

A Political Ecology of Wellbeing: The role of civil society organizations in supporting communities with
limited access to water, sanitation, and hygiene in Brazil

by

Rodrigo Curty Pereira

A thesis

presented to the University of Waterloo

in fulfillment of the

thesis requirement for the degree of

Doctor of Philosophy

in

Geography (Water)

Waterloo, Ontario, Canada, 2025

© Rodrigo Curty Pereira 2025

Examining Committee Membership

The following served on the Examining Committee for this thesis. The decision of the Examining Committee is by majority vote.

External Examiner

Carmen Anthonj

Associate Professor, University of Twente

Supervisor(s)

Susan J. Elliott

Professor, University of Waterloo

Internal Member

Elijah Bisung

Associate Professor, University of Waterloo

Internal-external Member

Warren Dodd

Associate Professor, University of Waterloo

Other Member(s)

Jenna Dixon

Research Scientist, University of British Columbia

Author's Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

Abstract

Safe access to water, sanitation, and hygiene (WASH) is key to human health and wellbeing. When populations lack or have limited access to WASH, they are at risk of contracting infectious diseases, suffering dehydration and malnutrition, developing musculoskeletal diseases, experiencing gender-based violence and conflict, and facing challenges to access other social determinants of health, such as health care and education. Regardless, billions of people lack access to safe WASH globally, mainly in low- and lower-middle income countries (LMICs). Nonetheless, historically marginalized groups in high income countries (HICs) and upper-middle income countries (UMICs) still face challenges to access WASH despite available financial and natural resources. In Brazil, the country with the largest supply of freshwater water and the 9th biggest economy in the world, 32 million people lack access to safe water and 89 million, to safe sanitation.

The COVID-19 pandemic shone a spotlight on the role of civil society organizations (CSOs) in creating and implementing solutions to access WASH as a way to halt the spread of the disease and offer relief aid to low-income communities that had their livelihoods affected by lockdowns and social distancing measures. Among other initiatives, CSOs around the world donated water and hand sanitizers, constructed communal wells and portable handwashing stations, and raised awareness about proper hygiene habits. Nevertheless, little is known about the way these organizations address WASH inequities, especially in UMICs, and how they support health equity-promoting practices in general.

The overall purpose of this research is to examine the role of civil society organizations in promoting solutions to water, sanitation, and hygiene inequities in Brazil. The specific research objectives are: 1) to describe barriers and facilitators in access to water, sanitation, and hygiene in low-income communities in Brazil, 2) to explore the impacts of water, sanitation, and hygiene inequities on the wellbeing of low-income communities in Brazil through political ecology of health, and 3) to investigate solutions to water, sanitation, and hygiene inequities implemented by civil society organizations in low-income communities in Brazil.

Using an integrated knowledge translation (IKT) approach to research and informed by political ecology of health, I conducted a multisite case study in three municipalities in the Metropolitan Region of Rio de Janeiro (MRRJ), whose populations experience varying levels of access to WASH and support from CSOs. I interviewed leaders from local CSOs (n = 7) and led focus groups with

residents of low-income communities (n = 24) in each municipality. Additionally, I visited the headquarters of partner CSOs, a local water treatment station, other affected communities, and attended meetings with local municipal governments. Interviews and focus groups were recorded and transcribed verbatim, translated from Portuguese to English, and analyzed through thematic analysis on NVivo.

The results revealed common barriers in access to WASH in all communities, including frequent and long-lasting water shortages, contaminated drinking water, absence of sewage collection and treatment, and complications from severe weather events. WASH inequities affect several dimensions of participants' wellbeing but most importantly, emotional health and sense of dignity, as they compared their living conditions to that of residents in other neighbourhoods as a consequence of persisting structural inequities. Finally, solutions to WASH inequities differ according to the level of resources and expertise offered by partner CSOs, revealing geographical inequities in access to funding and manpower between organizations located in the state capital and those in peripheral municipalities.

This research makes contributions to the political ecology of health framework by proposing *a political ecology of wellbeing* through the contextual understanding of “wellbeing” and how WASH access affects low-income communities beyond physical and mental health. Additionally, this research advances the understanding of the complex role of local CSOs as intermediaries between decisionmakers, academics, and marginalized communities, capable of communicating the needs and wants of populations in a concise and representative manner and facilitating both short- and long-term equity-promoting action. Finally, this research contributes to the body of work on WASH inequities in HICs and UMICs, advancing the notion that certain marginalized populations are rendered invisible by global WASH data that ignores nuanced local inequities, such as the frequency and quality of WASH services.

In conclusion, CSOs in Brazil promote short-term infrastructural WASH solutions, promote critically reflective dialogue about the distribution of environmental and social determinants of health and wellbeing, and act as intermediaries between powerful actors who decide what happens in the territory, e.g., local politicians, criminal groups, and WASH companies. CSO work can be scaled up if responsible authorities recognize their role as knowledge brokers and design policies considering context-specific needs and challenges for each community, while also supporting civil society

organizations' services to promote autonomy and agency among marginalized groups in the long term.

Acknowledgements

I would like to thank my advisor, Dr. Susan J. Elliot, for her mentorship and support throughout the years. Her commitment to critical inquiry inspired me to become a tireless researcher and, perhaps, an even more stubborn mentee than anticipated.

I am also grateful to the members of my committee, Dr. Elijah Bisung, Dr. Warren Dodd, and Dr. Jenna Dixon, who have helped me polish this work and offered insightful commentary every step of the way. A special thanks to Dr. Margaret Walton-Roberts, who was fundamental to the earlier developments of this research.

I acknowledge the invaluable contribution of the research partners and participants. Your contribution made this research possible, and I hope the findings will inform your work and help you support even more people. Likewise, I thank the research participants for their time and generosity in sharing lived experiences with me.

I am also thankful to Mitacs, the Ontario Graduate Scholarship Program, the Water Institute, and the University of Waterloo, for the funding that made my Ph.D. journey possible, and allowed me to conduct international research.

Furthermore, I express my gratitude to the GoHeLP lab for their continuous support and input in polishing this work. Thank you to my CTE colleagues, and Writing Café participants and staff, for creating learning and sharing opportunities that were crucial during difficult times.

Finally, I am grateful to my family and friends in Brazil, who offered Pan-American love during all these years and lifted me up when I needed the most. Thank you also to my partner and friends in Canada, who became family away from home. I will always cherish all of you.

Dedication

I dedicate this thesis to my younger self, who amidst all poverty – both financial and emotional, was able to survive and thrive. We did it, little one.

Table of Contents

Author’s Declaration	iii
Abstract	iv
Acknowledgements	vii
Dedication	viii
List of Figures	xiii
List of Tables.....	xiv
List of Abbreviations.....	xv
Chapter 1 Introduction	1
1.1 Research problem.....	1
1.1.1 Global access to water, sanitation, and hygiene.....	1
1.1.2 The water-health (and wellbeing) nexus	4
1.2 Theoretical framing.....	5
1.2.1 WASH inequities seen through a political ecology of health lens.....	5
1.2.2 Framing civil society organizations through political ecology of health.....	7
1.3 Research objectives	8
1.4 Dissertation outline	8
Chapter 2 Literature Review	10
Chapter introduction.....	10
2.1 Political ecology of health.....	10
2.1.1 Wellbeing in health geography and political ecology of health.....	13
2.2 Global access to water, sanitation, and hygiene.....	16
2.2.1 Water, sanitation, and hygiene inequities through the lens of political ecology of health ..	19
2.2.2 WASH and health in Brazil.....	21

2.2.3 WASH governance in Brazil.....	22
2.3 Civil society organizations.....	29
2.3.1 Civil society organizations and WASH provision in Brazil	32
Chapter summary	35
Chapter 3 Research Design and Methods	37
Chapter introduction.....	37
3.1 Positionality statement	37
3.2 Research design.....	39
3.2.1 Multisite case study.....	39
3.2.2 Integrated knowledge translation approach to research	40
3.2.3 Qualitative approach	41
3.3 Case selection.....	43
3.4 Ethical considerations	45
3.5 Sampling and recruitment	46
3.5.1 Key-informant interviews	46
3.5.2 Focus groups	48
3.6 Data analysis	49
3.6.1 Systematic Equity Action-Analysis	51
3.7 Adaptations to the research design and methods	53
Chapter summary	54
Chapter 4 Results	55
Chapter introduction.....	55
4.1 Current state of access to water, sanitation, and hygiene in research locations.....	55

4.2 Barriers and facilitators in access to water, sanitation, and hygiene in low-income communities	59
4.2.1 Barriers to WASH	59
4.2.2 Reasons for persistence of WASH barriers.....	63
4.2.3 Facilitators to WASH access.....	68
4.2.4 Summary of results for objective 1	69
4.3 Impact of inequities in access to water, sanitation, and hygiene on the wellbeing of low-income communities in Brazil	70
4.3.1 Understandings of wellbeing.....	70
4.3.2 A political ecology of wellbeing	76
4.3.3 Summary of results for objective 2	81
4.4 Solutions to inequities in access to water, sanitation, and hygiene.....	81
4.4.1 CSO interventions	81
4.4.2 CSO as intermediaries.....	87
4.4.3 Summary of results for objective 3	91
Chapter summary	92
Chapter 5 Discussion and Conclusion.....	94
Chapter introduction.....	94
5.1 Key findings	94
5.1.1 WASH inequities in Brazil.....	94
5.1.2 Impacts of WASH inequities on wellbeing.....	97
5.1.3 CSO solutions to WASH inequities	101
5.2 Research contributions	103
5.2.1 Theoretical contributions	103

5.2.2 Methodological contributions	106
5.2.3 Substantive contributions	108
5.3 Research implications	110
5.3.1 Implications to civil society practice.....	110
5.3.2 Implications to policy.....	112
5.4 Limitations	114
5.5 Future research directions	115
Chapter summary	117
References	118
Appendices	134
Appendix A. Key-Informant Interview Guide	134
Appendix B. Focus Group Guide.....	138
Appendix C. E-mail Recruitment Script	145
Appendix D. Verbal Recruitment Script.....	147
Appendix E. Information Letter – Key-Informants	149
Appendix F. Information Letter – Focus Groups.....	152
Appendix G. Written Consent Form	155
Appendix H. Verbal Consent Form	157
Appendix I. Letter of Appreciation.....	160

List of Figures

Figure 2.1. Map of Baixada Fluminense.....	25
Figure 3.1. Research locations.	45
Figure 3.2. The Systematic Equity Action-Analysis Framework.	52
Figure 4.1. Open sewer alongside residences in Japeri-Belo Horizonte.....	58
Figure 4.2. Illegal water pipe over open sewer in Japeri-Belo Horizonte.....	61
Figure 4.3. Driveway built over sewer in Japeri-Nova Belém.....	65
Figure 4.4. Slope where residents dispose of solid waste in Rio de Janeiro-Morro da Providência. ...	72
Figure 4.5. Concrete pipe used to divert wastewater in Japeri-Nova Belém.	85
Figure 5.1. Wellbeing dimensions affected by WASH inequities in research locations.	98
Figure 5.2. Process of application of Political Ecology of Wellbeing	105

List of Tables

Table 1.1. Definition of different levels of access to water, sanitation, and hygiene	2
Table 2.1. WASH governance in Brazil.....	24
Table 2.2. Access to WASH in Baixada Fluminense and the city of Rio de Janeiro in 2022	26
Table 3.1. Location of CSOs and number of KIs interviewed.....	48
Table 3.2. Number of residents in focus groups and geographical distribution	49
Table 4.1. Community water access in research locations.....	56
Table 4.2. Barriers to WASH access in research locations.....	59
Table 4.3. Reasons for persistence of WASH barriers in research locations.....	63
Table 4.4. Dimensions of wellbeing affected by WASH inequities in research locations	70
Table 4.5. Systems of inequity affecting wellbeing in research locations	76
Table 4.6. CSOs' WASH solutions in research locations.....	82
Table 4.7. Actors involved in CSO WASH solutions.....	88

List of Abbreviations

ANA	Agência Nacional de Águas e Saneamento Básico (National Water and Sanitation Agency)
CEDAE	Companhia Estadual de Águas e Esgoto (State Water and Sewage Company)
CSO	Civil Society Organization
DALY	Disability-Adjusted Life Years
FAO	Food and Agriculture Organization
FG	Focus Group
HIC	High Income Countries
IHME	Institute for Health Metrics and Evaluation
IKT	Integrated Knowledge Translation
IPCC	Intergovernmental Panel on Climate Change
JMP	Joint Monitoring Program for Water Supply and Sanitation
KI	Key-Informant
LDC	Least Developed Countries
LMIC	Low- and Lower-Middle Income Countries
NGO	Non-Governmental Organization
ORE	Office of Research Ethics
PED	Political Ecology of Disease
PEH	Political Ecology of Health
PET	Programa de Educação Tutorial (Education Program)
PEW	Political Ecology of Wellbeing
REB	Research Ethics Board

RWSS	Rural Water Supply Systems
SDG	Sustainable Development Goals
SEA	Systematic Equity Action-Analysis Framework
SEAS	Secretaria do Ambiente e Sustentabilidade (Secretariat of Environment and Sustainability)
SNIS	Sistema Nacional de Informações sobre Saneamento (National Sanitation Information System)
UMIC	Upper-Middle Income Countries
UN	United Nations
UNICEF	United Nations Children’s Fund
WASH	Water, sanitation, and hygiene
WHO	World Health Organization

Chapter 1

Introduction

1.1 Research problem

1.1.1 Global access to water, sanitation, and hygiene

In 2015, all member states of the United Nations (UN) committed to achieve the Sustainable Development Goals (SDGs) by 2030 to eradicate poverty in all forms and promote “sustainable development in its three dimensions – economic, social and environmental” (United Nations, 2015) (p. 6). One of these goals, SDG 6, aims to “ensure availability and sustainable management of water and sanitation for all” (United Nations, 2015, p. 22), which includes the achievement of “universal and equitable access to safe and affordable drinking water, and access to adequate and equitable sanitation and hygiene” (United Nations, 2015, p. 22). Since then, global coverage of safely managed drinking water increased from 69% to 73%, safely managed sanitation increased from 49% to 57%, and basic hygiene increased from 67% to 75% (United Nations Children’s Fund [UNICEF] & World Health Organization [WHO], 2023).

Despite progress in the expansion of access to water, sanitation, and hygiene (WASH), severe global inequities persist. In 2022, 2.2 billion people lacked safely managed drinking water, 3.5 billion lacked safe sanitation, and 2 billion lacked basic hygiene facilities (UNICEF & WHO, 2023). On average, WASH coverage has increased only 1% annually since 2000, but an annual 3% increase rate is needed just to provide *basic* WASH services to all by 2030 (UN-Water, 2021). The difference between “safely managed” and “basic” access to WASH relies on the quality and availability of these services (Table 1.1). To achieve SDG 6, i.e., provide *safe* drinking water and sanitation access to all, the World Health Organization and the United Nations Children’s Fund estimate that countries require a “three- to six-fold increase in current progress rates” (UNICEF & WHO, 2023, p. VII).

Table 1.1. Definition of different levels of access to water, sanitation, and hygiene	
Level of access	Definition
Safely managed drinking water	“Drinking water collected from an improved water source located on premises, available when needed and free from faecal and priority chemical contamination” (UNICEF & WHO, 2023, p. 12).
Basic drinking water	“Drinking water collected from an improved water source, provided collection is not more than 30 minutes for a round trip, included queuing” (UNICEF & WHO, 2023, p. 12).
Improved water sources	“Piped water, boreholes or tubewells, protected dug wells, protected springs, and packaged or delivered water.” (WHO & UNICEF, 2019, p. 8).
Safely managed sanitation	“Use of improved facilities that are not shared with other households and where excreta are safely disposed of in situ or removed and treated offsite” (UNICEF & WHO, 2023, p. 36).
Basic sanitation	“Use of improved facilities that are not shared with other households” (UNICEF & WHO, 2023, p. 36).
Improved sanitation facilities	“Flush/pour flush to piped sewer systems, septic tanks or pit latrines; ventilated improved pit latrines, composting toilets or pit latrines with slabs” (WHO & UNICEF, 2019, p. 8).
Basic hygiene	“Availability of a handwashing facility with soap and water at home” (UNICEF & WHO, 2023, p. 62).

Population growth, change in consumption patterns, and climate change represent additional challenges to the achievement of SDG 6 (Schuster-Wallace et al., 2015; UN-Water, 2021). More people demand more water, which increases the stress on available freshwater resources; additionally, as families transition out of poverty to middle-income lifestyles in developing countries, they start consuming goods that require more water to produce, such as meat (Clonan et al., 2016). In China, home to the second largest population in the world, the average meat consumption per capita, excluding fish and sea food, increased from 16 kg in 1990 to 49 kg in 2018 as the proportion of people in upper- and middle income classes grew (Wesz Jr. et al., 2023). Meat-based diets use three times more water than meat-free diets (Clonan et al., 2016), partially due to the water quantity used in soybean production, which constitutes the base of animal feed and requires intensive irrigation (Wesz

Jr. et al., 2023). Concurrently, water sources are being depleted due to unsustainable use and pollution, and increased frequency and severity of extreme weather events, such as floods and droughts (UN-Water, 2021).

Low- and lower-middle income countries (LMICs) are the most affected by WASH inequities. In Sub-Saharan Africa, only 65% of the population has access to at least basic drinking water services, 34% to basic sanitation, and 23% to basic hygiene facilities (UNICEF & WHO, 2023). In Oceania (excluding Australia and New Zealand), only 60% of the population has access to basic drinking water, 33% to basic sanitation, and 39% to basic hygiene (UNICEF & WHO, 2023). With the exception of Europe, Northern America, Australia, and New Zealand, all other regions have less than 80% access to safely managed drinking water, and less than 65% access to safe sanitation (UNICEF & WHO, 2023). In Least Developed Countries (LDCs), 63% of the population lacks safely managed drinking water and 73% lacks safely managed sanitation (UNICEF & WHO, 2023). Data on hygiene is very limited, but it is estimated that only 34% of people living in LDCs has access to basic handwashing facilities, while the global coverage is 75% (UNICEF & WHO, 2023).

Nonetheless, historically marginalized groups in high income countries (HICs) and upper-middle income countries (UMICs) also face barriers to access safe WASH (Brown et al., 2023). This is seen among populations in condition of homelessness practicing open defecation in Germany and Mexico (Anthonj et al., 2024; Liera et al., 2023); Hispanic, Native American, and Black groups facing plumbing poverty in the United States (Deitz & Meehan, 2019); Indigenous people experiencing boiling advisories and unsafe sanitation in Canada (Galway, 2016; Lauret et al., 2025), migrant seasonal workers drinking contaminated water in Spain (Rodríguez-Guerrero et al., 2024), Roma communities in Italy and France, Aboriginal communities in Australia, and rural households facing water insecurity in South Korea (Brown et al., 2023). Some of the most common WASH challenges in these contexts are reaching rural and remote communities, updating WASH infrastructure, overcoming discrimination against racialized groups, lack of sanitation infrastructure, and gaps in WASH data at the household level (Mattos et al., 2021). This trend indicates that current global estimates for WASH access may be optimistic and disguise inequities even in countries considered to have achieved virtually universal safe WASH distribution.

1.1.2 The water-health (and wellbeing) nexus

Water is essential to a healthy life. Humans need water to hydrate, grow crops and raise animals, and maintain personal hygiene to protect themselves from diseases. Safe sanitation and wastewater treatment are necessary to protect water supplies and maintain the hydrologic cycle functioning in a sustainable manner. The “water-health nexus” is the intersection of bio-physical systems – i.e., the natural environment - and the hydrosocial cycle – i.e., the flows of water through human systems - with human health (Elliott, 2011; Schuster-Wallace et al., 2015). Water also contributes to human *wellbeing* as a common element of leisure activities, spiritual practices, and therapeutic landscapes, which suggests the existence of a *water-health-wellbeing* nexus, as seen among First Nations communities in Canada, where wellbeing is associated with “community control over and access to environmental resources” (Richmond et al., 2005, p. 354).

Persisting WASH inequities undermine global health and the world’s ability to combat and prevent pandemics; they underpin efforts to end hunger and poverty, and negatively impact maternal health and the physical and cognitive growth of children, thus perpetuating health inequities among future generations (UN-Water, 2021). Negative health outcomes associated with inadequate WASH include, among others, diarrhoeal diseases – linked to contaminated drinking water and hygiene behaviours, respiratory infections – linked to hygiene behaviours, and many vector-borne diseases such as dengue, hookworm disease, malaria, and schistosomiasis – linked to contaminated water and limited sanitation (Prüss-Ustün et al., 2019). It is estimated that inadequate WASH is responsible for 2.8% of global deaths and 3.9% of disability-adjusted life years (DALYs) (Prüss-Ustün et al., 2019), that is, the “loss of the equivalent of one year of full health” due to diseases (WHO, 2024a). Furthermore, diarrhoeal diseases still feature among the main causes of death in the world, mostly affecting children under 5 years old (Institute for Health Metrics and Evaluation [IHME], 2021; Prüss-Ustün et al., 2019).

Marginalized groups suffer unique challenges related to WASH inequities. Women and girls, for example, are particularly vulnerable to having their physical health affected by inadequate WASH access and associated challenges in LMICs. Being responsible for fetching water for the household, women in traditional communities in Sub-Saharan Africa collectively spend 200 million hours per day travelling to water sources such as lakes and communal wells (UN-Women, 2023), where they are at greater risk of contracting waterborne and vector-borne diseases such as cholera and malaria (Nunbogu & Elliott, 2022). On the way back home, women and girls carry heavy containers filled

with water, which with time, can cause musculoskeletal conditions such as severe neck and back pain (Meeuwisse et al., 2024). Additionally, the lack of private toilets at home and in schools exposes women and girls to gender-based violence as they seek to relieve themselves in bushes or communal toilets (Nunbogu & Elliott, 2022; UN-Women, 2023).

