noticed that the notion of surveillance of water quality is strengthened in the latest ordinance; however, when considering the relevance of actions performed and the magnitude of their impact, the performance along the years is still poor and weakened by the structural arrangements of those who carry them out – the municipalities.

Chart 1. Comparison of drinking water ordinances regarding definitions, parameters and surveillance

	Portaria Ministério da Saúde nº 56, 1977	**Ordinance of the Ministry of Health No. 56, 1977**	**Ordinance of the Ministry of Health No. 1.469, 2000**	**Ordinance of the Ministry of Health No. 518, 2004**	**Ordinance of the Ministry of Health No. 2.914/2011***
Definitions	- Desired Maximum Value (DMV).	- Extinction of the Desired Maximum Value (DMV) and replacement by the Maximum Allowable Value (MAV).	- It improves definitions of drinking water, control and surveillance of water quality for human consumption. - Adds definition of alternative supply solution, cyanobacteria/ cyanotoxins.	- They are maintained.	- Definition of drinking water and water for human consumption, potability standard, organoleptic standard, treated water, individual, collective alternative solution.
Parameters	- Total of 36 microbiological, physical, chemical and organoleptic parameters: 12 organic substances, 10 inorganic substances and 14 organoleptic substances.	- Potability standard divided into 3 categories: physical, organoleptic and chemical characteristics (4 physical categories, 10 components affecting organoleptic quality, 31 chemicals, 11 inorganic and 20 organic substances, including disinfection by-products); bacteriological characteristics (tolerant to thermotolerant coliforms) and radioactive characteristics.	- Distinct microbiological standard for drinking water, at the treatment station outlet and distribution system. - Turbidity standard for post-filtration or pre-disinfection water set for groundwater, subjected to slow filtration and rapid filtration. - Potability standard for chemicals that pose health risks: 13 inorganic substances, 12 organic substances, 21 pesticides, 6 disinfectants and disinfection by-products, 1 cianotoxin. - Radioactivity pattern: global alpha and global beta. - Acceptance standard for human consumption: 20.	- Distinct microbiological standard for drinking water, at the treatment station outlet and distribution system. - Turbidity standard for post-filtration or pre-disinfection water set for groundwater, subjected to slow filtration and rapid filtration. - Potability standard for chemicals that pose health risks: 13 inorganic substances, 12 organic substances, 22 pesticides (by adding hexachlorobenzene), 6 disinfectants and disinfection by-products, 1 cianotoxin.	- Distinct microbiological standard for drinking water, treated water at treatment station outlet. Treated water in the distribution system. - Turbidity standard for post-filtration or pre-disinfection water set for groundwater, subjected to slow filtration and rapid filtration. - Potability standard for chemicals that pose health hazard: 15 inorganic, 15 organic, 27 pesticides, 7 disinfectants and disinfection by-products, cyanotoxins. - Water radioactivity standard: radio 226 (alpha) and 228. - Organoleptic pattern: 21 substances and parameters that change organoleptic characteristics.
Vigilância	- It does not define surveillance, but requires state health departments to continuously record water quality information.	- It defines control and surveillance of the quality of public water supply. - Its roles, competences and responsibilities are unclear.	- It defines control and surveillance of water quality for human consumption. - It clarifies the competences, procedures and responsibilities of the three spheres considering the guidelines and model of the SUS organization.	- It defines control and surveillance of water quality for human consumption. - It clarifies the competences, procedures and responsibilities of the three spheres considering the guidelines and model of the SUS organization.	- It clarifies the municipal performance in the context of Vigiagua. - It establishes operational control procedures for both systems and alternative solutions.

Source: Own elaboration.

* The Consolidation Ordinance No. 5/2017 has not modified any definitions or parameters.

Surveillance of water quality for human consumption

During the 1980s and 1990s, the Brazilian sanitary reform enabled health surveillance actions to include into their scope the socio-environmental determinants of health problems. Freitas and Freitas[9] highlight in this process the creation of the Unified Health System (SUS) in 1990 and the National Plan of Health and Environment in Sustainable Development designed in 1995 as a Brazilian contribution to the Pan-American Conference on Health and Environment in Sustainable Human Development (Copasad), held in 1992. Through these plans, environmental health surveillance gained links with the attributions of SUS. Environmental surveillance is a continuous and systematic process of data follow-up; more recently is has been defined by the National Health Council (CNS), in its Resolution No. 588/2018, as a set of actions and activities that enable the knowledge and identification of environmental determinants and conditionals that interfere in human health, with the purpose of improving, recommending and adopting measures of health promotion and prevention, and monitoring risk factors related with diseases or health worsening[7,15,28].

