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Savannah Miller April 21, 2022

A Qualitative Assessment of Water, Sanitation, and Hygiene in an Urban Working-Class Neighborhood of São Paulo, Brazil

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Abstract

Accessible and equitable water, sanitation, and hygiene (WASH) fundamentals are needed to slow the spread of WASH-related viruses, bacteria, and protozoa. Rapid urbanization poses challenges to the provision of adequate WASH services due to increased risk for contact with and exposure to diseases and infected individuals. This is especially noticeable in the highly urbanized Brazilian state of São Paulo, where 96.56% of the state's total population of over 44 million lives in urban areas. WASH-related diseases, including malaria, dengue, Zika, cholera, tuberculosis, and other diarrheal illnesses, have been a persistent problem in Brazil. Brazil's water and sanitation industries utilize quantitative quality indicators in assessing overall performance to achieve universal access to water and sanitation. While these measures are often embraced by policymakers as an evidence-based tool for policy decision-making, they do not always reflect needs on the ground, such as enhanced equitable access to safe water and specialized health programs addressing WASH issues for vulnerable populations. The goal of this study was to use qualitative research methods, especially thematic analysis of community ethnography field notes, to illustrate the reality of daily-life for those living in an urban-working class neighborhood of São Paulo city. By analyzing historical and contemporary WASH policies in Brazil, this research provides better understandings of inconsistencies between public policy and the reality of daily life in the context of WASH. The study has two primary questions 1) "How has the prioritization of sanitation by policymakers, both historical and contemporary, shaped the health of the urban working-class in Brazil?" 2) "How do living and working conditions among the urban working class relate to the creation and/or implementation of water, sanitation, and hygiene (WASH) services?" Findings from this study suggest that local authorities should employ a bottom-up, equity-centered lens emphasizing distributive justice when creating and implementing WASH-related public policies to ensure inequities are not overlooked.

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Introduction

Basic sanitation and hygiene are the foundation of public health and have saved countless lives, frequently serving as the first line of defense against various diseases and illnesses. The U.S. Centers for Disease Control and Prevention define basic sanitation as "having access to facilities for the safe disposal of human waste (feces and urine), as well as having the ability to maintain hygienic conditions, through services such as garbage collection, industrial/hazardous waste management, and wastewater treatment and disposal."[1] Accessible and equitable water, sanitation, and hygiene (WASH) fundamentals are needed to slow the spread of WASH-related diseases which include, viruses, bacteria, and protozoa. Basic sanitation and hygiene practices are often low-cost solutions that can be implemented in a variety of environments. The United Nations has identified access to water and sanitation for all as one of the seventeen Sustainable Development Goals (SDGs) that aim to achieve a better and more sustainable future globally.[2] Investment in infrastructure and policy-change for these basic services can reduce disease and illness, improve health outcomes, alleviate poverty, and stimulate socio-economic development.

Rapid urbanization poses challenges to the provision of adequate WASH services due to increased opportunities for contact with and exposure to WASH-related diseases and infected individuals.[3] This is especially noticeable in the highly urbanized Brazilian state of São Paulo, where 96.56% of the state's total population of over 44 million lives in urban areas.[4] The state's capital city, also named São Paulo, has a population of over 22 million, is Brazil's most populated city, and is the fourth largest city worldwide.[5] Some WASH-related diseases have been a persistent problem in Brazil, while others have diminished over time.[6] Major diseases related to unhygienic and unsanitary conditions in Brazil include malaria, chikungunya, dengue, Zika, schistosomiasis, chagas, leptospirosis, cholera, tuberculosis, and other diarrheal diseases.[7]

The provision of safe WASH services has also proven essential throughout the ongoing COVID-19 pandemic.

Brazil's water and sanitation sectors utilize quantitative indicators and benchmarks in assessing overall performance. Goal setting for reaching universal access to water and sanitation using quantitative measurements for system efficiency and quality is embraced as an evidence-based tool for policy decision-making. However, quantitative water and sanitation quality standards do not always indicate the needs on the ground, for example the ongoing distributive injustice of water and sanitation resources, including fair distribution.[8] Who has access to services and where services can be accessed are just as important as the efficiency through which services are provided when striving for universal access to water and sanitation. Additionally, many WASH utility statistics are aggregate which may overlook the realities of daily life for low- and middle-income residents of a rapidly growing urban city. More research on the experiences and perspectives of individuals could be useful in informing future service provision and policymaking.

This study has two primary questions 1) "How has the prioritization of sanitation by policymakers, both historical and contemporary, shaped the health of the urban working-class in Brazil?" 2) "How do living and working conditions among the urban working class relate to the creation and/or implementation of water, sanitation, and hygiene (WASH) services?" A narrative case study of the urban-working class neighborhood of Bom Retiro, located centrally in the city of São Paulo, will be presented to illustrate the social realities of the residents. This neighborhood has had a large presence of immigrants from across the globe since the 19th century and continues to be dominated by the textile industry, known widely as one of the major garment districts of the city.[9] This case study will be analyzed to discuss what policies and

programs could be implemented to improve the health of the urban-working class in São Paulo, Brazil. To build a better future where all individuals living in São Paulo and in Brazil as a whole, regardless of immigration or legal status, are guaranteed the right to health, a review of historical and contemporary water, sanitation, and hygiene policies and programs can be valuable as well; history provides lessons to learn, and the health of people is determined by whether those lessons are learned.

Background

Universal Healthcare and the Sistema Único de Saúde (SUS)

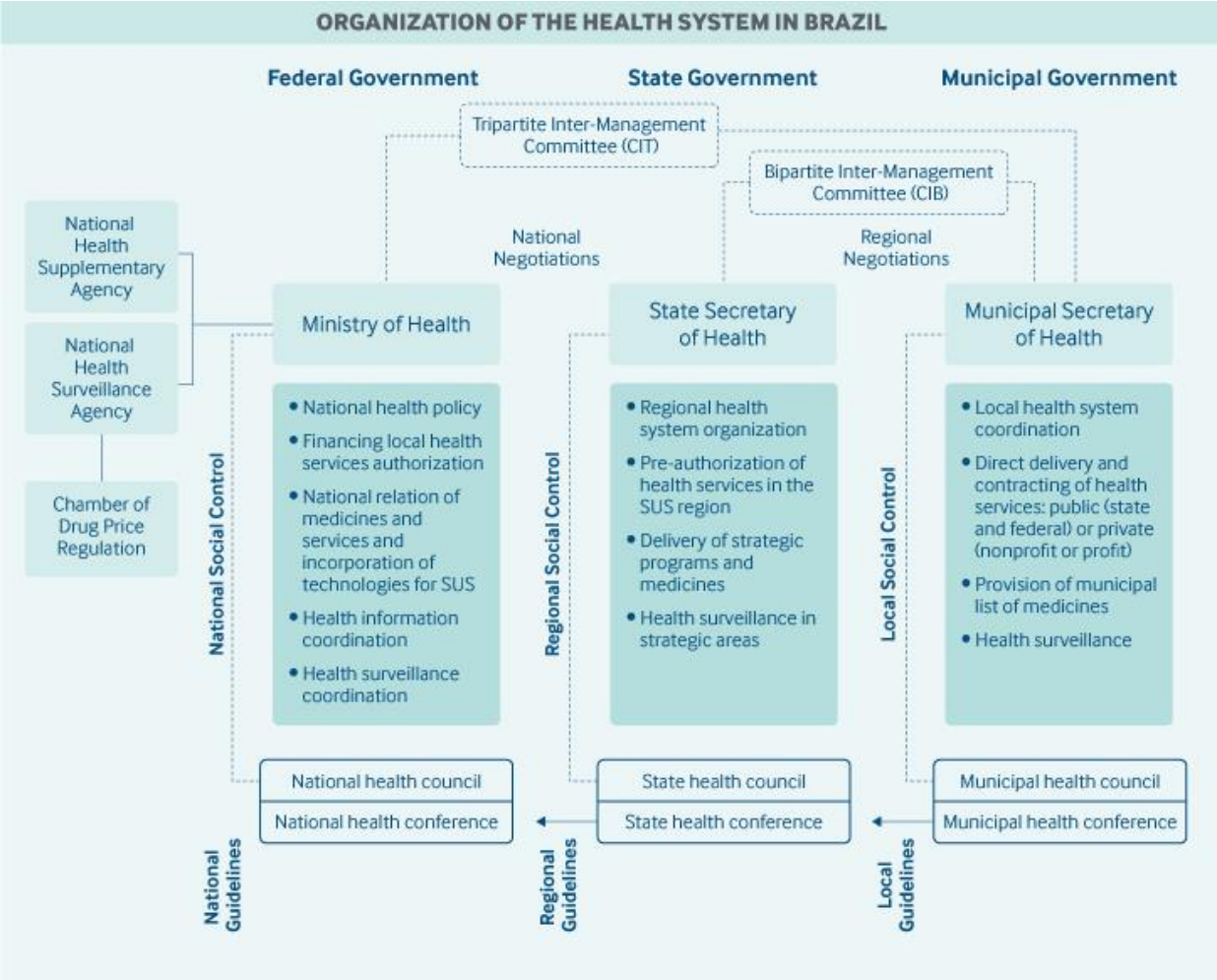
In the 1980s, Brazil re-democratized following two decades of brutal military dictatorship.[10] Social and economic justice became integral to the establishment of Brazil's new 1988 democratic constitution and health became a human right.[11] The constitution affirms "Health is everyone's right and the State's duty, guaranteed through social and economic policies aimed at reducing the risk of disease and other diseases and at universal and equal access to actions and services for its promotion, protection and recovery."[12] In short, health is a constitutional right for everyone in Brazil and is the government's responsibility. Furthermore, this new constitution paved the way for the creation of the world's largest government-run public healthcare system, Sistema Único de Saúde (SUS), which has increased access to health services for a significant portion of Brazil's population including non-Brazilian citizens.[13]

The governance and organization of SUS are based on the principles of universality, integrality, decentralization, and community participation. This led to the establishment of a national, single-payer, publicly funded health system with an additional private health sector. The entire population of Brazil can use SUS for any health service SUS provides for free that

they would otherwise have to pay for through the private health sector and about 70% of the population utilizes SUS for basic and family healthcare.[14] Contributions to SUS are made at the national, state, and municipality levels of government with the direct administration and delivery of care by the state and/or municipal governments. The federal Ministry of Health is responsible for the coordination of SUS, health policy development, financial planning, and auditing.[15] Each of the twenty-six states are responsible for coordinating strategic programs and delivering specialized services that are not under the purview of the municipalities within each state.[16] The 5,570 municipalities of Brazil utilize managerial structures (Municipal Health Departments) to administer SUS services at the local level, coordinating local health programs, and directly delivering health services.[17]

Figure 1

Organization of the Health System in Brazil



**Note.* Source: The Commonwealth Fund https://www.commonwealthfund.org/international-health-policy-center/countries/brazil

In 1994, SUS established the Family Health Program, now known as the Family Health Strategy (FHS). This program uses clinic-based healthcare professional teams that include a general physician, a nurse, a nurse assistant, and community health workers who provide comprehensive primary care such as chronic disease management, immunizations, health promotion, screenings, and maternal/child health services.[18] In 2013 the Brazilian government created the Programa Mais Médicos (More Doctors Program) to address physician shortages and increase primary care residency positions.[19] This increased the number of primary healthcare doctors by 18,000, bringing coverage to 20 million more individuals in Brazil (15% of the population), although research suggests that the health benefits of the Programa Mais Médicos were undermined by allocation of primary care doctors to non-priority areas.[20] Direct primary care is carried out in the municipalities through primary care clinics called Unidades Básicas de Saúde (UBS) (Basic Health Units). In 2015, the FHS covered about 123 million individuals, 63% of the Brazilian population at the time.[21] The FHS and UBS primary care clinics also serve many immigrants as Brazil continues to be a major center of migration. About 807,000 registered immigrants currently live in Brazil with hundreds of thousands more immigrants without formal documentation.[22,23] The services provided by SUS are available to anyone who is a resident of Brazil regardless of their citizenship or visa status.

