Surveillance of water quality for human consumption: potentials and limitations regarding fluoridation according to the workers

Vigilância da qualidade da água para consumo humano: potencialidades e limitações com relação à fluoretação segundo os trabalhadores

Lorrayne Belotti[1], Soraya da Rocha Brandão[2], Karina Tonini dos Santos Pacheco[2], Paulo Frazão[1], Carolina Dutra Degli Esposti[2]

DOI: 10.1590/0103-11042019S304

ABSTRACT Water surveillance workers play a key role in the implementation of the National Water Quality Surveillance Program for Human Consumption and hold information suggesting the degree of structuring and institutionality of practices at the local level of health organizations. The objective was to describe the potentialities and difficulties related to the water fluoridation surveillance in a Brazilian metropolitan region according to the workers' view. Semi-structured interviews were conducted with professionals from seven cities in metropolitan region of Espírito Santo, Brazil, which were recorded, transcribed and interpreted in full according to the Thematic Content Analysis. The results allowed the elaboration of categories: recommendations of the legislation and the practice of fluoride concentration external control; difficulties and potential of the work process; dissemination of information to society. Most of the workers followed the current recommendations of the current legislation in the period of the interviews (Ordinance MS nº 2.914/2001), however, the need for structural and organizational adjustments was noted. The fluoride surveillance process faces problems, involving sample collection, analysis and dissemination of results. It's clear the need for greater prioritization and allocation of resources for expansion and qualification of the surveillance of this public health measure.

KEYWORDS Water supply. Fluoridation. Surveillance. Environmental health surveillance.

RESUMO *Os trabalhadores da vigilância da água exercem importante papel na implementação do Programa Nacional de Vigilância da Qualidade da Água para Consumo Humano e detêm informações sugestivas do grau de estruturação e da institucionalidade das práticas no âmbito local das organizações sanitárias. O estudo objetivou descrever as potencialidades e as limitações relativas à vigilância da fluoretação da água em uma região metropolitana brasileira segundo a visão dos trabalhadores. Realizaram-se entrevistas semiestruturadas com profissionais de sete municípiosda região metropolitana do estado do Espírito Santo, Brasil, que foram gravadas, transcritas na íntegra e interpretadas segundo a Análise de Conteúdo Temática. Os resultados*

[1] Universidade de São Paulo (USP), Faculdade de Saúde Pública – São Paulo (SP), Brasil.
lorraynebelotti@usp.br

[2] Universidade Federal do Espírito Santo (Ufes) – Vitória (ES), Brasil.

This article is published in Open Access under the Creative Commons Attribution license, which allows use, distribution, and reproduction in any medium, without restrictions, as long as the original work is correctly cited.

permitiram a elaboração das categorias: recomendações da legislação e a prática do heterocontrole da concentração do fluoreto; dificuldades e potencialidades do processo de trabalho; disseminação das informações para a sociedade. A maioria dos trabalhadores seguia as recomendações da legislação vigente no período das entrevistas (Portaria MS nº2.914/2011), porém, notou-se a necessidade de adequações estruturais e organizacionais. O processo de vigilância do fluoreto enfrenta problemas que envolvem a coleta da amostra, as análises e a divulgação dos resultados. É nítida a necessidade de maior priorização e alocação de recursos para ampliação e qualificação da vigilância dessa medida de saúde pública.

PALAVRAS-CHAVE *Abastecimento de água. Fluoretação. Vigilância. Vigilância sanitária ambiental.*

Introduction

Water quality health surveillance is recognized worldwide as an essential strategy to ensure safety and quality standards. Among the quality parameters, fluoride stands out[1]. The United States of America (USA) and Brazil are countries with large territorial extensions and high population coverage of public water fluoridation, however, there are important differences in water quality monitoring between the two countries. In the USA, inspection and audit actions are performed periodically to ensure that water quality parameters are met by the treatment companies[2,3]. On the other hand, in Brazil, since 2000, the water quality monitoring that is offered to the population is the responsibility of the municipal health authorities, which carry out surveillance actions and implement their own sampling plan[4].

