

Street-level implementers of population-based oral health policies: the case of water fluoridation supply in Brazil's small towns

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Background: Knowledge of conditions influencing the performance of street-level operators when implementing population-based policies could increase the understanding of local implementation dynamics. **Objective:** We analyzed how street-level operators claim to act to implement fluoridation policy in the water treatment units of small Brazilian municipalities and identified conditions shaping behavior against adherence to policy. **Methods:** A case study using narratives obtained through in-depth interviews with key informants in two pairs of municipalities with contrasting levels of implementation. Analysis identified themes in the data and in the street-level bureaucracy literature. **Results:** Institutional characteristics such as administrative fragility of local entities, low priority given locally to policy, poor physical structure of the water treatment plants, isolated working relations, low effectiveness of monitoring devices, and local actors' uncertainties about the policy favored the expansion of the discretionary power of street-level operators configuring important barriers for water fluoridation. **Conclusion:** These data highlight the complexity of policy implementation and inform policymakers about the importance of inter-federal and inter-sectoral coordination when implementing population-based health policies in small towns.

Keywords: Street-level agents, Public Policy, Water Fluoridation

Introduction

Studies on population health policies have received growing attention. Encompassing different sectors such as public spaces, urban mobility, food and water provision, work opportunities (WHO, 2011; Freiler *et al.*, 2013), these policies almost always fail to reach expected results owing to several reasons linked to the process of implementation, including the discretionary power of street-level implementers (Ferreira and Medeiros, 2016).

Lipsky (1980) pointed out the quality of state-funded public services was dependent on choices made by those providing the services (e.g., teachers, police), known as street-level bureaucrats. Civil servants are endowed with discretionary power, and their decisions are based not only on institutional norms, but on individual values and beliefs. Such values could face adversity and uncertainty as a result of conflicting incentives from other bureaucrats, politicians, and citizens. Therefore, frontline workers may act in unwanted or unexpected ways, contradicting formal policy goals and directives while remaining within the processes of their local agencies. More than recognizing that they have power, it is important to see how they use it.

Street-level bureaucracy theory has been used in academic fields such as education, health and social care, policing and justice. Research has investigated conditions under which frontline implementers work and reasons behind their actions. However, conflicting goals from their employers and situations where clients are not a primary reference group have been less explored (Erasmus, 2014).

Over the past thirty years, the idea that the state should “drive, not row” has influenced state reforms and provision of public goods. Public policies are not only implemented through state bureaucracies, but by agents acting in social organizations, private companies, and a myriad of public-private agreements (Brodkin, 2012). New strategies and tools for sectoral and inter-sectoral management are necessary (Queiroz *et al.*, 2015).

The supply of fluoride-treated drinking water may be considered an inter-sectoral health policy, given its importance to population oral health, the associated multiple interests, the complexity of decisions involved and the administrative and management requirements for its implementation (Frazão and Narvai, 2017). Its benefits and requirements to avoid the associated risks have been updated in the literature (O'Mullane *et al.*, 2016).

Three quarters of the Brazilian population receives fluoride-adjusted water. However, disparities remain with lower accessibility in small municipalities (CDC 1999; Frazão and Narvai, 2017). Federal republics with autonomous and inter-dependent governmental levels face more difficulties than countries with unitary governments for accomplishing goals from policies to promote equity (Howlett *et al.*, 2009). Investigation on barriers against the implementation of water fluoridation in small municipalities may help to understand challenges that federal republics face to disseminate population-based policies.

We analyzed how street-level operators claimed to act during fluoridation policy implementation in water treatment units of small Brazilian municipalities and identified conditions shaping behavior against adherence to policy.

Material and methods

We studied discrepant cases using in-depth interviews with key informants (Yin, 2009). Cases were selected in one Brazilian region. Although since 1974 fluoridated water supply has been enforced by Federal Law, data from 2008 indicated that 40% of Brazilian municipalities were still not compliant, corresponding to 25% of population (Frazão and Narvai, 2017). Lack of water fluoridation is often observed in municipalities with below median coverage for water and sewage services, less than 10,000 inhabitants, medium to very low human development and where the service is predominantly provided by municipal administrations and private companies associated or not with public entities (Silva and Frazão, 2020).

One challenge in implementing fluoridation in Brazil concerns the three-level federal system of the Constitution that assures power and relative autonomy for the 26 states (first level) and one Federal District (second level), and 5,570 cities (third level) (Arretche, 2004). Since 2007, local levels have held the prerogative to manage the sanitation in their jurisdiction, including changes and renewal of contracts with service providers. If water is not fluoridated, judicial and political institutions must be prompted to require it from sanitation companies (Araujo and Guimaraes, 2018).