Immigration to Brazil and to São Paulo

Brazil has had large-scale immigration from Europe, Asia, Latin America, Africa, North America, and the Middle East.[24] Rates of immigration, countries of origin, reasons for immigrating, and Brazilian immigration policies have transformed over time. Prior to European colonization, it is estimated that there were more than 1,000 denominations of Indigenous peoples in Brazil with a total population between 2-4 million.[25] Starting with Portuguese arrival

in the early 16th century, 4 million African slaves were transported, until slavery was abolished in 1888.[26] Today, there are an estimated 896,917 Indigenous people in Brazil and 65-120 million Brazilians of African descent.[27,28]

Immigration to Brazil began in 1808 with the opening of Brazilian ports and began to rapidly grow in the late 19th century/early 20th century with 2.6 million immigrants arriving in Brazil between 1890-1919.[29] Reasons for migrating to Brazil varied throughout the 19th and 20th centuries. For example, an influx of about 55,000 immigrants from Japan was a result of the United States' military occupation of Okinawa in WWII. In the 1980s, Brazil-China commercial relations were expanding while Brazil saw an increase of immigrants from China, a vast majority now living in São Paulo, working in retail, clothing production, and wholesale of imported goods. In 1991, the Southern Common Market (MERCOSUR) was established by Argentina, Brazil, Paraguay, and Uruguay and eventually Venezuela and Bolivia joined as well.[30] This promoted the movement of people between these Latin American countries; Brazil began to receive tens of thousands of Bolivians. While there are about 121,000 registered Bolivians living in Brazil as of 2015, this number is more likely closer to 1 million when accounting for those without formal documentation.[31] These are just a few examples of the numerous reasons for different populations of people to immigrate to Brazil throughout its history.

The state of São Paulo was particularly attractive for many immigrants. In the more rural areas of the state, immigrants were incentivized to settle there because of the expanding coffee-growing industry.[32] Meanwhile others were drawn towards the rapidly urbanizing capital city of São Paulo, also called São Paulo, because it posed more opportunities than some of the already established and highly populated cities such as New York and Rio de Janeiro.[33] Between 1872-1929, a period marked by European immigration encouraged by the Brazilian government, the

largest immigrant group arriving in the state of São Paulo were Italian, followed by the Portuguese, Spanish, German, and Japanese.[34] In the middle of the 20th century, specifically after WWII, new groups of European immigrants including Greeks, Polish, Russians, and Ukrainians were drawn to the more urbanized parts of São Paulo. Between 1872-1972, over half (57%) of the 5.4 million immigrants arriving in Brazil settled in the city of São Paulo.[35] More recently, from 2000-2010, the number of registered Bolivians in the city of São Paulo increased from 6,600 to almost 18,000, which was most likely closer to 100,000 when including unregistered Bolivian immigrants.[36]

São Paulo continues to be a city of immigrants and their descendants of various nationalities and religions. In the metropolitan area of São Paulo city there are: 6 million of Italian descent, 3 million of Portuguese descent, 2.2 million of African descent, 1 million of Arab descent, 665,000 of Japanese descent, 400,000 of German descent, 250,000 of French descent, 150,000 of Greek descent, 120,000 of Chinese descent, 120,000 to 300,000 Bolivian immigrants, 50,000 of Korean descent and 40,000 Jews.[37] Despite the Brazilian constitution guaranteeing healthcare to all individuals in Brazil regardless of legal status, some immigrant populations face insufficient access to healthcare services as well as inequalities in their living and working conditions. This is discussed further in the context of water, sanitation, and hygiene (WASH) below.

WASH in São Paulo

During the First Republic (1889-1930), public health and rural sanitation policies began to emerge in Brazilian society, which was in part due to increases in migration between cities and countries as well as heightened urbanization and industrialization.[38] The interdependence of humans from all levels of society became more pronounced, as public health issues became

issues of the well-off and poor alike. Communicable diseases exemplified this interdependence of social classes; it became more obvious to the social elites that they could not enjoy social immunity against these illnesses and were therefore motivated to take political action.[39] During this time, Brazil's government was structured in a way that each state was independently responsible for itself while the federal government would handle international relations. With the surging complexity of this nation, communicable disease posed a major problem to Brazilian society that surpassed the ability of its current constitutional framework to address. Epidemics of yellow fever, cholera, and the Spanish flu during the mid-nineteenth century and early 20th century are commonly cited examples of the social, political, and cultural impacts of communicable disease on society.[40] These impacts of communicable disease can still be seen today with the ongoing COVID-19 pandemic, which has to date killed over 660,000 people in Brazil.[41]

Historical timeline related to water, sanitation, and hygiene:

- **1892-1903:** São Paulo was at the forefront of the Brazilian health reform. The São Paulo Health Service, the most comprehensive public health and hygiene service in Brazil, was created in 1892. Several research institutes based in São Paulo were also created, namely the Bacteriological Institute in 1892, the Butantan Institute in 1901, and the Pasteur Institute in 1903.[42]
- **1903-1909:** A focus on urban sanitation, specifically in Rio de Janeiro and São Paulo, where yellow fever, bubonic plague, and smallpox epidemics were raging.[43] Many of the sanitation and hygiene policies of this time were centered on mitigating the atrocious sanitary conditions within the city and its ports so as to reduce any negative impacts felt

on foreign trade.[44] Compulsory notification of infectious diseases, sanitary inspections of homes and places of work, and sanitary supervision of food were made public.[45]

- **1910-1930:** A focus on addressing rural sanitation and hygiene issues, battling communicable diseases more prevalent in rural populations such as hookworm, malaria, and Chagas's disease.[46] Also a period of intense São Paulo state focus on immigrant populations and the poor in growing urban areas. Throughout this time, sanitation and hygiene became a political issue of the country, coinciding with an increase in public recognition of government responsibility for the health of the nation. Furthermore, by 1920, most of São Paulo's municipalities had water supply systems, and more than half had sewage systems.[47]
- **1930s:** Some Brazilian states created new administrative structures for sanitation services in which state and federal departments formed a centralized administration.
- **1940s:** In 1940, the Sanitation Commission of Baixada Fluminense (a region in the state of Rio de Janeiro, in southeastern Brazil) is transformed into the National Department of Sanitation Works (DNOS) and operates throughout Brazil. In 1946 the National Department of Sanitation Works is reorganized to begin overseeing all sanitation services, not only those related to drainage and controlling floods.[48]
- **1953:** The First National Financing Plan for Water Supply in which the municipalities became the first alternative to direct administration; the service structure gained administrative autonomy.[49]
- **1960s:** By the start of the 1960s, there are seventeen different federal agencies working in the sanitation area. These included the National Department of Sanitation Works (DNOS), the Public Health Special Service Foundation (SESP), the National Department

of Rural Endemics (DNERu), and the Sanitary Engineering Section of the Ministry of Health.[50] In 1962, DNOS underwent a major reorganization and was expanded, therefore becoming responsible for the implementation of national policy on sanitation.[51]

- **Mid-1960s and onwards:** Rural populations became increasingly more attracted to urban cities as social policies aimed at development and assistance continued to lack. By 1970, Brazil's degree of urbanization was 56%.[52]
- **1971:** The National Water and Sanitation Plan (PLANASA) was created to establish guidelines and defined sources of funding for water supply systems at the regional and state levels. Large investment in resources contributed to a significant increase in the water supply, subsequently improving quality of life. However, unity in integrating sanitation services was lacking. These included supplying the population with treated water, collecting and treating wastewater and sewage, implementing effective drainage systems, and vector control. This plan also did not address the continuing social inequalities across the country. Investments in the water and sanitation sectors were preferably made in more urbanized and developed regions, areas where a return on investment would be more guaranteed. [53]
- **1988:** Brazil's new constitution declares that health is a right for all and that it is the duty of the national government to provide health activities and services. It also grants the federal government the power to establish a national system for managing water resources.[54]
- **Mid-1990s and onwards:** An increase in private participation in the water and sanitation sectors is seen. The National Secretariat for Sanitation encouraged more competition between the public and private sectors.[55]

- **2000s:** The regulatory model for the water and sanitation sectors becomes more decentralized. Several water and sanitation sector regulatory agencies are created and include state, intermunicipal or municipal regulation.[56]
- **2020:** By October 2020, there were 72 water and sanitation sector regulatory agencies in Brazil functioning with a hybrid regulatory model. In this hybrid model providers make contracts with municipalities that own the service; state water and sanitation companies sign program contracts with municipalities while private water and sanitation companies sign public-private contracts with municipalities.[57] This hybrid model led a lack of coordination in monitoring, between contractual and discretionary regulation.[58] To address this, law No. 4162., also known as the new law on water and sanitation, was published on July 15, 2020, which updated the legal framework and brought in more competition for the WASH sector to further incentivize private sector participation.[59]

Universal and accessible healthcare is, in theory, an efficient and effective healthcare structure to address public health issues such as infectious disease control and prevention, food and water security, sanitation, and waste-disposal. It is valuable to identify the improvements in health outcomes and service accessibility in Brazil since the inception of its universal healthcare system, SUS, in 1988. In the thirty-four years since the declaration of health as a constitutional right, Brazil has seen improvements in health outcomes, such as life expectancy at birth increasing from ~65 years to ~76 years and infant mortality rate (per 1,000 live births) decreasing from 56.4 to 12.4 from 1988 to 2019.[60,61] Expanded primary health care and the Family Health Strategy (FHS) have led to declines in avoidable hospitalizations, reduced racial inequalities in mortality, largely improved general access to water and sanitation, and increased immunization coverage.[62] It is also crucial to recognize that even today not everyone in Brazil

has equitable access to health services and public health issues related to WASH. Researchers have expressed concern for the sustainability of SUS, with demographic, epidemiological, political, and social changes threatening its future performance, which have been highlighted recently during the COVID-19 pandemic and extreme right-wing presidential administration under Jair Bolsonaro.[63]