Moreover, social norms around the collection, consumption, and management of water have negative psychosocial impacts on marginalized groups. A systematic review of case studies in Africa, South Asia, and Latin America revealed that inadequate WASH access causes financial and social stressors – such as having to pay more for drinking water from local water vendors compared to residents served by water mains, and stressors associated to physical access or related to perceived inequities – such as fear of collapsing latrines and feelings of marginalization (Bisung & Elliott, 2017). Additionally, researchers found that individuals in condition of homelessness in Germany and Mexico, respectively, feel stigmatized and excluded for not being able to comply with societal expectations of hygiene and cleanliness (Anthonj et al., 2024; Liera et al., 2023), whereas women in rural communities in Kenya feel exposed and unsafe by having to practice open defecation or bathe without privacy (Ototo et al., 2024).

These inequities violate the human rights to safe water and sanitation sanctioned by members of the UN in 2010 (United Nations, 2010). They are also detrimental to the prospects of development and wellbeing of countries as a whole for keeping the youth, especially girls, from attending school regularly, and impeding adults from dedicating time to productive and personal development activities, in addition to exposing them to injuries, violence, and death (UN-Women, 2023). Improving WASH access also saves money. Estimates indicate that every 1 USD invested in the expansion of drinking water results in savings of 2 USD on average at the global level, mostly due to savings with health services; for sanitation, the return rate is 5.5 USD per dollar spent (Schuster-Wallace et al., 2015).

1.2 Theoretical framing

1.2.1 WASH inequities seen through a political ecology of health lens

In this thesis, I utilize the political ecology of health (PEH) framework to investigate access to water, sanitation, and hygiene. This theoretical framework is commonly utilized by health geographers to

examine the distribution of environmental determinants of health as a result of *multiscalar* power dynamics. PEH researchers focus on the *inequities* associated with unequal access to natural resources due to power differentials. For example, in a political ecology analysis of WASH access in India, Truelove (2011) shows how workers and migrants in New Dheli have been historically involved in the construction of the city, but placed in slums, where they are deprived of WASH access. As the city developed into a financial centre, these groups were displaced to resettlement colonies in peripheral regions, where accessing WASH is even harder and further marginalized groups have to navigate micropolitics to access water illegally, which is used by decisionmakers as an argument to justify the shortcomings of the city's water services (Truelove, 2011).

Similarly, in Lilongwe, Malawi, richer urban areas are favoured to receive water because they are able to pay, while the urban poor have to create alternative solutions to deal with water discontinuity, such as using untreated water, or storing water from kiosks in unsafe containers (Rusca et al., 2017). These and many other case studies reveal top-down health narratives sustained by local powerful actors to explain the maintenance of the status quo, i.e., the unequal distribution of common goods like water. However, affected communities create and implement solutions to access these resources despite their limitations, as exemplified by communal efforts to bring water mains to rural communities in Kenya (Bisung et al., 2016), alternative sanitation services in Ghana (Dery et al., 2020), drinking water collection practices from communal fountains in rural Spain (Rodríguez-Guerrero et al., 2024), and water-harvesting in irregular settlements on the border between the United States and Mexico (Wutich et al., 2022).

PEH scholars are often concerned with political actors involved in dynamics affecting access to natural resources, such as decisionmakers, local elites, and WASH companies – who usually hold power over most affected groups, such as community residents, activists, and environmental conservationists. However, one group of actors has been particularly overlooked in PEH studies of WASH inequities despite their presence as local partners in WASH research on marginalized communities: civil society organizations (CSOs). CSOs commonly support researchers in accessing marginalized communities and translating findings into action, as demonstrated by the extensive work of political ecologists in Sub-Saharan Africa (Bisung et al., 2016; Dery et al., 2020; Kangmennaang & Elliott, 2019; Lusambili, 2011; Ototo et al., 2024), but also seen in other parts of the world where CSOs are consulted, but not studied (Anthonj et al., 2024; Liera et al., 2023; Neves-Silva et al., 2020; Rodríguez-Guerrero et al., 2024; Wutich et al., 2022).

1.2.2 Framing civil society organizations through political ecology of health

Civil society organizations, also known as non-governmental organizations (NGOs), are voluntary non-profit organizations that provide services to communities to improve their standards of living (Hassan et al., 2020; Wolch, 1990). Their services are associated with areas of life in society left unattended by state and for-profit actors, such as relief aid, education, social and environmental justice, and income equality. While some scholars question how effective CSOs are in promoting social change (Eikenberry et al., 2023; Srinivas, 2009), it is undeniable that they play an important role in offering immediate support to marginalized groups facing some of the most debilitating problems in modern societies, including hunger, water insecurity, violence, and homelessness (Curty Pereira et al., 2023; Ortega & Béhague, 2022; Patel, 2020; Wasdani & Prasad, 2020).

During the COVID-19 pandemic, between 2020 and 2022, many CSOs with various mandates became involved in helping communities access safe WASH to comply with the non-pharmacological interventions to stem the spread of COVID-19 infections, i.e., frequent handwashing and social distancing. Initiatives included water donation, installation of portable sinks and hand sanitizing stations, and dissemination of knowledge about proper hand hygiene (Brauer et al., 2020; Curty Pereira et al., 2023; Molina-Betancur et al., 2021; Shermin & Rahaman, 2021). WASH inequity researchers often partner with CSOs to access marginalized communities in a respectful and culturally appropriate manner, but do not place these actors in the centre of analysis, thus coming short of accurately portraying their role in promoting WASH equity, particularly in high- and upper-middle income countries (Anthonj et al., 2024; de Moraes et al., 2022; Liera et al., 2023; Machado et al., 2021; Maiello et al., 2021; Marcynuk et al., 2013; Neves-Silva et al., 2020; Remigio et al., 2019).

This research contributes to filling this gap by investigating the role of CSOs in promoting solutions to WASH inequities in high- and upper-middle income countries using Brazil as a case study. The country was selected due to its unique position as an upper-middle income country with persisting inequities in access to WASH despite the natural availability of freshwater supplies in its territory. These seemingly contrasting characteristics make Brazil an intriguing case from a political ecology perspective, since understanding WASH inequities and the role of bottom-up actors requires explanations that go beyond technical and purely physical analyses to include political, economic, and cultural forces.

Brazil has the highest supply of freshwater in the world, with total renewable water resources equivalent to 8,647 billion m³/year – almost twice as much as Russia, who occupies the second position in the ranking (Food and Agriculture Organization [FAO], 2021). Nonetheless, 32 million Brazilians lack access to safe water at home, and 89 million lack safely managed sanitation (Sistema Nacional de Informações Sobre Saneamento [SNIS], 2023). These inequalities are partially explained by regional disparities in water availability, with the Northeastern semiarid region presenting some of the lowest regional drinking water indicators; however, sanitation is comparably limited in all regions of the country, and data for hygiene is unavailable (SNIS, 2023).

As an upper-middle income country and the 9th largest economy in the world (World Bank, 2024), the magnitude of WASH inequities in Brazil is puzzling. The natural availability of water highlights the need to address this issue and better understand what the political, economic, and environmental explanations for the perpetuation of WASH inequities are. The country faces challenges common to both low- and high-income countries and studying its WASH inequities through PEH at a finer scale may illuminate challenges present in other UMICs and HICs.

1.3 Research objectives

The specific research objectives are:

- 1) To describe barriers and facilitators in access to water, sanitation, and hygiene in low-income communities in Brazil.
- 2) To explore the impacts of inequities in access to water, sanitation, and hygiene on the wellbeing of low-income communities in Brazil through political ecology of health.
- 3) To investigate solutions to water, sanitation, and hygiene inequities implemented by civil society organizations in low-income communities in Brazil.

1.4 Dissertation outline

This dissertation is divided in five chapters, including this introduction. Chapter two reviews the theoretical and substantive literature used to inform this work, that is, the theoretical framework of political ecology of health and current data on global WASH access, WASH in Brazil, and theoretical

conceptualizations of civil society organizations, as well as some CSO-related WASH initiatives in Brazil. In chapter three, I present the research design and methodology, and further explore the research location, i.e., the Metropolitan Region of Rio de Janeiro. In chapter four, I present the research results, organized by research objectives, i.e., barriers and access to WASH in the communities under study, impacts of WASH inequities on wellbeing, and solutions proposed by local CSOs. Finally, in chapter five, I present the discussion and conclusion, situating the research findings within relevant literatures, and proposing an advancement to political ecology of health, i.e., *a political ecology of wellbeing*, herein applied to the study of WASH inequities.

Chapter 2

Literature Review

Chapter introduction

This chapter explores the relevant literatures necessary to contextualize this work and address the objectives:

- 1) To describe barriers and facilitators in access to water, sanitation, and hygiene in low-income communities in Brazil.
- 2) To explore the impacts of inequities in access to water, sanitation, and hygiene on the wellbeing of low-income communities in Brazil through political ecology of health.
- 3) To investigate solutions to water, sanitation, and hygiene inequities implemented by civil society organizations in low-income communities in Brazil.

Firstly, I describe the theoretical framework used to frame the research problem, i.e., political ecology of health, and conceptualizations of wellbeing in health geography. Secondly, I review what is empirically known about global inequities in access to water, sanitation, and hygiene, and contextual characteristics of this problem in Brazil. Thirdly, I define civil society organizations and their role in achieving the sustainable development goals, particularly the one dedicated to advance access to water, sanitation, and hygiene. Finally, I identify the gap in the literature that this research will help to fill, i.e., to better understand the role of CSOs in promoting solutions to WASH inequities in upper-middle income countries.

2.1 Political ecology of health

This research is informed by political ecology of health, a theoretical framework used by researchers interested in how unequal power relations shape the distribution of natural resources, ultimately affecting human health and causing health inequities (King, 2010). This framework was first proposed within the subfield of health geography by Jonathan Mayer (1996), who called it “political ecology of *disease*” (PED) and suggested it as an approach to *medical* geography in the 1990s. Mayer (1996) believed that the use of PED could lead to greater *systemic* understanding of health and

disease as they occur in each context by putting power at the centre of analysis regarding human-environment interactions, as opposed to traditional ecological approaches that oversaw the importance of power and politics.

At the time PED was proposed by Mayer, Kearns (1993) had identified a paradigm shift in medical geography influenced by changes in the parent discipline of geography towards the incorporation of *social theory* and a return to the centrality of the concept of *place* – i.e., the local context or space embedded with meaning (Gatrell & Elliott, 2015; Kearns, 1993). This change partially replaced the positivist and quantitative trend observed in geography since the 1960s, when medical geographers largely focused on the occurrence of disease and availability of healthcare in space, having individuals as units of analysis (Kearns, 1993; Mayer, 1996). Such a shift happened in response to structuralist arguments that highlighted the influence of social, political, and economic structures on local phenomena and studies that identified how certain groups experienced ill-health more than others due to social injustices (Kearns, 1993). These studies included the Black Report in Britain, which focused on health disparities between social classes (Department of Health and Social Security, 1980), the Lalonde Report in Canada, which discussed how targeted health policies can support populations at risk (Ministry of National Health and Welfare, 1974), and the Heckler Report in the US, which identified the higher burden of disease among racialized groups (US Department of Health and Human Service, 1985).

These changes in medical geography, soon to be referred to as “health geography”, were accompanied by a broader understanding of health as more than the absence of pathologically diagnosed ailments (Kearns, 1993). Instead, health was understood as “the extent to which an individual or group is able to realize aspirations and satisfy needs, and to change or cope with the environment; a resource for everyday life” (World Health Organization Regional Office for Europe, 1984, p. 4). This socio-ecological model of health, as opposed to a biomedical one, “involves an interactive set of relationships between a population and their social, cultural, and physical environment” (Kearns, 1993, p. 44), which reinforced the capacity of place to influence people’s health in both positive and negative ways.

By proposing a political ecology of disease, Mayer (1996) incorporated these trends to explain disease through contextual understandings of the natural characteristics of the environment and human activity, with special attention to human agency, power relations and how they influence

resource distribution and access. He argued that political ecologists already considered power and politics in the study of human-environment interactions, but overlooked the impacts of political economy on health and disease (Mayer, 1996). Examples explored by the author included studies on the causes of deforestation in the Amazon, which appropriately considered the driving forces of capitalism as well as the environmental attributes of the place, but overlooked how this phenomenon could affect human health across multiple scales through the emergence and spread of infectious diseases (Mayer, 1996).

The *multiscalar* nature of health was also emphasized in PED. Mayer (1996) argued that, because scale is an artificial construct, it cannot contain real-life phenomena, which happen simultaneously at various scales. He illustrated this through the example of sex workers in Uganda who presented high rates of HIV prevalence despite living in an isolated region of the country, but whose main clients were international truck drivers, who contributed to the spread of the disease while transporting commercialized goods within Africa. Mayer (1996) argued that this case exemplified the interconnectedness of places with the rest of the world, ultimately mediated by political economy. In this sense, he emphasized that global socioeconomic forces impact disease in place, but local phenomena can also influence macro political and environmental changes that affect health and disease patterns at a global level (Mayer, 1996).

More recent applications of this framework refer to it as political ecology of health, emphasizing a broader definition of health and investigating issues of wellbeing. Richmond et al. (2005), for example, studied the impacts of the aquaculture industry on the health and wellbeing of First Nations on the West coast of Canada. They found that the growth of salmon aquaculture disrupted coastal ecosystems, reducing Indigenous People's capacity to generate income through fishing and threatening the natural resources they relied on for subsistence. Additionally, they found that, while aquaculture expanded employment opportunities, the jobs being offered were of lower quality and the practice negatively affected what the groups defined as wellbeing, i.e., "control over and access to environmental resources" (Richmond et al., 2005, p. 354). In the tradition of political ecology, the authors framed this place-based health and wellbeing issue as a result of driving global capitalist and colonial forces, which threaten traditional ways of living a healthy life in favour of profit (Richmond et al., 2005).

PEH scholars are concerned with the *political economy* of disease, but the broader understanding of health allows further consideration of how production, distribution and consumption of goods and services mobilize resources and populations, eventually impacting health (King, 2010). Central to this is an explicit focus on *inequities* in access to information, resources, and opportunities. King (2010) was particularly interested in how power relationships reinforce inequities, impacting modes of production, local economies, and resource allocation. This concern with inequities is linked to political ecologists' commitment to environmental justice, i.e., the distribution of environmental goods and bads as a result of power struggles (Blaikie, 2012).

Finally, one of the key concepts of PEH is the idea of social and environmental *narratives* produced by different actors and institutions, acknowledging that powerful agents promote top-down health narratives that influence health decision-making and local understandings of health and disease (King, 2010). Simultaneously, there are bottom-up narratives arising in opposition to dominant discourses and proposing their own understandings of health (King, 2010). These key ideas are linked to the critical origins of PEH, helping to challenge conventional health orthodoxies promoted by the biomedical model (King, 2010). The interest on narratives has its origins on the 'discursive turn' that influenced human geography in the 1990s, drawing on poststructuralism and discourse theory to investigate how power and knowledge affect political-ecological outcomes (Bryant, 1998).

2.1.1 Wellbeing in health geography and political ecology of health

Wellbeing emerged in health geography in the 1990s, as geographers discussed holistic ideas of emotional, social, and physical contentment (Severson & Collins, 2018). Despite being linked to health in the commonly used expression "health and wellbeing", the sub-discipline still lacks a conceptual framework to study the concept independently, as well as techniques and methods to measure and analyze wellbeing (Elliott, 2018).

Andrews et al. (2014) identified a loose consensus over the definition of the term, concluding that "wellbeing is about being-well, content, healthy and in a good place in life" (p. 212). The authors linked wellbeing to human needs, including vital needs, spiritual and emotional needs, and consumer products and luxuries, but recognized that needs-based definitions do not contemplate human variability (Andrews et al., 2014). In this conception, wellbeing encapsulates physical and mental health, but can also involve spiritual and emotional dimensions, as well as societal expectations of

ownership and purchase power, and socioeconomic status (Andrews et al., 2014; Dean & Edge, 2024). This understanding is certainly place-based due to cultural variations regarding the more subjective dimensions herein listed, and due to material conditions that vary from one social group to the others.

While Andrews et al. (2014) understand wellbeing as a shared notion among societal groups at different scales, Hanlon (2014) sees it as a “feeling-state which is clearly influenced by environmental and social relationships but possessed by individuals” (p. 144). These two ideas can be complementary, as shown by Crooks et al. (2018), who argue that “wellbeing encompasses personal *and* collective components in multiple scales” (p. 125). They also assert that:

The term points to a sense of completeness and balance in varied aspects of life, including the emotional, social, material and physical (MacKian, 2009). It is also the positive sense of having potential and ability within each of these dimensions of human experience. (Crooks et al., 2018, p. 127).

In a recent case study of the experiences of refugee men living in Canada, Kruth et al. (2023) document that their wellbeing is simultaneously affected by local events in the community they live in and those affecting life in their country of origin. This reinforces the notion that wellbeing is inherently place-based and influenced by socioeconomic systems, which are critical to the uneven distribution of wellbeing across populations (Crooks et al., 2018).

A broader yet related understanding of the concept is that “wellbeing is that space between expectation and reality” (Elliott, 2021, p. 229). A possible interpretation of this definition is that wellbeing is informed by equity. In this sense, people feel well when their expectations of what life should be like is closer to the reality they encounter; these expectations are, again, place-based and informed by material and cultural conditions. On the other hand, when expectations are frustrated and access to resources and services that contribute to wellbeing are limited, people’s capacity to feel “well, content, healthy and in a good place in life” is also reduced. Therefore, the experience of inequity compromises wellbeing.

For example, in a study of the subjective wellbeing of refugees, Dean and Edge (2024) explain wellbeing as the “imaginary of what settled life will look and feel like in their host country” (p. 3) compared to what life *looked and felt like* in their country of origin. In this sense, people’s expectation of what life in a new country should feel like in comparison to the reality found once they

settle informs wellbeing. If the expectations of access to resources and services is high but not met, then wellbeing is affected. In addition, the experience of inequities widens the gap between expectation and reality, further compromising wellbeing. In this sense, it is relevant to understand what makes up these expectations, i.e., the dimensions of wellbeing, to understand and address inequities keeping people from feeling well, healthy, and content.

PEH researchers have claimed to study wellbeing (Bisung et al., 2016; King, 2010; Richmond et al., 2005) but the term is rarely featured independently from “health”. This is perhaps because health is a fundamental element of wellbeing, or because PEH is concerned with inequities and people’s perceptions of health, which are two central components of wellbeing. This theoretical framework, thus, contains ideas key to the study of wellbeing and can be used to investigate how this concept is socially constructed in different places and highlight dimensions beyond measurable physical and psychosocial health, such as people’s “experiences” and “perceptions” of equity and social justice, colonialism, and discrimination (Kearns & Collins, 2010).

Kangmennaang et al. (2019) utilized PEH as part of a conceptual framework to study wellbeing in Ghana. By focusing on perceptions of inequality among Ghanaians, they first identified components of wellbeing according to shared understandings of what it means “to be well” at different scales, which included living standards, health, education, community vitality, democratic engagement, environment, recreation, and leisure (Kangmennaang et al., 2019). Through interviews and focus groups, they demonstrated how notions of wellbeing varied regionally, but certain dimensions were shared at the country level. By utilizing ecosocial theory and political ecology, they centred the analysis around perceptions of inequities and found that income inequality does affect wellbeing since those earning less have limited access to basic needs, including food, housing, and water security (Kangmennaang et al., 2019; Kangmennaang & Elliott, 2019).

Elliott (2018) proposes that elements of wellbeing on a global scale include access to water and sanitation, food insecurity, and climate change. In a sense, every global problem could be seen from a wellbeing perspective, but these are particularly interesting problems because they are linked to resource allocation and inequities, and they affect people’s health and wellbeing in complex ways. WASH is vital but can also affect someone’s sense of dignity, perception of social and environmental justice, and their potential to live a better, and more content life (Bisung & Elliott, 2016). Safe access to WASH contributes to wellbeing, then, by causing “a predominance of positive emotions,

satisfaction with life, and a sense of meaning and positive functioning” (Intergovernmental Panel on Climate Change [IPCC], 2023) (p. 1049).

There is, therefore, a fertile terrain to study how WASH inequities affect people’s *wellbeing* through a political ecology of health. An intrinsic challenge to this undertaking is the fleeting nature of the concept of wellbeing, which is understood differently in different contexts and at different scales. Because political ecologists are interested in conducting multiscale analysis of local phenomena, this theoretical framework can offer the flexibility needed to identify local dimensions of wellbeing, while considering how they relate to global phenomena and shared notions of health and wellbeing across scales. This thesis aims to provide an example of how to utilize key ideas and concepts of PEH to study WASH inequities while considering the various ways in which this phenomenon detracts people from being well and healthy. By doing so, this thesis can help pave the way towards a political ecology of wellbeing, equipped to study how power and politics influence people’s experience of *wellbeing* in place by identifying what the concept means in different contexts.

2.2 Global access to water, sanitation, and hygiene

The world is undergoing a water crisis. Water stress is increasing in most regions due to population growth, socio-economic development, urbanization, land-use change, inefficient use in water-intensive sectors, and changing consumption patterns (UN-Water, 2021). Furthermore, water sources and associated ecosystems are drying up, becoming more polluted or both, while surface water areas suffer rapid changes caused by climate change that could lead to increased frequency of droughts or flooding (UN-Water, 2021). In the meantime, access to safe water, sanitation, and hygiene remains unequal. It is estimated that 2.2 billion people lack access to safe drinking water and 3.5 billion, to safely managed sanitation services (UNICEF & WHO, 2023).

Safe WASH access is essential to good health. Globally, 2.8% of all deaths and 3.9% of disability adjusted life-years are attributed to inadequate WASH (Prüss-Ustün et al., 2019). These estimates include diseases related to drinking water, sanitation, and hygiene, such as diarrhoeal diseases, and those related to water resource management, like malaria and dengue. Moreover, unsafe WASH access also affects health in a broader sense not featured in these numbers. For example, women – who are responsible for collecting water in many traditional communities in LMICs – are at risk of experiencing physical and sexual violence when collecting water or using sanitation and hygiene

facilities outside of home (Nunbogu & Elliott, 2022). Some examples include women suffering domestic violence for not collecting enough water or being victim of sexual abuse when bathing or relieving themselves. Even when not experiencing physical violence, they face psychological distress and social anxiety related to these risks (Bisung & Elliott, 2017), having to create strategies to cope, such as using communal toilets in groups to avoid being caught alone.

