Water security in two megacities: observations on public actions during 2020 in São Paulo and London

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This paper discusses water security and wellbeing with public health perspective and focuses on urban areas with high population density. The analysis relates access to safe water and the multiple challenges to water security, in two Megacities: São Paulo and London, considering their differences and similarities. It illustrates how water security and health are related to Agenda 2030 Sustainable Development Goal 6 (SDG6): universal and equitable access to safe drinking water, sanitation, and hygiene; SDG3: healthy lives and well-being for all. It also presents a discussion on water security exacerbated by the context of COVID-19 pandemic, during 2020.

Keywords: water security; public health; sustainable development goal; São Paulo; London; megacities.

1. Introduction

Achieving and maintaining water security for megacities is a major and growing global challenge, complicated by historical events, existing environmental conditions, social inequalities, political processes and the climate emergency. Megacities host populations of over 10 million people, and have a concentration of population, goods and services which make them particularly vulnerable to water-related risks and therefore water insecurity (United Nations, 2018). This case study compares megacities because of the complexity involved in public policies to plan water security for dense populations affected by the challenges typical of large cities, such as slums, migration, homelessness and lack of urban infrastructure in the poorest areas.

The global urban population has grown rapidly from 751 million in 1950 to 4.2 billion in 2018, reflecting a process of rapid urbanization due to migration from rural to urban areas

and population growth (United Nations, 2018). By 2050, 68% of the world's population is projected to live in urban areas, with the most urbanized regions of the world including Latin America and Europe (United Nations, 2018). By 2030, it is projected that 725 million people (8.8% of the global population) will live in megacities, which are predicted to grow from 33 in 2018 to 43 in 2030 (United Nations, 2019). São Paulo is one of the megacities in the world with estimated population around 12 million inhabitants, in 2020 (IBGE, 2020). London had a population of just over 9 million in 2018 and is projected to become a megacity, with a population of over 10 million by 2030 (World Population Review, 2021). As London's population is close to the size of a megacity and is projected to become one within the next nine years, we refer to it in this paper as a megacity.

These cities also host technical, scientific and human resources, which can be mobilized to work against existing and future challenges, and toward greater water security (United Nations, 2018). The United Nations Sustainable Development Goal 11 focuses on making cities inclusive, safe, resilient, and sustainable (UN SDGs), and the need to provide necessary infrastructure for drinking water, sanitation, and hygiene facilities (WASH) access within cities to protect public health and achieve this goal is clear (United Nations, 2019). However, typically technical and scientific proposals of solutions to water insecurity are emphasized, whilst attention to the social, political and cultural processes are required to mobilize them effectively, or that may result in water insecurity despite such technical and scientific innovations (Jepson et al., 2017).

The gap in the literature addressed in this paper is around how the approach can be applied to understand the social and political processes which create water insecurity in megacities; how it can and must be utilized to achieve water security for populations living in megacities, and how it influences the health and wellbeing of populations living in megacities.

This paper will compare water security in two cities in the context of the coronavirus pandemic to achieve the following objectives: compare water security in Sao Paulo and London, focusing on social and political contexts; analyze the relationships between water security and public health; highlight the rationale for improving universal access to safely managed WASH for public health protection; describe social and political responses to managing the public health risk of the COVID-19 pandemic that connect with water security; highlight how water security can be actioned to move toward universal and equitable access to safe drinking water, sanitation and hygiene facilities (SDG 6), healthy lives and well-being for all at all ages (SDG 3) and making cities and human settlements inclusive, safe, resilient and sustainable (SDG 11).

Comparison of Sao Paulo and London allows us to demonstrate the application of Jepson et al.'s (2017) relational approach and its value for understanding water insecurity/security within megacities. Application of the approach demonstrates political, social and cultural processes which exacerbate existing inequalities, and the processes which are required for technical or scientific solutions to be equitable, inclusive and facilitate water security for all.

The two cities were chosen because they enable comparison of water security in the Global South versus the Global North. Published data, government information and public media communications were accessible to the research teams as Brazilian and U.K. citizens; and the research teams could draw on lived experiences of the COVID-19 pandemic in each country to illustrate interactions between water security and public health in these cities.