In 2005, the Normative Instruction No. 01/2005 of the Ministry of Health established the competences of the various spheres of environmental health surveillance in the country. This norm provided the regulations of the National Subsystem of Environmental Health Surveillance (SINVSA) with the attributions of coordination, evaluation, planning, follow-up, inspection, and control of surveillance actions related with diseases and health worsening regarding water for human consumption, soil and air contamination, natural disasters, environmental contaminants and chemical substances, accidents with dangerous products, physical factors effects and healthy conditions in the work environment[5,15].

Surveillance of water quality for human consumption emerged in 1986 when the Ministry of Health created the National Program of Surveillance of Water Quality for Human Consumption, known as Vigiagua. At that time, surveillance did not have the current scope: it was restricted to normative and laboratorial control. However, it was after the edition of Ordinance No. 1.469/00 that Vigiagua was implemented by the General Coordination of Environmental Health Surveillance (CGVAM)[4,9,15,27]. Environmental health surveillance related with water quality for human consumption comprises a set of actions systematically and continuously performed by public health authorities with the following objectives: to ensure that water consumed by the population complies with the standards and norms established by legislation; and to assess the risks to human health represented by water for consumption[8].

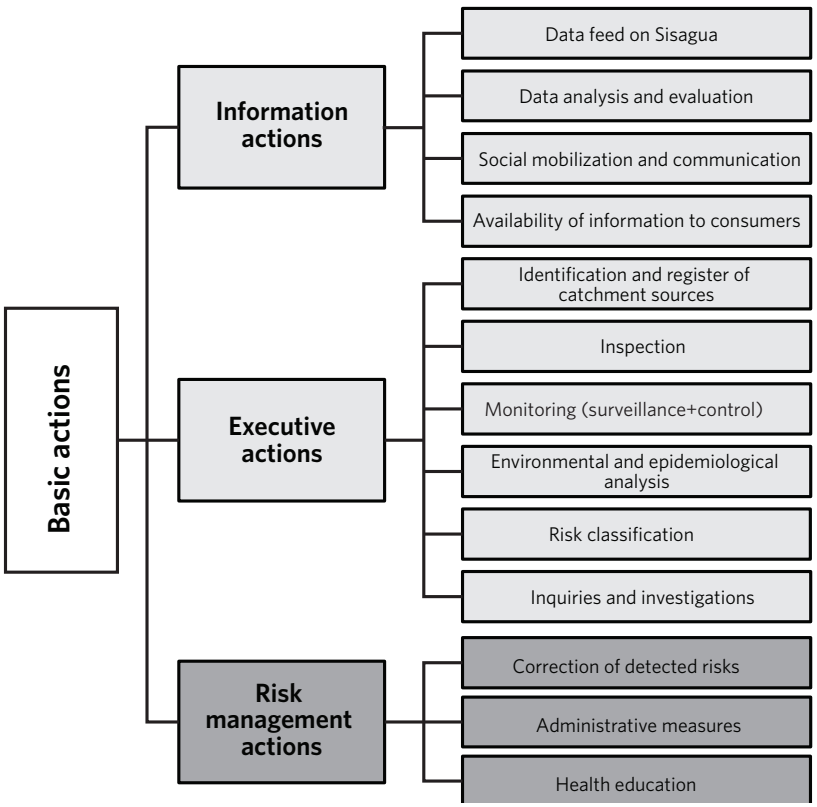
Control and surveillance actions are contemplated in the scope of Vigiagua. These two types of actions are differentiated by competence attribution: surveillance is under the responsibility of the health sector; the control of water quality for human consumption is under the competence of those responsible for the operation of water supply systems. Both types of actions configurate fundamental instruments to ensure the protection of consumers' health[6,8].

Water quality surveillance includes inspection, monitoring and informational actions; it needs operational indicators, water physico-chemical and microbiological indicators, and epidemiological, sanitary and environmental indicators[7]. One of the challenges is to ensure an integrated assessment, which is understood as a joint interpretation of data on the quality of the water for human consumption along the supply and the consumption stages, comprising the parts of a dynamic totality[4,9].

Seeking to standardize the actions on water quality surveillance, the Health Surveillance Secretariat adopted an operational model distributed in strategic and basic actions. The

basic actions are organized in three groups: information actions, executive actions, and risk management actions (*figure 2*). Information actions are related to feeding Sisagua, data analysis and evaluation, social communication and mobilization, and availability of information to consumers. These actions are directly related with the executive monitoring actions[7,8].