The COVID-19 pandemic, which spanned from 2020 to 2022, shone a spotlight on the links between WASH and health, as well as the existing inequities in access to these services (Elliott, 2022). With the public health message in most countries urging people to “wash their hands frequently” to avoid transmitting the disease, it became clear that there were groups who could not adhere. Among other marginalized groups were slum dwellers, people in condition of homelessness or living in informal settlements, those in extreme poverty or facing insecure and informal work (United Nations, 2020). For the United Nations, the pandemic served as a reminder of how interdependent our world is, and that someone’s health depends on the health of everyone else (United Nations, 2020). The interconnectedness of COVID-19 cases and deaths around the world and how emerging strains of the SARS-CoV-2 virus quickly spread through international travel served as a reminder that “all health is global health” (Elliott, 2022, p. 175) – i.e., all local health issues have the potential to affect health at a global level.

The United Nation’s 2030 Agenda dedicates one of its Sustainable Development Goals, SDG 6, to clean water and sanitation for all. Among other targets, SDG 6 aims to achieve “universal and equitable access to safe water” and “adequate and equitable sanitation and hygiene” for all by 2030 (United Nations, 2015). Nonetheless, all regions of the world are far off-track from reaching it in time, needing a three- to six-fold increase in current progress rates (UNICEF & WHO, 2023; UN-Water, 2021).

Despite being closer to universal WASH coverage than LMICs, HICs and UMICs also face challenges in providing access for all. Marginalized groups such as those in condition of homelessness, poorly housed, incarcerated, remote populations, racial and ethnic minorities, and refugees are usually the ones lacking access to safe water and sanitation in these nations (Brown et al., 2023). A study in Germany shows that people experiencing homelessness in Bonn face several challenges accessing WASH. There are only a few drinking water stations in the city, washrooms have limited working hours, and there are no public showers or handwashing facilities (Anthonj et al.,

2024). Official WASH data hides this reality with optimism and the belief that the WASH problem in Europe has already been solved (Anthonj et al., 2024). In the first study focused on WASH access among people experiencing homelessness in Germany, Anthonj et al. (2024) found that this population often resorts to open urination and defecation, and that challenges like these make it even harder for them to transition out of homelessness.

In Mexico City, people experiencing homelessness often face challenges accessing WASH, which was further complicated by the COVID-19 pandemic and associated public health measures, such as business closures and social distancing (Liera et al., 2023). Open defecation became more common during the pandemic, handwashing was harder to practice, and drinking water access was compromised as this group saw informal income generation activities reduced during lockdowns (Liera et al., 2023).

In the United States, about 1.5 million people lack piped water at home (Deitz & Meehan, 2019). A higher proportion of people in this condition are black, Hispanic, and Native American (Deitz & Meehan, 2019), which demonstrates how environmental racism and colonialism are built into the spatial distribution of WASH services in capitalist societies (Brown et al., 2023). Like in Germany, research on WASH insecure populations in the US is quite limited, reflecting the perspective that WASH access in this country reaches almost all people and is not a priority (Deitz & Meehan, 2019). Similarly, in Canada, there were 101 Indigenous communities living under boiling water advisories in 2021, which means residents must boil water before using it safely (Lauret et al., 2025). These limitations to safe WASH access translate to health inequities: a study on the health outcomes of Indigenous people living on reserve in Canada found that those with running water at home had 80% less chance of reporting depression after controlling for a wide range of health determinants, and a similar relationship was found for those who had a toilet and septic systems (O’Gorman, 2021).

Other examples of populations lacking access to safe WASH in HICs include migrant seasonal agriculture workers in Spain (Rodríguez-Guerrero et al., 2024), nomadic and migrant populations in rural areas of the European Union more broadly, Roma communities in Italy and France, Aboriginal communities in Australia, and rural households in South Korea (Brown et al., 2023). These conditions have negative effects on the health of these populations, such as increasing rates of gastrointestinal diseases, chemical and microbial contamination, and other conditions not currently tracked by the

global burden of disease estimates that assume the risk of water and sanitation deficits to be negligible in HICs (Brown et al., 2023).

2.2.1 Water, sanitation, and hygiene inequities through the lens of political ecology of health

Unequal WASH distribution can sometimes not be a matter of resource scarcity, but rather, result from political, economic, and cultural traditions, as seen in the Canadian and American contexts, where racialized communities are more likely to experience water insecurity (Deitz & Meehan, 2019; Lauret et al., 2025). Political ecology of health is a useful framework to inform research on WASH inequities for three main reasons: its concern with the distribution of natural resources as determined by power relations, its attention to inequities and how to address them, and its focus on health narratives that shape health decision-making.

This theoretical framework indicates that the distribution of natural resources like water is, above everything, political (King, 2010). Likewise, political and economic systems influence the distribution of disease and health care response in interconnected ways (King, 2010). Under this logic, inequities in access to WASH and resulting health impacts can be maintained through unequal power relations, which is particularly relevant in capitalist societies in the Global South. As sustained by Bryant (1998), contemporary patterns of human-environment interactions in this part of the world continue to be shaped by colonialism and subsequent asymmetrical incorporation into a global capitalist economy. Therefore, conflicts over access to environmental resources in these countries can only be understood under a historical perspective that takes into account the multiple systems of oppression keeping inequities in place (Bryant, 1998).

In these political struggles, narratives can be pivotal. According to King (2010), different actors create and promote representations of disease that can be traced to particular political interests. Through PEH, researchers look for concurrent social and environmental narratives around health and disease, which can help better understand local health-decision making patterns.

In the context of WASH, Truelove (2011) argues that unified narratives to solve global water issues usually promote privatization as a solution, but these narratives are advanced primarily by water companies without ample debate, favouring profit over the needs of the poorest. This is exemplified

in Kenya's pro-poor WASH programs, which follow market dynamics through local organizations that provide water to rural communities for a fee (Bisung et al., 2016). At times, this arrangement leaves low-income communities unserved since private water companies may consider that the communities do not have enough wealth to justify the investments even within the scope of pro-poor programs (Bisung et al., 2016). WASH research must pay attention to everyday water practices to overcome such universalist narratives and understand the intricacies of local WASH problems (Truelove, 2011).

Rusca et al. (2017) utilized political ecology of health in a study of WASH inequities in Malawi. Being interested in the uneven production of space and uneven access to water, they considered the history of the city of Lilongwe and the power relations that led to fragmented waterscapes through selective development of urban spaces and informal urban growth. To account for the richness and complexity of the issue at stake, they considered narratives from various groups on water provision, highlighting differences among those affected and those in power (Rusca et al., 2017).

Nunbogu and Elliott (2021) employed feminist political ecology of health to explain how unbalanced power dynamics are supported by associations between gender and water responsibilities in LMICs, e.g., narratives about the role of women and girls in collecting and managing water in the household. These patriarchal narratives affect the physical and psychosocial health of women throughout their lives, reducing prospects to build autonomy and overcome poverty and subjugation to gender-based violence. The focus on gender through a feminist and political ecology lens allowed the authors to identify how, at the community and national levels in many LMICs, women have less power to make decisions related to water governance, even though they are the ones directly affected by these choices (Nunbogu & Elliott, 2021). Women's and girls' health and wellbeing in LMICs are marked by gender and water dynamics in many ways, but particularly through violence: structural violence, as political, economic and cultural structures determine who gets access to water and for how much; physical violence, when women and girls are punished for not fulfilling their water responsibilities; psychological violence as a result of the stress and overall emotional harm caused by water insecurity; and sexual violence, through the enhanced risks of sexual abuse and harassment posed by water insecurity (Nunbogu & Elliott, 2022).

2.2.2 WASH and health in Brazil

Brazil is an upper-middle income country facing WASH challenges commonly found both in LMICs and HICs. Brazil has the highest freshwater supply in the world, with total renewable water resources equivalent to 8,647 billion m³/year (FAO, 2021). Nonetheless, it seems unlikely that the nation will reach SDG 6 by 2030 given that approximately 32 million Brazilians lack access to safe water at home and about 89 million lack safely managed sanitation services (SNIS, 2023), with even formal settlements in some peripheral areas struggling to access WASH regularly (Britto et al., 2019).

The mortality rate attributed to exposure to unsafe WASH in Brazil in 2019 was 6.6 per 100,000 people, placing the country 83rd in the global ranking of countries with the least WASH-related deaths (WHO, 2024b). In 2021, only two communicable diseases figured as the main causes of death in Brazil, i.e., COVID-19 in first, and lower respiratory infections in fourth (WHO, 2024b), both associated with hygiene limitations (IHME, 2021; Prüss-Ustün et al., 2019). On the other hand, diarrhoeal diseases still figure as the seventh main cause of death for children under 5 years old, with a mortality rate of 10.4 per 1,000 live births in 2016; in that same year, protein-energy malnutrition was the 10th main cause of death for this group, with a 5.1 rate 1,000 live births (Ministério da Saúde, 2024b)

In terms of morbidity, the country has made progress, with hospitalizations caused by inadequate WASH falling from 615.4 thousand cases in 2008 to 344.4 thousand in 2024, approximately 33% of all hospitalizations (Freitas & Magnabosco, 2024; Ministério da Saúde, 2024a). The majority of cases, 49%, were caused by diseases transmitted by insects, including dengue, yellow fever, leishmaniosis, malaria, lymphatic filariasis, and chagas disease – with dengue being the most common cause (Freitas & Magnabosco, 2024). In fact, there were 6.5 million cases of dengue notified to the Ministry of Health in 2024, marking a historical increase in dengue infections (Freitas & Magnabosco, 2024). The second most common cause for hospitalization were diseases transmitted through faecal-oral routes, such as diarrhoeal diseases, typhoid, and hepatitis A; they represented 47.6% of WASH-related hospitalizations in 2024 (Freitas & Magnabosco, 2024).

The majority of cases caused by insect-transmitted diseases, 46%, were registered in the Southeast region, composed of four states: São Paulo, Rio de Janeiro, Minas Gerais, and Espírito Santo (Freitas & Magnabosco, 2024). While the region with the most cases caused by faecal-oral transmission was the Northeast (43% of all cases), the Southeast followed in second, with 20% of all cases (Freitas &

Magnabosco, 2024). The incidence rate of insect-transmission cases in the state of Rio de Janeiro was 4.8 per 10,000 residents and 3.4 for faecal-oral transmissions; the state also had the second largest incidence rate for diseases related to poor hygiene (i.e., eye and skin infections), with 1.6 cases per 1,000 residents (Freitas & Magnabosco, 2024).

The groups most affected by diseases caused by inadequate WASH are women (national incidence rate of 16.8 per 10,000 residents over 15.6 for men), children under 5 years old (national incidence rate of 53.8 per 10,000 residents in this age group), and seniors over 60 (mortality rate of 27.8 per 100,000 residents in this age group) (Freitas & Magnabosco, 2024). Race is also an indicator of higher probability to suffer from diseases caused by inadequate WASH, with those identifying as black or *pardo* (i.e., mixed African and/or Indigenous, and European) accounting for 64.8% of WASH-related hospitalizations in 2024, and mortality rates being higher among Indigenous populations (21.1 per 100,000 people in this ethnic group) (Freitas & Magnabosco, 2024). In the Southeast, the highest incidence rates were among *pardos* and Asian-Brazilians (Freitas & Magnabosco, 2024).

2.2.3 WASH governance in Brazil

Public authorities are responsible for WASH provision in Brazil. Although access to WASH is not a constitutional right, Brazilians enjoy the rights to life, dignity, and health, all of which are dependent on access to safe WASH (Aith & Rothbarth, 2015). Additionally, in 2007, the Federal Government passed Federal Law nº 11.445/2007 – National Guidelines for Basic Sanitation, which established that all citizens must have access to “basic sanitation”, including potable water supply, sewage collection, and rainwater drainage (Ministério do Desenvolvimento Regional, 2021). More recently, Federal Law nº 14.026/2020, known as the New Basic Sanitation Act, sets the goal to provide access to potable drinking water, sewage collection and treatment to 99% of the population by the end of 2033 (Novo Marco Legal do Saneamento, 2020). This law is the most recent federal piece of legislation related to WASH and requires private companies to be included in the bidding processes for WASH distribution licensing, once dominated by public state companies (Programa de Educação Tutorial [PET] & data_labe, 2023).

The Federal Constitution established that the development, coordination and implementation of programs, legislation, and infrastructural expansion related to WASH are a shared responsibility

between all levels of government, i.e., federal, state, and municipal governments (Table 2.1); the federal government is responsible for leading this coordination (Ministério do Desenvolvimento Regional, 2021; PET & data_labe, 2023). The state government oversees municipal WASH plans and initiatives through its monitoring agencies and, in the state of Rio de Janeiro, through the state water and sanitation company, *Companhia Estadual de Águas e Esgoto* (CEDAE), currently responsible for water collection and treatment before distribution (PET & data_labe, 2023). Municipalities are legally responsible for providing WASH services in their territories (Ministério do Desenvolvimento Regional, 2021), but very few municipal governments possess the infrastructure or budget to do so, so they commonly license the operations to other entities, which can be public or private companies, joint-ventures, or consortia (Cunha, 2011; Ministério do Desenvolvimento Regional, 2021).

Table 2.1. WASH governance in Brazil	
Government level	Legal responsibilities
Federal government	• Establish and approve legislation, norms, and targets for basic sanitation* in the national territory (Law nº 11.445/2007). • Collect, organize, and display WASH data through the National System of Basic Sanitation Information (Política Nacional de Saneamento Básico art. 53; Presidential Decree nº 7.217/2010). • Establish reference norms for the regulation of basic sanitation services through the National Agency of Water and Basic Sanitation (Agência Nacional de Águas e Saneamento Básico – ANA; Law nº 14.026/2020).
State government**	• Alongside the federal and municipal governments, promote programs to improve the quality of life, including basic sanitation (Constituição Federal art. 21, art. 23/1988). • Monitor the quality of drinking water provided to the population and sewage diverted to natural water bodies after treatment through state-level monitoring agencies and through the state-based public company, CEDAE (Law nº 11.445/2007). • Articulate licensing processes for groups of municipalities when authorized/requested by municipal governments.
Municipal government	• Create and implement municipal plans containing targets for drinking water and sanitation in the municipality based on the national plan for basic sanitation (Law nº 11.445/2007). • Provide potable drinking water and sewage collection to residents, or license it to public or private companies, joint-ventures, or civil society organizations (Law nº 14.026/2020).
* “Basic sanitation” includes the provision of potable drinking water, sewage collection and treatment, rainwater drainage, and solid waste collection. ** State responsibilities vary by state; this table reflects the current governance in the state of Rio de Janeiro.	

Source: (Ministério do Desenvolvimento Regional, 2021).

The Metropolitan Region of Rio de Janeiro, the geographical scope of this research, consists of 21 municipalities home to 12.2 million people (Câmara Metropolitana de Integração Governamental,

2024; Souza & Terra, 2017). Baixada Fluminense (Figure 2.1) is a sub-region comprised of 12 municipalities on the western part of the MRRJ. This sub-region constitutes the periphery of the city of Rio de Janeiro, being known for high rates of violence and inequities in access to public services (Albuquerque, 2020; da Rocha & de Oliveira, 2023). This region's recent history is marked by an abrupt and unplanned process of urbanization as the capital of the state developed economically, demanding a cheap workforce for industrial and commercial sectors (Britto et al., 2019; da Rocha & de Oliveira, 2023; Da Silveira Pereira et al., 2021). To this day, approximately 2 million residents from Baixada Fluminense commute daily to the state capital to work and access health, education, leisure, and other services (Casa Fluminense, 2020).

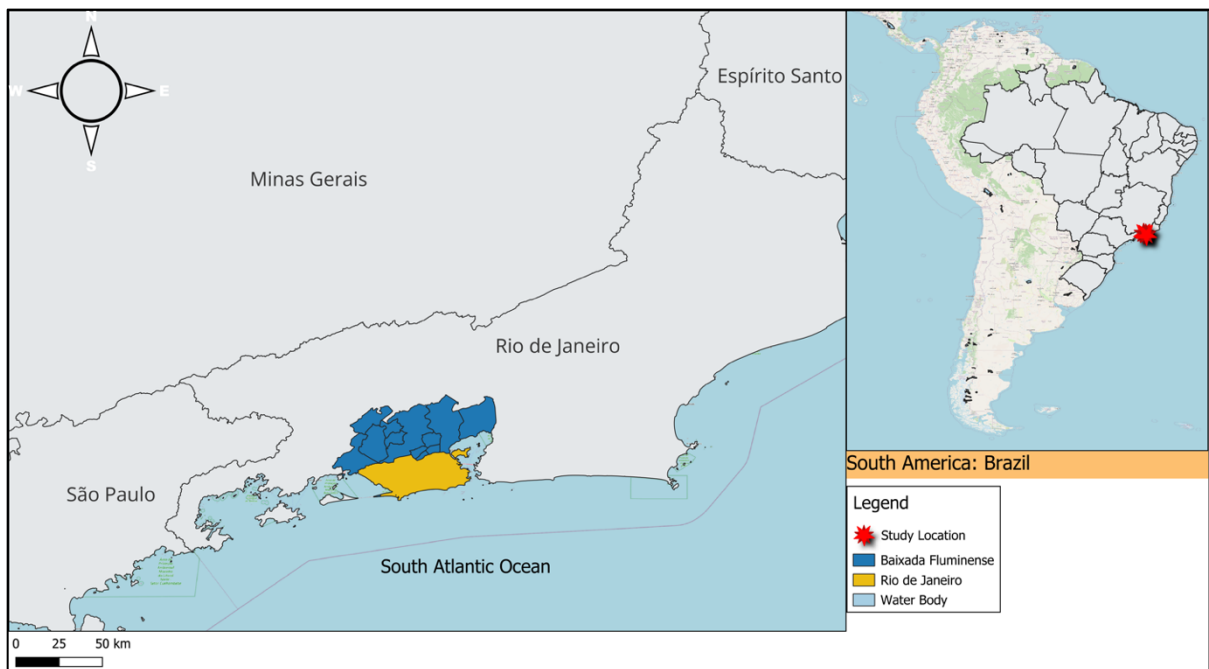


Figure 2.1. Map of Baixada Fluminense. Map created using the Free and Open Source QGIS.

The city of Rio de Janeiro is dependent on water collected outside its borders, mainly from the Guandu and Paraíba do Sul rivers, because water sources in the capital have been highly polluted since the 1960s (Britto et al., 2019). The main source of pollution of the Guandu river is untreated domestic sewage (Formiga-Johnsson & Britto, 2020). Despite being bathed by the Guandu river, municipalities in Baixada Fluminense present the worst WASH indicators in the MRRJ (**Table 2.2**),

especially when compared to the state capital (Britto et al., 2019), highlighting a complex and unequal relationship between poorer peripheral regions and the richer central capital of the state.

Table 2.2. Access to WASH in Baixada Fluminense and the city of Rio de Janeiro in 2022				
Municipality	Population	Water supply coverage (%)	Sewage collection coverage (%)	Sewage treatment coverage (%)
Belford Roxo	483,087	74.1%	5.6%	0.3%
Duque de Caxias	808,161	66.0%	8.7%	1.6%
Itaguaí	116,841	60.5%	29.1%	13.5%
Japeri	96,289	54.8%	0.0%	0.0%
Mesquita	167,127	100.0%	13.5%	52.8%
Nilópolis	146,774	100.0%	0.0%	0.0%
Nova Iguaçu	785,867	100.0%	29.0%	9.5%
Paracambi	41,375	42.6%	92.8%	0.0%
Queimados	140,523	80.9%	0.0%	18.1%
Rio de Janeiro	6,211,223	93.8%	95.8%	27.6%
São João de Meriti	440,962	83.5%	95.0%	60.2%
Seropédica	80,596	100.0%	0.7%	0.0%

Source: Based on data from (SNIS, 2024) and (Casa Fluminense, 2024).

Brazil's National Sanitation Information System (*Sistema Nacional de Informações sobre Saneamento* [SNIS]) is part of the Ministry of Regional Development and collects data from municipalities and WASH providers annually (SNIS, 2025). SNIS reports that water supply in the state of Rio de Janeiro is above the national average (84.9%), reaching 89.1% of the population (SNIS, 2023). However, this does not reflect the quality and reliability of services, with civil society organization contesting the official data for the state (PET & data_labe, 2023). In fact, the state-level average hides inequities between municipalities in Baixada Fluminense (Formiga-Johnsson & Britto,

2020; Pierobon & Fernandes, 2023), where seven municipalities are below the national average for water provision (Table 2.2).

The poor performance of WASH companies is the main factor contributing to WASH insecurity in Rio de Janeiro (Formiga-Johnsson & Britto, 2020) but the unequal development of the region explains the spatial distribution of WASH inequities as peri-urban regions and those further away from urban centres have the lowest rates of connections to water mains (da Rocha & de Oliveira, 2023). In municipalities like Itaguaí and Seropédica, more than a third of residents make less than half of a minimum wage in monthly income while paying two times the national average for water services (da Rocha & de Oliveira, 2023). As a result, some residents purposefully disconnect from the water network due to service intermittency and the fact that they continue to receive water bills based on estimates despite the compromised quality and regularity of services (Formiga-Johnsson & Britto, 2020).

Another challenge to sustained access to safe drinking water are clandestine connections built by residents to access water mains in low-income areas (Formiga-Johnsson & Britto, 2020). Although not the sole reason, illegal connections contribute to frequent water shortages in these neighbourhoods. Since residents do not pay for water bills, they are not considered clients by WASH companies (Britto et al., 2019). These companies frequently manage water resources so that at least “some” water gets to all residences (Britto et al., 2019) or purposefully prioritize areas with a higher concentration of paying households over those with irregular connections. This leads to a scenario where residents, even the ones who pay, may spend weeks without water (Pierobon & Fernandes, 2023). Some areas of Baixada Fluminense only have water two days a week on average (Britto et al., 2019).