São Paulo and London present social and environmental issues related to water security, such as insufficiency of water reservoirs, inequalities in water use and access, large population agglomerations and expansion of homelessness. Although, São Paulo, as a global south city, presents social vulnerabilities at a more severe level, such as an elevated housing deficit

revealed by the presence of slums and other forms of precarious housing, around 14.9% of the São Paulo population live in slums (Trata Brasil et al., 2016). On the other hand, according to official analysis, “Despite being a prosperous city, London has the country’s biggest housing problems.” (Mayor of London, n.d.). The analysis claims that people need more houses to tackle chronic overcrowding problems.

However, some practices of water governance in London match with the context of São Paulo, as both global cities have the biggest urban population concentration of each country: São Paulo has estimated 12,325,232 inhabitants (IBGE, 2020) and London has 8,904,081 inhabitants (Mayor of London, n.d.).

The global COVID-19 pandemic has highlighted the importance of water security which includes and ensures access to clean drinking water and sanitation (United Nation, 2010). Besides the human right to water, prevention of water related disease has often been cited as a goal to be achieved through improved access to safely managed drinking water, improved sanitation facilities and better hygiene practices, such as handwashing with soap and water, collectively called WASH (Luby et al. 2018; Stewart et al. 2018; WHO, n.d.-a; WHO and UNICEF 2017).

The reality of the urban centers challenges water security, as people are at home in the period of the pandemic isolation and finally could notice problems with access to water in both cases. In São Paulo, families in vulnerable social conditions could feel in an exacerbated way the failures in accessing water reliably, for example due to intermittent water supplies (Manfio & Alves, 2020). In London, the national lockdowns imposed by the government in 2020 and which continue in 2021 (Vizzard et al., 2021) highlighted several other issues of water insecurity: affordability of water services; the plight of homeless people living on London’s streets without safe WASH access (Lewer et al., 2020); and challenges to regional

water supply capacity, as London commuters stayed at home and water consumption increased in the surrounding commuter belt counties. Water insecurity and the health problems associated with poor access to water, sanitation and hygiene (WASH) services are likely to be exacerbated during the current global pandemic (Staddon et al., 2020).

For example, in low-income regions, increased need for household water for regular handwashing and hygiene combined with the need to maintain social distancing, compound existing challenges for those collecting water from shared water sources or supply points, particularly those living in crowded urban areas (Staddon et al., 2020). In high income regions, social changes such as working from home and/or 'shielding' during nationwide 'lockdowns' affect water consumption patterns, challenging the capacity of water utilities to match supply and demand and therefore regional water security (Abu-Bakar et al., 2021; BBC, 2020).

At the same time, the pandemic also challenges the delivery of health services (Propper et al., 2020), creates social tensions and exacerbates common mental health problems such as anxiety (Johnson et al., 2020). Vulnerable populations, such homeless, living with health conditions, or from the poorest households living in densely populated or precarious urban areas are likely to be most affected by the economic, social and health impacts of the global pandemic. The effects of the pandemic are superimposed over existing inequalities, and so likely to both exacerbate and be exacerbated by poor access to WASH, a range of health conditions in addition to infectious disease and persisting water insecurity.

In Brazil, the specific situation of responses to the COVID-19 pandemic have been contradictory, since the Federal Government has been neglecting the pandemic, while many regional (state) executive governments and municipalities have been following WHO rules, and this enables some level of control over the pandemic in Brazil to be ensured.

2. Material and Methods

We used Jepson et al.s' (2017) framing of advancing human capabilities for water security within a relational approach, to address the lack of attention to social, political and cultural processes that determine who is and who isn't water secure within megacities. To answer the main objective of this paper, identifying similarities and differences between water security challenges and general public policies in both cities, during the first year of COVID-19 pandemic, 2020, this research group accessed documents to explore the situation of water security, referring to the cities of São Paulo and London, as described below. We did a quick review of the subject, with searches focusing on water security, London city water security, São Paulo water security, vulnerability, COVID-19 and water security, all of them for the year 2020. The review was done in official sites from government and institutions linked to the subject. The discussion of the cases was led by on-line meetings between authors from the U.K. and authors from São Paulo, exchanging empirical knowledge and official information.