The National Water Quality Surveillance Program for Human Consumption (Vigiagua) was created at the end of the 1980s[5], and fluoride concentration is a relevant parameter for the evaluation of drinking water quality, either due to the potential to cause dental fluorosis, when at high levels, either because of the possibility of preventing dental caries when at appropriate levels. For this reason, establishing safety levels for fluoride in drinking water is an essential measure of health protection[6]. In this sense, Ordinance MS nº 2.914[7], in force since 2011, established that drinking water must comply with the standard of health hazardous chemicals, with 1.5 mg F/L being the maximum allowed value of fluoride ion. In 2017, Ordinance MS nº 2.914 was incorporated by Consolidation Ordinance nº 5[8], which reaffirms water potability standards and consolidates previous resolutions on a permanent basis.

Maintained by normative instruments since then, health surveillance should be carried out by health system management bodies, independent instances of those responsible for water treatment, through observation and direct analysis of samples from the distribution network. These characteristics meet the principle based on the notion of external control, recognized by researchers as a very important aspect from the point of view of surveillance[9,10], whose activity does not replace or disclaim companies and water treatment enterprises in carrying out their operational controls[1].

However, the monitoring action, by local health authorities, does not occur uniformly throughout the Country. Some capitals, several municipalities and some states have not yet organized a permanent system of sampling, collection and physical-chemical analysis to monitor water fluoridation and ensure knowledge and control of the measure within

a health surveillance program[11]. A study in Brazilian municipalities with more than 50 thousand inhabitants showed that only 209 (53.0%) of those with half or more of the population covered by water fluoridation performed surveillance based on external control data, and the situation was better in Southeast and South regions and very poor in other regions, indicating the urgent need to formulate strategies in order to include the topic on the agenda of all health managers[12].

In fact, gaps between the formulation of the program and its implementation at the municipal level[13], problems of training of surveillance workers and the matter of professional profile, among other aspects, have been documented in the literature[14,15]. Thus, the situation corresponds to a picture composed of workers dispersed in various nomenclatures, institutional linkages, relationships and different working practices, which results from multiple aspects, among which, the fragmentation of the surveillance field – health surveillance, epidemiological surveillance, environmental health and worker health surveillance – and the process of decentralization of responsibilities and actions of the area between the government levels[16] stand out.

A study in the USA compared the level of knowledge on fluoridation of water treatment plant operators and found that workers at large plants had greater knowledge than operators at small water treatment plants[17]. On the other hand, Brazilian experience has shown that the surveillance system has positive effects on the quality of public water fluoridation, as it is an essential strategy to ensure safety and quality standards for human consumption[5].

Despite the importance of fluoride concentration monitoring actions in water, there are many questions among leaders who participate in decision-making processes on health and health system in the Country[18], and no study has examined the perspectives and difficulties regarding the fluoridation monitoring process in the view of workers and agents of water quality surveillance for human consumption. As they work at the operational level and play an important role in the implementation of actions related to water surveillance policy, these workers have information that may offer relevant elements that suggest the degree of structuring and institutionality of certain practices within local health organizations.

Given the above, the objective of this study was to describe the potentialities and limitations related to water fluoridation surveillance in a Brazilian metropolitan region according to the workers' view.

Methods

It is a qualitative approach research. The choice of this methodology is justified due to the objective that qualitative research has to answer to complex themes, addressing a level of reality that cannot be quantified and that involves the universe of meanings, motives, aspirations, beliefs, values and attitudes[19].

The present study was carried out in the seven municipalities of the Grande Vitória Metropolitan Region (RMGV), state of Espírito Santo (ES), Brazil: Cariacica; Fundão; Guarapari; Serra; Viana; Vila Velha and Vitória. This region concentrates most of the population of the state of Espírito Santo (50.24%)[20] and, in 2017, presented the Municipal Human Development Index (MHDI) of 0,781, above the Brazilian average of 0,778[21]. According to data from the National Sanitation Information System (SNIS), in 2017, the coverage percentage of treated and fluoridated water supply in the RMGV was 88.15%. The municipality with the highest coverage was Vila Velha, with 95.80% of its population served, and the one with the lowest coverage was Viana, with 71.40% (www.snis.gov.br).

The research subjects selection criteria was the performance of the professional as a municipal technical reference of Vigiagua, represented by a server in each municipality, totaling seven subjects. As a data collection technique, semi-structured individual

interviews were carried out, so that the issues emerged from a script containing the following triggering questions: 'Could you talk a little bit about how the water surveillance process happens, including fluoride surveillance, routinely?'; 'How is the dissemination of the results obtained?'; 'Is information communicated to civil society?'; 'What are the difficulties in the water quality surveillance process, including fluoridation surveillance?'; and, 'in your opinion, what could improve the water quality/fluoridation surveillance process?'. This script was previously tested by means of a pilot study conducted in April 2015[22], in a city in the state that did not make up the study region, for verification and adequacy of the guide script.