These clandestine connections also compromise the quality of water that residents receive since they are built with materials of low durability (Handam et al., 2020). In a study of 134 residences in Manguinhos, Rio de Janeiro, Handam et al. (2020) found acidic pH in a majority of samples, which was traced to the presence of free carbon dioxide, potentially resulting from the decomposition of organic matter by sewage contamination. Acidic pH in drinking water can cause skin and eye irritation, as well as gastric problems (Handam et al., 2020).

Since water provision is intermittent, residents usually store water in tanks that require frequent cleaning and maintenance (Handam et al., 2020; Remigio et al., 2019). However, these

recommendations are not always followed due to lack of information, and physical and economic limitations. Handam et al. (2020) also found that total coliforms and *E. coli* concentrations were higher in water tanks and filtered water than in tap water. In another slum in the state capital, Remigio et al. (2019) found *E. coli* and total coliforms concentrations above safety limits in tap water, water tanks, and filtered water. Improper water storage and damaged WASH infrastructure increase the risk of diarrhoea and facilitate the proliferation of vector-borne diseases, such as those transmitted by mosquitoes and rodents (Handam et al., 2020; Remigio et al., 2019).

These challenges are seen in slums in the city of Rio de Janeiro because they do not follow urban planning standards and have reduced access to essential public services (Remigio et al., 2019). More than 22% of residents of the city of Rio de Janeiro live in such informal settlements, referred to as *favelas* (Remigio et al., 2019). Formal water provision systems only began to be extended to favelas in the 1980s (Pierobon & Fernandes, 2023). Prior to that, residents were responsible for collectively building irregular connections or fetching water elsewhere. Construction and maintenance of housing units in these areas often involves para-state authority figures like the militia and the drug cartel, community associations, and non-profit organizations (Pierobon & Fernandes, 2023). These areas are also mostly populated by black, pardo, and migrant populations (Pierobon & Fernandes, 2023), a similar pattern of environmental racism as seen in high-income countries (Brown et al., 2023).

Sanitation indicators in the region are also unequal, with only 65.0 % of the population in the state of Rio de Janeiro accessing safely managed sanitation services (SNIS, 2023). Additionally, there are clear inequities between the state capital and municipalities in Baixada Fluminense, where only three municipalities have sewage collection coverage higher than 50% (Table 2.2). Sewage treatment is even more limited (Table 2.2). Just 54.8% of the state's sewage is treated (Casa Fluminense, 2024) and only two municipalities in Baixada Fluminense have more than 50% of their sewage treated, with four completely lacking this service. Even the capital has less than a third of its sewage treated before disposal. Data on sewage treatment was compiled by Casa Fluminense, a civil society organization dedicated to the sustainable development of the MRRJ, from the Government of the State of Rio de Janeiro's Secretariat of Environment and Sustainability (Secretaria do Ambiente e Sustentabilidade [SEAS]) (Casa Fluminense, 2024). At the time of writing this thesis, the data was not available on the secretariat's website, which discloses an error message stating that this is due to the absence of a regulatory norm for transparency (Secretaria do Ambiente e Sustentabilidade, 2025).

2.3 Civil society organizations

Civil society organizations are also known as non-governmental organizations or referred to as “the voluntary sector” and “the third sector” (Hassan et al., 2020). They are non-profit organizations formed voluntarily by individuals from civil society, i.e., outside of the governmental sphere, with the goal of “improving the standards of living of the less fortunate” (Hassan et al., 2020, p. 97). Whatever surpluses they might obtain from service delivery and sales are not distributed in the form of profits (Wolch, 1990), but rather into services for targeted populations.

The use of the terms NGO and CSO is associated with the creation of the United Nations Organization (Hassan et al., 2020; Srinivas, 2009). In attempting to define itself as a legitimate intergovernmental organization, the UN needed to highlight its singularity from other non-governmental international actors like the Red Cross and Oxfam. The term CSO became more popular after the United Nations Conference on Sustainable Development (Rio+20) in 2012, with the adoption of the Sustainable Development Goals, as the UN recognized the importance of incorporating the broader civil society (i.e., non-state actors) in advocating for the implementation of the SDGs, proposing practical solutions, and monitoring existing difunctional policies (Hassan et al., 2020). CSOs participated in the creation of the SDGs and have a key role to play in achieving them (Hassan et al., 2020), serving as intermediaries between marginalized populations and governments around the world. Before that, NGOs were already recognized as important actors in international development, with thousands of them having consultative status within the UN (Srinivas, 2009).

Globally, there was an increase in the number of CSOs in the 1980s as neoconservative political movements promoted the dismantling of the welfare state and the implementation of neoliberal economic policies (Wolch, 1990). In that context, CSOs were considered more efficient than government agencies in service provision (Atia & Herrold, 2018). Governments in the Global North – notably in the United States and in the United Kingdom – stopped offering services and benefits that supported marginalized populations. These services were then taken on by for- and non-profit organizations like social service agencies, housing and community development groups, arts and cultural societies, and non-profit healthcare institutions. These organizations attempted to fill the gap left open by governments in the provision of basic social services (Wolch, 1990). Since then, CSOs have played this role in political-economic cycles where states reduce social spending, while

continuously acting as spokespersons for certain groups, primarily those rendered marginalized by political and economic structures (Hassan et al., 2020).

In the United States and in the United Kingdom, CSOs operated with support of the state in a system that Wolch (1990) called the “shadow state”, where they received financial support from the government through grants, contracts, and, indirectly, through tax benefits to private donors. The government apparatus and civil society organizations became linked through extensive institutional interdependencies (Wolch, 1990). Consequently, the voluntary sector has historically empowered groups who benefit from its services and share political and economic challenges (Wolch, 1990). Its most powerful progressive contribution, however, is its capacity to reinvent productive activities, i.e., to rethink and propose new political-economic forms of social organization by expanding democratic participation and influencing state policy (Wolch, 1990), which is seen as a dangerous threat by oppressive governments (Vu, 2017).

Alternatively, critical scholarship on CSOs highlights the negative impacts these actors can have on the communities they aim to support, especially in the Global South (Eikenberry et al., 2023). One of the ways in which this can happen is through CSO-funder relationships, which are marked by power asymmetries, thus influencing how these organizations operate, shifting their priorities towards donors’ interests, and limiting their ability to promote social and policy change (Atia & Herrold, 2018; Eikenberry et al., 2023). Others question the very efficacy of CSOs in affecting change in state-society relations, prioritizing citizen-led activism as a more effective mechanism due to the long-term interests of NGOs and their need to maintain peaceful relationships with governments (Vu, 2017).

Voluntary activity varies according to time and space. National and local differences interact to produce geographies of voluntarism, where states and voluntary organizations interact differently (Wolch, 1990). Broad national forces shape the voluntary sector, but local conditions influence local patterns of voluntarism (Wolch, 1990). Different metropolitan regions and cities have varying degrees of donative resources and needs, which impacts the response of local CSOs. In this logic, the shadow state is a model for how these relationships were shaped in the Global North, through the rise and fall of the welfare state. In the Global South, the dynamics between the third sector and governments have different characteristics, partially due to the absence of ambitious and continuous welfare policies.

In a case study of Palestine and Morocco, Atia and Herrold (2018) argue that, as CSOs started to rely more heavily on external funding, some became depoliticized and disconnected from the

communities they were set up to represent, operating under patronage of governments and foreign aid. In these two contexts, CSO growth happened through patronage rather than through local grassroots movements (Atia & Herrold, 2018). In Palestine, the authors argue that “there is no government so NGOs had to take care of what the government didn’t do” (Atia & Herrold, 2018, p. 1046). In Morocco, where CSOs are mostly supported by the government in response to international scrutiny over regional inequities, these authors observed a predatory behaviour, with some CSOs being formed to benefit from the government’s initiative, but void of mission and connection to local communities (Atia & Herrold, 2018). In this scenario, local CSOs lose space for not being competitive enough for funding. Operating within this logic, CSOs are less likely to promote social change as they are discouraged from undertaking advocacy initiatives and guided solely towards humanitarian work (Atia & Herrold, 2018).

Similarly, some scholars challenge the idea that CSOs are as beneficial to society as they claim to be; instead, they see them as “tools for the elites to justify inequalities and delay rather than create social change” (Coule et al., 2022, p. 489). Overall, these critiques propose more than simply replacing the mainstream positive view of CSOs for a negative one; they encourage researchers to question this bias and critically analyze the role that each of these organizations have in the place where they operate.

Srinivas (2009), for example, questions the vagueness of the term “nongovernmental organizations” and how it is discursively used in a way that masks the heterogeneity of organizations, groups, and associations comprised by it. This trend, found in policy documents and narratives in international development, can confound grassroots NGOs and NGOs who support grassroots movements, which is a substantial distinction since the former are expected to align more closely with the interests of marginalized groups than the latter (Srinivas, 2009).

Independent of criticism, CSOs can offer short-term relief to those in need. More recently, local organizations were paramount in the global response to the COVID-19 pandemic, especially where there was limited action from public authorities to respond promptly to this health crisis. Low-income populations in developing countries faced several challenges to comply with public health measures implemented during the pandemic (Brauer et al., 2020; Paula et al., 2020; Shermin & Rahaman, 2021). Some of these problems pertained to the absence and inadequacy of hygiene facilities, the intermittency of water supply, and limited spaces to socially isolate.

In Medellín, Colombia, approximately 120 civil society organizations developed an emergency plan to minimize the impacts of COVID-19 in vulnerable communities (Molina-Betancur et al., 2021). In India, CSOs donated water to migrant workers and slums dwellers, and, in Rwanda, CSOs installed handwashing facilities at bus stations (Patel, 2020; Wasdani & Prasad, 2020). In the Philippines, faith-based NGOs provided food to poor communities under a strict lockdown that reduced income-generation activities (Speers et al., 2023).

In countries with governments that delayed response to the COVID-19 pandemic, like Brazil, CSOs not only had to take on the role of the state as described by Ortega and Béhague (2022), but also fight the government's ongoing campaigns to discredit scientific information about the disease and its prevention. Consequentially, these populations were left unattended in aspects of wellbeing that were previously tackled by civil society initiatives as their main mission, like education and income generation (Curty Pereira et al., 2023).

2.3.1 Civil society organizations and WASH provision in Brazil

Many WASH initiatives involving CSOs in Brazil take place in the Northeast, a semiarid region where water access is limited, and droughts are frequent. In the state of Ceará, CSOs are fundamental to help communities manage very limited groundwater resources (Cooperman et al., 2022). They take the form of community associations that “advocate and oversee collective resources in the community” (Cooperman et al., 2022, p. 3) by building rainwater cisterns, and designing and managing common-pool resource systems for water use. In this system, community residents are appointed as water operators who maintain piped systems from nearby wells, fix broken pipes, and operate water pumps (Cooperman et al., 2022).

In other two communities in the same state, Gasmi et al. (2022) recount how communities partnered with external actors, including CSOs, to build and manage rural water supply systems (RWSS). These initiatives included building water towers and taps, installing a water pump in local communal wells, and the donation of water cisterns. In one of the communities, local power dynamics involving the residents' association responsible for managing the RWSS led to its demise within less than a decade of implementation (Gasmi et al., 2022). In the other community, the system remains functional and the authors attribute its endurance to the active work of the community water association, a local CSO (Gasmi et al., 2022).

Multiple other rural municipalities in Northeastern Brazil have benefited from the One Million Cisterns Project sponsored by the national government since 2001 and supported by NGOs, such as Oxfam and 700 other local CSOs (Marcynuk et al., 2013). As indicated by its name, the project's objective was to build cisterns in one million households that lacked access to safe drinking water services so that they could store water collected from the rain. By 2011, 351,000 cisterns had been built (Marcynuk et al., 2013). A study of rural households in one of the states in the region, Pernambuco, found significant health improvements, with reductions in the prevalence of acute diarrhoea among individuals with cisterns when compared to those without (Marcynuk et al., 2013).

The work of CSOs in facilitating WASH access in other regions is limited and often marginal to the investigation of their role in environmental conservation. That is the case for communities in the Southeast, where this research took place. De Moraes et al. (2022), for example describe many collective initiatives in Vale do Paraíba, a region between the state of São Paulo and Rio de Janeiro, to preserve water quality. These initiatives involve partnerships between residents, grassroots CSOs, and local and state governments (de Moraes et al., 2022). Efforts from these actors benefit their communities, but also municipalities downstream since this watershed supplements the Guandu river in the state of Rio de Janeiro. Collective action in this region was plenty and involved several actors, which the authors link to trust among stakeholders, including residents and CSOs (de Moraes et al., 2022).

Another initiative led by CSOs is found in the city of São Paulo, in an urban stream revitalization project that included the installation of sewage networks (de Oliveira Rolo et al., 2022). After the project implementation, residents noted a decrease in rodent population and perceived improved relationships among neighbours. The partner CSO had an important role in raising awareness about ecosystem services and the importance of preservation for shared health and wellbeing benefits, such as reduced flooding, and exposure to unpleasant odours in the community (de Oliveira Rolo et al., 2022).

In Paraty, a municipality located on the eastern part of the state of Rio de Janeiro, Machado et al. (2021) report partnerships between NGOs, residents, and researchers to tackle sanitation problems in rural communities affected by increased tourism. The project involved the construction of evapotranspiration tanks for sewage treatment and awareness raising campaigns to mobilize the

community towards collective action and disseminate the social technology necessary for building the tanks (Machado et al., 2021).

A notable example of CSO work in WASH involves TETO, an international CSO that operates in seven states across four regions in Brazil. The organization has improved housing quality for more than 14,000 people living in marginalized communities (TETO, 2024a). Through external funding, it builds and improves housing for poor families living in shacks and often supports WASH infrastructure by building communal water tanks connected to the newly built and refurbished house units (TETO, 2024a). Since 2022, they have also built private toilets in the units. Additionally, they collect data from assisted families on housing conditions and access to WASH in supported communities, which is published on annual reports. According to their last report, 89% and 74% of the assisted population lack access to safe sanitation and safe drinking water, respectively (TETO, 2024a). The majority of communities they support (54.13%) are urban slums and most (50.46%) access water illegally, through clandestine connections; 38.07% are regularly connected and billed by WASH companies (TETO, 2024b). In Rio de Janeiro, all surveyed households (100%) have irregular drinking water connections (TETO, 2024b).

During the COVID-19 pandemic, CSOs in Rio de Janeiro provided emergency relief aid to low-income communities, which included WASH-related services such as water and hand sanitizer donations, the construction of sinks for homeless populations, and the dissemination of adequate handwashing practices (Curty Pereira et al., 2023; Nunes, 2021). Furthermore, there is evidence that community organizations support WASH access in impoverished communities even outside of the context of the pandemic. Maiello et al. (2021), for example, describe WASH distribution services in Queimados, one of the municipalities in Baixada Fluminense, as a hybrid between public, private, and civil society-led models. This system's shortcomings are partially addressed by improvised grassroots initiatives that rely heavily on private and communal wells, rainwater harvesting, communal taps, and illegal connections to water mains (Maiello et al., 2021). Multiple community-based organizations were created in the city of Rio de Janeiro during the 1990s with the goal of improving living conditions in favelas (Nunes, 2021) and they continue to support marginalized populations in accessing basic services.

Globally, there is an extensive body of research on WASH inequities where researchers partner with local CSOs to access vulnerable populations for their proximity to these groups (Abu et al.,

2019; Anthonj et al., 2024; Kangmennaang et al., 2019). However, little is known about these organizations' role in promoting equity in access to WASH and, consequently, contributing to the achievement of the SDGs, particularly in Brazil. Given the level of activity of CSOs in addressing WASH globally (Lu et al., 2017), it is important that we investigate their role to better understand their responsibility and potential in promoting social change towards WASH equity. Brazil faces challenges common to both HICs and LMICs so, this research uses it as a case study whose findings have the potential to be transferrable to countries at different stages of development.

Chapter summary

In this literature review, I demonstrated that political ecology of health is a useful theoretical framework to study WASH inequities since it focuses on how the unequal distribution of natural resources can lead to health and wellbeing inequities. This is well established in the WASH-health literature, particularly in LMICs, with PEH studies revealing how unequal power dynamics negatively affect the health and wellbeing of marginalized groups in Kenya (Abu et al., 2021; Bisung et al., 2016; Ototo et al., 2024), Ghana (Dery et al., 2023; Kangmennaang & Elliott, 2019; Nunbogu & Elliott, 2022), India (Truelove, 2011), and Malawi (Rusca et al., 2017). PEH has also been applied to cases in HICs and UMICs, but more rarely, with exceptions in Canada (Richmond et al., 2005) and Brazil (da Rocha & de Oliveira, 2023).

Independent of the theoretical approach, studies of WASH inequities in rich countries are rarer, which reveals a gap in the literature, since they prove that marginalized populations in these countries still suffer unique challenges to access safe water, sanitation, and hygiene. This body of literature reports that WASH inequities in high- and upper-middle income countries are overlooked because estimates consider access to water and sanitation to be advanced (Brown et al., 2023). However, marginalized groups get left out in context-specific ways and more research is needed to categorize the intricate political, social, and economic mechanisms that permit inequities to persist even when resources abound (Mattos et al., 2021). This research will contribute to filling this gap by addressing the first research objective: to describe barriers and facilitators in access to water, sanitation, and hygiene in low-income communities in Brazil.

This chapter also shows that political ecologists in health geography have demonstrated an interest in wellbeing since the proposal of the framework by Mayer in 1996, and early applications in Canada

(Richmond et al., 2005) and South Africa (King, 2010). Additionally, researchers in LMICs have utilized PEH to identify and measure contextual meanings of wellbeing, like Kangmennaang and Elliott (2019), who considered wellbeing in Ghana to consist of “living standards, health, education, community vitality, democratic engagement, environment, recreation and leisure” based on residents’ input. However, this practice is still limited in PEH, and apparently absent in HICs and UMICs. For that reason, this research aims to address this knowledge gap through the second research objective: to explore the impacts of WASH inequities on the wellbeing of low-income communities in Brazil through political ecology of health. The findings and discussions will illuminate the path towards a political ecology of wellbeing.

Finally, many researches interested in WASH inequities have either partnered with CSOs to access affected communities in a culturally appropriate manner (Anthonj et al., 2024; Liera et al., 2023; Machado et al., 2021) or identified these organizations as actors that help communities access WASH in the absence of inclusive policies (Maiello et al., 2021; Remigio et al., 2019; Wutich et al., 2022). Despite the importance of CSOs as political actors who address WASH inequities and support academic research, past studies have not attempted to investigate their roles in the WASH-health-wellbeing nexus, and how they vary from place to place. This research aims to fill this gap through the third research objective: to investigate the solutions to water, sanitation, and hygiene inequities implemented by civil society organizations and low-income communities in Brazil. Brazil was chosen as a case study for two main reasons: 1) to contribute to the small, but growing literature on WASH inequities in UMICs, and 2) to enhance the transferability of the research findings to both developed and developing countries, since Brazil faces challenges common to both groups.

Chapter 3

Research Design and Methods

Chapter introduction

This chapter outlines the rationale guiding the research design and methodology to address the following objectives:

- 1) To describe barriers and facilitators in access to water, sanitation, and hygiene in low-income communities in Brazil.
- 2) To explore the impacts of inequities in access to water, sanitation, and hygiene on the wellbeing of low-income communities in Brazil through political ecology of health.
- 3) To investigate solutions to water, sanitation, and hygiene inequities implemented by civil society organizations in low-income communities in Brazil.

In this chapter, I first provide a positionality statement, which describes how I approach the research and addresses potential biases and language choices. Next, I describe the research design and provide a rationale for the choice of data collection methods. I then explain the case selection strategy, followed by ethical considerations. Finally, I describe sampling and recruitment strategies, as well as the data analysis process.

3.1 Positionality statement

Informed by political ecology of health, this research places power at the centre of analysis but also, at the centre of investigation. Catungal and Dowling (2021) argue that it is impossible to scrub the research process of power and that the best researchers can do is to recognize how their identities influence the research process and work to minimize bias where identified. For that reason, I practiced critical reflexivity from the conception of this research to the moment of writing the thesis.

I am a white Latino cis-gender queer man who has English as a second language. Having spent most of my life in Brazil, I was inclined to choose this country as the geographical scope of my research on WASH inequities, mainly due to personal experiences of poverty and deprivation. Despite having attained a higher level of education than the average citizen, I was born in Japeri, the

municipality with one of the lowest Human Development Indexes in the state of Rio de Janeiro, placed 84th of 92 municipalities (United Nations Development Programme, 2013). My family, led by a divorced mother of two, moved frequently within Baixada Fluminense, in the MRRJ, in the condition of a lower-middle income household. Therefore, my interest for the capital-periphery dynamics in this region was also informed by personal experiences.

I was incentivized to pursue higher education in a public Brazilian university, where I also had the opportunity to undertake a research internship at the University of Waterloo, studying WASH inequities in irregular settlements in Mexico. I realized that similar challenges were present in day-to-day life where I came from and became interested in the topic, which happened to be understudied. In the process of designing the research, I realized how I was also directly affected by WASH inequities, despite having minimum resources to cope with existing challenges. For example, it was only at age six that I learned that there was a river in my hometown; before that, I only knew it as a “valão”, a word used in Portuguese to refer to a river that is so contaminated that it is no longer considered a river. I passed through this river every day on my way to school and yet, I did not know that it had once been clean.

While my personal experiences help inform my choice of research topic and the interpretation of results, elements of my identity can also bias the research design. For example, being a cis-gendered man makes me less sensitive to issues of gender, a central theme to studying WASH inequities. Additionally, being a white man, though informed by anti-racism literature and social movements, makes me less aware of environmental racism and how it affects everyday life of most affected populations. Such limitations were addressed by working closely with local partners, especially CSO representatives, who have complementary lived experiences and helped tailor this research to material and social conditions experienced by the target populations. Humility, authentic partnering, inclusion, and responsiveness to causes of inequities were all principles considered at every step of the research.