We selected four cities in the Northwest region of São Paulo state where the implementation of most public policy was satisfactory (Belotti *et al.*, 2020). These municipalities had human development indices of approximately 0.75, two towns had under 10,000 inhabitants and two had 20,000 to 25,000 inhabitants. To identify the conditions shaping behavior against adherence to policy we interviewed participants from pairs of municipalities including one with fluoridated water, and another without.

Data were collected through in-depth interviews and a field diary. Interviews were based on a central theme using a conversation guide including identification of the interviewee's role in the healthcare and/or sanitation organization; description of the institutional scenario and the context in which relations between organizations took place; participants' perception of the water supply and on characteristics of oral healthcare in terms of directives, structure and services offered. The field diary recorded aspects of the relationship between the interview content and its context (Pope and Mays, 2006).

Participants were accessed through the regional oral health coordination, a function linked to the Health Department of São Paulo state. Participant selection included agents who were directly (water treatment plant workers) or indirectly (bureaucrats from other sectors of public administration) linked to water fluoridation and could elucidate factors conditioning its implementation. More than one participant was selected to each municipality.

To preserve participants' anonymity, municipalities with less than 10,000 inhabitants were designated as P1 and P2, and those with 20,000 to 25,000 inhabitants, as M1 and M2. P1 and M1 had fluoride contents below recommended levels and P2 and M2 optimal levels (0.6 to 0.8 mg F/L). Interviewees were identified by their functions and the abbreviation of the workplace (P2 Coordinator, M12 Consultant etc.).

Interviews lasted between 40 and 60 minutes and were audio-recorded, then transcribed.

Participants' narratives were coded and gathered into thematic categories emerging from the data and according to the street-level bureaucracy literature (Lipsky, 1980; Ferreira and Medeiros, 2016). Categories modulating the behavior of implementer agents, such as structural conditions, individual values and interests, and institutionally established rules and incentives from other local level bureaucrats were considered (Pope and Mays, 2006).

Discretionary behavior partly depends on frontline agents' activity. For instance, agents must sometimes make prompt decisions in unforeseen situations, marked by ambiguity, in the heat of moment under immediate public pressure. They must decide what to do by themselves, without help of supervisors, procedure guides or precedents. Alternatively, there are predictable situations without immediate pressure of the public, such as those activities undertaken by water treatment plant workers (WTPW), in which commitment and expected performance do not represent a discretionary behavior. In this sense, it is important to note that the transcripts did not indicate exceptional commitment and sharing of objectives by the bureaucracy in municipalities where the program was implemented in an acceptable level. For the street-level bureaucracy theory, discretionary behavior can affect policy implementation in different ways (positive or negatively), however according to the central focus of this paper, we selected excerpts in interviewees' narratives that represented conditions shaping discretionary behavior against adherence to oral health policy.

Interpretative axes were established, based on the data and the literature as possible modulators of the implementers' behavior.

The project was approved by the Ethics Committee on Research of the School of Public Health, University of São Paulo, Brazil (Report #1219939). All participants signed a free and informed consent agreement. We used COREQ to ensure no critical information was missing (Tong *et al.*, 2007).

Results

Data were acquired from eleven interviews: three WTPW, three oral health municipal coordinators, one general dental practitioner and former oral health municipal coordinator, one oral health assistant in primary healthcare; and two professionals in charge of providing advice and support for organizations of primary healthcare. One participant was a public servant of the Regional Section for Health Surveillance, maintained at the second level of government and therefore was not engaged in the town's public management. Participants were aged between 26 and 56, and seven were female (Table 1). Salient quotes (translated to English) support the results.

Water acquired from wells was operated by a single technician using simple equipment. However, conditions differed among municipalities, which lead to difficulties adjusting fluoride concentrations by WTPW. While some municipalities applied more up-to-date and efficient operationalization technologies, others recognized that conditions were insufficient to ensure effective operational control and faced problems such as avoiding animal husbandry near the water sources.