The interviews were conducted between December 2015 and February 2016, with an average duration of fifty minutes, at a place and time chosen by the participants. The audio recordings of the interviews were transcribed in full with the aid of the Listen N Write Free program. To guarantee anonymity, the interviews were identified with the letter I, followed by an arabic number (I1 to I7). In addition, the interviewees were consulted regarding the existence of protocols or documents to guide their activities.

The examination of the material obtained from the interviews was guided by Thematic Content Analysis[23]. The interpretation of the content was performed in order to look for aspects underlying the apparent reality[19,23], assuming that narratives can allow access to 'local knowledge', multiple voices and experiences in an organizational context capable of illuminating certain dimensions that provide a deeper understanding of public administration[24], and taking as theoretical reference knowledge in the area of water surveillance and the notion that, in the transit to democracy, the Brazilian public administration has been undergoing major transformations, in which new practices and expectations of modernization arose, but many of its traditional features were not removed[25].

The research was approved by the Research Ethics Committee (CEP) of the Federal University of Espírito Santo (Ufes), following the norms of Resolution nº 466/12, under Opinion nº 767.637 (CAAE: nº 32266514.6.0000.5060). All participants were informed and signed the Informed Consent Form.

Results

No protocol or guidance document for respondents' activities was obtained from them, an aspect that will be discussed in the next section. At the beginning of the interview, the workers were asked about the routine of the water quality monitoring process for human consumption and whether the fluoride parameter was included. Regarding the collection points for analysis, most of the professionals interviewed showed that they performed the collection in public places with large circulation of people, as described by I6:

> *[...] we prioritize health facilities, teaching establishments, kindergartens, elementary schools, high schools, maternity hospitals, high traffic areas such as bus terminals, railway station.*

In addition, according to the workers, the collections were carried out on predetermined days and scheduled at the Central Laboratories of Public Health (Lacen), ES, body responsible for all analyzes of the municipalities studied.

As for the number of samples collected monthly, most of the municipalities studied seek to respect the legal determinations: *"Per month, there are 40 microbiological analyzes and 18 for fluorine. This number is given per month [...]"* (I5). The I2 showed that the municipality determined the number of samples according to population size:

> *53 monthly samples, because it is according to the stocked population. Of the 53, only 13 samples are made for fluorine, which is mandatory according to the Ordinance, right?*

On the other hand, I4 stated that, in his

municipality, the fluoride parameter has not been analyzed:

> *It's been a long time since we made fluorine here in our city [...] because we didn't schedule [...]. Because when we make fluorine, we have to make an observation.*

Regarding field activity, most reported having a specific employee who was solely responsible for the collection. *"The boys help me, in collecting. The day I can't come, they go and collect. I told them on, and they do [...]"* (I5). However, one technician said he performed all collection activities on his own: *"I go to the field myself [...]"* (I3).

When asked about the difficulties and what could improve in the process of monitoring the quality of water for human consumption, in general, all workers reported some difficulty in performing their duties. As an important point, I7 mentioned the lack of structure:

> *So, today my difficulty is more structural: computers are bad, our internet has a very bad capacity, when you go to feed the system, the internet doesn't work well and crashes all the time.*

Also, one worker reported that, besides being the only one to perform all program activities, the municipality has a limited structure *"here I am the only one, right?, and we, still, have a small structure [...]"* (I3).

The unavailability of vehicles to collect samples and transport them to the reference laboratory was emphasized.

> *Today, the reality is that we have the difficulty of the car and also the driver to make the collections [...].* (I6).

> *We only have one car in the morning, and, in the afternoon, another person take the sample. We only have it in the morning, and that's it [...].* (I1).

Regarding laboratory-related difficulties, most workers reported the delay with which the analysis reports are ready, which is up to 15 days in some municipalities:

> *[...] because, in 10 days, or seven days, or 15 days, it depends, we cannot take another measure for that because the situation has gone.* (I7).

> *Usually, the analysis take from 3 to 15 days, and we would need a more immediate response [...].* (I5).

> *[...] We need to monitor this with the fastest information, which would be hourly, then develop a tool that would be able to give us this answer.* (I6).