Finally, my positionality has also informed the language used in this thesis. The theoretical framework informing this research, as well as the methodology implemented, and the conceptual framework used in data analysis fit within a post-positivist scientific paradigm. While research that claims to be neutral and objective seeks to avoid the use of the first-person in academic writing, researchers who recognize that personal identities and theoretical approaches necessarily inform the research process and interpretation of results argue that the recognition of their actions help minimize

unavoidable biases (Webb, 1992). Being a political scientist and now, health geographer, I believe that the sub-discipline must reflect its commitment to qualitative approaches and diverse theoretical framings (Elliott, 2018), like feminist and decolonial theories, by allowing and fostering such language in publication venues. Utilizing purely neutral writing, in fact, contributes to perpetuating inequities in research, suggesting that the researcher's perspective (commonly a man from the Global North) is a monolithic and universal representation of truth (Mansvelt & Berg, 2021). In this thesis, I utilize the first-person to emphasize decisions and interpretations that were made by the researcher, though informed by the data and literature, as a form to indicate my role (and the influence of my positionality) in conducting this investigation.

3.2 Research design

3.2.1 Multisite case study

A multisite case study design was used in order to better understand how place-specific dynamics influence the role of CSOs in promoting WASH equity. The cases consisted of three communities supported by CSOs in accessing WASH in three different municipalities. A case study design is defined as an “intensive study of a single instance or small number of instances of a phenomenon in order to explore in-depth nuances and contextual influences *on* and explanations *of* that phenomenon” (Baxter, 2021, p. 109). Phenomena in this context can be events, processes, places, and relationships (Baxter, 2021).

Although the research was initially designed as a parallel case study, multiple similarities between research locations became apparent during data analysis. While each community had unique experiences with WASH inequities that varied by place-based characteristics, their shared experiences indicated that the research problem should be tackled between sites, and that reporting results for each site would be counterproductive for most sub-themes. For that reason, the research design was adapted to a multisite case study, with three sites within the same research location, i.e., the Metropolitan Region of Rio de Janeiro. In this research design, data across sites are compared and aggregated, but site-specific findings are still highlighted (Jenkins et al., 2018). A multisite case study refers to “the approach of constructing meaning through analysis of context within sites, and comparison of qualitative data across multiple sites” (Jenkins et al., 2018, p. 1970).

Given the gap in the literature on how CSOs promote WASH equity and advance the SDGs particularly in high- and upper-middle income countries, I decided to implement such design because this research could benefit from attaining a deeper understanding of place and how nuanced contextual differences can impact the degree to which these organizations are successful in improving WASH access. Similarly, multisite case studies also honour the theoretical framework guiding this investigation because they allow researchers to consider what roles contextual features play in shaping people's health. By paying close attention to three different communities located in Brazil, this research can progress collective knowledge of the role of CSOs in advancing equity in WASH in HICs and UMICs, and reflect on finer-scale social and spatial phenomena affecting how successful they are. Case studies are also appealing to human geographers as they are interested in the manifestation of phenomena in "place". Through case studies, geographers can consider the contextualized meanings and social interpretations of place in each case rather than conceptualizing them as "locations", which has a purely materialistic connotation (Baxter, 2021, p. 111).

3.2.2 Integrated knowledge translation approach to research

This research also had an Integrated Knowledge Translation (IKT) approach, which is aimed at bridging the knowledge-to-action gap in health research and practice by engaging multiple stakeholders in the process (Graham et al., 2006; Nguyen et al., 2020). IKT was proposed in response to the realization that the transfer of health research to practice is slow and, as a result, both treatment and public health policies can be outdated or harmful (Graham et al., 2006). Researchers using IKT argue that this gap can be bridged by involving multiple stakeholders (e.g., academics, practitioners, policymakers, and patients) throughout the research process (Graham et al., 2006; Nguyen et al., 2020).

A key concept within IKT is that of knowledge users, i.e., those who implement knowledge in day-to-day practices, such as health practitioners and policy-makers (Nguyen et al., 2020). In some initial knowledge translation conceptions, knowledge users consisted of decision-makers only. However, IKT currently recognizes multiple stakeholders as knowledge users, including the public and those most affected by the health problem under investigation (Nguyen et al., 2020). Knowledge users must be involved throughout the research process and, for this reason, CSO leaders were consulted since research conceptualization and their input guided the research design and implementation.

IKT also informs the *equity principles* to guide research, knowledge translation, and practice in global health (Plamondon & Bisung, 2019). These principles were considered when designing this research because they are linked to the understanding that research about the Global South is often embedded in unequal power relations, which must be recognized and mitigated, if not completely corrected, in order to cause positive change in health outcomes (Plamondon & Bisung, 2019). The proposed principles are authentic partnering, inclusion, shared benefits, commitment to the future, responsiveness to causes of inequities, and humility (Plamondon & Bisung, 2019).

Authentic partnering signifies recognizing and addressing power differentials between people, organizations, and countries involved in global health research (Plamondon & Bisung, 2019). This could be translated into constant reflection about how authority, resources, and benefits are shared in the partnership. Authentic partnerships constantly question how equity can be fostered among stakeholders. Inclusion stands for meaningful inclusion of historically marginalized groups, acknowledging historical systems of oppression such as patriarchy, racism, and classism. Shared benefits refer to the generation of more equitable distribution of benefits throughout the entire research process. Commitment to the future represents a concern with long-term partnerships and future generations. Responsiveness to causes of inequities aims to steer the focus from symptoms of inequities to their causes and how to disrupt them. Finally, humility requires a position of learning that recognizes and engages with knowledge beyond Western views (Plamondon & Bisung, 2019).

3.2.3 Qualitative approach

A qualitative approach was chosen because deep contextual knowledge of place was needed to achieve the research objectives and qualitative methods can provide more intensive data in comparison to a quantitative/extensive approach (Stratford & Bradshaw, 2021). That is, while extensive research provides generalizable data, intensive research allows researchers to “ask how processes work or opinions are held, or actions are taken in a specific way” (Stratford & Bradshaw, 2021, p. 95). I employed two primary data collection methods: (1) key-informant semi-structured interviews and (2) focus groups with community residents. Additionally, I visited each community and took notes and photos which informed data analysis and helped contextualize results. I also attended community meetings and local government meetings, and visited two local water treatment stations, and other communities in neighbouring municipalities.

In-depth interviews are used to generate narratives related to fairly specific research questions (Miller & Crabtree, 2003). They are a way of asking questions directly to those experiencing the phenomenon under investigation and allowing them to express thoughts and opinions that might have not occurred to the interviewer (Gatrell & Elliott, 2015). They are often used to counter universalizing narratives of public opinion by uncovering the views of subaltern groups (Dunn, 2021). Key-informants are people who represent other individuals and can provide detailed information on a given phenomenon due to their privileged positions as leaders, representatives, and service providers; “they liaise between the researcher and the communities being researched” (Dunn, 2021, p. 157).

In IKT, “researchers work with knowledge users who identify a problem and have the authority to implement the research recommendations” (Nguyen et al., 2020, p. 2). In this research, KIs were leaders at CSOs working with the selected communities in projects related to improving access to WASH. The selection of this group of participants was intrinsic to the research objectives, which investigate the actions of CSOs in WASH-deprived communities. CSO leaders are well positioned to provide rich descriptions of the solutions implemented, as well as their perceptions of the level of success of WASH initiatives and the reasons behind it.

Preliminary field visits helped build rapport with key-informants, which can increase the level of understanding that researchers have about what participants share (Dunn, 2021) (p. 163). Because I visited the communities, participants could easily convey their relation to the places under investigation and often referenced them during our interactions.

Community residents are the individuals who experience inequities in access to WASH first-hand. Therefore, it was essential to include them in data-collection as they possess the most profound knowledge of the phenomena under investigation. They have not only benefited from solutions implemented at the community level by CSOs and other external actors, but are also the ones who have implemented initiatives at the household and individual levels to access WASH.

Focus groups were chosen to engage with residents because they allow for social interactions between participants and the moderator in an informal discussion that helps address some of the power differentials embedded in the research-participant relationship. Additionally, focus groups allow for a sense of ownership among participants (Gatrell & Elliott, 2015), which directly aligns with the research IKT approach and goals of involving knowledge users throughout the research process. This method is also useful in exploring ideas that are shared by a group (Colucci, 2007), as

well as their opposing views (Cameron, 2021, p. 201). I planned to recruit 6 to 12 participants for each focus group as suggested by the literature on this method to allow for detailed, yet diverse discussions (Cameron, 2021; Gatrell & Elliott, 2015).

Focus groups contribute to knowledge production, with both researcher and research participants simultaneously obtaining insights about particular phenomena and how to effect social change during the facilitation of this method (Cameron, 2021, p. 204). Focus groups become a place for learning and exploration of ideas (Cameron, 2021, p. 219), which aligns with the goal of bridging the gap between what is known and what is done to promote WASH equity.

I developed interview and focus group guides (0 and 0, respectively) based on the research objectives. Both guides contain questions related to background participant information, general information about the community, main service gaps, barriers and facilitators to WASH access, impacts of WASH inequities on health and wellbeing, previous experiences with WASH solutions, partnerships *with* and perceptions *of* other CSOs, and collaboration among residents and CSOs.

Interviews and focus groups were performed between June and August 2023 in Portuguese. KI interviews happened in CSOs' headquarters. Focus group 1 (FG1) happened in the partner CSO's office, while focus group 2 (FG2) and focus group 3 (FG3) happened on the streets of their respective communities. KI interviews and focus group discussions were digitally recorded and transcribed verbatim. I also took notes during data collection and field visits, which informed the write-ups and helped contextualize the information shared by participants. Notes from non-verbal communications were added to the transcripts while typing them using square brackets. Transcripts and audio files were encrypted and digitally stored.

3.3 Case selection

In case studies, “researchers carefully select cases to understand its practical aspects but also the broader phenomenon under scrutiny” (Baxter, 2021, p. 114). Therefore, purposive case selection is commonly employed in such designs. Theory and evidence-informed case selection can increase the potential for transferability by allowing researchers to select cases representative of other relevant contexts while studying them in enough detail so that future investigations can identify potential linkages (Baxter, 2021). “The rich description inherent in many case studies provides the opportunity

for the reader to apply claims to wider contexts with which he or she is familiar” (Goodrick, 2019, p. 16).

I purposefully selected the cases using the following inclusion/exclusion criteria: cases must consist of communities (1) where a majority of residents lack access to safely managed drinking water and sanitation at home, (2) located in a water-rich region in Brazil, and (3) supported by at least one civil society organization in accessing WASH. Selected CSOs needed to (1) be civil-society-led organizations, (2) be located in one of the pre-selected communities, and (3) have implemented or tried to implement solutions to facilitate access to WASH.

Following an IKT approach, I designed the project in consultation with a local partner, a CSO located in Duque de Caxias - a peri-urban municipality within the Metropolitan Region of Rio de Janeiro. This CSO also agreed to be in the study because the community they support fits all the inclusion criteria. Other cases were selected later, as data collection began. In consultation with the local partner, I chose to pre-select other cases within the MRRJ, where the initial case was located, to allow for effective comparisons in an environment with similar WASH governance, socioeconomic and cultural contexts.

I also aimed to achieve *maximum variation* within the selected cases to provide the strongest possible test of theories within a small sample project (Goodrick, 2019). This sampling technique “documents unique or diverse variations that have emerged through adaptation to different conditions and identifies important common patterns that cut across variations” (Stratford & Bradshaw, 2021, p. 100). To do so in the context of this research, I selected cases in municipalities with differing levels of water supply and sewage collection relative to one another (Table 2.2).

Besides Duque de Caxias, where the initial case was located, I pre-selected cases in the capital of the state, the city of Rio de Janeiro, and in Japeri (Figure 3.1). I selected the city of Rio to explore capital-periphery dynamics but also because, within the sub-region, this municipality has the highest indicators for both water supply and sewage collection (Table 2.2). On the other hand, Japeri is the municipality with the lowest indicators for both water supply and sewage collection in Baixada Fluminense (Table 2.2).

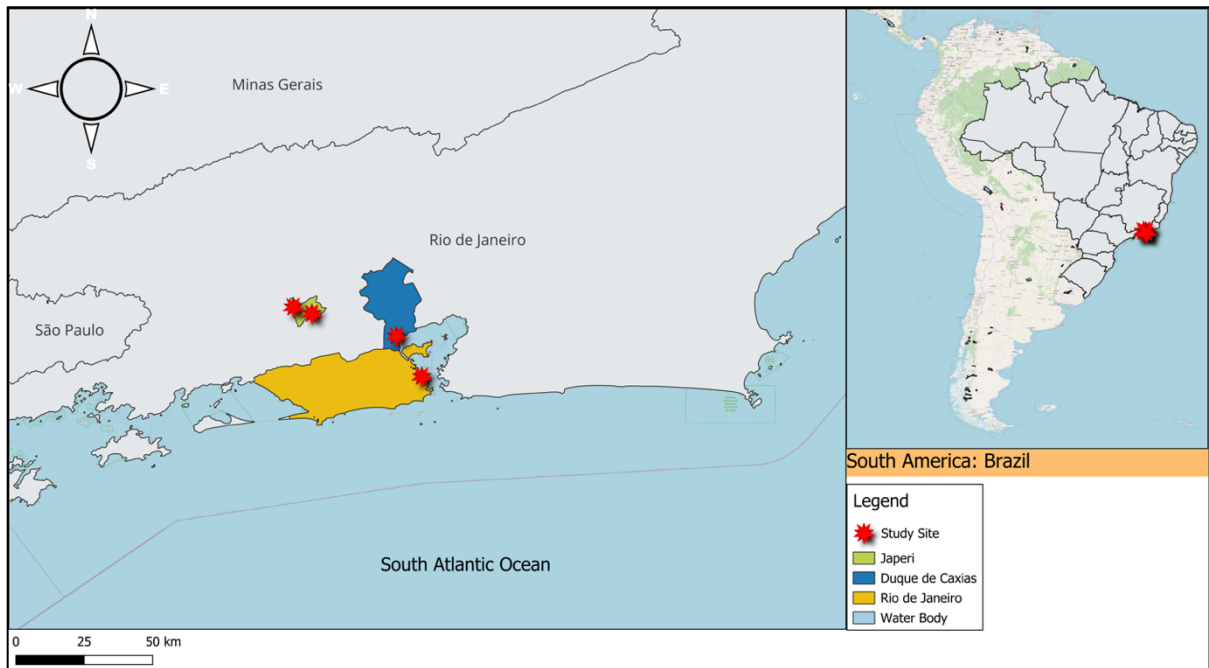


Figure 3.1. Research locations. Map created using the Free and Open Source QGIS.

3.4 Ethical considerations

This research was reviewed and approved by the University of Waterloo’s Office of Research Ethics (ORE) under the protocol number 45260. I contacted potential participants and informed them about the research by following an e-mail script (0) and a verbal recruitment script (0). Both contained brief information about the members of the research team, the University of Waterloo, the objectives of the research, what participation entailed (i.e., time commitment, remuneration, the scope of the interview and focus group discussions), modality of participation (i.e., in-person), location (i.e., in a site convenient to them), sample questions, information about how I would share results, and contact information for the research team and the ORE.

Potential participants also received information letters (0 and 0), which contained more details on each of the aforementioned topics and expanded on how data would be used for presentations, publications, and elaboration of lay-language reports. These letters detailed potential risks and benefits of the research for participants, their rights to refuse to participate or answer specific questions, leave the interview or focus group at any point, and request their data to be removed. I

informed them of how data would be handled, i.e., digitally recorded, transcribed, anonymized, and digitally stored in a password protected computer for seven years after data collection. The information letter aimed at focus group participants (0) also explained the limitations in data confidentiality, i.e., that researchers could not guarantee that other participants would keep their identity confidential, but I requested that they did so as recommended by the literature on focus groups (Cameron, 2021, p. 207).

The information letter aimed at key-informants (0) also explained that the name of the organization they worked for would not be displayed unless they wished otherwise and expressed so through a written consent form (0). This form was also used to collect written consent from key-informants at the time of data collection. Oral consent was collected from focus group participants during data collection following a verbal consent form (0). When collecting consent, participants were given opportunities to ask clarifying questions about the project and the research protocol. I also collected consent to record our conversations and use anonymized quotations in publications and presentations related to the research.

Participation was voluntary, but participants were given a token of appreciation valued at CAD 10.00 and a letter of appreciation (0). Key-informants received a University of Waterloo signature pen and focus group participants received tokens determined culturally appropriate in consultation with local partners, i.e., cinema vouchers in one community, and basic food and hygiene items in the other two communities. I translated all the documents from English to Portuguese.

3.5 Sampling and recruitment

3.5.1 Key-informant interviews

In consultation with the initial local partner, I planned to interview one key-informant from each participating CSO in each pre-selected location. I purposefully sampled potential CSOs fitting the inclusion/exclusion criteria for case selection through an online search using Google and social media (e.g., Instagram, Facebook, Twitter/X, LinkedIn) and consultations with the initial research partner. I retrieved contact information from organizations using information available on their website and social media profile (e.g., e-mail addresses, direct message) and contacted them via e-mail or WhatsApp.

After having received initial positive expressions of interest from organizations, I asked the first point of contact (e.g., the social media administrator, institutional e-mail correspondent) for the contact information of the member most responsible for WASH projects in their team. When contacting the prospective participant, I screened them to ensure they fit the inclusion/exclusion criteria for key-informants, which were the following: the key-informant must (1) be a staff member in a CSO working in WASH initiatives in one of the pre-selected communities, (2) be 18 or older, and (3) be the person most responsible for WASH projects in the CSO. At this point, I also ground-truthed the pre-selection of case studies by confirming with CSO representatives that the neighbourhoods they assisted fit the inclusion/exclusion criteria for case selection. This process contributed to reduce limitations from purposive sampling and enhance credibility through member-checking (Baxter & Eyles, 1997).

Some key-informants were enthusiastic about the research and invited other members of their organizations to share experiences with specific interventions relevant to the research objectives. KIs were not intimidated by having other colleagues participate in the interview so I welcomed them, informed them of their rights, collected informed consent, and continued with the interviews. Seven key-informants were interviewed in total ($n = 7$), which allowed for richer descriptions of CSO initiatives since the additional key-informants were experts in WASH solutions in the communities they support. This flexibility to receive and interview KIs invited by CSO representatives enhanced the commitment to the equity principles in global health, particularly authentic partnerships – to foster equity among research partners - and humility – to learn and engage with knowledge beyond Western views (Plamondon & Bisung, 2019). Table 3.1 presents the participating CSOs, their locations, the number of KIs interviewed and the identifiers attributed to them, which will be used in anonymized quotations in the results chapter.

Table 3.1. Location of CSOs and number of KIs interviewed			
Civil society organization	Municipality	Assisted communities	Key-informant identifier
CSO1	Rio de Janeiro	Morro da Providência	KI1
			KI2
			KI3
CSO2	Japeri	Belo Horizonte	KI4
		Nova Belém	KI5
			KI6
CSO3	Duque de Caxias	Jardim Gramacho	KI7

3.5.2 Focus groups

The inclusion/exclusion criteria for focus group participants were that they must (1) be 18 or older, (2) reside in one of the locations under study, and (3) have experienced inequities in access to WASH. They were sampled through a snowball subject recruitment technique (Tenzek, 2017), through which KIs were asked to support the researcher in the recruitment of community residents. This strategy is commonly used in focus groups in geographical research because it allows researchers to target a fairly specific group of people with particular place-based experiences (Cameron, 2021, p. 209).

Key-informants were asked to support in recruiting focus group participants in their respective communities and the leaders of CSO1 suggested meeting with residents that already gathered bi-weekly to discuss community issues and potential solutions as part of one of their initiatives for community development. Ten residents ($n = 10$) participated in this focus group in addition to one key-informant (KI2) who introduced the first author to the group.

CSO2 indicated that residents in Japeri did not attend scheduled meetings in past experiences. As an alternative, they suggested walking in the community and engaging with groups of participants on the way. Two key-informants (KI5 and KI6) and five residents participated in the intervention that took place in Nova Belém, a mostly rural community in the municipality of Japeri. Since the KIs also reside in this neighbourhood, seven residents participated in this focus group ($n = 7$).

CSO3 indicated that they could not host a focus group due to financial and staff limitations, so there were no focus groups held in the municipality of Duque de Caxias. In the face of this challenge, CSO2 volunteered to host another focus group in Japeri, but in a different neighbourhood, with peri-urban characteristics. In this location, six residents were engaged in addition to KI4, who resides there, thus totalling seven participants ($n = 7$). In total, 24 residents were consulted in all three communities ($n = 24$) (Table 3.2).

Table 3.2. Number of residents in focus groups and geographical distribution				
Municipality	Focus group identifier	Neighbourhood	Urbanization level	Number of residents
Rio de Janeiro	FG1	Morro da Providência	Urban	10
Japeri	FG2	Nova Belém	Rural	7
	FG3	Belo Horizonte	Peri-urban	7
TOTAL				24

Although the minimum number of participants was pre-determined for each data collection method, I concluded recruitment after noticing that no new themes emerged from interviews and focus groups, thus reaching data saturation (Baxter & Eyles, 1997). This was possible because I processed data immediately after data collection, keeping a physical and digital research journal that informed bi-weekly communications with the advisor.

3.6 Data analysis

Transcripts from interviews and focus groups were analyzed using thematic analysis. This method was selected because it allows for the investigation of social meanings grounded in a shared material reality, which aligns with the theoretical framing of this research (Kiger & Varpio, 2020). By identifying, analyzing, and reporting repeated patterns in the data set, I investigated the power relations present in these cases, while valuing participants' voices. As discussed by Kiger and Varpio (2020), thematic analysis is an appropriate method to understand experiences, thoughts, or behaviours.

I developed a single codebook for focus groups and KI interviews, with deductive themes stemming from the research objectives, focus group and interview guides. I translated the transcripts from one KI interview and one focus group to English, to be reviewed by a second researcher. After review, inductive themes were created, discussed, and incorporated in the codebook.