Material

Information was sought in official sites of the governments and institutions responsible for water management and public health in both cities. The UN sustainable development goals guidelines for water, sanitation, public health and cities were also considered (United Nations, n.d.). We also explored recent public information on the COVID-19 pandemic associated with access to water and socioeconomic vulnerability in London and São Paulo.

Method

The paper uses a comparative method of analysis, between two cases studied during the year of 2020, observing the performance of public authorities and its policies, relating to water security. We chose the case study approach because it enables us to better understand how

and why water insecurity/security occurs within the two cities, the potential consequences of water insecurity for public health of populations living in those cities during the coronavirus pandemic and because as researchers, it is not possible to control or manipulate events and behaviors within these contexts (Yin, 2009).

The case study was developed as an outcome of a collaboration of interdisciplinary Brazilian and U.K. researchers participating in a British Council – FAPESP (Fundação de Amparo à Pesquisa do Estado de São Paulo) Researcher Links workshop titled 'Urban Water Security in Brazil: From Infrastructure to Social Action' held at the Universidade Federal do ABC in southern São Paulo metropolitan region from 21st to 25th October 2019. The workshop was used to develop the general theoretical focus on relational water security and public health in cities, and the case study chosen was on water security in Sao Paulo and London during the 2020 coronavirus pandemic. Data collected was publicly available or peer reviewed documentation of data on WaSH, water security and public health in the two cities. Data sources included documentation comprised of peer reviewed publications, reports from government and non-government organizations, information conveyed through public media channels, and participant observation before the pandemic in Sao Paulo precarious settlements, and the U.K. during the coronavirus pandemic.

3. London and São Paulo cases

This item presents the general context of the case studies of São Paulo and London cities, focusing on the public policies of water management in each of them. The London case study illustrates how extreme situations and behavior change challenges water security. The São Paulo case study presents a situation of legal framework important changes, concurrent with

the sanitary crises of COVID-19, putting in check the public system of water and sanitation and appealing for private services.

3.A. London case study

In the U.K., water companies are regulated and cannot disconnect household customers who have not paid their water bills, to some extent ensuring security of household water supply connection and WASH access for those that receive a service (Ofwat, 2016). However, it is recognized that significant life events or changes to the wider social and economic landscape (Ofwat, 2016) can place any individual in a situation of vulnerability, which may compromise their ability to pay for water and consequently reduce household water consumption. The COVID-19 pandemic has dramatically affected the social and economic landscape in London (Vizzard et al., 2021), to create concerns of rising unemployment and exacerbate inequalities which exist due to poverty and lack of affordable housing (Mayor of London, 2020; Smith et al., 2020). Access to sufficient quantities of water is required to support frequent handwashing as a core element of the government's advice for infection prevention and control (IPC), but also general hygiene, household cleaning and laundry (Howard et al., 2020). Thus, affordability of water for people with housing but who are unemployed or living on low incomes, may be a key factor contributing to household water insecurity within London. People of black and ethnic minority backgrounds are more likely to live in crowded housing, have multigenerational households, be key workers or unable to work from home, and on low incomes (Learning and Work Institute, 2020). When combined these factors create higher risk of COVID exposure and higher risk of water or WASH insecurity.

London's most vulnerable people include those who are homeless, and risk of homelessness is increasing due to the economic impacts of the pandemic leading to business closures and