The lack of inputs was also mentioned, making it difficult for the laboratory to process sample analyzes: *"Look, it happened last year, it happened in the year before last year too, the lack of input in Lacen to perform the analysis"* (I5).

One last difficulty was highlighted by a worker who reported the extensive work demand and responsibility for managing various instances of drinking water quality surveillance and other programs, such as Health Surveillance of Populations Exposed to Contaminated Soil (Vigisolo). *"Here, today, in fact, I am responsible for Vigiagua and Vigisolo, apart from the issues of extra demands [...]"* (I3).

Regarding the potential of Vigiagua and its work, two of the interviewees highlighted aspects related to the competence of the work team. I7 reported having a well-trained and responsible team:

> *[...] It is an excellent team. You can leave the team alone because they know the skills, the responsibilities ... They will get the job done.*

The last point raised during the interview concerns the dissemination of the results obtained during the surveillance process. In this item, all workers stated that this step does not occur in their municipality. I4 stated not considering the necessary measure: "*No, I do not consider it important. I think that who would have to disseminate this is the (concessionaire) anyway*". Another

interviewee recognized the importance of the measure:

> *I think it would be important, yes, for the population to know about the data. It turns out it is a program that it is made, but it is an invisible program for the population.* (I7).

Another worker reported that:

> *We once thought of suggesting the inclusion of a field on the City Hall website where the population could consult the surveillance data even though we do, but today there is no way of disclosing it.* (I1).

Given the results, the discussion was presented in three categories of analysis: 1. Recommendations of the legislation and the practice of external control related to fluoride concentration; 2. Difficulties and potentialities of the work process; and 3. Dissemination of information to society.

Discussion

In this study, excerpts from interviews with those responsible for the operation of water surveillance in all municipalities of an important Brazilian metropolitan region were highlighted, with the purpose of increasing the understanding of the degree of structuring and institutionality of practices related to fluoride surveillance within local health organizations.

Concerning the category 'recommendations of the legislation and the practice of external control related to fluoride concentration', the interpretation of the interviews allowed to verify the conformity between the workers' narrative and the normative dispositions related to the water quality monitoring[7]. It was observed that all municipalities studied, in general, followed the recommendations of Ordinance MS nº 2.914/2011, seeking to distribute the collection points, in order to ensure the representativeness of the samples in relation to the supply system. The adjustment to collection points is fundamental, because if any microbiological parameter changes in areas with large circulation and vulnerable population, the effects will fall on a large number of people. Spatial coverage criteria and strategic points were mentioned, such as: bus terminals; railway terminals; buildings that cover at-risk populations such as hospitals, kindergartens and retirement homes; and those located in vulnerable sections of the distribution system, such as network ends, pressure decrease ends, locations affected by maneuvering, and those subject to intermittent supply.

In addition, the municipalities respected the determination of the minimum number of samples required by National Sampling Plan of the Vigiagua[26]. Following a sampling plan is essential to produce relevant information on the quality of water offered to the population. However, in one municipality, surveillance regarding the fluoride parameter was not being carried out, in violation of Brazilian water quality surveillance regulations, impairing the control of the effectiveness of water fluoridation policy. The prevention of dental caries at the population level depends on the continued maintenance of exposure to adequate fluoride levels, which is why experts have recommended the implementation of water fluoridation surveillance programs by health authorities[27]. Level below the recommended value means increased risk for dental caries, and level above the recommended value means increased risk for dental fluorosis, a defect in dental enamel mineralization[28]. Therefore, to ensure the benefit of fluoridation, it is not enough to adjust the concentration of fluoride in water, constant monitoring is necessary, so that the measurement does not suffer unnecessary interruptions.

It was noted that some municipalities were following the normative devices, while others declared surveillance practices in

disagreement with what was determined in Ordinance MS nº 2.914/2011[7], as described by the worker who reported that the municipality was not performing the analyzes for the fluoride parameter. This lack of uniformity in actions was demonstrated in a study by Moimaz et al.[29], who reported that some of the municipalities of the state of São Paulo did not have their own place to perform laboratory analyzes, had inadequate infrastructure and lack of investments in the sector. Given these situations, it is important to verify what are the difficulties reported by the interviewees for the proper development of their work process.