In an inter-rater reliability process, a research assistant and I independently coded the two translated transcripts using thematic analysis on NVivo. We met to compare and discuss findings through peer-debriefing (Baxter & Eyles, 1997; Cope, 2021), and agreed on 98.5% of coded fragments. Then, I coded the remaining transcripts using the adjusted codebook and generated a summary of results, highlighting common patterns and unique characteristics from each case study, as well as themes that were underused in comparison to what was expected during the research design.

Multisite case studies require rounds of within-site analysis, where site-specific findings are considered, and between-site analysis, where similarities and differences between sites are identified (Jenkins et al., 2018). In this research, within-site analysis took place while separately coding transcripts from each community. Then, as themes were refined during inter-rater reliability assessment and quote selection, commonalities between communities became clearer and some sub-themes were combined and adjusted to reflect that – e.g., “fixing water pipes” was combined with “building sanitation infrastructure” into “fixing and building WASH infrastructure” under “CSO solutions to WASH barriers”. A third round of within-site analysis took place during write-up, as data from each site were pooled to represent similarities among communities within the MRRJ. Unique experiences from each community, when pertinent, are highlighted by contrasting quotes.

The results were summarized by objectives and illustrated by quotes, which were reviewed by a second researcher. I selected quotes that were representative of the main themes highlighted in the results chapter and sought to equally represent each of the participating communities. I used summary statistics in the format of tables containing the frequency of mentions for each sub-theme to enhance confirmability in the choice of sub-themes expanded in the results chapter (Dunn, 2021, p. 175).

In the presentation of results, data from both methods were pooled due to the similarity in responses between key-informants and focus group participants and the fact that most key-informants also reside in these communities, with only one exception (i.e., KI2, who resides in the city of Rio de Janeiro, but not in Morro da Providência). The frequency of themes was calculated considering the total number of data collection events, i.e., three KI interviews and three focus groups. Therefore, the

total number of cases in frequency tables is six ($n = 6$). Sub-themes are listed in descending order from most mentioned among cases to least mentioned. Sub-themes mentioned among the same number of cases are organized in descending order from the greatest number of mentions to the least number of mentions.

The quotes used to illustrate sub-themes contain information about the context from where they were taken, i.e., key-informant interview (KI) or focus group (FG), the name of the municipality and neighbourhood, and the level of urbanization of that community. Despite differences among communities, many challenges were shared amongst them. For that reason, quotes from participants in all three locations are used to illustrate some of the common sub-themes. When disparities are noted, they are highlighted and exemplified by quotes from different communities.

3.6.1 Systematic Equity Action-Analysis

In a second round of data analysis, I applied the Systematic Equity-Action Analysis (SEA) framework to the dataset (Figure 3.2). This is a conceptual framework used to translate knowledge to action through the lens of equity by highlighting potential pathways to equity-promoting action and exploring elements of the current reality that keep inequities in place (Plamondon et al., 2023). The SEA framework offers four main concepts that guide data analysis: worldviews, coherence, potential, and accountability (Plamondon et al., 2023). It proposes that objects of analysis are considered through each of these concepts.

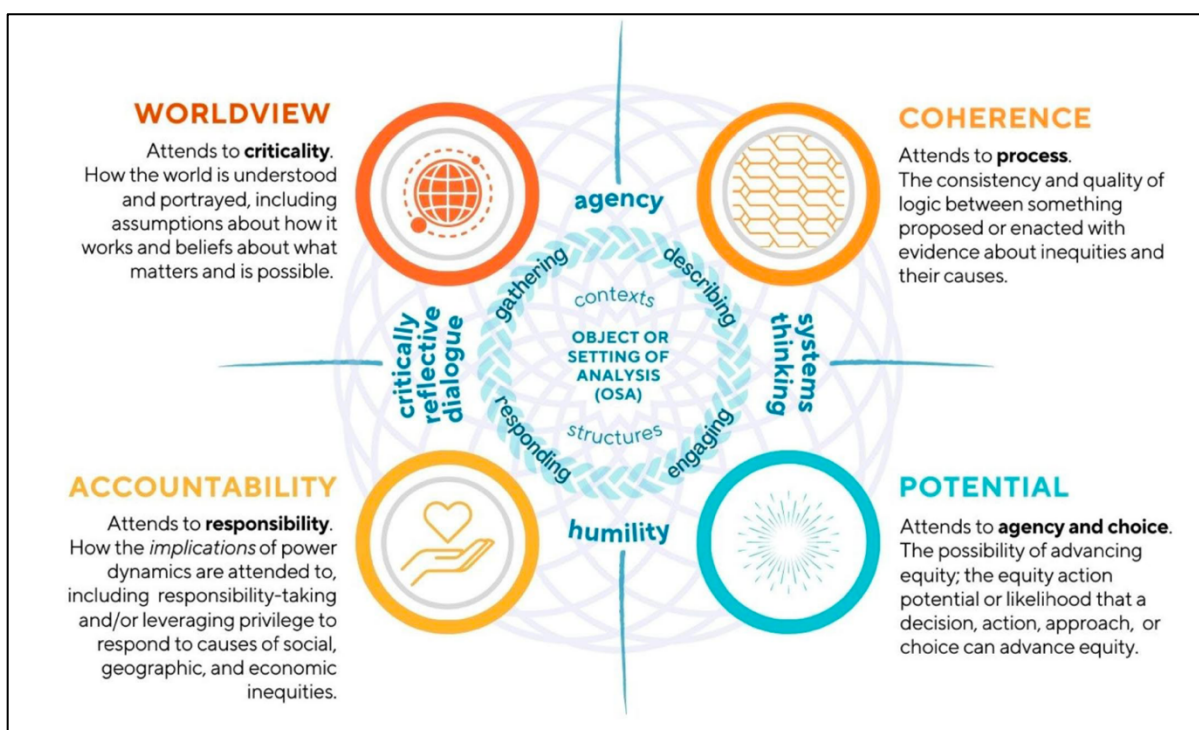


Figure 3.2. The Systematic Equity Action-Analysis Framework (Plamondon et al., 2023).

Copyright permission from the publisher and copyright holder not required.

<https://www.biomedcentral.com/about/policies/reprints-and-permissions>

Worldview is a collective understanding of the world by groups with common values and interests, including the relationships between elements of reality and their interpretation (Plamondon et al., 2023). This concept is related to the narratives that explain the current state of things, such as those around the distribution of environmental health determinants, like water. *Coherence* can be considered by comparing rhetoric and action, or action and evidence on a given research topic (Plamondon et al., 2023), e.g., what is known and said about WASH inequities in the world, and what is done to address them. *Potential* refers to the likelihood that equity-promoting actions have to address and disrupt known causes of inequities and *accountability*, to the attribution of responsibility for promoting equity attributed to different actors in society and how to keep them in check (Plamondon et al., 2023).

I organized codes from the first round of thematic analysis according to these four concepts. I considered the *worldviews* of actors involved in WASH governance – particularly CSOs and residents, how *coherent* WASH data is with lived experiences of those most affected, the *potential* of CSO-led WASH solutions, and who is *accountable* for addressing the root causes of WASH inequities in the research locations. The application of the SEA framework highlighted power inequities in the research location and illuminated potential pathways for equity-promoting action from CSOs, policy makers, residents, and researchers.

The SEA framework has been used to study equity in global health research funding in Canada, vaccine distribution, the development of a nursing curriculum, and the processes and policies of a municipal government (Plamondon et al., 2023), but this is its first application to the study of WASH inequities and the role of CSOs in promoting health equity.

3.7 Adaptations to the research design and methods

As this research utilized an Integrated Knowledge Translation approach, insights from local partners, i.e., CSO leaders, were welcomed and implemented both at the design and data collection phases. Firstly, the initial partner in Duque de Caxias, who reviewed and approved the proposed research design, also volunteered to support in case selection and recruitment by mobilizing their contact network with other CSOs in the Metropolitan Region of Rio de Janeiro. This was aligned with the proposed purposive sampling strategy, commonly used in qualitative research to select cases and participants that are more likely to help answer the research questions (Stratford & Bradshaw, 2021).

Secondly, CSOs 1 and 2, respectively located in the municipalities of Rio de Janeiro and Japeri, influenced the format of the focus groups, suggesting changes to the recruitment and data collection strategies. CSO1 suggested working with a group of residents who met bi-weekly as part of a program ran by the organization to discuss community development issues. This change presented the challenge of potential bias from residents who might view the partner CSO more positively than those without a strong link to the organization. Nonetheless, a door-to-door recruitment strategy would not be feasible in this community since the territory is controlled and closely watched by criminal groups. During data collection, the risk of bias was partially addressed when I noticed that residents willingly shared critical views of CSO1's initiatives without fear of being reprimanded, which demonstrated

that the group was already comfortable in sharing criticism so that the organization could improve their services.

In Japeri, CSO2 demonstrated concern over the traditional format of a focus group due to the residents' lack of commitment to scheduled meetings. As an alternative, they suggested walking along the community and engaging groups of residents as we encountered them. This change introduced a limitation that was particular to this research site, as it was not possible to engage with each group of residents as long as originally intended. However, the alterations also presented benefits unique to go-along interviews, such as revealing contextualized perspectives guided by participants who could introduce impactful sensory cues to better illustrate elements of the space where the focus groups took place (Dean, 2016; Garcia et al., 2012).

These changes, though challenging, allowed for data collection where conditions were either unsafe or unfavorable to research due to material and cultural aspects. Implementing what local partners suggested led to rich qualitative data and observations that added nuance to the interpretation of results. This experience serves as an example of how commitment to the equity principles of global health research, in particular humility, shared benefits, and authentic partnering, can empower both researcher and research partners and lead to more meaningful findings (Plamondon & Bisung, 2019). The limitations were addressed by carefully and transparently recording alterations made to the methods in each community, a practice that enhances trustworthiness in qualitative research (Baxter, 2021).

Chapter summary

This chapter describes the research design and methodology. Since the research is focused on the complexity of WASH inequities in place and the role of different actors in their (re)production, I designed a multisite case study relying on qualitative research methods. With this approach, I considered nuanced perspectives from those most affected by the problem (i.e., residents) and those more well-equipped to promote change (i.e., CSO leaders). Being theoretically informed by political ecology of health and relational conceptualizations of wellbeing, I also uncovered place-based dimensions of wellbeing and how they are affected by WASH inequities. Results are presented in the next chapter.

Chapter 4

Results

Chapter introduction

This chapter reports the results of the analysis focused on the objectives:

- 1) To describe barriers and facilitators in access to water, sanitation, and hygiene in low-income communities in Brazil.
- 2) To explore the impacts of inequities in access to water, sanitation, and hygiene on the wellbeing of low-income communities in Brazil through political ecology of health.
- 3) To investigate solutions to water, sanitation, and hygiene inequities implemented by civil society organizations in low-income communities in Brazil.

Results are organized around each objective. The first section describes how residents currently access water, sanitation, and hygiene in the communities. The second section reports the barriers and facilitators to WASH access. The third section explores the impacts of WASH inequities on the wellbeing of residents according to their shared understanding of wellbeing, as well as the political ecology driving the distribution of determinants of health and wellbeing in the region. Finally, the fourth section presents the solutions to WASH inequities implemented by CSOs. All sections also present results from the systematic equity action analysis, which explores worldviews from different actors on WASH inequities, insights on how coherent their narratives are with current WASH practices, who is accountable for WASH governance and at what level, and the potential for equity-promoting actions.

4.1 Current state of access to water, sanitation, and hygiene in research locations

Before reflecting on the barriers and facilitators to access water, sanitation, and hygiene, participants were asked to describe the current state of WASH access in their communities. This section presents results on community water access, sanitation and hygiene practices, and water quality. Participants focused on access to drinking water and sanitation, reporting that most residents had access to basic

handwashing facilities at home, except for those living in Duque de Caxias-Jardim Gramacho, where the responsible key-informant (KI7) reported that residents have no private washrooms, which includes handwashing facilities. His organization, CSO3, is focused on promoting educational support to children after school hours, and he noticed that the assisted children have no familiarity with handwashing practices:

Here in Jardim Gramacho you don't have a minimum hydraulic system inside the shacks. [...] When children come to the bathroom [in the CSO], they don't know what a toilet is, what a shower is for. Our routine of washing hands before meals or after using the washroom in the beginning was very tense because personal hygiene is not part of their lives. How are you going to think about taking a shower when you don't have water at home? (KI7, Duque de Caxias, peri-urban community).

In this community, residents access well water and store it in precarious tanks, bottles, or buckets. In the other communities, however, most residents have access to unregulated piped water (Table 4.1), which means they have illegal pipe connections to the water mains and do not pay water bills. Despite piped water being the most common source of drinking water, other sources were mentioned as alternative solutions, such as well water, and water collected elsewhere – e.g., from other residents, businesses, or from communal sources (Table 4.1).

Sub-themes	Cases mentioning (n=6)*	%	Times mentioned (n=60)	%
Unregulated piped water	5	83%	22	37%
Well water	4	67%	11	18%
Water collected elsewhere	4	67%	4	7%
Water truck	3	50%	6	10%
Bottled water	2	33%	4	7%
Regulated piped water	1	17%	1	2%
*The total number of cases refers to data collection events, with three key-informant interviews (n=3) and three focus groups (n=3). Data was pooled due to overlap of sub-themes.				

As a result of the improvised nature of drinking water pipes in these communities, participants frequently complained about the water quality, including alterations to the colour, smell, and taste of

tap water, alongside other site-specific indicators, such as high salinity and slurry contamination in Duque de Caxias-Jardim Gramacho, a community located near a mangrove and a former landfill. This resident reflected on the quality of drinking water in Japeri-Belo Horizonte:

The water we get is dirty. When it rains, it's filthy. And we drink it like that because I can't buy bottled water [with frustration]. I only receive Bolsa Familia [financial government support]. I'm not even retired, and my husband is unemployed. How am I going to buy water? We filter it and drink it like that. (R3, FG3, Japeri-Belo Horizonte, peri-urban community).

This resident's reflection on her socioeconomic status and inability to purchase water was common among residents of all three communities, revealing a critical worldview on why residents face challenges to access safe water and sanitation in these communities. Both key-informants and focus group participants were aware that their social class and inability to pay for WASH determined the quality of service they receive and how they are able to cope.

Participants' main concern, however, was sanitation, with all communities reporting open sewers in their territories and consequently, no sewage treatment before disposal. Domestic sewage flows to improvised ditches alongside the houses, commonly dug by residents themselves, and directed towards nearby water bodies (Figure 4.1). In one of the communities, Duque de Caxias-Jardim Gramacho, participants reported open defecation as a common sanitation practice, with residents typically using small ponds, bushes, toilets in schools or bars, or improvised pit latrines to relieve themselves. In other research locations, however, the practice was cited as a rare occasion.



Figure 4.1. Open sewer alongside residences in Japeri-Belo Horizonte. Photo by Rodrigo Curty Pereira.

Open defecation was cited anecdotally as a sanitation practice in most communities, except for Duque de Caxias-Jardim Gramacho, where the leader of CSO3, who supports the community, considered it to be a common practice. In the absence of private toilets, he mentioned that residents typically use small ponds, bushes, toilets in schools or bars, or improvised pit latrines inside their houses.

In summary, residents in the research location access water mainly through unregulated piping networks. The water quality is compromised, with alterations to taste, colour, and smell. Most residents reported having handwashing facilities and private toilets at home, but domestic sewage is not safely collected nor treated in any community, with neighbourhood landscapes including open sewers and polluted rivers. Based on what participants shared, Duque de Caxias-Jardim Gramacho is the most precarious research location in terms of WASH access; residents there mostly use well water

from communal wells, do not have private toilets and handwashing facilities, and commonly practice open defecation.

4.2 Barriers and facilitators in access to water, sanitation, and hygiene in low-income communities

4.2.1 Barriers to WASH

Participants spoke extensively about WASH barriers (Table 4.2), which are understood here as elements, phenomena, or factors that complicate access to safe WASH in addition to the precarious WASH conditions in these communities. When designing the interviews and focus groups, I expected to find barriers related to conflicts between neighbours or excessive water collection time – which are common in LMICs - but instead, residents reported a variety of problems related to WASH infrastructure, water shortages, and flooding (Table 4.2). In this section, I will explore the four most frequently mentioned sub-themes and “limited water storage” for its uniqueness to the research locations (Table 4.2).

Table 4.2. Barriers to WASH access in research locations				
Sub-themes	Cases mentioning (n=6)*	%	Times mentioned (n=91)	%
Water shortage	5	83%	19	21%
Flooding	4	67%	25	27%
Limited water supply (unspecified)	4	67%	16	18%
Damaged water infrastructure	4	67%	8	9%
Drinking water contamination	3	50%	3	3%
Limited water storage	2	33%	7	8%
Bad smell from sewer	2	33%	4	4%
Unreliable WASH data	1	17%	4	4%
Water pump needed	1	17%	3	3%
*The total number of cases refers to data collection events, with three key-informant interviews (n=3) and three focus groups (n=3). Data was pooled due to overlap of sub-themes.				

Water shortage, the most common sub-theme, was experienced in all communities (Table 4.2). The sub-theme “limited water supply (unspecified)” is linked to water shortages but refers to instances where residents simply shared that they do not receive enough water on a regular basis, whereas “water shortage” was associated with specific causes, such as droughts or seemingly arbitrary decisions from the water company to interrupt supply. The following quotes illustrate how the experience of water shortages is similar in urban and rural low-income communities:

R9: Almost every month there's water shortages; we go up to three days without water.

R1: It's been almost a week now.

R6: Yes, we had water in the morning, at six o'clock and then there was no more water coming in. (FG1, Rio de Janeiro, urban community).

R5: It doesn't have to be summer for the water to stop. When it rains, it stops.

KI5: They block the reservoir. Since the water comes from the river, the water level rises and the river overflows, so they block it and we'll be left without water. We're not told in advance. (FG2, Japeri-Nova Belém, rural community).

Some residents reported that this issue intensified during the summer when it rained less frequently. Others, on the other hand, argued that water shortages were as common when it rained because the water companies would stop or reduce water supply to prevent solids (e.g., leaves, sand) from contaminating water mains. Independent of weather events, some participants suggested that water shortages were unavoidable in these communities since most residents have illegal connections and the private water company, responsible for water distribution, would prioritize neighbourhoods with paying customers.

Flooding was common in these communities (Table 4.2), but mainly in those located in Japeri. Flooding happens during rainstorms and is linked to poor housing infrastructure and the absence of sewage and rainwater collection. According to participants, rainwater accumulates in the open sewers and polluted rivers, flooding, and flowing into nearby residences.

The storms worry residents a lot, mainly because of the open sewer and the valão [polluted river]. That's the main problem here because the valão floods; it receives wastewater from everywhere, including the prison. (KI4, FG3, Japeri-Belo Horizonte, peri-urban community).

In addition to direct risks to physical health through contact with contaminated water, accidents, and drowning, flooding worsens the quality of drinking water since the illegal connections to water mains facilitate contamination due to proximity to domestic sewage and the reduced quality of materials used to construct the pipes (Figure 4.2). Floods also damage residents' houses and belongings, reduce mobility, and impact their mental health since they are constantly worried about the potential for flooding events.



Figure 4.2. Illegal water pipe over open sewer in Japeri-Belo Horizonte. Photo by Rodrigo Curty Pereira.

Damaged WASH infrastructure (Table 4.2) represents a barrier to WASH access as it creates opportunities for water contamination. Damage can be caused by different actors and events. Participants reported that ill-intentioned individuals have purposefully damaged these connections,

but they are also subject to damage from weather conditions (e.g., storms, intense heat, landslides), abnormal water pressure, and accidents.

R6: The other day a citizen went there and cut off the water pipe, leaving us without water.

R9: We already tried to solve the problem and it worked, but someone broke it again, so my husband had to fix it again. Then the pipe simply broke because of the [strong] water flow, so he fixed it again. (FG1, Rio de Janeiro, urban community).

This quote contains an issue of coherence in the way residents build illegal connections to access water. Although this practice is proposed as a mechanism for accessing drinking water for those who cannot pay for the service, it also presents additional challenges, which could be discussed openly in the communities so that residents are aware of the risks in consuming drinking water from illegal connections. Currently, many seem unaware of the risks, reporting that they prefer drinking untreated tap water simply out of convenience. On the other hand, this quote also presents potential for equity-promoting action, with residents showing initiative to solve common water issues. In this focus group, other participants explained that the materials used to fix the pipes were bought with funds raised by several neighbours through small donations.

In Japeri, the water mains installed by the water company had become damaged over time. Key-informants and residents reported that the pipe network used in the municipality was built in the 19th century and had not been renovated since. In Duque de Caxias, the key-informant reported that one of the communal wells was destroyed by a strong rainstorm and landslides.

Limited water storage was not mentioned as frequently (Table 4.2) but provides an illustration of how barriers to WASH are shaped by community context. Given the unreliability of drinking water provision, participants highlighted the need for tanks to store water to withstand longer periods of water shortage. However, these tanks can be expensive, and some households do not have the space or infrastructure needed to install them.

There are families that don't have water tanks because their roofs are not made of cement, they're made of fragile tiles. So, they can't put a water tank on top of their houses. (K11, Rio de Janeiro, urban community).

Families without water tanks need to find other coping mechanism during water shortages. One of the residents in Rio de Janeiro-Morro da Providência shared that her husband collects water in a 20 L water jug from his workplace and carries it home on public transit. Some residents in Japeri-Nova

Belém reported seeking refuge in relatives' homes in nearby municipalities. The need to cope with water shortages without storage space is complicated during periods of emergency, as reported by one of the key-informants. During the pandemic, CSO1 received a water truck donation to be distributed to residents. However, neither the residents nor the CSO had enough storage space to receive the donation, so they asked the donor to provide water bottles instead.

4.2.2 Reasons for persistence of WASH barriers

The barriers reported by participants were considered persistent over time, with residents becoming resigned about the possibility of change. When asked to reflect on the reasons why these barriers persist, participants' answers were mostly structural, covering inadequate housing, political negligence, characteristics of the physical environment, and criminal activity (Table 4.3). In this section, I will focus on the most frequently mentioned sub-themes, i.e., inadequate WASH/housing infrastructure, limited social capital, negligence from authorities, and residents not willing to pay for WASH.