rising unemployment (Learning and Work Institute, 2020). A short-term strategy was employed to place homeless people in hotels which were vacant due to enforced closures (Lewer et al., 2020). The measure seemed designed to enable all people living in London to comply with the government imperative to 'stay at home' for prevention and control of COVID infection. However, as a short-term measure for IPC, it does little to improve water security for people who will remain or become homeless once this emergency provision is stopped. This demonstrates links between housing insecurity and water insecurity, which not only poses risks for people without a home, but for the whole population if homelessness persists and creates sub-groups within communities at high risk of contracting and transmitting disease. It also highlights the importance of a long-term strategy which addresses social inequalities to achieve water and health security for all (Mayor of London, 2018). Other vulnerable groups in London include older adults or people with disability living alone, who were advised to stay at home and 'shield' during the pandemic. Due to long term or specific health needs, people shielding have increased and special access needs for water, sanitation and hygiene products (Bunn et al., 2016; Jimoh et al., 2019) at the very time that access to those items was compromised due to their own movement restrictions, panic buying and interruption to supply chains (Lufkin, 2020). In the U.K. and London, local communities made use of social media platforms combined with telephone calls and socially distanced in-person contact, to communicate with each other when isolated individuals or households needed assistance during lockdown (Chamberlain, 2020). For example, networks of volunteers formed to provide or deliver food, medicines, and hygiene and sanitation products for older adults or people with long term health conditions who were shielding and advised not to leave their homes at all. Thus, formal supply chains were bolstered by informal arrangements negotiated within local communities or streets. This highlights the importance of relational processes of water and WASH security (Jepson et al., 2017) which can bolster

formal systems of provision to meet local needs. It also echoes the reality observed by Cleaver (1998), where people draw on a range of formal and informal institutions and social relationships to secure water.

The change in living and working habits among people who would normally commute to and work in London each day, likely increased patterns of water consumption and demand within the regional counties as many more people worked from home each day (Abu-Bakar, 2021). This created a challenge to regional water utilities' capacity to meet the increase in demand (Alda-Vidal, 2020; Prothero, 2020), which coincided with a period of drought over the spring and summer (Thames Water, 2020). Thus, changes in social and economic behavior, combined with an extreme weather event, created a challenge to water security that spread beyond London to affect the commuter belt counties (BBC, 2020; Harrabin, 2020). This demonstrates the interdependence of water security between regions and at different scales, need for redundancy and resilience in WASH systems (Water U.K., 2016), and highlights that what happens in large urban centers is connected with the water security of surrounding regions. Finally, changes of water consumption patterns and the high level of water use during the quarantine show how water supply systems are interconnected at the regional scale. This suggests that to preserve public health, there is a need for flexible, resilient WASH systems that can maintain water security when shifts in regional demand, associated with changes in behavior, work and commuting habits occur (Water U.K., 2016).

3.B. São Paulo case study

Until July 2020, the national guidelines and the federal basic sanitation policy, established by the National Basic Sanitation Law (LNSB), Federal Law number 11.445 / 2007,

municipalities were responsible for formulating public policies on the subject, based on the elaboration of plans and programs that define parameters for the execution of services, in addition to fulfilling the legal demand for civil society participation. Municipal sanitation policies must define the physical structures that make up sanitation services and elaborate structural measures for policies, such as: providing, regulating and submitting the necessary services to social control. Last year, Federal Law Number 14.026/2020 updated the legislative framework about sanitation and its implication about jurisdiction of WASH-related services, opening the possibility of changing it from public to private services, and managed by regional and federal governmental instances, instead of the municipality.

In Brazilian cities, urban rivers became waste receptors and conduits based on hygiene projects, road systems and an urban drainage paradigm (Almeida, 2010). The combination of social inequality, socio-spatial segregation and no social housing policies have produced a "risk urbanization" (Rolnik, 1999). The formal and legal city is for a few in a consolidated urban context of irregularity, precariousness and self-production (Young & Hogan, 2010, p.19; Nery et al., 2019). In these scenarios illegal and irregular housing became invisible to public managers. Watersheds, riverbanks and areas above rivers became "urban land" for the low-income population: therefore, water contamination, health problems, and recurrent flooding mean, on the one hand, the degradation of the lives of the most vulnerable people, and on the other hand, the compromise of the water supply.

During the COVID-19 pandemic, slums and precarious settlements have been the most alarming and tragic foci of contagion and death. The highest degrees of vulnerability are connected to multiple dimensions of poverty: low income, precarious jobs, low education, women as maintainers of the home by themselves and, in most cases, precarious housing without such basic sanitation infrastructure.

The São Paulo metropolis can be characterized as an area of insufficient clean water availability, within a region of hydrological complexity and it has arisen tensions in the context and outcomes of the decision-making process (Torres et al., 2020). This represents a challenge to improve equity in the distribution of water in the metropolis and to reduce unequal access.