In all municipalities, difficulties were reported regarding the availability of resources that compromised the structure needed to ensure a working process without improvisation. Although all respondents reported having a vehicle to collect water on scheduled days, several mentioned that the vehicle was not always available, either due to lack of driver, lack of fuel or other higher priority demand to the health authority, impairing the sampling schedule and compromising its temporal distribution and the monitoring process related to the period of water consumption by the population. Eventual alteration of the parameters during this period would not be identified by the surveillance agencies, preventing the fulfillment of their purpose. This problem was also mentioned in a study that evaluated fluoride surveillance in public water supply in Brazilian capitals. Among the difficulties encountered in carrying out the surveillance process was the lack of human resources and computers[30].

The work process of surveillance workers must include continuous actions, without interference, such as that caused by the lack of vehicles, to detect changes in the analysis parameters that may interfere with human health[13]. The goal should not only be to meet goals, but to ensure that the water consumed by the population meets the standards established by current legislation, controlling the risks present in water supply through a permanent activity[31].

Difficulties related to laboratory support were mentioned, such as the delay in the release of the reports and the absence of fluoride parameter analysis due to lack of input, aspects that hinder the entire surveillance process, as it delays a possible corrective measure that should be taken in a timely manner to reduce potential damage. Other studies have also identified laboratory support difficulties related to delayed reporting, lack of structure, and unavailability of specific analyzes[30,32].

Furthermore, the report about a high workload was also shared by all respondents, who had, under their responsibility, in addition to monitoring water quality, other Health Surveillance programs and activities. A high degree of demand and fragmentation of the work process can cause emotional tension, early fatigue, excessive anxiety and even somatic diseases; and produce worker insecurity and stress, impairing the workplace income[33]. The responsibility of managing multiple instances of surveillance makes the process difficult, making work demand high and the time available to conduct surveillance of each field, in particular, is reduced, harming the expected results.

In relation to potentialities, two municipalities reported having an excellent, well-trained and responsible work team. Having a skilled team facilitates and optimizes the work process, as well as helping ensure that responsibilities are not left to the sole responsibility of a surveillance officer, enables a better division of tasks and improves the results obtained with the surveillance process. It is necessary that all health professionals working with surveillance have an initial training related to the activities they will perform, and it is the duty of the responsible for the public policy management to provide permanent education of these professionals. In addition, they must be part of

the permanent staff, so that knowledge in a certain area can be transformed into effective practices[32], because, today, there is still the proliferation of precarious contracts and outsourcing activities[16].

Among the relations that the individual presents with his institution, the working condition is one of the first concerns. Environmental factors, such as equipment and materials available to perform daily activities, have been associated with quality of work[34,35].

Another relevant issue presented by the workers was the lack of *"dissemination of information to society"*, not even to the municipal health councils. Although most professionals considered this step extremely important, it was observed that there were no opportunities for society to learn about and participate in water quality control. One study showed that this lack of information is reflected even among health leaders, who are unaware of the importance of surveillance in this sector[18]. When changes in the water quality pattern occur, decision making is carried out centrally, excluding the population from the process. For this interaction between surveillance and the population to occur, it is essential to publicize the data and reports produced by surveillance[5,12].

The control of society over the State is a process that has gradually gaining strength in Brazil since democratization. Recently, however, Decree nº 9.759[36] of April 11, 2019, proposed to limit the participation of civil society in the formulation and oversight of public policies through the extinction of National Commissions and Councils, threatening, therefore, the process of decision taking and control of society. The institutionalization of forms of social participation in health policies through health councils and health conferences, combined with mechanisms that regulate the dissemination of water quality information to the population in both monthly and annual reports[37], represent important conditions that can help to drive greater commitment of public administration to the needs of society. However, the effective modernization of the State will depend on reforms that alter the system of power relations, redistributing power resources and altering the channels of communication between the public and its administration[25].

The observed results reinforce the need for the new attributions and competences acquired by the municipalities since the 1988 Constitution, with emphasis on the responsibilities in the field of health surveillance, to be accompanied by a professionalization process of the local public administration. The new roles and competences should provide job security and permanent education for civil servants to ensure the identity of workers in the area, combined through supportive strategies and programs to promote the building of a local public administration focused on needs of the citizen.

Final considerations

Although workers as a whole, have demonstrated compliance with regulatory standards related to water quality surveillance, the external control process of fluoride parameter needs both structural and organizational adjustments in all municipalities. In municipalities where legal requirements were not observed, there is impairment in water quality surveillance. In addition, there is no dissemination of information to society exercise control over the State activities. The results suggest that there is an important space for the formulation of action strategies aimed at raising the degree of structuring and institutionality of water quality surveillance practices in relation to the fluoride parameter. Therefore, the work processes must be adjusted by guaranteeing their conditions and the permanent education of the professionals, so that the norms can be put into practice and the expected results can be achieved.