Table 4.3. Reasons for persistence of WASH barriers in research locations				
Sub-themes	Cases mentioning (n=6)*	%	Times mentioned (n=121)	%
Inadequate WASH/housing infrastructure	5	83%	31	26%
Lack of urban planning	5	83%	21	17%
Limited social capital	5	83%	9	7%
Negligence from authorities	4	67%	22	18%
Residents not willing to pay for WASH	4	67%	10	8%
WASH is not a priority	4	67%	5	4%
Limited funds	3	50%	6	5%
Political-economic structure	3	50%	5	4%
Natural environment limitations	2	33%	4	3%
Criminal activity	2	33%	2	2%
*The total number of cases refers to data collection events, with three key-informant interviews (n=3) and three focus groups (n=3). Data was pooled due to overlap of sub-themes.				

Inadequate WASH/housing infrastructure (Table 4.3) was often reported as an explanation for the persistence of WASH barriers, mostly referring to the improvised manner in which residents build their houses and the lack of investments from WASH companies and the government in their neighbourhoods. This sub-theme was commonly linked to lack of urban planning, highlighting the history of land appropriation in these territories as participants explained that residents built their houses where they could, many times without land registration. While land appropriation happened more frequently in the past as part of the urbanization process in Baixada Fluminense, participants reported that similar practices still take place:

KI5: There was an open sewer near the fish market and a guy put up a fence around it, to throw soil in it and build his house on top!

KI6: This happens here, and it makes it harder to fix the sanitation issues. (FG2, Japeri-Nova Belém, rural community).

In this discussion, participants described a practice where residents cover open sewers with soil and build on top of it (Figure 4.3) considering that others would not be interested in that land. However, this practice blocks the flow of domestic sewage and increases the likelihood of floods in the neighbourhood. Participants also reflected on accountability for the persistence of WASH barriers, recognizing that land appropriation hinders WASH equity and that residents should take responsibility for these practices. Nonetheless, participants noted that responsible authorities should provide safe WASH infrastructure and that this practice would not be possible if domestic sewage was safely collected and treated.



Figure 4.3. Driveway built over sewer in Japeri-Nova Belém. Photo by Rodrigo Curty Pereira.

Practices like these erode social capital, which participants considered to be one of the reasons for the persistence of WASH barriers (Table 4.3). Key-informants argued that individual behaviour was often selfish and predatory, which hindered their potential for joint efforts towards WASH-equity promotion. This was also latent in Duque de Caxias-Jardim Gramacho, where in the key-informant's worldview, the community's background of extreme poverty and proximity to an open-air landfill led them to hold on to the few resources available and, at times, keep others in nearby communities from accessing it, as exemplified in this quote:

I think that the landfill, until its closure, generated a culture of stonewalling in interpersonal relationships, a relationship of scarcity that didn't generate as much sharing, as much giving. The well could serve more families if the residents who are there had a more altruistic vision, more will to share, more sensitivity to others who could, for example, come from far away and access the same water. (K17, Duque de Caxias, peri-urban community).

This key-informant linked this culture to the global neoliberal capitalist logic where individuals are encouraged to compete and fend for themselves. A similar worldview was shared by key-informants in the other partner organizations, who highlighted structural issues as reasons for persistence of WASH barriers, as seen in this quote about how negligence from authorities (Table 4.3) satisfies local elites' interests by keeping marginalized groups under poverty so they can continue to serve as a cheap workforce:

In the history of capitalism, it's important to keep people in this place because we are the employees. Basic sanitation has to do with where you want to keep these people, how much you want them to truly believe they are humans who have rights. And we're talking about basic rights, water, sanitation, food, housing. (K11, Rio de Janeiro, urban community).

Similarly, other participants reported that WASH companies continuously neglect these neighbourhoods because of their inability to pay and other complicating factors such as the presence of criminal groups. Apart from Japeri-Nova Belém, all other communities in this research deal with the presence of criminal groups who exert control over the territory and are heavily armed. Their main function is to facilitate drug trafficking and their presence is considered an investment risk by WASH companies. Other participants argued that corruption is also a relevant factor to understand these barriers since investments from the federal government or even the municipality's share from the privatization of the state WASH company have not been used to advance water and sanitation. Both key-informants and residents expressed frustration with how political negligence is reflected in the persistence of WASH barriers:

After the concession of the state WASH company, we've been following up with the sanitation network to know what happened to the money paid to the municipality, almost BRL 4 million [USD 71,000]. Many other municipalities invested in other areas that are not related to sanitation. To this day, we haven't heard back from the municipal government. (K14, Japeri, rural community).

It's useless to recur to the authorities, my son. We speak up, politicians come, we go into the swamp [polluted river or puddles], they take photos and say they will look into it, and then nothing happens. Nothing ever happens here. (R3, FG3, Japeri-Belo Horizonte, peri-urban community).

The perceived inaction from responsible actors has tarnished residents' trust in authorities and in the potential for social change, which reinforces the tendency for political apathy and limited social

capital. This leads to a scenario where residents are not willing to pay for water (Table 4.3) because they do not trust that the water company will provide a better service, thus preferring to access water free of charge even when the quality is compromised. Participants also revealed that, in face of food insecurity and limited employment, WASH is not a priority.

It's difficult to communicate the subject of water because their priority is food. Those who are hungry are in a hurry. Hunger has a dehumanizing component. You're not yourself when you're hungry. So, between water, hygiene, or any other element, they're going to prefer satisfying their hunger. (KI7, Duque de Caxias, peri-urban community).

Unwillingness to pay for water contributes to perpetuating WASH barriers because, when residents are offered to join the formal water network, they tend to decline since they can access it for free. Additionally, those who have accepted to join, have been charged more than they expected, as demonstrated in this quote:

R3: The neighbours said that the water bill costs BRL 80.00 [USD 14.00], [...] but [the company] said it would be BRL 24.00 [USD 4.25] if you receive Bolsa Familia [government support for poor families].

KI5: Yes, when the bill comes, the price is absurd. (FG2, Japeri-Nova Belém, rural community).

Furthermore, the history of the relationship between residents and water companies in the region leads them to be suspicious of the quality of the service. Residents in Japeri noted that they did not trust that the water from regular pipe connections would be safer because the water company installed water meters on unpaved roads without consulting the community. By doing so, the water company utilized existing irregular pipe connections placed by residents themselves. Residents argued that they would only be willing to pay for water if the roads were paved, so the pipes would not be exposed to mud and contamination during rainy periods. These conflicts expose an incoherence between the way WASH companies communicate with residents about their service fees and the advantages in joining the regulated network. On the other hand, this dynamic presents potential for equity-promoting action, with residents suggesting that local governments can act in tandem with WASH companies to provide the infrastructure demanded by the community as a pre-requisite to join the formal water network.

4.2.3 Facilitators to WASH access

Participants rarely mentioned facilitators to WASH access - i.e., elements, phenomena, or factors that facilitate access to safe WASH in current conditions. When they did, support from civil society organizations was the primary facilitator mentioned. Residents in Rio de Janeiro-Morro da Providência emphasized how the initiatives undertaken by CSO1 helped them access safe drinking water during the pandemic and improved the quality of drinking water overall. They explained how they trusted that the CSO would support them in the future, while they had no faith in the local or state governments.

I now believe that [the sanitation] problem will be solved because we have a partner who is working with us, so I see that in the future this may be resolved. Because if we wait for the government, I don't believe it. Our NGO is our partner. There's no way that nowadays we can talk about [Morro da Providência], point out a problem and not mention CSO1. (R7, FG1, Rio de Janeiro, urban community).

Residents highlighted how CSO1 approached them to understand their needs and included them in planning committees, which was considered a facilitator to WASH initiatives. Through the implementation of the projects, the CSO gained residents' confidence not only because they were involved in their design, but also because they saw tangibles improvements to water access and flood control.

In the other research locations where focus groups were conducted, residents were not aware of the involvement of CSOs in advancing WASH equity. Nonetheless, those in Japeri-Nova Belém reported that water access in some parts of the neighbourhood had improved recently, becoming more reliable. One key-informant explained that this was a reflection of CSO2's demands for improvement in WASH provision in the municipality, which benefitted all residents:

The water treatment station is finally built and operating after a lot of pressure from the social movements and residents' associations. CSO2 made a petition and we met with the public prosecutor's office in 2012 to discuss the water mains that were old and delivered contaminated water to the population. Then, the proposal of the water treatment station came up, which was only built in 2022. (KI4, Japeri, rural community).

Participants also saw the potential in government support as a facilitator to WASH access. They reported that, during elections, candidates and sitting officials promote changes to improve WASH access. Despite welcoming the support, they were aware that politicians do so in exchange for votes:

KI5: People have piped water since [this city legislator] brought water here. He worked for the state water company.

KI6: He had that thing of “politicians helping the community”. (FG2, Japeri-Nova Belém, rural community).

In this municipality, residents recognized that the sitting mayor, elected for the first time in 2020, was responsible for some long-awaited changes, such as building proper sewer infrastructure, paving roads, and pressuring the private water company, *Águas do Rio*, to expand and regulate water distribution. One of the communities, Belo Horizonte, was undergoing construction work to receive sewage collection infrastructure, while the other, Nova Belém, witnessed an improvement to water quality as a result of the newly functioning water treatment station.

Participants’ discussions on facilitators or the lack thereof often involved understandings of accountability. Despite lack of clarity on who is responsible for what aspects of WASH governance (e.g., water collection, treatment, and distribution; sewage collection, treatment, and disposal), residents were aware that local governments and WASH companies were responsible for providing and regulating WASH in the region. Although CSOs facilitate access to WASH, both residents and key-informants argued that support from the government was necessary to promote long-term change.

4.2.4 Summary of results for objective 1

The first research objective was to describe barriers and facilitators in access to water, sanitation, and hygiene in low-income communities in Brazil. Findings revealed that the most common barriers were water shortages and limited water supply, flooding, and damaged WASH infrastructure. These barriers represent additional challenges in accessing WASH in already precarious conditions. Water shortages and limited water supply compromise residents’ capacity to consume safe drinking water, while also undermining hygiene practices. Flooding presents higher risks to health due to the presence of open sewers and the contamination of drinking water through illegal pipe connections. Damaged WASH infrastructure threatens water security by impacting both quantity and quality of drinking water in the neighbourhood. Reasons for persistence of WASH barriers encompassed inadequate WASH/housing infrastructure, lack of urban planning, limited social capital, negligence from public authorities, and WASH not being a priority due to other social vulnerabilities, such as food insecurity. Facilitators to WASH access were rare, but mostly included support from civil society organizations and occasional government initiatives.

4.3 Impact of inequities in access to water, sanitation, and hygiene on the wellbeing of low-income communities in Brazil

4.3.1 Understandings of wellbeing

By reflecting on how WASH inequities affect their wellbeing, participants revealed their understanding of what wellbeing meant to them; herein categorized as dimensions of wellbeing (Table 4.4).

Table 4.4. Dimensions of wellbeing affected by WASH inequities in research locations				
Sub-themes	Cases mentioning (n=6)*	%	Times mentioned (n=271)	%
Emotional health	6	100%	49	18%
Climate resilience	6	100%	45	17%
Sense of dignity	6	100%	26	10%
Neighbourhood infrastructure	6	100%	23	8%
Access to education	5	83%	26	10%
Physical health	5	83%	21	8%
Leisure	5	83%	11	4%
Potential and ability to promote change	5	83%	6	2%
Spirituality	4	67%	12	4%
Public safety	3	50%	24	9%
Community integration	3	50%	15	6%
Access to consumer products and luxury	3	50%	6	2%
Mental health	1	17%	6	2%
Preservation of historical patrimony	1	17%	2	1%
*The total number of cases refers to data collection events, with three key-informant interviews (n=3) and three focus groups (n=3). Data was pooled due to overlap of sub-themes.				

Although participants were concerned with physical and mental health, the most frequently mentioned sub-theme was emotional health (Table 4.4). Participants noted how characteristics of their

communities made them experience a variety of feelings ranging from happiness, love, and hope to fear, anger, and frustration. While residents often described their relationship with the neighbourhood with positive feelings like love and gratitude, the absence or precarity of WASH and other services commonly caused negative emotions as reported by this resident:

The other day I was coming home from the train station, carrying some heavy bags under the scolding sun and I passed by that slope where people throw garbage. Then, a bag came from up there passing close to my face and hit the wall. When I looked to see what it was, it was full of shit! [...] I cried with hatred. (R1, FG1, Rio de Janeiro, urban community).

This resident proceeded to explain that she felt powerless because there was nothing that she could do to address the situation; she could not find the person responsible and hold them accountable. The slope mentioned in her story (Figure 4.4) is informally used for waste disposal since solid waste collection services in the community are also unreliable. Another resident reported that she too was almost hit by a glass bottle thrown in this slope. As revealed by this quote, the slope is also used to dispose of human feces.



Figure 4.4. Slope where residents dispose of solid waste in Rio de Janeiro-Morro da Providência. Photo by Rodrigo Curty Pereira.

Climate events were mentioned in all interactions with participants. Inadequate WASH infrastructure affected their ability to cope with severe weather events, thus compromising communities' climate resilience (Table 4.4). Heavy rainstorms cause floods, water shortages, and landslides; they also compromise water quality, mobility, and other services like waste collection and electricity. Intense summers highlight negative effects of limited water access, enhance the unpleasant odour produced by open sewers, and increase mosquito and rodent populations.

Between 2019 and 2020, there was a heavy rainstorm and a landslide destroyed and buried a large part of the base where the artesian well was located. So, we had to open another catchment, connect it with another network and we found it difficult to access potable water. (KI7, Duque de Caxias, peri-urban community).

There's a strong smell coming from the sewer here! People complain about it, but mostly during the summer when it gets worse. [...] There are a lot of rats here in the sewer, the size of a cat, and big snakes too. (KI5, FG2, Japeri-Nova Belém, rural community).

The first quote demonstrates how the existing WASH infrastructure in Duque de Caxias-Jardim Gramacho is fragile to climate events, which affects residents' ability to cope with rainstorms and landslides. Residents who access water from communal wells face additional barriers during heavy rainstorms. The second quote highlights how open sewers leave an unpleasant odour in the neighbourhood, which is enhanced during the summer when sewers dry out. The ditches also serve as breeding sites for mosquitoes, rodents, and other animals like snakes. Residents in all communities complained about the presence of rodents and mosquitoes.

The sewer smell was also used to explain one of the wellbeing dimensions highlighted by residents: sense of dignity (Table 4.4). Due to the lack of sewage collection, residents must cope with the visual pollution caused by open sewers and polluted rivers, as well as the smell of domestic sewage, which deeply affects their sense of dignity, especially when compared to the experience of other neighbourhoods where these elements are not present.

Sanitation here is horrible! You can't even go downhill with nice shoes on because you're going to arrive at the movie theatre stinking of sewage. (R6, FG1, Rio de Janeiro, urban community).

This resident reports how the lack of sanitation facilitates contact with contaminated water, which hurts community members' sense of dignity when moving through the city. She feels like she cannot access the movie theatre, for example, without feeling embarrassed for how her shoes may smell when she leaves the community. This example also illustrates how WASH inequities affect participants' ability to access and enjoy leisure activities (Table 4.4).

Participants reported how WASH inequities further complicate challenges with neighbourhood infrastructure (Table 4.4). Electricity, waste collection, public safety, health care, and transportation were all services that were missing or dysfunctional. The latter, however, was also impacted by WASH inequities. Residents focused on how unpaved roads reduced mobility during rainstorms, which was complicated by the lack of sewage and rainwater collection. Roads would be covered in mud or flooded and traveling on foot becomes both challenging and dangerous. Public transportation,

when available, is also disrupted; with residents in Japeri-Belo Horizonte reporting that the only bus line connecting the community to the city centre was interrupted during the installation of sewer pipes in the neighbourhood:

The [municipal government] came to pave the road, but it's a disorder now. There are more holes on the road because of the trucks passing by and the street isn't paved. When it rains, we're isolated. The bus we had before is no longer running. (R6, FG3, Japeri-Belo Horizonte, peri-urban community).

This experience reveals incoherence in the processes of advancing equity by the responsible authorities, who failed to identify how important mobility is for these communities and how they value paved streets to facilitate movement. While residents wish they had safe sewage collection, they expressed frustration with the way the construction was undertaken in Japeri-Belo Horizonte, i.e., by depriving them of other transportation services without offering viable and accepted alternatives. Similarly, residents in Japeri-Nova Belém and Rio de Janeiro-Morro da Providência reported that the lack of sanitation infrastructure challenged their ability to go to church and to take children to school, which threatens other dimensions of wellbeing like spirituality and access to education (Table 4.4).

This is the neighbourhood school. The valão [contaminated river] goes by it. When it floods, it goes into the school and classes are interrupted. (K14, FG3, Japeri-Belo Horizonte, peri-urban community).

Despite not being their main concern, participants recognized how WASH inequities represented risks to physical health (Table 4.4). They cited diarrhoea, skin diseases, allergies, respiratory diseases caused by mold, and vector-borne diseases as potential risks:

When we did a survey in [Morro da Providência], we noticed that the majority of the diseases affecting residents are linked to poverty, contaminated water, mold, housing, sanitation, and garbage. (K11, Rio de Janeiro, urban community).

Children step in this sewage, and they pick up bacteria. When it rains the sewer down here clogs up. Then we go down to take the children to school and they're heavy [so they have to walk]. Then the child gets a fever, and we don't know what to do. (R1, FG1, Rio de Janeiro, urban community).

R6: People don't get sick from the open sewer, thank God!

R5: But kids play near the sewer. It's the most common thing to happen. (FG2, Japeri-Nova Belém, rural community).

While key-informants reported cases where physical health was threatened by WASH-related diseases, residents had difficulties identifying what the disease was and how it was caused as illustrated by the last two quotes. This finding indicates a gap in knowledge among residents, which can be interpreted as an incoherence within the SEA framework. In this case, while WASH inequities are understood as detrimental to health, they are not easily identified in practice by those most affected. This knowledge gap also represents a potential for action from CSOs and public health authorities to better communicate what water-borne diseases and their symptoms are, how they are contracted, and how to avoid them.

For key-informants, the impact of WASH inequities on residents' potential and ability to promote change (Table 4.4) was the most detrimental as it hinders autonomy and (re-)produces poverty in place. Key-informants highlighted how the persistence of WASH inequities over time contributes to political apathy and resignation. Residents, in turn, do not show up to community meetings and exchange short-term political favors in support of politicians who may not have equity-promoting social change on the agenda.

One of the main factors keeping us from seeing improvements to WASH is the lack of will from residents. They won't even show up to meetings, but I understand why: there have been so many promises from politicians that the population doesn't believe in change anymore. The candidates know how to please part of the population, they'll throw a barbecue, buy beer, give away soccer balls, jerseys... (KI6, FG2, Japeri-Nova Belém, rural community).

These reflections are linked to worldview, accountability, and potential. As inequities are kept in place over generations, residents' worldviews accommodate this notion that nothing will change; WASH inequities are naturalized parts of the landscape. As suggested by this quote, some residents prefer obtaining short-term political gains, but fail to perceive their responsibility in challenging power dynamics contributing to keep inequities in place. CSOs have the potential to foster agency among residents by debating the root causes of inequities and mechanisms to disrupt them through autonomy-building.

4.3.2 A political ecology of wellbeing

Exploring the impacts of WASH inequities on wellbeing through the lens of political ecology requires more than identifying the dimensions of wellbeing affected by WASH; it also demands putting power at the centre of analysis. For that reason, this sub-section further explores how participants interpreted inequities by highlighting power imbalances and situating them within larger systems of inequity.

Participants expressed that, in the context of WASH inequities, wellbeing means having good emotional, physical, and mental health; being resilient to climate events, feeling dignified and having access to basic services, such as urban infrastructure (e.g., pavement, waste collection, electricity), education, and leisure; wellbeing also means feeling capable to promote change, practice spirituality, feeling safe and part of a community, being able to consume products that others in nearby neighbourhoods can consume, and preserving local historical patrimony (Table 4.4). All these dimensions of wellbeing are affected by geographical inequities intersected by global systems of inequities such as classism, racism, sexism, and colonialism (Table 4.5).

Table 4.5. Systems of inequity affecting wellbeing in research locations				
Sub-themes	Cases mentioning (n=6)*	%	Times mentioned (n=211)	%
Classism	6	100%	34	29%
Geographical inequities	5	83%	42	36%
Racism	4	67%	13	11%
Sexism	3	50%	17	15%
Colonialism	3	50%	9	8%
*The total number of cases refers to data collection events, with three key-informant interviews (n=3) and three focus groups (n=3). Data was pooled due to overlap of sub-themes.				

Participants recognized how WASH inequities and, consequently, access to determinants of wellbeing are distributed differently across space. Geographical inequities (Table 4.5) were discussed at different scales, i.e., at the community, municipal, and regional levels. At the community level, key-informants highlighted how certain sub-neighbourhoods experienced WASH inequities differently. In Rio de Janeiro-Morro da Providência, CSO leaders noted that those living at the top of the hill experienced water shortages every other day because the WASH infrastructure was even more

precarious there. Likewise, the key-informant in Japeri-Belo Horizonte reported that those living near polluted rivers were the most vulnerable to flooding and diseases contracted from contact with contaminated water.

Pedra Lisa [sub-neighbourhood in Morro da Providência] is considered the worst place to live in on the hill. The police won't go there so those with problems in the justice system live there. They have water one day, then they'll go three days without it. Sewer pipes are mixed with drinking water pipes. There are houses with no washroom. If we gather them with other residents, each will have a different opinion about the community. (KI2, Rio de Janeiro, urban community).

That area that we visited is the poorest here. Within poverty, there's an even poorer area, which is always near the valão [contaminated river]. Irregular housing is strongly associated with poverty. It's a place that no one wants. You're not going to build your house there; you only do it because you have no other means. (KI4, FG3, Japeri-Belo Horizonte, peri-urban community).