Population of the city of São Paulo is estimated at 12,325,232 inhabitants for 2020, with a high population density of 8,102 inhabitants/ km2 (IBGE, 2020.) and 2,073 irregular settlements where 14,9% of the São Paulo population lives (Trata Brasil et al., 2016). Water access by public services was served to 99.3% of São Paulo´s population in 2020, and sanitation benefited 96.3 %[1] (SNIS, 2019). However, recent reports by social organizations and social movements research and newspaper articles and media news denounce that population of peripheral regions of the city suffer from frequent lack of water in their houses, usually by the late afternoon until the next morning, and especially in slums and other irregular settlements (Mural, 2020-a; Folha de São Paulo, 2020; Brasil de Fato, 2020; Manfio & Alves, 2020).

As one of the biggest metropolises of the Global South, São Paulo became one of the main epicenters of COVID-19. The richest region of Brazil is also marked by chronic social and environmental problems, such as social inequalities, precarious housing and lack of sanitation. Peripheral districts have higher concentration of black and low-income households, who frequently have worse access to health services and cannot adequately quarantine. This is one of the consequences of the infrastructure and urban design being

[1] Data declared by sanitation companies to the National Sanitation Information System. Sanitation is the sewage collection, not considered the treatment.

exclusive, which usually benefits the real estate market to the detriment of the functionality of the cities and accessibility to public services (Alves, 2018).

Research in the 2020 first semester with São Paulo's population shows that more than 50% of the interviewed population had lack of water in their house, and most of this response was by the regions which have more irregular settlements, the South Region (68.5 % of the record) and has persisted for more than a year (Manfio & Alves, 2020). Due to the inequality of water and sanitation access added to the other factors of social vulnerability, the COVID-19 occurrences and deaths in the peripheral areas shows a lethality five times higher than in other parts of the city (Mural, 2020-b) associated with social inequalities, precarious housing, and lack of sanitation. It also highlights the need to take a longer-term view to address existing social inequalities and develop resilient WASH systems (Manfio & Alves, 2020). It should also be recalled that the routine of peripheral households residents is fraught with difficulties associated with unequal access to basic sanitation and health services, in addition to inadequate urban mobility and overcrowded public transport. Most of the residents of the outskirts of the city are employed in services that do not allow homeworking, thus making social isolation impossible during the pandemic.

The unequal access to water in São Paulo peripheries as part of the São Paulo Metropolitan Region has become recurrent. And this was evident during the water crisis that occurred between 2013 and 2015, that can be associated with inadequate governance of the complex system implemented. The water crisis brought a set of problems in terms of water security. Besides the persistent pollution of watershed areas and poor natural resource management and planning, the absence of data, transparency and lack of room for social participation in water governance are key factors that explain the unprecedented water crisis in Latin America’s largest metropolitan region (Jacobi, Torres & Gresse, 2019), Relative scarcity

constitutes a secular reality of São Paulo, given that the city is located in the riverbed, with reduced availability of water (Jacobi et al., 2015).

3C. Challenges and opportunities found in both cases

The comparison established between situations found in São Paulo and London was based on targets of the Sustainable Development Goals (SDGs) 3 and 6.

Based on SDG 3 - *Ensure healthy lives and promote well-being for all at all ages* - targets 3.3 and 3.9 were considered to analyze the cases, as those targets fit with the facts about water security and public health, including the 2020 COVID-19 pandemic. Based on SDG 6 - *Ensure access to water and sanitation for all* - targets 6.1, 6.2 and 6B were considered to analyze the cases, as those targets connect with water security concepts and social vulnerability, besides sanitation.

For São Paulo, there is a challenge to end epidemics, water-borne diseases and other communicable diseases (target 3.3) and reduce the number of deaths and illnesses from water and soil pollution and contamination (target 3.9). For London both targets can be an opportunity to address resources for improving the access to water and sanitation infrastructure including the poorest neighborhoods. On another perspective, high hydric availability is an opportunity for São Paulo, but a limitation for London to achieve, by 2030, universal and equitable access to safe and affordable drinking water for all (target 6.1). In a contradictory way the target 6B - Support and strengthen the participation of local communities in improving water and sanitation management can be, for São Paulo, a challenge because of the reduced transparency and prevalence of a technocratic approach, and simultaneously an opportunity based on a legal possibility of community participation.