Table 1. Characteristics of the interviewees

	Number (F/NF)
Sex	
Female	7 (3/3)*
Male	4 (3/1)
Age group	
20-29	1 (1/0)
30-39	4 (4/0)
40-49	3 (1/2)
50-59	3 (0/2)*
Job position	
Town Oral Health Coordinator	3 (2/1)
Water Treatment Plant Worker	3 (2/1)
Oral Health Team Member	2 (1/1)**
Primary health care consultant	2 (1/1) ^a
Regional Officer for Health Surveillance*	1
Education level	
Bachelor's or equivalent level	7 (4/2)*
Postsecondary non-tertiary education	4 (2/2)

*One interviewee was not engaged in the town's public management. **Oral Health Team Member: one dentist and one dental assistant. ^aOne consultant used to attend three municipalities (P1, P2, M2) and the other only one of them. F: Town's fluoride samples within the optimal level range. NF: Town's fluoride samples below the optimal level range

"It is a pastille system; it would be better if it were a pump system. It varies too much" (WTPW P1).

"I remember the secretary (referring to P1) was desperate, because people intended to raise pigs where there was water." (Consultant).

"We used to work with an integrated system, because if three wells throw water in the same reservoir, it's the reservoir that will be treated..." (WTPW M2).

Priority given to the policy differed according to local frontline implementers. While the activities were supported by the local authority in the municipality with optimal fluoride level:

"Thus, we work with a treatment pond. The mayor was very interested, and a lot of people wanted to do it." (WTPW M2).

Pumps had been misused and resources made available by the state government were not used in those with below recommended levels:

"Notice that six pumps were received and not a single one was installed. He received (referring to M1) and did not install them for the water fluoridation." (Consultant).

"The municipality (referring to P1) has sent the money back. They didn't want the pump (pump destined to water fluoridation, offered by the state government). I think the secretary did not even receive proper information about it." (Surveillance Authority).

The relationship between WTPW and the oral health municipal coordinator was closer where fluoride content was adequate. There was no standardized operational procedure

established by local government to implement the policy, in which case, implementation depended on decisions by the frontline operators. The data suggest that implementation was less linked to an institutional commitment and more to the legislation's compliance and to awareness of a few actors.

"I know that fluorine is necessary. It's only for children, right? Therefore, if you offer it to every person, you would be wasting money. Why don't you provide it just for schools, nurseries? Adults don't need it. I provide it because I have to. It's the law, isn't it?" (WTPW P1).

"I know it makes no damage. I formerly believed it was only beneficial for children, but the doctor (referring to the coordinator) said it works in adults as well..." *"The doctor always says it is important to keep everything right, and she is the one who knows better about it..."* (WTPW M2)

"But there are different coordinators. Some are involved, like the one in municipality M2, but others..." (Consultant).

Some actors involved in implementation were unsure about the role of fluoride in caries prevention. This lack of basic knowledge was not restricted to WTPW, but was also observed among primary healthcare consultants and dentists.

"They (the population) have an inadequate vision. They say: are you poisoning the water? They are setting a big fuss in the internet." "People complain about lack of attendance, particularly in urgencies." "Water? They know nothing about it." (Coordinator P1).

Both oral health team members and the oral health municipal coordinator ignored the municipality's responsibility for managing the fluoride concentration in the water supply (municipality M1). As was the case in municipality P1, WTPW and oral health professionals had never met each other.

We noticed WTPW monitored water fluoridation without formal supervision. Thus, water quality control by the municipality was in the hands of those in charge of the treatment:

"It's always about mismanagement by the municipality. Sometimes they don't even deliver a chronogram. Some municipalities really do it because they have a conscientious technician." (Surveillance Authority).

"A package was established with the mayor: The municipality provides the analysis and the pastilles. This agreement seems that sort of business: the fox taking care of the poultry yard (laughters)." (WTPW P1).

"He (referring to the WTPW) performed the analyses and was careful enough to send them to me every month." (Coordinator P2).

State level primary healthcare consultants were not familiar with fluoridation policy in their municipalities. Regional sanitary surveillance activities appeared to be the only institutional mechanism capable of monitoring the policy. However, they are restricted by the autonomy of local governments. Whilst the regional oral health coordination offered administrative support for municipal coordination, the data suggest that the interaction did not influence the behavior of non-implementers.

Discussion

This study identified conditions shaping the behavior of street-level implementers against adherence to the water fluoridation policy in small municipalities in a federal republic with three relatively autonomous government levels.

The findings contributed to illuminate the complexity of implementation of such policy at the local level, and thus, inform policy-makers about the best ways to plan and direct efforts for intersectoral coordination in similar situations.

The structural conditions of water supply systems have an important implication in the implementers' working process in municipalities. A necessary condition for policy implementation and attaining the expected outcomes is its prioritization in the actions developed by the health authorities, i.e., whether that policy is inscribed in the local managers' agenda (Howlett *et al.*, 2013).