Figure 2. Basic operational actions of surveillance and quality control of water for human consumption



Source: Adapted from Brasil[7,8].

Sisagua has been fed with data from the monitoring of microbiological, chemical and physicochemical parameters, collected by the water quality control and the surveillance. The surveillance module refers to data from the monitoring of water quality carried out by the health secretariats of municipalities[25]. The system aims to support surveillance actions, providing information on the supply and quality of water for human consumption, originating in all forms of supply. The continuous insertion of data into Sisagua is, thus, a fundamental condition for the achievement of the specific objectives of Vigiagua, such as the systematic follow-up of monitoring, information to the population about the quality of the water and health risks, health risks management, education promotion, social mobilization and communication, and supply of subsidies for the definition of strategies for actions by the agents involved in the process of ensuring the quality of water[7,9,25,29].

When assessing the challenges of Sisagua and surveillance actions, Freitas and Freitas[9]

highlight the production of data, and the analysis and dissemination of information as stages that are precariously carried out. The authors point out that the fragility in data collection, analysis and feeding the data bases generates problems regarding the availability of information for all levels. The non-availability of information, in their perception,

> goes against one of the attributions of the federal level, which is the dissemination of information aiming at increasing the population's sanitary awareness and its participation in the activities of surveillance and control of worsening aspects[9(1000)].

The dissemination of information to consumers, as established by Decree No. 5.440/2005, should be carried out in a clear and easily understandable manner5 and this requires a careful evaluation of the adequacy of what is being made available to the public. Annex XX of the Consolidation Ordinance No. 5/2017[3], in accordance with Decree No. 5.440/2005, highlights that the agent responsible for the water supply should systematize the information about the water quality in a way that is understandable to consumers and it should be available for immediate access; it also defines that the States should ensure the information to the population in conformity with Decree No. 5.440/2005.

In the process of making information available, aspects that should be observed are language, contents, means of communication, and especially a reflection should be made on the effectiveness of the communication[3-5]. Almeida[30] provides a criticism to the ordinance on potability, which defines the standards but does not enable a classification of water in a scale of quality, and this requires further explanations to the non-expert public. In this perspective, another challenge that can be pointed is that of participative management. In the conception of Freitas and Freitas[9], the understanding of participation by managers and technicians who work in surveillance and control has been to merely inform the population and the health and environment councils about the quality of water,

> in a passive and asymmetric way, by means of monthly reports that register a certain past qualitative state, which is insufficient for disease prevention[9(1001)].

Surveillance, Information and Empowerment

Promoting health implies promoting quality of life, focusing on healthy and sustainable environments. In order to achieve this, it is necessary to have access to water of good quality and sanitation[31]. It is worth noting that access to water is considered a fundamental right of human beings. The discussion in this regard dates to 1977, when the United Nations stated that everyone, regardless of their economic and social situation, was entitled to have access to drinking water in enough quantity and quality to meet basic needs. In 1979, the 'Convention on the Elimination of All Forms of Discrimination against Women' recognized that women had to be given access to water. Ten years later, in 1989, the 'Convention on the Rights of the Child' established free access to water for children, as this would be a fundamental premise for their development. More recently, in the 2000s, the right to water was mentioned in the 'General Comment' on health as a fundamental right to promote human health. Despite these milestones, access to water was only internationally recognized as a human right by the United Nations General Assembly in 2010, with Resolution A/RES/64/292 on the Human Right to Water and Sanitation[16,32,33].

Access to drinking water is a complex process due to the various factors involved, and requirements such as availability, quality/safety, consumer acceptability of its characteristics, and physical and financial accessibility,

should be considered, in addition to the general principles of human rights[2,16,34]. Therefore, it involves the quantitative and qualitative perspective. The simple access to the supply system or the percentage of coverage does not truly reflect the universalization of the service, nor the quality of the service, and should therefore also consider the socioeconomic and cultural elements of the communities and the quality of the services provided[2,34].

The precarious situation of access may pose a risk to the increased incidence of water-related diseases. As it is a complex issue, it needs to be seen from the perspective of health promotion. In the health promotion process, communities play a relevant role, since, as defined by the first International Conference on Health Promotion, held in Ottawa in 1986, health promotion is a process of training the community to improve their quality of life, by allowing for the control of health determinants, which includes greater engagement and social participation[35]. Reaffirming the importance of the role of communities in health promotion, the sixth International Conference on Health Promotion, held in 2005 in Bangkok, Thailand, emphasized the importance of training human resources for health promotion, advocating that the promotion of health is also the focus of the community and civil society initiatives[31].