Acknowledges

To the Research and Innovation Support Foundation of Espírito Santo (Fapes), for funding the project that subsidized the results of this study.

Collaborators

Belotti L (0000-0001-6111-8908)*, Pacheco KTS (0000-0002-4687-6062)* and Esposti CDD (0000-0001-8102-7771)* also contributed to the conception, planning and design of the study; acquisition, analysis and interpretation of work data; data collection; writing, preparation of preliminary versions of the article and critical review of important intellectual content; final approval of the version to be published. Brandão SR (0000-0001-7714-9637)* contributed to the analysis and interpretation of the work data; writing, preparation of preliminary versions of the article and final approval of the version to be published. Frazão P (0000-0002-3224-0020)* contributed to the analysis and interpretation of the work data; presented important suggestions incorporated into the work; relevant critical review of the intellectual content and final approval of the version to be published. ■

*Orcid (Open Researcher and Contributor ID).

References

1. World Health Organization. Guidelines for drinking--water quality [internet]. 3a. Geneva; 2004. [acesso em 2019 ago 31]. Disponível em: http://apps.who.int/iris/bitstream/10665/44584/1/9789241548151_eng.pdf.

2. USA. National Primary Drinking Water Regulations [internet]. 2018 [acesso em 2019 ago 31]. Disponível em: https://www.epa.gov/dwreginfo/sanitary-surveys.

3. Centers for Disease Control and Prevention (CDC). Water Fluoridation Reporting System [internet]. [acesso em 2019 ago 31]. Disponível em: https://www.cdc.gov/fluoridation/data-tools/reporting-system.html.

4. Brasil. Ministério da Saúde. Portaria nº 1.469, de 29 dez. 2000. Estabelece os procedimentos e responsabilidades relativos ao controle e vigilância da qualidade da água para consumo humano e seu padrão de potabilidade, e dá outras providências. Diário Oficial da União. 30 Dez 2001.

5. Freitas MB, Freitas CM. A vigilância da qualidade da água para consumo humano: desafios e perspectivas para o Sistema Único de Saúde. Cien. Saúde Colet. [internet]. 2005 [acesso em 2019 ago 31]; 10(esp4):993-1004. Disponível em: http://www.scielo.br/pdf/csc/v10n4/a22v10n4.pdf.

6. Frazão P, Peres MA, Cury JA. Qualidade da água para consumo humano e concentração de fluoreto. Rev. Saúde Pública [internet]. 2011 [acesso em 2019 ago 31]; 45(5):964-73. Disponível em: http://www.scielo.br/pdf/rsp/v45n5/2584.pdf.

7. Brasil. Ministério da Saúde. Portaria nº 2.914, de 12 de dezembro de 2011. Dispõe sobre os procedimentos de controle e de vigilância da qualidade da água para consumo humano e seu padrão de potabilidade. Diário Oficial da União. 13 Dez 2011.

8. Brasil. Portaria de Consolidação nº 5, de 28 de Setembro de 2017. Consolidação das normas sobre as ações e os serviços de saúde do Sistema Único de Saúde. Diário Oficial da União. 29 Set 2017.

9. Schneider Filho DA, Prado IT, Narvai PC, et al. Fluoretação da água: como fazer a vigilância sanitária? Rio de Janeiro: Rede CEDROS; 1992.

10. Narvai PC. Cárie dentária e flúor: uma relação do século XX. Ciênc. Saúde Colet. [internet]. 2000 [acesso em 2019 ago 31]; 5(2):381-92. Disponível em: http://www.scielo.br/pdf/csc/v5n2/7102.pdf.

11. Saliba NA, Moimaz SAS, Saliba O, et al. Fluoride content monitoring of the public water supply of the Northwest area of the state of São Paulo, Brazil: 36-month analysis. Rev. odonto cienc. [internet]. 2009 [acesso em 2019 ago 31]; 24(4):372 - 376. Disponível em: http://revistaseletronicas.pucrs.br/ojs/index.php/fo/article/view/4863/0.

12. Frazão P, Narvai PC, organizadores. Cobertura e vigilância da fluoretação da água no Brasil: municípios com mais de 50 mil habitantes [internet]. Higeia Livros; 2017. [acesso em 2019 ago 31]. Disponível em: http://www.livrosabertos.sibi.usp.br/portaldelivrosUSP/catalog/book/181.