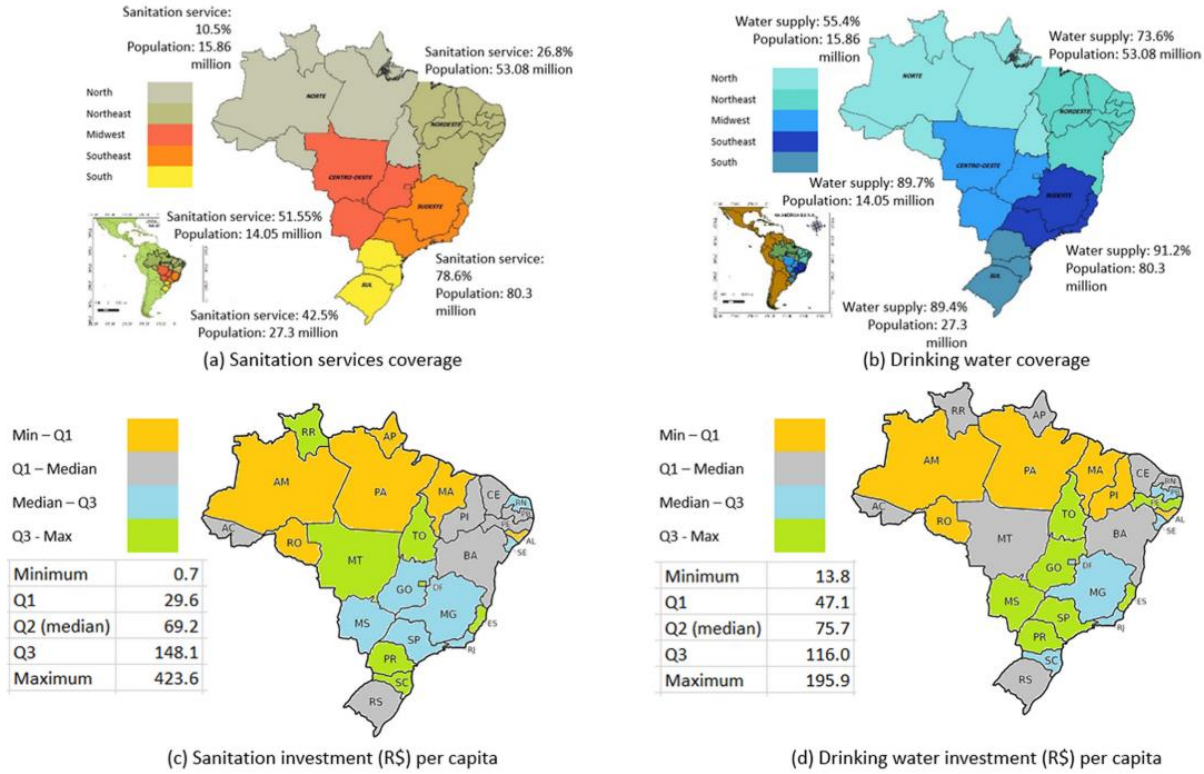
In comparison to the other regions of Brazil, the Southeast, which includes the state of São Paulo, has better WASH coverage in general.[64] 78.6% of the Southeast's population has adequate coverage for sanitation services compared to 51.55% in the Midwest, 42.5% in the South, 26.8% in the Northeast and 10.5% in the North.[65] Furthermore, 91.2% of the Southeast's population has adequate coverage for drinking water compared to 89.4% in the Midwest, 89.4% in the South, 73.6% in the Northeast, and 55.4% in the North.[66] Many aggregate statistics show that on average, those living in urban areas experience better access to health services, education, water and sanitation, and other essential services in comparison to their rural peers.[67] This so-called "urban advantage" in which urban dwellers earn higher incomes, have better infrastructure, and live closer to essential services overshadows its paradoxical nature. Rapid, unplanned urbanization can thwart the benefits of urbanization because it leads to unstable and insecure housing which have lower resilience to economic and natural stressors and may be excluded from accessing governmental services.[68]

Urban dwellers with lower socio-economic status and/or informal residential status are at increased risk for environmental and health hazards and mismanaged waste and wastewater which can be exacerbated by climate change.[69] Many people living in the urban areas of the Southeast such as the city of São Paulo experience unfavorable living and working conditions, making them more vulnerable to WASH-related diseases. According to Brazil's Bureau of

Statistics, about one quarter of the city of São Paulo's population lives in poverty, with almost 40% of the urban population experiencing low living standards, about 37.9% with average living standards, and less than 24% with good or very good living conditions.[70] The health-related disadvantages to living in a highly urbanized state and city should not be overlooked when comparing the supposed superior WASH and other health service coverage in the Southeast region to other regions in Brazil. An investigation into water, sanitation, and hygiene priorities and developments across Brazil over time is useful in better understanding this urban paradox in São Paulo, specifically focused on basic sanitation.

Figure 2

Regional Differences in Coverage and Investment in Sanitation and Drinking Water Supply



Note. Investment updated to 2017 prices. Original source: Ferreira, D.C., Graziele, I., Marques, R.C., & Gonçalves, J. (2021). Investment in drinking water and sanitation infrastructure and its impact on waterborne diseases dissemination: The Brazilian case. *Science of the Total Environment, 779*(2021), 146279. Data source: the authors based on data from Sistema Nacional de Informações sobre Saneamento and Trata Brasil, URL: www.painelsaneamento.org.br

Methods

Review of Policies

Quantitative data on hygiene and sanitation policies throughout Brazil's history is limited and not uniform so primary and secondary sources are used to understand sanitation and hygiene policies and programs. Official legal and technical documents and various media sources pertaining to water, sanitation, and hygiene legislation and programs in Brazil with a specific focus on São Paulo were reviewed. The review included official government websites and legislative data from the Federal Government (www.planalto.gov.br) and the Chamber of Deputies of Brazil (https://www2.camara.leg.br/legin/fed/decret/1970-1979/decreto-84219-14-novembro-1979-433518-publicacaooriginal-1-pe.html). To find relevant legal documents, key words such as saneamento (sanitation) and names of known programs and policies including Programa de Interiorização de Ações de Saúde e Saneamento (Program of Interiorization of Health and Sanitation Actions) were used. The review also included news media sources such as Time Magazine.

Qualitative Data Collection

Sociologist Dr. Emily Pingel conducted a community-based ethnography in São Paulo's Bom Retiro neighborhood from August 2018-October 2019. She gained access to the UBS primary care clinic in Bom Retiro through professional connections to the director and a physician. Her ethnographic field work included participant observation and in-depth interviews, both semi-structured and unstructured, with health professionals and patients to explore how community health workers (CHWs) navigate relationships and interactions with immigrant patients. During the period of data collection in São Paulo, Dr. Pingel spent over 400 hours

engaged in participant observation, primarily in Bom Retiro, and at community health events in different parts of the city. A typical day of participant observation could include sitting in with a physician for patient appointments, following CHWs on home visits, or joining a team meeting in the clinic's small conference room. Dr. Pingel walked with CHWs to their micro-areas in the neighborhood and visited with single patients or entire families. CHWs would do tasks such as registering new patients, passing along information about upcoming appointments, and checking vaccine records. While conducting this research, Dr. Pingel kept detailed field notes as she engaged in participant observation and attending community events. These field notes were used as the source of data for the secondary data analysis that was conducted to build a narrative case study of the living/working conditions of Bom Retiro.

Discussions with Dr. Emily Pingel and thesis research advisor Dr. Jeffrey Lesser led to the development of relevant search terms related to water, sanitation, hygiene, working and living conditions, environmental health, nationalities, countries of origin, and religions that would be found in the field notes. A codebook in the qualitative coding software MAXQDA was then developed with these terms. Relevant parent codes were created which were "Living/Working Conditions," "Names & Programs," "Country/Population," "Agents of Disease," "Infectious Diseases & Prevention," and "Sanitation." These parent codes were used to code the relevant data as the data were read. Once relevant data were identified through coding, thematic analysis was performed, which is detailed below.

Qualitative Data Analysis

While quantitative data illuminates the prevalence and incidence of disease and injury, qualitative data can describe peoples' experiences, discourses, and how they display their own thoughts and feelings, therefore contextualizing the health outcomes of interest. Because this

data set is composed of one researcher's ethnographic field notes, the analysis of the data sought to build a narrative of the living and working conditions of the Bom Retiro neighborhood with a WASH-specific focus. The COVID-19 pandemic halted the ability to travel to Brazil to record new observational data or feasibly interview key informants living there.

Recurring patterns in the data were identified, analyzed, and described using inductive thematic analysis. An inductive approach is one where themes come directly from the coded data, so that the identified themes are more closely linked to the original data.[71] This differs from deductive analysis in which pre-existing theories are tested and used to identify themes of interest with a researcher-driven focus.[72] With the inductive approach, themes are purely data driven so they may not reflect the researcher's original interests when collecting the data and is typically a more expansive analysis of the entire data set.[73] Furthermore, this thematic analysis was also used to refine theories from this data originally discussed by Dr. Emily Pingel in her dissertation with a specific focus on WASH.

Data was coded line-by-line using the parent codes and initial in-document memos were written. The coded data segments and associated memos were examined for possible broader themes using inductive analysis. After the data were read, coded, and memoed, inductive themes were identified that helped refine existing and generate new constructs and explanations of the daily life of the urban-working class in Bom Retiro with a WASH-specific lens. Some data were descriptive in nature and used to provide context for the case study. This included descriptions of the structure of the primary care clinic in Bom Retiro, the scope of work of WASH-related CHW groups, working/living conditions within textile shops, homelessness as a health issue in São Paulo, varying formality of housing, and water crises in São Paulo. Other data were more

nuanced and open to interpretation as inductive themes. These included spaces of health and racialization.

Results

Historical and Contemporary Laws and Policies

The Sustainable Development Goals (SDGs) of the United Nations are recognized internationally as blueprints for achieving better health outcomes for all. As one of the founding members of the United Nations, Brazil has committed itself to working towards achieving these SDGs. One of these SDGs is Goal 6 which seeks to ensure access to water and sanitation for all by 2030.[74] Brazil and specifically São Paulo have seen improvements in WASH, however it is important to address accessibility, availability, and quality to ensure sustainability of WASH services.