The targets of the SDGs mentioned above could be illustrated by the aspects identified in the two megacities, or as a challenge to be solved by the governments or as an opportunity when it was noticed that each city overcame a situation. In the case of São Paulo, the two main targets involved represent the need to reduce vulnerabilities associated with precarious sanitation in slums and irregular settlements. This basically implies that the goal of universality of access has to be achieved as to reduce vulnerabilities mainly of the most vulnerable and create favorable conditions of local communities. The opportunities to multiply are mainly associated with the reduction of the deficit of access to basic sanitation utilities by the vulnerable communities that inhabit slums and irregular settlements, and the possibility of their reurbanization and improvement.

4. Broader conceptualization of water security, health and social learning

The 2030 Agenda (Plataforma Agenda 2030, 2020) emphasizes the importance of understanding - and acting upon - interlinkages between policy areas articulated in the sustainable development goals (SDGs). The SDG 6 composed of 8 targets, which aim at "Ensuring availability and sustainable management of water and sanitation for all" (Plataforma Agenda 2030, 2020) (SDG 6) deals with sanitation and water resources in an integrated perspective. It allows evaluation of the scenario of each country as to the availability of water resources, demands, and uses of the water for human activities, ecosystem conservation actions, water waste reduction and access to water supply, sanitary sewage collection and treatment.

The goal of ensuring water security has become one of the mobilizers of water governance, and its use has intensified since the late 2000s, promoted by international development organizations (Melo & Johnsson, 2018). For Bakker (2012) an important issue in water

security is balancing society's needs (always considering environmental justice issues) and ensuring and conserving basic ecosystem services and biodiversity. Other approaches emphasize the need for a relational approach whereby water security should not be seen as a goal, but rather "a relationship that describes how individuals, families, and communities navigate and transform water-social relationships to access the water they need and to support the sustained development of human capabilities and well-being in its breadth and scope" (Jepson et al., 2017, p.50).

This transformation of water-social relationships to achieve water security involves enabling people and organizations to participate meaningfully in water governance, not only as water users, but also as political actors (Empinotti, Budds & Aversa, 2019). And as Jepson et al. (2017) points out, this implies a shift in the focus of water security interventions away from water supply towards transformation of water-society relations, which means empowering people and social organizations to participate meaningfully as political actors in water governance, valuing practices related to collaboration and social learning.

> A social learning perspective [...] implies a change in governance style towards more collaboration and a different role of information as a means to support communication instead of just providing expert advice. Active involvement of stakeholders and the public at large can result in social learning, and this is important for achieving integrated resource management. (Jacobi, Toledo and Grandisoli, 2016, p.01)

Water security goes beyond immediate physical availability of water, as it places issues such as risks, access capacity, and the strengthening of actions based on respect for the human right to water, as inherent to water systems. When variability increases and we do not have the capacity to adapt, the results are water-related risks such as floods, droughts, and pollution, for instance. For water security with a human focus to be real and meaningful, beyond technical and political circles, it must focus on the needs of all individuals, and

especially poor and vulnerable populations who are victims of environmental injustice. Water security for all means equality, regardless of economic, social, and political disparities.

The development of technically and socially appropriate responses to this problem therefore calls for the creation of spaces for active participation and collaborative processes that enable critical reflection, both individual and collective, on the issues involved; the recognition, explanation and resolution of conflicts; and also the exchange and deepening of knowledge among the actors involved (Jacobi et al., 2015).

Social learning therefore emerges as part of an array of participatory and collaborative methodologies that articulate the social, environmental, and cultural aspects. In this way, the kind of dialogue desirable for social learning can happen spontaneously or can be promoted or improved through the design and planning of interaction (Wals, 2009). A Social Learning perspective potentially strengthens the role of cultural values or institutional settings and implies a change in governance style towards more collaboration and a different role of information as a means to support communication instead of just providing expert advice. Active involvement of stakeholders is essential and they need to be well informed and learn new skills in order to maximize the benefits of their participation (Jacobi et al., 2016).