In Brazil, the Unified Health System (SUS) is organized following some basic guidelines, including community participation. The monitoring of water quality in Brazil is based on the principles and guidelines of SUS, which includes the doctrinal ones, namely integrality, equality and equity; the organizational ones, which deal with decentralization, regionalization, hierarchization; and the executive ones, which determine the use of epidemiology, integration of health, environment and sanitation actions, organization of services in order to avoid duplication of means to serve the same purposes, dissemination of information and community participation. In addition to the principle of essentiality, it is important to understand that access to water in enough quantity and adequate quality is fundamental to human life[4].

Data collection, regular data analysis and their regular dissemination stand out as key components within surveillance actions for drinking water quality. This tripod subsidizes control, education and social communications actions[8]. The availability of information about the quality of the water provided to the population should be made clear, giving them autonomy to face their problems. This autonomy is what Toledo and Pelicioni[31] call empowerment, which is a process of the individual's growth as a social subject, for her personal, interpersonal or political power development. According to the authors, in health promotion, empowerment enables individuals to extend control over their lives through community participation.

As an extension of health promotion, in the 1990s, the Primary Care in Environmental Health (Apsa) was created, According to the Paho, it is a preventive and participatory environmental action strategy at the local level that allows for the definition of their responsibilities and duties in relation to the protection, conservation and restoration of the environment and health at the individual and community levels[15]. In all contexts, be it health promotion, Apsa or water quality surveillance, community development requires full and continuous access to information – a fundamental condition for the empowerment process[31].

In the process of monitoring the quality of water for human consumption, Freitas and Freitas[9] point out as obstacles to the participation of society and social control the limitation in information production. There is a clear difficulty in converting data into information. In addition, they are unavailable in many diverse spheres and even to the population. The availability of

information to the society aided by health actions is provided for in the Federal Law No. 8.080/90 (the law that created SUS) and in Annex XX of the Consolidation Ordinance No. 5/2017, in which it is clear that those responsible for control and surveillance keep the population informed about water quality. In addition, the Brazilian Consumer Protection and Defense Code establishes as a basic right adequate and clear information on products and services. Non-availability also contradicts the Union's role in promoting health awareness and the participation of the population[3,7,9].

The way communication about water quality has often been established is reductionist, and not directed to users, who are often lay, which excludes the decision-making process from the community. Information is a fundamental element in the process of analysis of access to water. Its absence or service fragility eventually compromises access to water, hindering social participation, and the establishment of actions for promotion and prevention in environmental health.

The data contained in Sisagua are in the public domain and may be requested at any time. In addition, the data entered in the latest version of the system, Sisagua 4, are available at the Brazilian Open Data Portal. Due to its nature and purpose, the database supports water quality surveillance actions, as well as provides indicators of environmental health and characterization of water supply in Brazil[25]. However, it should be noted that Sisagua data are used by management and research institutions. Despite the progress made to make the surveillance process public and transparent, the published data need special treatment and there is no effective communication to the users.

Final remarks

Access to drinking water, which is already consolidated as a fundamental right of human beings, must be guaranteed in terms of quantitative and qualitative availability. Regarding quality, treatment is not the only way to guarantee access to water. Strategies such as surveillance, directed to the regulated standards of potability, are fundamental to meet this component. Normatively, the surveillance process is already consolidated in the Brazilian context; however, in the practical field, there are many challenges. Among the various actions inherent in the scope of water quality surveillance, those regarding information, especially in the field of communication and social mobilization, are often regarded as secondary, due to weaknesses that are beyond communication actions. These are weaknesses in executive actions, such as monitoring. Such gaps compromise access in its qualitative component and prevent full compliance with the purposes of water quality surveillance. In addition, such gaps may also hinder, to some extent, research aimed at monitoring Diseases Related to Poor Environmental Sanitation (DRSAI) and at establishing causal relations with surveillance data. Although there has recently been an effort to make this data widely and openly available to society, it is still necessary to improve work on how it is made intelligible to society. Transparency in data production and information play a fundamental role in effective social mobilization in the pursuit and defense of access to water. In short, every process needs to be strengthened: it is necessary to invest in surveillance structures, laboratory equipment and human capital, so that basic surveillance actions can be more effective.

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