In many cases, informal settlements in urban areas are excluded from assessments and monitoring of WASH while the concentration of people living in these areas continues to grow. The state of São Paulo has the largest number of households in informal settlements and is the most urbanized state in all of Brazil.[75] A challenge in achieving universal sustainable WASH in São Paulo, and all of Brazil, is improving and expanding the provision of WASH services to vulnerable areas, which may be complex depending on the existing infrastructure and governance. The following discussion is of WASH policies and programs in Brazil and São Paulo and their success, or lack thereof, to achieve access to water and sanitation for all. This is not an exhaustive list of pertinent WASH policies in Brazil's history but have been identified as defining policies and programs for how WASH has been prioritized in Brazil and what has worked and not worked for all actors involved. The discussion section reviews the existing

policies on their effectiveness, which can help inform the applicability of WASH policies and programs in an urban-working class neighborhood and what improvements could be made.

- **PLANSA (1971)**: The first major public policy for WASH services in Brazil was the National Water and Sanitation Plan (PLANASA) which was launched in 1971. PLANSA established guidelines and defined sources of funding for water supply systems to be constructed at the regional and state levels, which resulted in the creation of state companies in almost all Brazilian states.[76] The focus of PLANSA was on the provision of water but was terminated in the 1980s with the fall of the military dictatorship. When the constitution was rewritten in 1988, it stated that health was a human right that included the right to treated water and waste collection.[77]
- **Sabesp (1973)**: The Companhia de Saneamento Basico do Estado de São Paulo (Basic Sanitation Company of the State of Sao Paulo – Sabesp) is one of the world's largest sanitation companies in terms of total population served. This mixed capital corporation was founded in 1973 and is currently responsible for supplying water, collecting and treating sewage in 375 municipalities in the state of São Paulo.[78] Sabesp accounts for about 30% of investment in basic sanitation in Brazil, supplying 28.6 million people with water and 24.9 million people with sewage collection.[79] It has also committed to investing about R$21.0 billion for the 2021-2025 time period in order to focus on expanding water availability and security, without disturbing any advances made in sewage collection and treatment rates.[80]
- **Basic regulatory framework law (2007):** In January 2007, law no. 11.445, known as the basic sanitation regulatory framework, was published. This law established the national guidelines for basic sanitation and federal basic sanitation policy. Several fundamental

principles are outlined in this law. They include universal access to public basic sanitation services; policies for urban and regional development, housing, poverty mitigation and eradication, environmental protection, health promotion and other policies of relevant social interest aimed at improving quality of life, for which basic sanitation plays a determinant role; and integrality, the whole set of activities and components of the several basic sanitation services, providing the population with access, according to its needs, with maximum efficacy of actions and results.[81]

- **PLANSAB (2013):** The National Sanitation Plan (PLANSAB), published in 2013 and revised in 2019, defines specific goals to universalize basic sanitation access in Brazil by 2033. It includes the integrated planning of four main components: supply of drinking water, sanitary sewage, solid waste management, and urban rainwater drainage.[82] PLANSAB estimates investments of approximately R$ 508.4 billion ($100.6 billion USD) over the 20-year period of 2013-2033.[83] Furthermore, this plan recognizes the need for increased federal public investment in addition to private investments in the WASH sector of Brazil; however given the current pace of WASH infrastructure development, achieving universalization of basic sanitation is not feasible by 2033.[84]
- **New law on water and sanitation (2020):** To address the slow progress towards achieving universalization of basic sanitation by 2033, law No. 4162., also known as the new law on water and sanitation, was published on July 15, 2020, which updated the legal framework and brought in more competition for the WASH sector to further incentivize private sector participation. Objectives of this are to bring regulatory uniformity to the sector as well as promote best practices since WASH regulations in Brazil are issued by over 50 municipal, state, and regional agencies that do not always

work coherently.[85] This new framework transfers regulatory power from the disjointed municipal, state, and regional regulations to the Agência Nacional de Água (National Water Agency), also called ANA, a governmental entity housed in the Ministry of the Environment. A specific change in the WASH sector from this law is the end of program contracts. Previously, state-owned sanitation companies and municipalities could directly sign a contract for provision of public basic sanitation services. Now, there is a bidding process for these contracts to help enhance competition in the sector, "which can contribute to promote efficiency in state-owned companies and to increase the presence of private agents."[86] A question that remains is whether the increased private participation that this new framework promotes will enhance accessibility to basic sanitation services to the most vulnerable populations. This is where a narrative case study of an urban working-class neighborhood in São Paulo can be useful. This case study can provide a look into the daily life of residents of Brazil with varying degrees of access to adequate WASH services and living/working conditions.

Narrative Case Study of Bom Retiro

Introduction

The qualitative analysis of the community-based ethnography field notes data helped create a narrative case study of the urban working-class neighborhood of Bom Retiro in São Paulo, Brazil. This case study exemplifies how public policies are interpreted locally at the district level. Simply looking at the broad verbiage of public policies does not inform us of the daily lives of individuals living in Bom Retiro and São Paulo. Furthermore, these lived experiences are overlooked by the aggregate statistics used to inform WASH public policies. A

difference may exist between what a policy says and how people live it. The implications of this could show gaps in basic water and sanitation service provision, accessibility, and quality.

The narrative case study begins with describing characteristics of the Bom Retiro neighborhood itself and the structure of the SUS-affiliated primary care clinic there. The scope of WASH-related work of the community health workers at this clinic is then detailed, which includes the Programa Ambientes Verdes e Saudáveis (Green and Healthy Environments Program) and the internal group on dengue. Two groups of people are identified as vulnerable populations to WASH related health issues and discussed. These groups are residents living and/or working in "oficinas" and individuals experiencing homelessness or other informal housing. A major WASH issue in São Paulo identified in the field notes were water crises which is discussed in the context of the field notes and the most recent water crisis. The narrative case study then shifts into discussing inductive themes, some refined from Dr. Emily Pingel's dissertation with a WASH-specific lens. These themes include spaces of health and racialization.

Bom Retiro and Structure of Local Primary Care Clinic

Bom Retiro (Good Retreat) is a north central neighborhood of São Paulo city where many immigrants have settled since the 19th century. The largest contemporary foreign populations include Bolivians, Paraguayans, Chinese, and Korean. About half of the neighborhood's population identify as non-white and a little over 50% of the population are middle-class, the remaining being working class or poor.[87] Bom Retiro is also considered one of the major garment districts in the city, with people traveling from all over the city to shop for various textiles. Many buildings are comprised of a public-facing garment shop on the first floor, and upper floors serving as workshops with sewing machines and a myriad of fabrics to be sold in

the shop below. Frequently, working and living conditions intermingle as those working in the workshops also live above or behind the workshops.

Many residents of Bom Retiro receive their primary healthcare through their local Unidade Básica de Saúde (Basic Health Unit), UBS-BR for short. Dr. Emily Pingel describes the UBS-BR primary care clinic where she conducted part of her community ethnography:

> *"The primary care clinic can be found at the end of the main retail street running through the neighborhood. It is in a small one-story building resembling a house with an accessibility ramp in front. To the left is a window where a pharmacist sits, filling prescriptions. Inside the building is a single hallway, lined with benches, on which patients are seated when waiting to be seen. There are about five exam rooms, a meeting room (which also doubles as storage for medical files), and the reception area at the front. The clinic...has the feeling of a destination, as it sits somewhat awkwardly at the convergence of four streets. During clinic hours, people mill about the front of the building or sit on outdoor benches."-Dr. Emily Pingel, 2021*

The UBS-BR primary care clinic includes five teams made up of health care professionals. The number of teams at a particular UBS depends on the size of the population that the UBS is serving. There are approximately 36,000 people in the Bom Retiro territory but not all utilize the services of the UBS-BR primary care clinic. About 20,000 of these people are registered at the clinic, therefore each of the five teams at the UBS-BR primary care clinic serves around 4,000 people. Each of the five teams covers a territory within Bom Retiro and are named a specific color (i.e., green, red, black, yellow, or blue team). The community health workers (CHWs) on each team go into their assigned community area to check in on their patients living there. Each CHW must complete 210 home visits per month, as dictated by their contract with the private health organization that the municipal government of São Paulo has contracted to administer SUS.[88] Each CHW is responsible for conducting these home visits in their assigned

microregion within the larger region their team serves. CHWs serve as community liaisons and do tasks on home visits such as registering new patients, sharing information about upcoming appointments, and checking vaccine records.[89]

WASH-Related CHW groups

Some CHWs are also involved in special programs or teams sponsored by the São Paulo municipal government such as the Programa Ambientes Verdes e Saudáveis (Green and Healthy Environments Program), also called PAVS. In 2008, this program was incorporated into the Family Health Strategy of SUS in São Paulo with the aim of strengthening management of environmental health issues that impact the health of the population.[90] PAVS has a team of three technicians at the central level, five Regional Managers and 46 Local Managers in the territories and is executed at the level of UBS primary care clinics throughout São Paulo.[91]

Throughout Dr. Pingel's ethnographic field work, she recorded observations of and conversations with the PAVS CHW at the UBS-BR primary care clinic. The PAVS CHW attends different community health events such as vaccine events at metro stations, in apartment buildings, and in places of worship to promote environmental health and how residents can protect themselves and others from environmental health hazards and diseases. At a yellow fever vaccine campaign event, the PAVS CHW showcases a centipede, tarantula, cockroach, snail, and a clear jar with water that holds live mosquito larvae. At another yellow fever event at a local church, the PAVS CHW hands out pamphlets and talks to people about the yellow fever vaccine and getting it at UBS-BR primary care clinic. She also mentions the importance of getting rid of sources of standing water where mosquitoes that spread diseases such as dengue breed. Another specific sanitation issue under the purview of PAVS is hoarding because it attracts pests like

roaches and rats. When hoarding reaches a certain degree of severity, the state can intervene and environmental health professionals such as the PAVS CHW help mediate the issue.