There are several participatory tools that essentially propose structures for interaction and dialogue building, acting on specific situations and issues within a general framework of collective dynamics throughout the process. We include research action learning knowledge and citizenship practices as an intervention methodology, thus implying the involvement of the subjects of the "problem" in a process of reflection, analysis of reality, collective learning and community strengthening. Among the various participatory tools available, the World Café (Brown, 2010), Open Space (Owen, 1997) and Improvisation Games (Gerard, 2005), characterized as a process of dialogue aimed at promoting meaningful conversations and

collective creation (Wals & Schawarzin, 2012). They all represent the possibility of symmetrical conversational practices among group members, thus support learning processes and contribute to the development of individual and collective capacities (Jacobi et al., 2015).

The major challenges regarding the strengthening of dialogic bases, decentralization of practices and the co-creation of a new narrative should strengthen processes that enhance social synergies. As example, we cite initiative as *Brake the Curve* (our translation) known as *Segura a Onda*, based on *Frena la curva*, of Spanish origin, which brings together in a digital platform volunteers, entrepreneurs, social organizations and innovation laboratories to promote and organize responses to the challenges brought by COVID-19, and have been very relevant to promote co-responsible actions that move us towards the creation of new, more participatory, horizontal, communitarian and resilient realities (Jacobi et al., 2020). It is also very relevant that the knowledge base should be pluralistic and diverse to include the widest possible range of quality, potentially usable knowledge and relevant sources of wisdom, without imposing the requirement that science has only one voice. emphasizing (Waltner-Toews et al., 2020).

4.A. Challenges to water security in London

Within the U.K., pandemic related messaging has been carefully constructed to convince the public that compliance with recommended behavior changes are necessary to 'protect the National Health Service (NHS) and save lives' (Salmon, 2020).

On the whole, the public has demonstrated capacity to comply with emergency regulations and advice, and demonstrated willingness to modify their behavior, for example by social distancing, increasing handwashing, staying at or working from home where possible and

wearing face masks. Communicating these behaviors as meaningful daily occupations, which protect a highly valued public health service and saves lives, together with government social and economic support, has facilitated behavior change during the COVID-19 pandemic. Emergency measures to house homeless people in vacant hotels arguably also enabled some of the most WASH vulnerable people in London to comply with IPC measures in the short term.

However, the changes have largely been made possible by the presence of functioning WASH infrastructure which serves most of the population, and regulatory mechanisms to ensure continuity of supply from private water companies, even when households face financial difficulty (Fletcher, 2020). This highlights the importance of effective governance which recognizes that anyone may be affected by changing social or economic circumstances and become vulnerable due to unemployment, financial problems, or poor health. A population wide approach to maintaining water security for all, including the most vulnerable and those affected by rapidly changing circumstances, is essential for management of global health challenges such as the current pandemic. It also highlights the need to take a longer-term view to address existing social inequalities and develop resilient WASH systems. In particular, water security can be supported through social and political processes and WASH systems which:

- Are inclusive for all, because the spread of water washed diseases such as COVID 19 is exacerbated by allowing inequalities of WASH access to persist,
- Are participatory, to ensure that the processes which create and exacerbate water insecurity, inequality and poor health are understood by all stakeholders, and that solutions are generated with the input of the people most affected.

- Empower people to negotiate, access and use the resources they need to protect their own health as well as the health of their families, communities and therefore the whole population. Such resources may include both formal and informal institutions and social relationships that secure water and protect health.
- Foster social learning, so that people can understand and adapt to changing circumstances or mobilize to lobby as an integral part of developing effective improvements to water and WASH security over time.

4.B. Challenges to water security in São Paulo

According to Spotlight Report on the 2030 Agenda in Brazil (Plataforma Agenda 2030, 2020), the evaluation of the history of the main indices and recent measures in public policies indicates that the universalization of access to drinking water and to sanitary exhaustion is not a priority of the Brazilian State, considering a longer historical analysis. It is therefore a structural problem in the country, especially considering that these are two fundamental human rights, and with very direct correlations with other SDGs, for example, health, combating inequalities, eradicating poverty, and promoting sustainable cities.