When institutional conditions are inadequate, street-level implementers may act according to their own meanings (Lipsky, 1980; Ferreira and Medeiros, 2016). Institutional arrangements that partition roles and the organization of work can allow actors to disregard a measure that they do not believe in or consider as a priority. Conversely, good work relationships are essential to establish shared priorities between actors within an implementation team (Oliveira, 2012). Thus, lack of collaboration between WTPW and oral health teams was an obstacle during policy-implementation.

Establishment of goals can indicate the rate of progress through policy stages and help teams to evaluate and redirect their actions (Draibe, 2001). Evidence suggests intra- and inter-organizational collaborations can improve outcomes by combining effort, knowledge, and budget plans. A study of alternative arrangements for public services in Brazilian local governments showed sanitation services were less costly if aided by inter-municipal cooperation (Silvestre *et al.*, 2018). In the case of water fluoridation, administrative weaknesses and low priority at the local level might be countered by effective coordination and inter-sectoral collaboration (Corbin *et al.*, 2018).

Narratives highlighted an absence of such mechanisms, reinforcing a scenario with isolated operators who could define technical procedures based on their personal beliefs. Therefore, risks arose from how the actors interpreted and prioritized policy (Draibe, 2001). Implementers' doubts about policy benefits therefore represented an important obstacle for its provision. Since they have discretionary power, they should have a level of technical qualification to ensure coherence between their decisions and policy goals.

Lack of common knowledge between oral health teams and implementers, and the individualised health care delivery model also hindered policy-implementation. Research in Northeast England emphasized the importance of health professionals as advocates for water fluoridation, countering public misinformation regarding the issue (Hastings *et al.*, 1998).

Coordinators and oral health teams showed inconsistent awareness of the benefits of fluorides in dental caries prevention. When implementers are not backed by those they recognize as technical references, a leadership crisis can emerge (Arrette, 2001). Authorities involved in the management of public policies should be endowed with legitimacy, which did not seem to have occurred in municipalities that lacked fluoridation.

When policy implementers are not sure of its benefits, they may create difficulties that will require monitoring (Lipsky, 1980; Lotta, 2012). The results indicated the precarious monitoring mechanisms, meaning implementation became excessively dependent on the discretionary power of street-level implementers.

Successful policy implementation depends on the degree of discretionary power held by street-level bureaucracy. Yet, implementation should not depend on the decisions of single agents (Oliveira, 2012). This study depicted some situations in which implementers failed to perform their tasks. This situation reinforces the importance of external control mechanisms (Narvai, 2000; Frazão *et al.*, 2018), since operational control carried out by WTPW was not sufficient to ensure the procedure effectiveness.

The findings reflect a lack of mechanisms of inter-sectoral and federal coordination that ensure local policy implementation (Machado, 2008; Howlett *et al.*, 2013). A similar lack of coordinated activities hindered local implementation of a national policy to humanize health services (Lima and D'Ascensi, 2017).

Notwithstanding federal financial support, water fluoridation is a national policy rather than a federal program. Neither a legal apparatus, nor state level efforts were sufficient to ensure acceptable implementation in some municipalities and broader dissemination of information on the public policy could weaken barriers in locations such as small municipalities.

These, and other street-level data indicate that choices about policy delivery, more than a mere technical matter, are fundamentally political choices. Such options depend on incentives to enable up-front investments and establish requirements for preventing consequences of poor managerial processes (Brodkin, 2012). In federal republics with relatively autonomous and inter-dependent units, such strategies require institutional arrangements to ensure vertical and horizontal coordination. Together, with the continued commitment of senior political and administrative levels, these mechanisms could support implementation of population-based health policies.

This study has limitations. Research based on interviews does not offer data about participants' actions, but reports their perspectives, revealing their deeper understanding, meanings, and assumptions of the topic. We sought to ensure rigor through a careful approach to capture a wide range of perspectives and by reflecting on each stage of the study. Although the research took place in a specific setting, and other themes might emerge in other contexts, the results provide useful knowledge for future studies.

Conclusion

This study identified conditions linked to the street-level implementers' discretionary behavior toward water fluoridation. It was based on small municipalities within a federal republic at three relatively autonomous and interdependent government levels. The findings illuminate the complexity of policy-implementation and may inform policy makers on the importance of federal and intersectoral coordination mechanisms for implementing of population-based health policies in small towns with similar conditions.

The administrative weakness of local entities, a low priority given to the policy, the precarious structure of water treatment unit, isolated work relationships, low effectiveness of monitoring procedures, and local actors' uncertainties about the policy meant that the discretionary power of street-level implementers was an important obstacle for water fluoridation in small towns.

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