Dengue is a mosquito-borne illness of concern in São Paulo since urbanization creates an ideal environment for the growth of mosquito larvae. Given this, another specialty group of CHWs is the internal group on dengue. Dr. Pingel describes the scope of work for this group:

> *"Next, Rafaela from vigilancia sanitaria* [health surveillance] *for SP-Centro gets up to give a presentation, complete with power point. She talks about arboviruses. She tells the crowd that all of the ACSs* [CHWs] *have been trained in how to deal with dengue. Dengue is endemic and cyclical – cases seem to peak every five years. If this follows, then 2020 will be a peak year, which makes the work she's doing this year with her team all the more critical. She says that each unit has "um grupo interno sobre dengue"* [an internal group on dengue] *– at the post, this consists of Roberta, Vitória, and Sebastian from VS. She talks about what her team does – how they put together all of the data on suspected and confirmed cases of dengue. They know which neighborhoods have the most larvae, and they go to those areas and go house to house with pesticide. They create "pontos estrategicos* [strategic points] *(PEs – which are often abandoned buildings or places they know are likely to have larvae but that aren't being overseen by anyone) and imobiliarios especiais (IES)* [special real estate]*, which are buildings with many many people that are also known to have a lot of larvae. When there is a confirmed case of dengue in an apartment building, her team goes in and they "nebulize" the common areas and put poison throughout the building. But sometimes, some buildings won't let them in – she mentions that this is especially a problem in Higienópolis, where the porteiros* [doormen]*, even knowing who they are, won't let them in. Her team also handles denuncias of agua parada (standing water) – these are especially a problem when the building is abandoned, because then they have to get permission to enter, if there are locks on the building, etc. and it can take a long time.* ***They are severely understaffed – and part of the team has gone on strike twice in the past year.*** *There are 41 agents." -Dr. Emily Pingel, February 2019*

This preventative work takes on a particular significance as there is no effective vaccine for dengue given the fact that there are different serotypes of the virus.[92] In 2021, health officials in São Paulo reported about 139,400 dengue fever cases, including 58 deaths. These numbers for dengue are likely to worsen, as are other mosquito-borne illnesses, with climate change and habitat destruction.[93]

Oficinas

Basic sanitation and personal hygiene are critical in maintaining a safe and healthy workplace. For some residents living in Bom Retiro, their occupational and home health overlap because they live and work in informal small textile factories, “oficinas” in Portuguese. Dr. Pingel asked team members at the UBS-BR primary care clinic who in the neighborhood works in these oficinas. People answered that Koreans own the shops and Brazilians work as salespeople in the front shop while Bolivians and Paraguayans work in the oficinas. It is claimed that Bolivians and Paraguayans do not work in the public-facing shops because when they arrive, they come with the idea of working in the oficinas, and so trying to work as a salesperson would be trickier and more “unstable.” They also often do not speak Portuguese. Furthermore, they are attracted to working in the oficinas because they get housing and food, in addition to pay. These oficinas, places of both working and living, have a unique situation for WASH related issues because there is no clear delineation between home health and occupational health. Therefore, policies that may relate to hygienic and sanitary living or working conditions may need to be considered concurrently.

One WASH related issue specific to working and living in an oficina is the increased risk of tuberculosis (TB). TB is a bacterial disease affecting the lungs that is spread through the air after an infected person coughs, speaks, or sings.[94] Some research suggests that poor ventilation of rooms may influence the risk of TB spreading from one person to another and encouraging natural air flow could reduce the likelihood of TB being spread.[95] Some of the working/living conditions of the oficinas have been described as hot and stuffy, with CHWs commenting on how the workers should be careful since they are at risk for TB. Dr. Pingel describes this in a visit she took with two other CHWs to an oficina in Bom Retiro:

"We walked up a steep staircase in total darkness. Amanda turned to me and told me to be careful – she looked apprehensive. When we got to the top, we rounded a corner and saw two rooms – a larger one in back where eleven people (8 men, 3 women) were doing various oficina tasks (piece work, steam ironing, flattening, sewing). Jessica was waiting for us in the smaller room in the front. The rooms walls were stacked nearly six feet high with trash bags full of fabrics – there were probably about 50 of them. Jessica, a Paraguayan woman (as were all of the other workers there), was white, about my height, with light brown hair. Jessica has been having tummy pain and thinks she might have an infection of some kind – that's why we've come. ***The rooms up here must be over 100 degrees. It's stifling.*** *There is a single fan in the larger room – it's blowing hot air. And the windows at the front of the large room, facing the street, are paneled. About half are open, but* ***the air is dead still.*** *The workers occasionally look up but otherwise mostly ignore us. The two men closest to me are ironing pink and blue linen shorts. When they finish ironing a pair (about every twenty seconds), they stack them on large yellow crates turned on their sides so that they're about 3 feet tall. We walk to the back where a younger man (about 25) and an older gentleman, Senhor Domingos, about 65, are sitting doing piece work. Amanda approaches and asks the younger man if Senhor Domingos has gotten his yellow [fever] vaccine. (no). She asks if any of them have had a cough or fever. (no.) She tells them that they must be careful, "because it's really abafado [stuffy] in here" and they're at risk for TB. She tells them to go to the post if they start coughing. The man agrees that he will. There are two bathrooms between the two rooms, one with a showerhead, one without, the small trash is overflowing with toilet paper. The rooms are generally dark and not well ventilated. There is a single bulb in the front room, whereas fluorescent lights hang overhead in the front room." -Dr. Emily Pingel, January 2019*

Most people with TB will need to take TB medicine for at least six months to be cured. Patients with TB in Bom Retiro are expected to go to the UBS-BR primary care clinic in person to receive treatment since CHWs do not provide medical care to patients and therefore cannot bring TB medicine to patients on their home visits. TB patients in Bom Retiro receive a "cesta" every month as an incentive to continue their course of treatment. A cesta means basket in English and they are typically given out by charity organizations and the government. They can include basic commodities such as rice, beans, coffee, and sugar.

Homelessness and Other Informal Housing

People experiencing homelessness or unstable housing are a particularly vulnerable population to WASH-related health issues in Bom Retiro and São Paulo. Homelessness and unstable housing were observed issues in the field notes and recent data have shown that homelessness has increased by 31% in São Paulo during the COVID-19 pandemic.[96] People experiencing homelessness are not registered at a single primary care clinic. Instead, the primary care clinics work with BomPar to attend to those experiencing homelessness. BomPar is non-profit Catholic organization that, through partnership with the Municipality of São Paulo, runs 52 service units and attends to over 10,000 people every day.[97] Dr. Pingel attended a BomPar conference and recorded these observations about homelessness while listening to a woman from the Defensoria Publica (the public defender's office) speak:

> *"The DP* [public defender's office] *defends the rights of those who can't access justice because of social vulnerability. They work to guarantee access to housing with dignity and to construct a democratic city. They work in partnership with social movements around moradia* [housing]. *There are roughly twenty thousand homeless people in São Paulo, and there is a need for more than 400,000 living spaces. One of the reasons that owners keep the buildings empty is to negotiate the IPTU* [Imposto Predial e Territorial Urbano/ Urban Property and Territorial Tax] *at the end of the year (basically the thing where if you don't pay taxes, then government rewards you by giving you a discount when you finally do pay it.). And there currently isn't really a clear housing policy for the city, which is exacerbated by the political moment. In fact, the DP may even be in danger of being disbanded under the current administration. Housing is a right, it needs to be provided by the state. It is not a privilege. Without it, work, education, and health and incredibly difficult to achieve. One idea has been residences that aren't property – they are provided by the state. People can stay there but they don't own the space." -Dr. Emily Pingel, June 2019*

Living conditions of those experiencing homelessness in Bom Retiro were noted throughout the field notes. Some people experiencing homelessness may sleep on the streets, whose conditions vary depending on where one is in the neighborhood. In some parts of the

neighborhood, there was human feces and urine on the streets. Others may find very informal means of housing by occupying old, abandoned buildings or other common spaces in the neighborhood. For example, a new registrant of the UBS-BR primary care clinic was noted to have been living in a shopping center in the neighborhood. She used to own a massage business in the shopping center but had a stroke and her sister had stolen from her while she was hospitalized. She now lives in the shopping center and the security guards check in on her occasionally. She has a small shower above the sink in the bathroom but no stove.

Others living in Bom Retiro have slightly more stable housing arrangements but can still be considered having informal housing. Some families have occupied old, abandoned buildings throughout the neighborhood whose conditions vary, some with exposed wires, trash strewn about, and potential for flooding. Another form of informal housing is an ocupação, a building that people occupy illegally with various states of informality. One such living space is described here:

> *"A brightly painted but fading wall with images of children ran along the Avenue – we had come on to Avenida do Estado, just past an enormous trash processing space. This was the entrance to the ocupação. Amanda explained that previously, the building that they were occupying was a daycare center, hence the walls.* ***The government had deemed the daycare center unfit for children because the presence of the trash processing place had contaminated the soil and it was an environmental hazard. The daycare center was moved to another building, in SABESP nearby. Meanwhile, now 45 children were living on the premises.****"-Dr. Emily Pingel, April 2019*
>
> *"A woman emerged who resembled Amanda – this was Sara – the leader of the occupation. She had some kind of skin condition that covered her face in boils, just like Roberta* [the PAVS CHW]. *She was short, brown skinned with long black hair. A baby wandered out of the room behind her and glared at me. I laughed and then he smiled. Another woman, taller and white, appeared and the two of them spoke to me about the occupation. Sara had scoped it out for a while and visited, both during the night and the day, to see if it would be viable as a space to occupy. She decided it would, and one night in December, she and four families came in the middle of the night and set up shop. Now there are over 150 people living there, including the 45 children. The other woman tells me her story – her 12-year-old son (the one who was sitting outside when we entered) had heart transplant surgery, and he continues to have periods of very low immunity, which makes it nearly impossible for her to work. She*

> *was living in the Zona Norte but needed a place that would be closer to the hospitals. She says that Sara is a person who knows a lot of people and so that was how she found out about the occupation and decided to move there with her son. She receives a benefit for taking care of him. If she worked, she would lose the benefit, and she would likely quickly lose any kind of job because when he has a bad spell, she is in the hospital with him for a month or two at a time, so it's not worth it to work. She makes things and sells them on the side to make a bit of extra cash. Sara explains to me that this woman and three others are part of the "coordenadoria."*[coordination]. *They developed this coordenadoria to relieve some of the pressure that was on Sara as the occupation grew. She expressed how stressful being in charge was because all the problems fall in her lap and everyone has expectations that she can solve all problems. She tells me that on Monday, their water will be turned off unless they find some kind of solution. They haven't been able to raise the money to pay the bill."-Dr. Emily Pingel, April 2019*

Water Crises

A major WASH concern in Brazil is droughts and the increased risk of infectious diseases associated with water-hoarding. Risk of dengue, a mosquito-borne disease, has been shown to be exacerbated in highly populated areas of Brazil after extreme droughts due to hoarding of water in containers suitable for mosquitoes to breed.[98] During a water crisis, urbanized areas may experience water shortages and intermittent water supply. During São Paulo's 2015 water crisis, an article in Time noted "The city of 20 million is plagued by failing infrastructure across the city, and it has been unable to deliver the water it does have to residents in need. Without major changes to the city's infrastructure and planning, commentators say the crisis is bound to continue."[99] Many residents felt failed by São Paulo's water utility service, Sabesp, which resorted to offering residents discounts to conserve, and therefore unofficially ration, water.[100] The water crisis connected to the dengue crisis of 2015, with Dr. Pingel writing:

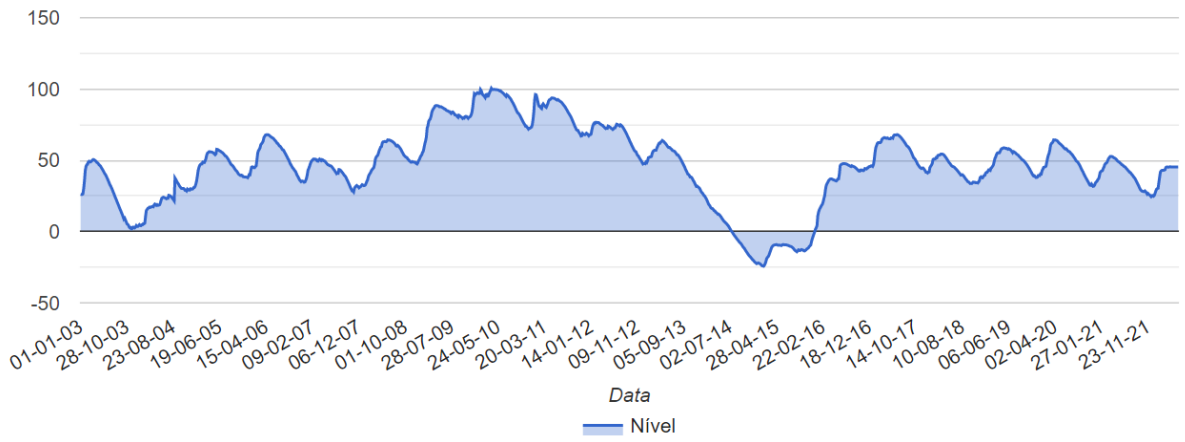
> *"They believe that the dengue crisis of 2015 was spurred by São Paulo's water crisis that same year – people were hoarding water, so there was a great environment for the mosquitoes. Rafaela also mentioned that many people blame the homeless for the dengue problem and this simply has no basis in reality – they don't contribute more than anyone else*

does. And the agents also go talk to them (she gives the example of under the Minhocão) and do health education with them on MBIs." -Dr. Emily Pingel, February 2019

This water crisis in 2015 was not a one-time event. Water shortages remain an issue for the residents of São Paulo. In 2021, the federal government had issued a water emergency alert for São Paulo and four other states from June through September.[101] As of April 7th, 2022, the water level in the Cantareira system, one of the water supply systems managed by Sabesp for the state of São Paulo, is 45.3%, which is considered "normal".[102] However, figure 3 shows the historical water level for the Cantareira system from January 1st, 2003 to present day. This figure shows that the water supply system has the capacity to function at much higher water levels than it does now and that since the water crisis in 2015, the water level has been lower an average than it was in the 5 years before the 2015 water crisis.

Figure 3

Historical Details of the Water Level in the Cantareira System



**Note.* Original source: https://www.nivelaguasaopaulo.com/cantareira

Spaces of Health

An inductive theme identified in the data was spaces of health. A space of health is a broad concept that can be understood differently by different people. In this context, a space of health was identified in the data as a physical place in which health-related activities are done and/or health-related information is shared. Spaces of health included the UBS-BR primary care clinic where residents of Bom Retiro would go for a myriad of primary care services such as check-ups, cancer screenings, diabetes management, ultrasounds, and more. Some interactions between people in this space of health are between a healthcare provider and a patient while others are between multiple health care providers. Some of these interactions at the UBS-BR primary care clinic are described below:

Doctor discussing health issues with a patient:

"'We did an ultrasound.' The patient is on the waiting list for surgery to take out the 'calculo renal' (kidney stone). 'Just from the ultrasound, we can see that you need to have surgery SOON.' Then he says it's urgent, then uses the word 'rapido,' they'll pass on her 'dados' [data/information] *to the prefeitura for the waiting list. Five years ago, it wasn't as urgent. 'I don't think it'll be long but I don't control it' (Caetano). She talks about 'meus enchassos'* [my cravings] *Caetano: 'Yes, it's all related' and she asks 'what about the other doctor?' he responds 'he's going to say the same thing.' She has six calculos on the left kidney. 'On August 2nd, I saw the first exam,' says Caetano. 'The right side has no calculos, but on the left side there are six so the right side is doing all of the work that is why it is swollen the kidneys in the kidneys can't get the water out so that is why there is swelling in your legs' etc. 'The folks at the prefeitura already know you need urgent surgery.' The patient wants to know if it is so serious why doesn't she feel pain? Caetano explains. 'I do feel like throwing up and like my tummy is heavy' 'Let's look at the CAT scan.' -Dr. Emily Pingel, August 2018*

Healthcare team meeting where healthcare providers discuss patients:

"Next patient we discuss is a Bolivian woman who has had 3 miscarriages in a year. She cannot have a baby for another year without putting her life in danger. Caetano wants to know if she could be a candidate for a special contraceptive implants program. They

> *don't have the money to give everyone implants so they select people specifically based on perceived vulnerability. She is considered vulnerable because she works in an oficina and may not be able to easily get out and get medications/injections. Implant may be easier." -Dr. Emily Pingel, September 2018*

Another space of health is a patient's own home, which for some is also a place of work as seen in some oficinas. CHWs visit patients in their own home for basic health-related work such as sharing information about upcoming appointments and checking vaccine records. While the CHWs do not provide medical care in the patients' home, health-related information is being shared here and patients are interacting with members of the healthcare system. Knowledge, behaviors, thoughts, beliefs, and opinions of health are present in this space. One instance where the doctor visits an oficina to discuss health issues with a resident is described:

> *"She has never had regular periods, and this is why she went to the UBS in Boraceia to have the ultrasound. The ultrasound, which she gives to Caetano to interpret, shows that she has polycysts – her body doesn't regularly produce hormones that induce one's period. In the past, she has always taken injectable birth control, but she stopped about a month ago. Friends have told her 'people say' that it can be harder to get pregnant. Caetano asks if she wants to have a baby – 'well, I'm getting married next year, and my boyfriend and I have talked about having kids.' He tells her that it can take a little longer, but doesn't make it impossible, and in the meantime, it acts as birth control and as a treatment for her hormone issue. She hates pills and therefore prefers the injection. He writes her a prescription. She also complains that she has had issues with yeast and he gives her a prescription for a cream for that, too. She had been underweight when she arrived in Brazil, but managed to gain weight once the rest of the family arrived. 'It's better with everyone here,' she said." -Dr. Emily Pingel, September 2018*

Throughout the field notes, observations were made on how the outward appearance of the neighborhood and living spaces would change from one block to the next, physically showcasing differences in social class. For example, Dr. Pingel noted on one of her outings with CHWs:

> *"Around the corner, Dona Elza was next on the list. Within a single block, the housing displayed signs of higher social class. Weeds no longer gushed forth from cracks in the sidewalk. Trash was not strewn about. The facades of the houses were more recently painted and potted plants bedecked the windowsills. Dona Elza ushered us in to a large high ceiling living room where images danced silently across a large, flat screen TV on mute. Her adult son, Joao, was playing a game on a desktop computer in the corner and stood to greet us. The floor was sparkling white tile, the walls filled with family photos."*
> *-Dr. Emily Pingel, December 2018*

Other spaces of health include community locations such as places of worship, metro stations, local museums, parks, and other public spaces. Often these spaces are transformed into a space of health for a community-wide event or group meeting related to a specific health issue. This includes the provision of a health service such as giving vaccines and the sharing of health-related information in group events focused on a particular health topic such as prostate cancer or family planning. Here Dr. Pingel describes a vaccine event at the Luz metro station:

> *"I got to the place in the metro station where everyone had set up the vaccine station, but they had decided that it wasn't a good location for the flow of people and so they were moving it across the way. I helped by carrying a couple tables. I sat down at a table with Isabel and Odete that ended up being the check-out station, where people would receive their "comprovante" – the slip of paper that says that they indeed got the vaccine, along with the date, location, and the code for the vaccine. For each comprovante, we need to write in all of this information. There was a stamp that we used to put the Bom Retiro clinic name and address on each comprovante, and then we wrote a code for the vaccine on the bottom left corner, the date, "CPTM" to show it was part of this "action," and the words "yellow fever." I started out stamping all of the comprovantes and then after a while, began writing in the different indications...The line was pretty much continuous. Every time I would look up and see that it was diminishing, three minutes later it resumed its prior state. Over 400 people were vaccinated. They would stand in line and one of the CHWs would take down their name and information on a clipboard. Then when it was their turn with the nurses, they would ask the patients the standard questions (about fever in the last weeks, had they had the vaccine before, etc.) and then give them the shot. When it was over, they would move on to our station, where they would tell either Odete or Isabel their name (later Julia subbed in) and receive their comprovante. I talked with many of the people as they came through. I would joke with them (saying, "did it hurt!?"), smile and say "bom dia,"* [good morning] *etc. People smiled back and seemed to genuinely appreciate our work – they often said "bom trabalho."*[good work]. *The CHWs however, tended to be fairly cold and straightforward. "Documents?" they would say, hand outreached but without looking up. It struck me that there was a resistance to*

> *emotional labor. These people are random people to the CHWs – they don't have any sense of "customer service." At one point, I remarked that everyone here was lucky to be getting the vaccine in such a convenient way that is also free – I explained that we have a shortage in the U.S. and that it is about a thousand reais to get the Stamaril version. People were shocked and then said, 'See, and they don't valorize our work!' They were telling me that last year, during the vaccination campaign, people became so agitated about how the line was long that they grabbed people by the collar and demanded they do something about it- it sounds like it was very tense." -Dr. Emily Pingel, November 2018*

At another vaccine event at a local church, the PAVS CHW, the one who focuses on environmental health work, shares information about yellow fever with the passing churchgoers. Dr. Pingel states:

> *"I returned to where Roberta and the CHWs were – Roberta was handing out pamphlets and talking to people passing by. She was asking people if they had gotten the yellow fever vaccine, talking to them about it and how they can go to the post to get it, and also mentioning the importance of getting rid of sources of standing water, where mosquitoes are bred that spread dengue, etc. Nearly everyone who passed by claimed they had already been vaccinated. Eventually the priest came over to talk with us. He said that he would mention the presence of the post during the 10am mass." -Dr. Emily Pingel, November 2018*

Racialization

Racialization is a theme that this study has refined in the context of WASH, based on what was originally discussed about racialization by Dr. Pingel in her dissertation. Racialization can be defined as the process of categorizing, marginalizing, or regarding someone or something to race.[103] The discussion of racialization in Dr. Pingel's dissertation informed this study in applying racialization in the context of WASH. One of Dr. Pingel's research questions was "How do racialized geographies (the ways that individuals organize the neighborhood around them in ethnoracial terms) shape the provision of primary care? What are the material

configurations and cultural imaginaries informing these geographies?" Dr. Pingel explores how the process of racialization occurs in healthcare interactions between patients (many of them immigrants), providers, and CHWs in the culturally and racially diverse neighborhood of Bom Retiro. Furthermore, health services provided by the UBS-BR primary care clinic are carried out through micro-regions, therefore healthcare workers conceptualize their work spatially, utilizing street names and physical landmarks when communicating about their patients. Dr. Pingel discusses how many interactions between healthcare providers and patients in Bom Retiro can be characterized in terms of racialized geographies, in which axes of ethnicity/race, occupation, and living space interconnect.