A focus on improved access to safe drinking water confines attention to material aspects of water, such as the quantity and quality of water obtained, water source type and location, or distance of water sources from the home. Similarly, improved sanitation and hygiene is often indicated by the type of toilet facility, and the presence or absence of water and soap for handwashing (WHO & UNICEF, 2018).

Compared to other major metropolises, São Paulo city is inserted in a hydrographic basin that has a limited natural production of water, depending on some water reservoirs, and most of

its water originates in neighboring states. The region can be characterized as undergoing permanent scarcity, and considering the demand and the inadequate quality of some reservoirs and sources, this aggravates the availability of clean water, and it is to be recalled that municipalities master plans with reduced regard to water protection, and insufficient environmental concern.

The existence of different approaches to water security has to be analyzed through its multiple dimensions, and we aspects: social equity; environmental sustainability, transparency, accountability and operational adequacy, within a context of climate emergency.

However, since peripheral neighborhoods are not homogenous, a hypothesis to be analyzed is whether self-organized local actions in vulnerable communities, based on solidarity, helped to reduce the spread of the pandemic and diminish the mortality index. Lack of water access presented in São Paulo peripheries, like Heliopolis - the largest slum in this city -, demands a non-governmental effort to deal and look to solve the WASH issues in these areas. According to UNAS (union of social movements of Heliopolis community) community leadership, NGOs, private initiatives and Public Ministry acted to ask for water and sanitation company services regularly, bring lavatories on the street and conducted awareness actions with the population (UNAS, 2020). Therefore, part of the solution relies on the urgent need of the establishment of collective and collaborative practices based on multi actor participation. That implies the need to stimulate dialogue considering the recognition of the complex nature of these contemporary socio-environmental challenges, to critically reflect about human health issues, establishing common goals and shared solutions (Jacobi, Toledo & Grandisoli, 2016). Thus, the social learning approach proves to be central for WASH related problems to more deeply understand the current situation, trends and perspectives. Together,

empirical quantitative and qualitative data should be collected to verify the effectiveness of such efforts to secure water and health for vulnerable individuals and communities.

There is a need for solutions based in runoff control integrated with socially relevant housing policies and investments in sewage and solid waste collection, transport and treatment systems to reverse the scenario of water contamination, disease vector proliferation and epidemics and flooding, especially in areas occupied by precarious settlements and with poor environmental sanitation infrastructure (Mathias & Silva, 2018).

5. Conclusions

Populations that do not have adequate access to water are more exposed to health risks than others because of their social context. The highest degrees of vulnerability are connected to multiple dimensions of poverty: low income, precarious jobs, low education, women as maintainers of the home and, in most cases, precarious housing without basic WASH infrastructure. Populations most affected by insufficient access to water are mainly black populations with low income and homeless, in both case studies.

Water security must warrant universal access, as a human right and responsibility of the state, with close attention to the needs of the most vulnerable people and communities. This remains a key issue for large urban areas. Whilst the realities of day-to-day life and water security affecting the urban poor in Sao Paulo and London differ, common risk factors affecting the poorest and most vulnerable in both cities highlight the need for water security governance and social policies that reduce inequalities and address inadequate housing. Social and political processes which maintain water security for all are essential if large urban areas are to move toward achieving SDG 3 on good health and SDG 6 on water for all.

However, to promote an agenda based on water security there is a need for public participation in decision-making processes. For participation to be possible, transparency and access to information must be guaranteed so that stakeholders can take ownership of the problem and engage in both decision-making and social control of the decisions to be implemented. This indicates the need for governance models that are inclusive and allow cooperation and co-responsibility among stakeholders.

There is a challenge to enlarge and multiply dialogic and learning processes, collaborative practices and the integration of knowledge and dissociated social sectors. Those are necessary aspects for transformations towards more sustainable practices and values that promote change in local realities. Socio-technical innovations are required to stimulate the opposite of a technocratic decision strategy based purely on numbers and models. Besides, knowledge sharing and the creation of dialogue spaces are necessary to promote social learning.

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