13. Queiroz ACL, Cardoso LSM, Silva SCF, et al. Programa Nacional de Vigilância em Saúde Ambiental Relacionada à Qualidade da Água para Consumo Humano (Vigiagua): lacunas entre a formulação do programa e sua implantação na instância municipal. Saúde e Soc. [internet]. 2012 [acesso em 2019 ago 31]; 21(2):465-78. Disponível em: http://www.scielo.br/pdf/sausoc/v21n2/a19v21n2.pdf.

14. Garibotti V, Hennington EA, Selli L. A contribuição dos trabalhadores na consolidação dos serviços municipais de vigilância sanitária. Cad. Saúde Pública [internet]. 2006 [acesso em 2019 ago 31]; 22(5):1043-51. Disponível em: http://www.scielo.br/pdf/csp/v22n5/17.pdf.

15. Leite MJVF, Oliveira AGRC. Recursos humanos em vigilância sanitária: uma discussão sobre perfil profissional. Holos [internet]. 2008 [acesso em 2019 ago 31]; 24(1):15-24. Disponível em: http://www2.ifrn.edu.br/ojs/index.php/HOLOS/article/view/116.

16. Batistella CEC. Qualificação e identidade profissional dos trabalhadores técnicos da vigilância em saúde: entre ruínas, fronteiras e projetos. In: Morosini MVGC, Lopes MCR, Chagas DC, et al., organizadoras. Trabalhadores técnicos em saúde: aspectos da qualificação profissional no SUS. Rio de Janeiro: EPSJV; 2013. [acesso em 2019 ago 31]. Disponível em: https://www.arca.fiocruz.br/handle/icict/14087.

17. Lalumandier JA, Hernandez LC, Locci AB, et al. US drinking water: fluoridation knowledge level of water plant operators. J Public Health Dent [internet]. 2001 [acesso em 2019 ago 31]; 61(2):92-8. Disponível em: http://www.ncbi.nlm.nih.gov/pubmed/11474920.

18. Ferreira RGLA, Bógus CM, Marques RAA, et al. Fluoretação das águas de abastecimento público no Brasil: o olhar de lideranças de saúde. Cad. Saúde Pública [internet]. 2014 [acesso em 2019 ago 31]; 30(9):1884-1890. Disponível em: http://www.scielosp.org/scielo.php?script=sci_arttext&pid=S0102-311X2014001001884&lang=em

19. Minayo MCS. O desafio do conhecimento: pesquisa qualitativa em saúde. São Paulo: Hucitec; 2014. 393 p.

20. Instituto Brasileiro de Geografia e Estatística. Estimativas da população residente para os municípios e para as Unidades da Federação brasileiros com data de referência em 1o de julho de 2018 [internet]. [acesso em 2019 ago 31]. Disponível em: https://www.ibge.gov.br/estatisticas/sociais/populacao/9103-estimativas-de-populacao.html?=&t=o-que-e.

21. Instituto de Pesquisa Econômica Aplicada, Programa das Nações Unidas para o Desenvolvimento, Fundação João Pinheiro. Radar IDHM: evolução do IDHM e de seus índices componentes no período de 2012 a 2017 [internet]. Brasília, DF: 2019 [acesso em 2019 ago 31]. Disponível em: http://www.ipea.gov.br/portal/index.php?option=com_content&view=article&id=34682.

22. Campos MDA, Pacheco KTS, Belotti L, et al. Análise do gerenciamento do heterocontrole da fluoretação das águas de abastecimento público de um município de médio porte no estado do Espírito Santo. RBPS [internet]. 2016 [acesso em 2019 ago 31]; 17(3):89-97. Disponível em: http://periodicos.ufes.br/RBPS/article/view/14140.

23. Bardin L. Análise de Conteúdo. 6. ed. São Paulo: Edições 70; 2011.

24. Ospina SM, Dodge J. It's About Time: Catching Method Up to Meaning-The Usefulness of Narrative Inquiry in Public Administration Research. Public Adm Rev [internet]. 2005 [acesso em 2019 ago 31]; 65(2):143-57. Disponível em: http://doi.wiley.com/10.1111/j.1540-6210.2005.00440.x.