A local racial hierarchy emerged from Dr. Pingel's research. Physicians and nurses are commonly from the middle and upper-middle class and are of primarily European descent while CHWs tend to descend from Northeastern migrants or long-term Afro-Brazilian residents of São Paulo. Providers and CHWs view Koreans as more affluent, usually owning the textile shops. Bolivians, along with impoverished Black and Brown Brazilians, are at the bottom of this local racial hierarchy, living and working in oficinas or living in settlements of varying degrees of formality respectively. Also present are Black and white Paulistanos (meaning to be from the city of São Paulo). Details from the field notes and interviews conducted by Dr. Pingel included below inform the concept of racialized geographies in Bom Retiro.

In an interview with a CHW, the observed changes in racialized geography of Bom Retiro and the racialized geography of the oficinas themselves are touched on:

> *CHW: "The majority of people were Jews, back in the day. So they lived here and they had their churches [sic], their bakeries, their schools. I don't why, but they began leaving the neighborhood. The main commercial street, the majority of the stores were theirs, you know, Jewish merchants. And then, with time, they began leaving, and going to Higienópolis [another central neighborhood]…and other immigrants arrived. So that*

> *was a really big change that we noticed.* ***Many immigrants came to live, to work here in the neighborhood. And automatically, a lot of filth…in the streets, that wasn't there back in the day, when the Jews were here….the streets are really dirty****. A lot of immigrants. So…I don't know if it has to do with them [the immigrants], but that's how it is. Koreans, Bolivians, Paraguayans….What really attracts them is the trade [the textile industry]. The stores, the majority of the merchants are Korean. The sewing, that's the Bolivians and the Paraguayans who do that part, mostly for the Koreans….and earning very little. Because they pay very little to them. Working hours and hours…."*
>
> *Dr. Pingel: "Would you say that these groups, for example Bolivians and Koreans, occupy the same space in the neighborhood? Do they do work on the same thing?"*
>
> *CHW: "No. Because the Koreans, they have greater purchasing power, right? They have the stores, they buy the stores. There are lots of cafés that belong to them, you know? They arrive here in Brazil and their money goes a long way here I think, I don't know. So they open things. And then they put foreigners to work for them."*

In another instance, a CHW told Dr. Pingel about a measles outbreak in the neighborhood and how she thought that the immigrants were to blame for this. Specifically, the Bolivians and Paraguayans who had not vaccinated their children or the Venezuelans crossing the border. The correlation of neighborhood "filth" and disease outbreaks to immigrants is not a new sentiment. Linking unsanitary living conditions and disease to immigrant populations has been pervasive in public discourse in São Paulo for over a century; what changes is the immigrant population whom this discourse targets. Also in the field notes, instances of every day discourse centered around a person's race/ethnicity were noted. Some include:

> *"He says Brazilians pay so many taxes and that it's a similar problem here, because the Venezuelans are streaming across the border and the Brazilians are feeding them and providing them with healthcare, while meanwhile there are Brazilians who are going hungry and don't have jobs. He doesn't say the same about the Bolivians or Paraguayans in the neighborhood. But he does say 'have you been on a home visit? Then you've seen how they live – small, dirty spaces.'" -Dr. Emily Pingel, February 2019*
>
> *"A case of a positive syphilis result comes up in a Paraguayan patient. Maria Eduarda says, 'When AIDS arrives, they're screwed, because they have so many cases of syphilis.' She is talking about the Paraguayans broadly and says that they change partners all the time AND that they date their cousins and sisters-in law. She says, 'You go on visits, and*

they have a new partner and you think, but wasn't that your friend's husband? There are a lot of them that live on my street.'" -Dr. Emily Pingel, February 2019

"She said that the majority of residents were Jewish and that they were better than the Koreans. When she arrived, the Koreans weren't here yet. 'You shouldn't speak ill of anyone, but the Koreans are terrible.' She described how they would put up the money to open up businesses and then once things were up and running and making money, they would either plunder the store in the middle of the night and simply close up shop and flee back to Korea OR they would transfer ownership of the business to another Korean. And the Brazilian would be left with nothing. They would show up to their shop in the morning and everything would be gone. Poof. Dona Edith said that they aren't good to work with because you can't work with someone that you can't trust. She added, 'the Bolivians are the same way.'" -Dr. Emily Pingel, February 2019

"She won't go see Bolivian physicians because they'll diagnose the wrong thing. I asked how she knows this and she tells me that her niece works in a hospital and has told her stories about the terrible Bolivian physicians there. 'I don't trust them,' she says." -Dr. Emily Pingel, October 2018

"Caetano tells me that after the next appointment which is with a pregnant woman, He will see one of the people from the reception. Then he makes a gesture with his fingers in which he pulls down the corners of his eyes, as if to demonstrate slanted eyes, and explains that the patient is Japanese. I was surprised to see Caetano do this – which I interpreted as racist – but then was afterwards surprised that I was surprised." -Dr. Emily Pingel, August 2018

In addition to racialized public discourse, it was discussed how a policy applied to the UBS-BR primary care clinic would impact the most vulnerable populations in the neighborhood, namely immigrant groups. The policy change regarded contacting patients on the waiting list for referrals to surgeries. Previously these patients would be called 3-4 times or until they were reached to let them know that their spot on the waiting list was ready. The patients would need to answer the phone call to gather details on when their procedure would occur and to confirm that they could be there. This had apparently resulted in a large amount of absenteeism. The policy was changed so that each patient on the waiting list is only called once. If that patient did not answer their phone on the first and only call, they would lose their spot on the waiting list. Dr. Pingel further describes this and her reaction to it:

> *"[I was astonished by this and expressed my concern re: all the reasons that someone might not pick up the phone – being at work, being in the shower, etc. etc.] I told Felipe my concerns and mentioned that I NEVER pick up an unknown number - and he and Caetano both said 'well, wouldn't you pick up if you knew you were expecting an important phone call?' yes – but often times people can be on the wait list for 6 months to a year. As Renato put it later, it's a draconian measure. The other issue is that people often change numbers* ***– this will particularly impact immigrants in the neighborhood, who may not understand the new policy as easily and who are less likely to call the post to update their phone number as needed, and who are less likely to have a consistent phone number. In other words, this policy change will prejudice the most vulnerable patients.*** *" Dr. Emily Pingel, December 2018*

Discussion

WASH-related diseases and health issues have been and will continue to be a major health issue for São Paulo and many other parts of Brazil. Despite water and sanitation quality indicators being generally higher in more urban areas, planning and infrastructure have been unable to keep up with rapid urban growth, posing challenges to the provision of adequate and equitable WASH services for some urban dwellers.[104] Mosquito-borne diseases such as Zika, chikungunya, dengue, yellow fever, and malaria, are likely to increase as the mosquito species responsible for these diseases adapt to urban environments and climate change expands their geographical ranges.[105] More frequent water crises, such as those seen in São Paulo, also increase the risk of mosquito-borne disease spread as people tend to hoard water in times of limited water access, providing ideal breeding grounds for mosquitoes.

Furthermore, rapid urbanization has resulted in uncontrolled expansion of informal settlements with less sanitary conditions and increased risk of WASH-related diseases. Accessible and equitable WASH fundamentals help slow the spread of disease and improve sanitary living and working conditions. Policy decisions and investment in infrastructure for these basic services can reduce disease and illness, improve health outcomes, alleviate poverty,

and stimulate socio-economic development. The rapid urbanization of São Paulo is likely to continue, therefore local, sustainable solutions for the most vulnerable populations to help ensure equitable access to WASH services is essential.

The narrative case study of Bom Retiro helps to understand the local context of WASH in the daily lives of many Bom Retiro residents, which is useful when quantitative WASH indicators are not fully representative of peoples' lived realities. Furthermore, a review of historical and contemporary WASH-related policies helps better identify gaps between aggregate quantitative statistics used as evidence for these policies and people's lived realities regarding WASH. These research strategies help address the original research questions: 1) How has the prioritization of sanitation by policymakers, both historical and contemporary, shaped the health of the urban working-class in Brazil? 2) How do living and working conditions among the urban working class relate to the creation and/or implementation of water, sanitation, and hygiene (WASH) services?

Bom Retiro is an urban working-class neighborhood, with many residents who are immigrants or descendants of immigrants. Bom Retiro's housing varies in formality, with some living in upscale, single-family apartments and others living in cortiços, a type of tenement often occupied by those who cannot afford a home. Others occupy spaces called oficinas, where occupational and home health merge. The five teams of healthcare professionals at the UBS-BR primary care clinic are responsible for covering micro-regions of the neighborhood which leads healthcare professionals to spatially contextualize their work. This work is further contextualized by race as patients are characterized in terms of racial geographies. Dr. Pingel's local racial hierarchy within oficinas exemplifies this. The reality of daily life for various groups of people in Bom Retiro is unique, so broad public policies are often interpreted at the local level.

Understanding how health is spatially and racially contextualized within a neighborhood can be useful when developing local solutions to WASH issues. For example, the oficinas are a space of health with conditions that increase the risk of TB, which consequently has a more significant impact on Bolivians and Paraguayans working in the oficinas, adding a racial context to this WASH-related health issue.

According to Brazil's constitution, housing is a right. Article 6 of the constitution reaffirms the social right to housing along with health, food, education, security, protection of motherhood and childhood, and assistance for people in poverty. Further in the constitution, in Article 21 Clause 20, the federal government not only continues to guarantee housing as a right, but also identifies the federal government as the director of urban development, which it classifies as housing, sanitation and urban transportation. In Article 23 Clause 9, the constitution says that the federal, state, and local governments all have the power to promote housing construction programs and the improvement of housing. However, housing as a constitutional right does not guarantee equitable access to affordable or stable housing.

People experiencing homelessness or living in other informal settlements are more vulnerable to environmental hazards, WASH-related infectious diseases, and natural disasters such as flooding.[106] Examples of this were observed in Bom Retiro, such as the ocupação where over 150 people live that was originally a daycare shutdown due to its proximity to a trash processing plant and environmental contamination. While this informal living settlement may not be considered an official place of residence by law, the UBS-BR primary care clinic considers it in their purview of work and so CHWs visit this ocupação. The local interpretation of what constitutes a place of residence may not be included in public policy. Community ethnography

field observations such as this help illuminate the living situations of those whom broad public policies overlook and can inform local solutions to improve health outcomes.