25. Motta PR. A modernização da administração pública brasileira nos últimos 40 anos. Rev. Adm. Pública [internet]. 2007 [acesso em 2019 ago 31]; 41:87-96. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0034-76122007000700006&lng=pt&tlng=pt.

26. Brasil. Ministério da Saúde. Diretriz nacional do plano de amostragem da vigilância em saúde ambiental relacionada à qualidade da água para consumo humano. Brasilia, DF: Ministério da Saúde; 2014.

27. Frazão P, Soares CCS, Fernandes GF, et al. Fluoretação da água e insuficiências no sistema de informação da política de vigilância à saúde. Rev. Assoc. Paul. Cir. Dent. [internet]. 2013 [acesso em 2019 ago 31]; 67(2):94-100. Disponível em: http://www.cecol.fsp.usp.br/dcms/uploads/arquivos/1398177780_Frazao-et-al-FluoretacaoAguaInsuficienciasSisInfoVigilanciaSaude-RAPCD-67-2-2013.pdf.

28. Esposti CDD, Frazão P. O relevante papel da vigilância para assegurar a efetividade da fluoretação da água de abastecimento público. RBPS [internet]. 2016 [acesso em 2019 ago 31]; 17(2):4-6. Disponível em: http://periodicos.ufes.br/RBPS/article/view/13180.

29. Moimaz SAS, Garbin CAS, Iglesias GF, et al. Dificuldades enfrentadas no processo de fluoretação das águas de abastecimento público. RBPS [internet]. 2016 [acesso em 2019 ago 31]; 17(1):87-94. Disponível em: http://www.periodicos.ufes.br/RBPS/article/view/12455.

30. Cesa K, Abegg C, Aerts D. A Vigilância da fluoretação de águas nas capitais brasileiras. Epidemiol e Serviços Saúde [internet]. 2011 [acesso em 2019 ago 31]; 20(4):547-55. Disponível em: http://scielo.iec.pa.gov.br/scielo.php?script=sci_arttext&pid=S1679--49742011000400014&lng=en&nrm=iso&tlng=em.

31. Castro AMSM, Câmara VM. Avaliação do programa de vigilância da qualidade da água para consumo humano em Salvador – BA. Rev. Baiana Saúde Pública [internet]. 2004 [acesso em 2019 ago 31]; 28(2):212-26. Disponível em: http://rbsp.sesab.ba.gov.br/index.php/rbsp/article/view/1192.

32. Gazzi BJ, Peixe BCS. Proposta para a organização dos serviços de Vigilância em Saúde: Estudo Sistematizado nos municípios da regional de Francisco Beltrão – PR. In: Peixe BCS, Müller CC, Hilgemberg CMAT, et al., editores. Formulação e Gestão de Políticas Públicas no Paraná: Reflexões, Experiências e Contribuições. Cascavel: Edunioeste; 2010. v. 2. p. 597-616.

33. Agostin A, Andrighetti F, Souza EP. Saúde Do Trabalhador. Rev Uniplac [internet]. 2015 [acesso em 2019 ago 31]; 3(1):212-26. Disponível em: https://revista.uniplac.net/ojs/index.php/uniplac/article/view/1540.

34. Medeiros EG. Análise da qualidade de vida no trabalho: um estudo de caso na área da construção civil [dissertação] [internet]. Rio Grande: Universidade Federal do Rio Grande do Sul; 2002. [acesso em 2019 ago 31]. Disponível em: https://lume.ufrgs.br/handle/10183/3048.

35. Rodrigues JM. Remuneração e competências: retórica ou realidade? Rev. Adm. Empres. [internet]. 2006 [acesso em 2019 ago 31]; 46:23-34. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0034-75902006000500002&lng=pt&tlng=pt.

36. Brasil. Decreto no 9.759, de 11 de abril de 2019. Extingue e estabelece diretrizes, regras e limitações para colegiados da administração pública federal. Diário Oficial da União. 11 Abr 2019.

37. Brasil. Decreto nº 5.440, de 4 de maio de 2005. Estabelece definições e procedimentos sobre o controle de qualidade da água de sistemas de abastecimento e institui mecanismos e instrumentos para divulgação de informação ao consumidor sobre a qualidade da água para consumo humano. Diário Oficial da União. 5 Maio 2005.

Received on 04/25/2019
Approved on 09/23/2019
Conflict of interests: non-existent
Financial support: Research Support Foundation in Espírito Santo (Fapes). Fapes Public Notice nº 007/2014 Universal – Integrated Research Project, process: 67660266