Another circumstance in which field observations provide deeper insight into the daily lives of Bom Retiro residents are the oficinas. A major WASH issue in oficinas is the increased risk of tuberculosis (TB), a bacterial disease spread through the air. Oficinas tend to be extremely hot and stuffy with limited air flow and oficina workers may work in those conditions for long hours in the day with little time to do much else.[107] Most people infected with TB must take TB treatment for six months and in Bom Retiro, they must travel to the UBS-BR primary care clinic to receive this treatment. The UBS-BR primary care clinic covers a region of about 4 km^2 in size, so some oficinas may be a far walking distance from the clinic.[108] Walking distance compounded with long working hours when the clinic is open from 7:00AM-7:00PM makes it difficult for some to travel to the clinic consistently over the course of six months for TB treatment. Taking off time from work to travel to and from the clinic to schedule appointments and receive care may not be feasible for all.

To address this issue, the policies of the clinic itself could be modified so that TB treatment could be provided at the oficinas. Another suggestion is the creation of a specialized health team addressing TB, like the dengue group. Furthermore, an organization called the Confederação Única de Associados e Residentes Bolivianos (Single Confederation of Bolivian Associates and Residents) was established around six years ago to help serve the Bolivian communities in Brazil. Today it is worth millions and has built over a thousand houses for Bolivian families and loaned them money for the mortgage. The Confederação has also provided funding for groups of entrepreneurs interested in working in a particular area such as construction. It is important to leverage already existing support for those living and working in

the oficinas of Bom Retiro, mostly Bolivians, when attempting to address the unique WASH issues of oficinas. The Confederação could possibly offer support for Bolivians working in oficinas who are infected with TB and do not have the time to take off from work to travel to the UBS-BR primary care clinic to receive consistent treatment. Expanding on this, collaboration among multiple groups such as housing movements, infectious disease researchers, immigrant health groups, and environmental specialists to address WASH-issues in oficinas should be considered.

The UBS-BR primary care clinic has some specific programs focused on WASH-related issues, such as the CHW internal group on dengue and PAVS (Green and Healthy Environments Program). CHWs carry out both programs, who are performing important, necessary public health work. However, these major WASH-related issues and others examined should be addressed with a multisectoral approach. Barriers arise when this WASH-related work is siloed as a responsibility for one group, whose work may already be stretched thin. In the example of the internal group on dengue, concerns about the team being severely understaffed were mentioned. This poses an even greater barrier to combatting the spread of dengue because the risk of increased spread is already exacerbated by climate change.

Another potential barrier to creating and reforming WASH policies and programs in Bom Retiro is the identification of priorities for the UBS-BR primary care clinic. A CHW described to Dr. Pingel how things are prioritized at the UBS-BR primary care clinic. An initial interest is developed but without institutional support it may not lead to action. The Municipal Health Secretariat (the city health department) develops their own priorities which are passed down to the local UBS clinics who are told to focus on that specific issue. The CHW said that this process of prioritization lacks effectiveness because there is no continuity in identified priorities. What

this CHW claims could imply a potential barrier to creating and reforming WASH policies and programs because discontinuity may arise between what UBS-BR would like to prioritize in WASH and what the Municipal Health Secretariat identifies as a priority in WASH. This research has highlighted some important WASH-related issues specific to Bom Retiro, namely water crises, working/living conditions within oficinas, homelessness and other informal housing issues. However, there is no guarantee the UBS-BR primary care clinic would have financial and resource support from the Municipal Health Secretariat to address these issues if they were not a priority for the city government.

Universal access to water and sanitation seems to not always be prioritized to the extent it should be at the state level of government either. As discussed earlier, Sabesp is São Paulo state's partly privatized water utility company responsible for supplying water, collecting, and treating sewage in 375 municipalities in the state of São Paulo.[109] As a mixed capital corporation, Sabesp is not a fully public organization focused on providing a public service nor is it a fully private company competing with other companies and under the control of regulatory agencies. Sabesp follows market trends and prioritizes the interests of private shareholders.[110] This resulted in monopoly on one the most essential resources to survive: water.

Before the new law on water and sanitation (law no. 4162), Brazilian regulation called for program contracts in which state-owned companies, such as Sabesp, provided sanitation services to local governments without any bidding process, which established a monopoly on this industry and blocked private investments.[111] The new law on water and sanitation, sanctioned in July 2020, outlawed these program contracts and has replaced them with a compulsory bidding process for provision of sanitation services to incentivize more private sector involvement.[112] This law has also designated the National Water Agency (ANA) as the entity responsible for

establishing regulatory benchmarks and parameters for monitoring targets, quality, and efficiency indicators.[113] In 2019, ANA published a report about Sustainable Development Goal (SGD) 6, clean water and sanitation, titled "SDG 6 in Brazil: ANA's Vision of the Indicators." This document discusses ANA's contribution to monitoring the eight SDG 6 targets and calculating the associated indicators.[114] These targets and indicators are grouped into three major thematic axes to help better conduct analysis and monitoring of the eight targets. These thematic axes, eight targets, and associated indicators are detailed in Table 1.

Table 1

SDG 6 Thematic Axes, Targets, and Indicators

Water Supply and Sanitation	Water Quality and Quantity	Management: Sanitation and Water Resources
Target 6.1 - By 2030, achieve universal and equitable access to safe and affordable drinking water for all	**Target 6.3** - By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse locally	**Target 6.5** - By 2030, implement integrated water resources management at all levels, including through transboundary cooperation
Indicator 6.1.1- Proportion of the population using safely managed drinking water services	Indicator 6.3.1 - Proportion of wastewater safely treated	Indicator 6.5.1 - Degree of Integrated Water Resources Management and Implementation
Target 6.2 - By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open air defecation, paying special attention to the needs of women and girls and those in vulnerable situations	Indicator 6.3.2 - Proportion of water bodies with good ambient water quality	Indicator 6.5.2 - Proportion of transboundary basin area with an operational arrangement for water cooperation
Indicator 6.2.1- Proportion of the population using safely managed sanitation services, including using a handwashing facility with soap and water available	**Target 6.4** - By 2030, substantially increase water use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity	**Target 6.6** - By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes, reducing the impacts of human action
	Indicator 6.4.1- Change in water use efficiency over time	Indicator 6.6.1 - Change in the extent of water-related ecosystems over time

	Indicator 6.4.2 - Level of water stress: freshwater withdrawal as a proportion of available freshwater resources	**Target 6.A** - By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programs, including, among others, water resources management, water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies
		Indicator 6.a. 1 - Amount of water- and sanitation-related official development assistance that is part of a government-coordinated spending plan
		Target 6.B - Support and strengthen the participation of local communities in improving water and sanitation management
		Indicator 6.b. 1 - Proportion of local administrative units with established and operational policies and procedures for participation of local communities in water and sanitation management

**Note. Adapted from "SDG 6 in Brazil: ANA's Vision of the Indicators."*

Many of these targets are measured by quantitative indicators. For example, target 6.1, achieving universal and equitable access to safe and affordable drinking water for all by 2030, is measured by the proportion of the population using safely managed drinking water services (indicator 6.1.1). The results show that in 2017, the proportion of the population of São Paulo state using safely managed drinking water services was 99.8%.[115] It was noted in the report that this calculated indicator "includes only variables related to accessibility, not considering, in its calculation, the availability (existence of intermittences, for example) or quality (meeting of drinking water standards) dimensions."[116] Target 6.3 considers water quality by calculating the proportion of wastewater safely treated by measuring the percentage of domestic and economic activities effluents that is safely handled in Brazil. For the Southeast territorial region (which includes São Paulo state), about 49.5% of the population had safely treated wastewater in

2016.[117] These targets focused on water accessibility and quality are quantitatively measured by ANA.

Despite multiple targets for SDG 6 mentioning equity, there is a lack of any equity-based monitoring. These aggregated quantitative statistics may not be suitable for evaluating equity in water and sanitation service provision, access, and quality. The narrative case study of Bom Retiro illuminates this gap in measuring any achievements towards meeting SDG 6 in an urban working-class neighborhood. For example, while the quantitative indicator shows that 99.8% of the population of São Paulo state is using safely managed drinking water services, the narrative case study details issues of water hoarding during times of water crises and instances of residents living in informal settlements at risk of having their water utilities shut off. Measuring SDG 6 in Brazil could benefit from including localized approaches with disaggregated data that unmask inequities commonly obscured by aggregated quantitative statistics only focused on system efficiency. New, innovative ways to implement equity-based monitoring can also help develop these localized approaches, which can be targeted to measure SDG 6 indicators among vulnerable populations such as those experiencing homelessness or informal housing or for immigrants living and working in oficinas. In summary, the aggregate national and regional quantitative measurements for the SDG 6 target indicators should be supplemented with disaggregated data, measurements of inequality, and qualitative data that provide a deeper understanding of the daily living and working conditions of people living in Brazil.

Conclusion

This research highlights the importance and usefulness of field observations through a community-based ethnography and historical analyses of WASH policies, which can be employed in other settings to better understand the intricacies in achieving universal water and

sanitation. The realities of WASH in an urban-working class neighborhood of São Paulo are more complex than the quantitative indicators being used to measure WASH outcomes. Through this research strategy, we can better understand people's behaviors, actions, opinions, and thoughts, information which is often obscured by quantitative measures of efficiency. Health equity can be achieved if we prioritize documenting the unique and informative experiences of everyday life, as we all have something to learn from each other.

Over the past two centuries, water, sanitation, and hygiene priorities have changed along with Brazil's demographics, epidemiological status, political, and social situations. While current public policies for WASH encourage increased private investment, quantitative indicators measuring the efficiency of the water and sanitation service provision may continue to mask the realities of accessibility and distributive injustice. Too often in public health have we relied solely on quantitative statistics to measure our success in achieving health equality. The issue with this lies in the inadequacy of quantitative statistics to inform health equity. If we only rely on one form of data, I argue that we may be limiting our capacity to go past equality to reach true equity. Therefore, it is important that we, as researchers, public health practitioners, scientists, and advocates utilize various forms of data to better inform our work. I recommend that quantitative evaluations are supplemented with qualitative data, including field investigations of vulnerable communities, historical analyses of WASH policies, and equity-based monitoring. These strategies require strategic and operational initiatives by federal, state, and municipal governments, funding organizations, and practitioners to ensure actual equity is achieved and vulnerable populations within an urban setting are not overlooked by the so-called urban advantage.

WASH policies and interventions aiming to achieve universal access to water and basic sanitation must recognize and address the differences that exist between and within racial geographies that influence place- and race-based determinants of health. Future research might investigate whether there are similar patterns in racial geographies affecting health in the context of WASH in other urbanized areas. While this research was focused on one neighborhood of one city in Brazil, it demonstrates the need and utility for employing a bottom-up, equity-centered lens emphasizing distributive justice to ensure inequities are not overlooked. Other highly urbanized cities with supposed better WASH outcomes are also experiencing an urban paradox, a disparity within urban contexts that will continue to worsen unless action is taken that prioritizes justice and equity for all.

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