While key-informants provided individual explanations for these intra-community WASH inequities, like inability to pay for water and lack of documents to prove ownership of appropriated lots, they also framed it as a structural issue involving classism and environmental racism (Table 4.5). Residents, on the other hand, were puzzled by inequities at the community level and often wondered what differentiated them from other neighbourhoods. This constitutes a knowledge gap in residents' worldviews, which may be addressed through critically reflective dialogue with CSO representatives about the root causes of inequities.

Geographical inequities at the municipal level were easily perceived by residents as they involved services and physical elements that significantly altered the landscape. In Japeri-Nova Belém, residents highlighted that the pavement reached other nearby neighbourhoods, but not theirs, which contributed to a feeling of marginalization in the municipality. Because Morro da Providência is a hill located at the heart of the state capital, participants could easily perceive inequities between their community and other parts of the city of Rio de Janeiro.

We're on a hill in the city centre. We can see the headquarters of the state government, the city hall, and the department of public security from the top of the hill. Yet, some people don't have water, or a washroom; some live in a shack or don't have food. (KII, Rio de Janeiro, urban community).

I was born and raised here in Morro da Providência. I've already had the opportunity to make a life for myself outside the community, but I've come back. If I tell you that I don't have a dream of improving more and tasting a bit of the guardrail of this wonderful world that Rio de Janeiro offers in a better condition than the one I'm in, I'll be lying to you. (R7, FG1, Rio de Janeiro, urban community).

A common element that helped key-informants make sense of geographical inequities at the municipal level in Duque de Caxias and Rio de Janeiro was the presence of criminal groups. They explained that the constant armed conflicts between drug traffickers and the police keep services from reaching residents while also directly threatening their lives. Additionally, militias – criminal groups linked to corrupt police officers and politicians - profit from these tensions as they offer services that are lacking, including drinking water.

We can't deny that they [drug traffickers] are criminals, but it's not the organization's main reason for being here. The exchanges of gunfire here are the result of a policy of war on drugs that we imported from the Reagan administration, from other Latin American countries like Colombia and Mexico, which doesn't work. Every day, every hour, there's an operation going on in here. As a result, the community doesn't get sanitation, electricity, water, sports, leisure, and culture services. (K17, Duque de Caxias, peri-urban community).

At the regional level, the most prominent geographical inequities were between communities located in the state capital (i.e., Rio de Janeiro) and those in peripheral municipalities in Baixada Fluminense (i.e., Duque de Caxias and Japeri). Inter-municipal inequities manifested mainly through the support of civil society. While CSOs were present in all research locations, they were much more capable of promoting interventions in the city of Rio de Janeiro. This was noted in the presence of multiple CSOs in Rio de Janeiro-Morro da Providência in comparison to the scarcity seen in other municipalities. Additionally, residents positively described their relationship with CSO1, whereas residents in other municipalities where focus groups were held were unaware of any civil society work. These quotes contrast experiences in Rio de Janeiro and in Japeri:

Our community has close to 17 social projects, mostly led by women born and raised here; many are led by dark-skin black people, which brings about another positionality of people who were exploited for a long time. (K11, Rio de Janeiro, urban community).

Thank God, with the arrival of the NGO and the partners they bring in [other partner CSOs], things are getting better. We know it's not going to happen in the blink of an eye, but what the government hasn't done, they're doing. (R7, FG1, Rio de Janeiro, urban community).

I've lived here for 18 years, and I've never seen an NGO. No one does anything for our neighbourhood." (R2, FG3, Japeri-Belo Horizonte, peri-urban community).

While key-informants in the state capital reported receiving support from other CSOs, being able to raise more funds and expand their projects, those in Japeri and Duque de Caxias stated that they constantly face financial shortcomings and difficulty recruiting volunteers. When asked why, they reflected on the capital-periphery dynamic and the fact that CSOs located in Rio de Janeiro receive more attention from the media and donors in addition to having a more well-established network of partners:

NGOs cannot survive in Japeri. There were several, but they all dwindled. This is because we're not in the centre of power, of opportunities. [...] Residents have so many needs that you can't expect the third sector to fulfill them all. (KI4, FG3, Japeri-Belo Horizonte, peri-urban community).

As suggested by this quote, key-informants in Baixada Fluminense also argued that community needs were so extensive that CSOs could not fill in the gap left by local governments in providing social services. While those living in Rio de Janeiro-Morro da Providência also have many unfulfilled needs and unique challenges, WASH inequities in the other two municipalities seemed harder to overcome since the water companies have far less interest in investing in non-profitable peripheral areas, and the civil society is less sensitized about their needs.

These geographical inequities are intersected by global power structures, most notably capitalism, racism, and colonialism (Table 4.5). Disparities in access to WASH and other services were interpreted by participants as a reflection of residents' inability to pay or to afford living in other areas. Key-informants often linked WASH inequities to poverty and argued that community members will only gain access to these services if they gain autonomy through their own income-generating activities.

[The water company] didn't invest in Japeri because it's not where they make money. They will invest in Rio because the population there pays. There, they have profits; here, they have debts. [...] How are you going to charge from a population that can't pay? (KI4, Japeri, rural community).

Key-informants in Rio de Janeiro and Duque de Caxias also linked poverty to environmental racism and colonialism (Table 4.5). They explained that the majority of the population in the assisted communities identify as black or *pardo* and that their history is linked to the process of abolition of slavery in Brazil, which happened without support to enslaved people, who were forced to move to uninhabited territories where they could still access low-paying work. The socioeconomic consequences of the region's colonial past can be seen to this day.

Access to water is a dilemma in Baixada Fluminense because of environmental racism. We understand that the state isn't present because it's a project. Brazil doesn't work regularly, continuously and doesn't guarantee peoples' rights because it's a project, it's not the result of chance, nothing explains what keeps these people in this state without there being social, political, and economic crossings. The colour of their skin and their zip code determine what will be done for them. (KI7, Duque de Caxias, peri-urban community).

While key-informants' worldviews were informed by the understanding that inequities are rooted in the colonial past and ongoing capitalist dynamics, residents attributed less importance to structural inequities. Some residents in Rio de Janeiro-Morro da Providência recognized that their community was considered the first favela in Brazil and referred to it as “Little Africa”, but failed to identify how racism affected the way they interact with outsiders, often hindering the potential for equity-promoting change:

At the start of the pandemic, KI2 would go around distributing food stamps with KI3 and another colleague, who's a black man. Although people knew KI3 and this other colleague, they would approach KI2 because she's white and European [laughs]. Someone who's white is [makes a sound expressing admiration], but the European is even more. She wouldn't be able to solve anything, but they would go straight to her. It's historical. (KI1, Rio de Janeiro, urban community).

4.3.3 Summary of results for objective 2

WASH inequities impact residents' wellbeing across various dimensions, including physical, mental, and emotional health. Furthermore, participants revealed dimensions of wellbeing specific to their context, such as climate resilience, neighbourhood infrastructure, access to education and leisure, sense of dignity and ability to promote change, and spirituality. These neighbourhoods are commonly affected by criminality, which directly puts residents' lives at risk and contributes to keeping WASH companies and other service providers out of the territory. All these challenges contribute to the production and reproduction of poverty in place and diminish people's ability to promote change.

Participants linked these experiences to historical systems of inequity, including classism, racism, and colonialism. While more well-off neighbourhoods enjoy better quality WASH services, poorer communities are disregarded for many reasons, but mostly due to their limited capacity and willingness to pay for WASH. These communities are mostly composed of black and *pardo* people, which is linked to the country's colonial history and its impacts on the inequitable distribution of income between white and non-white groups.

The results also reveal geographical inequities which produce “peripheries within peripheries”, that is, further marginalized areas located in already peripheral municipalities and communities. While poor communities in the state capital face unique and persisting challenges to access WASH, those in Baixada Fluminense are further behind. Even CSOs supporting these communities face more challenges to raise funds and recruit volunteers due to the lack of attention they receive by civil society for being distant from the regional centre of power, i.e., the city of Rio de Janeiro.

4.4 Solutions to inequities in access to water, sanitation, and hygiene

4.4.1 CSO interventions

All partner CSOs have implemented WASH solutions in the assisted communities, varying from direct interventions to political activism (Table 4.6).

Table 4.6. CSOs' WASH solutions in research locations				
Sub-themes	Cases mentioning (n=6)*	%	Times mentioned (n=27)	%
Water-filtering systems	2	33%	8	30%
Building WASH infrastructure	2	33%	6	22%
Water donation	2	33%	4	15%
Political activism	1	17%	5	19%
Well-drilling	1	17%	4	15%
*The total number of cases refers to data collection events, with three key-informant interviews (n=3) and three focus groups (n=3). Data was pooled due to overlap of sub-themes.				

One of the most complex WASH solutions consisted of water-filtering backpacks (Table 4.6) donated by CSO1 in partnership with a social enterprise. This intervention was targeted at improving drinking water quality and storage during the COVID-19 pandemic and afterwards. Having noticed that residents in Rio de Janeiro-Morro da Providência collected water from a common source at the base of the hill, CSO1 distributed filtering backpacks that allowed residents to collect and transport water with more ease. The backpack is equipped with a water filter and a hose, allowing residents to install it on the wall of their house.

This project was wonderful; it was productive for me. Because I used to buy gallons of water to drink and with the arrival of this filter, I practically don't buy water anymore. So, it's a little change that turns into something else. So, these boys' project is wonderful and if you see the result, you can say 100%, just by looking at the bag, tasting the water, it really does filter, it doesn't let any dirt through. Because when you do maintenance, you see that all that dirt comes out. So, the filter doesn't really let through any residue that could leave the water with a bad quality. So at least for me it came in handy. And I think for others too. (R7, FGI, Rio de Janeiro, urban community).

As seen in this quote, participants also reported that the filtering backpack was a solution to drinking water affordability. Residents were still collecting water from other sources, but they did not have to pay and felt that the water quality was safe. While the donation was made by the partner social enterprise, CSO1 was responsible for selecting the families who would receive the backpack since only 100 units were available. The organization also provided a manual on how to handle and

care for the filter, helped installing it, and arranged visits from a social worker to assess the impact of the solution on residents' lives. They also reported creating a WhatsApp group with the donees, who could ask support with maintenance.

Although key-informants were pleased with the project, residents reported mixed feelings. Some complained that maintenance was too laborious, and the filter was too slow, so they preferred drinking tap water. Key-informants also reported that poor housing infrastructure limited the implementation of the project:

The idea was to fixate the filter to the wall so that it wouldn't take too much space since the houses are small, but some filters fell because the plaster was too fragile. [...] We had a social worker following up for three months and she noticed that the quality of life improved, kids were no longer having diarrhoea, but some families were bothered by the visits and gave up. We then redirected the filters to other families. (KI3, Rio de Janeiro, urban community).

The limitations in this project indicate incoherencies in residents' response to solutions to WASH inequities. While they complained about the water quality and storage, the response to the proposed solution was partially negative, demonstrating resistance to maintenance inconveniences, e.g., cleaning the filter frequently and waiting for the filtering process. This response indicates a gap in knowledge on the risks of consuming tap water from illegal water connections or from filters that are not cared for properly. Residents may benefit from discussions linking the health risks to water consumption behaviours.

CSO1 also undertook initiatives targeted at building WASH infrastructure (Table 4.6). They described a project where the organization renovated a public square in the community and, in the process, tackled infrastructural issues linked to drinking water and the risk of flooding:

The architect also renovated the hydraulic part of the square because it's located near the big wall where all the water connections to the lower part of the community start from. [...] There are two pipes there; one is newer than the other and houses connected to the older one suffered shortages more often. The architect proposed connecting the two pipes to increase the water flow and reduce water shortage. [...] He also used a draining material on the floor of the square, which helps absorb the rain and reduce floods (KI2, Rio de Janeiro, urban community).

CSO 3, in Duque de Caxias-Jardim Gramacho, focused on building communal water wells (Table 4.6). They described digging multiple wells throughout the year. The process required finding a safe water source, which was difficult due to the location of the community. Searching for a reliable and

safe water source required hiring a well-drilling company and the organization had to partner with other actors to raise funds.

Three years ago, we drilled an artesian well in partnership with other organizations. This well served the residents very well, there are over 100 families there. [...] After the landslide, we had to open a second well, which took a long time because the water came with a huge amount of salt. We made four attempts, man, and this involves money, machinery, time. On the fifth attempt, the water came out with a slightly lower concentration of salt, but we understand that as consumption increases, as it is more demanded, you put it to work more and it cleans up a bit. (KI7, Duque de Caxias, peri-urban community).

In Japeri, CSO2 had no initiatives to build WASH infrastructure, but they described informally supporting residents in their own initiatives. For example, key-informants who also reside in Japeri-Nova Belém recounted how the residents worked together to install concrete sewer pipes donated by key-contacts in the state water company to divert domestic sewage away from the houses and serve as passage for residents (Figure 4.5). This initiative did not fix the sanitation issue in the community but helped create a temporary solution.



Figure 4.5. Concrete pipe used to divert wastewater in Japeri-Nova Belém. Photo by Rodrigo Curty Pereira.

A common initiative across CSOs 1 and 3 was water donation (Table 4.6). They donated bottled water or hired water tankers to supply households, especially during the pandemic when civil society at large was particularly sensible to issues of water insecurity. In Japeri, CSO2 did not donate water, but described how politicians would hire water tankers during periods of water shortage. Key-informants considered water donation to be an emergency response and not a systemic solution.

We opened a well because it wasn't enough for us to just buy water tankers, which we did a lot during the pandemic, practically twice a month. In the first fortnight and in the second fortnight, water tankers came in to supply the families in this neighbourhood. (KI7, Duque de Caxias, peri-urban community).

There was a clear discrepancy between CSO1's capacity to implement short-term solutions that require more funds and partnerships in comparison to CSOs 2 and 3. This is linked to the geographical inequities between capital and periphery, where communities located in the city of Rio de Janeiro receive more attention from donors than those in Baixada Fluminense. In the case of the water-filtering backpack, CSO1 was approached by the partner social enterprise, whereas the key-informant in CSO2 described seeking partnerships to find safe water sources from a well-drilling social enterprise but facing difficulties due to limited funding.

Although limited by lack of funding and partnerships, CSO2 focused efforts on political activism (Table 4.6), thus advocating for action from responsible authorities. CSO2 leaders sat in municipal councils for environmental, health, and WASH issues, participated in the Guandu river watershed committee, and organized petitions to take water companies and local governments to court for neglecting low-income communities from accessing safe WASH. By sitting in municipal councils, they also contest official WASH data and demand a municipal WASH plan, which is required by Federal Law from all municipalities.

CSO2 participates in a network of civil surveillance on sanitation and health, and we monitor the process of privatization of the water company, if they are meeting the targets, if the municipalities are being supported... we try to follow the news because there's no transparency. [...] We participate in city councils for the environment, health, social work, school meals. We discuss the city and try to organize the social movements. Our institution defends [residents'] rights. (KI4, Japeri, rural community).

While these actions require more time to generate results, they have the potential to lead to long-term changes in WASH access and affect a wider population. The interventions described by CSOs 1 and 3 benefitted approximately 100 families, but CSO2 was able to obtain a water treatment station in the municipality of Japeri that benefits all residents, i.e., approximately 100,000 people.

Nonetheless, key-informants in CSOs 1 and 3 are aware that their WASH interventions are short-term. The organizations' main mission, in fact, is to help residents overcome poverty through culture and education, respectively. They tackle WASH issues because it is a primary necessity not being met by responsible actors. Key-informants were also critical of other CSOs who focus solely on charity, which was seen as problematic for fostering dependency. These two quotes present shared worldviews on how CSOs must support communities suffering with WASH and other inequities linked to poverty:

People in extreme poverty only ask for things, food, clothes, a job. They can't dialogue. You have to work with them to understand how they'll first have access to the minimum, to food, regain their self-esteem, their dream, and then find employment so they won't depend on you anymore. This is very complex because it's a relationship established by the colonizer. (KI1, Rio de Janeiro, urban community).

Today, the most important community leaders in any favela in Brazil are the churches. [...] While we lack money, they lack a more polished critical conscience. [...] They continue to feed the culture of charity, assistance, but they don't think from a perspective of autonomy. [...] Dom Elber Câmara has a wonderful phrase: when I give food to the poor, they call me a saint, but when I ask them why they're poor, they call me a communist. (KI7, Duque de Caxias, peri-urban community).

These key-informants uncover an aspect of coherence and accountability informing CSO work in this region, which is the understanding that charity work may contribute to maintaining inequities in place if not accompanied by political debate about the root causes of inequities. While CSO partners promote critically reflective dialogue among residents to varying degrees, they recognize that other civil society actors, like churches and local politicians, promote a cyclical relationship with low-income communities where basic needs are marginally met and the supporting actors are seen as charitable donors that do not promote social change. For this reason, key-informants expressed that their priority is to expand educational projects that promote income-generation and support other dimensions of wellbeing that can help overcome poverty.

4.4.2 CSO as intermediaries

In addition to implementing direct WASH interventions, CSOs play the role of intermediaries between communities and outside actors. They partner with various actors to implement and negotiate WASH solutions, including other CSOs (national and international), residents, faith-based organizations, for-profit organization (including state and private WASH companies), social enterprises, individual donors, and government agencies (Table 4.7). Partner CSOs also carefully navigate the presence and influence of criminal groups and corrupt politicians.

Table 4.7. Actors involved in CSO WASH solutions				
Sub-themes	Cases mentioning (n=6)*	%	Times mentioned (n=41)	%
Private companies/individuals	5	83%	11	27%
Water companies	3	50%	15	37%
Government agencies	3	50%	7	17%
Other CSOs	3	50%	5	12%
Residents	2	33%	2	5%
Criminal groups	1	17%	1	2%
*The total number of cases refers to data collection events, with three key-informant interviews (n=3) and three focus groups (n=3). Data was pooled due to overlap of sub-themes.				

CSOs are skilled in understanding and communicating community needs to outside actors due to their proximity to and personal experience in each location. Key-informants described constantly communicating with residents to understand their priorities and consult them about proposed interventions. This practice demonstrates coherence with CSOs' narrative about promoting autonomy and authentically representing residents' worldviews.

Before implementing the water-filtering backpacks, we organized a breakfast with the residents. We explained the project step by step and people started understanding. There were community residents explaining it, including myself, and they opened up and believed in the project. (KI3, Rio de Janeiro, urban community).

Consulting residents before implementing projects was considered a necessary step by key-informants to ensure that solutions would be well received. Key-informants explained that residents need to take part in the decision-making process to foster accountability and overcome dependency with outside actors. Participants also reported cases where outsiders offered support without consultation, but ended up not implementing their projects, which was the case of an individual who offered water tanks to families in need. This practice hurts participants' trust on CSOs, so the practice to critically evaluate and select partnerships helps to prevent that.

In Rio de Janeiro-Morro da Providência, where partnerships were available more frequently, key-informants explained that there would be proposals from outside actors that did not meet the needs

and limitations of the community, so the presence of residents in the organization would help them select projects that made sense to them.

This is a place where the police won't go and the cartel is very violent, so outsiders can only access it through us, so we have to negotiate. The ideas are always excellent, but when they're not designed by people who have lived in these conditions, they need adaptation, otherwise they won't fit. (KI1, Rio de Janeiro, urban community).

In this quote, one of the key-informants reports offering support to outside actors to navigate the presence of criminal groups in the territory. Similarly, in Duque de Caxias-Jardim Gramacho, the CSO leader revealed having to explain to the cartel what the well-drilling project consisted of in order to implement it:

We had to ask permission from the drug traffickers to install wells. [...] We had to communicate that we were carrying out a project that we were responsible for, and it wouldn't generate any costs for the community. [...] Their relationship with us is respectful because their children are here, their nephews and nieces are here. They don't want the kids out of school or a social project. (KI7, Duque de Caxias, peri-urban community).

According to key-informants, CSO representatives are respected by cartel leaders due to the nature of their work and how it benefits the community as whole. They are also more respected by the police since they have expertise in human rights and the means to denounce arbitrary police violence. CSO leaders have a prestigious status in the community because they are seen as benefactors, so they are able to navigate tensions that, otherwise, would keep services away from these territories. This dynamic presents potential for the relationship between government agencies and WASH companies in the community. With the support of CSOs, it is possible that essential services can reach these neighbourhoods despite the dominance of criminal groups. This is in line with CSOs' worldview that violence results from inequities and overcoming it requires empowering community members to have dignified income-generating opportunities beyond the drug economy.

As seen with CSO2's political activism initiatives, CSOs also act as intermediaries with local and state governments. They possess advanced knowledge of WASH governance and the state's responsibilities, being able to keep authorities accountable. CSOs 1 and 3 also described putting efforts to include local governments in their initiatives, but without success. This was understood as a

central limitation since participants see governments as the only actors capable of promoting systemic change.

When you organize a soup kitchen in the street, it happens without articulation with the Social Assistance Secretariat, without partnership with the Secretariat of Employment for the population in condition of homelessness, so you continue to feed the culture of charity, of assistance, but you don't think from a perspective of autonomy. The same goes for water: with more money and partners, we could build more wells, but the problem wouldn't be fixed because you're not fighting the structures that make it impossible for people to have the right to water. (K17, Duque de Caxias, peri-urban community).

R7: We can't demand something from a private initiative when they have no obligation to do so. They are here to help us so that we can live a better life, but they don't have that obligation. We can't live our whole lives on the benefit of an NGO, whereas who had to take care of our infrastructure are the public authorities. (R7, FG1, Rio de Janeiro, urban community).

In the latter quote, one of the residents in Rio de Janeiro-Morro da Providência articulates a common opinion held by participants that, while CSOs are able to support residents in finding relief for WASH inequities, they are not responsible for doing so. Residents in this focus group shared a similar worldview to key-informants, recognizing that governments must be involved in the process of social change since poverty is a multi-faceted phenomenon that requires structural responses. Key-informants noted that this group would be more politically informed than other residents because they meet bi-weekly to discuss community issues. This was another initiative from CSO1 that demonstrated potential to foster critically reflective dialogue. This group was compensated for their dedication and acted as a consultation board, which can serve as an example for other CSOs facing issues in mobilizing residents.

Finally, CSOs play the role of fundraisers. Liaising with private companies, individual donors, and fundraising agencies, they seek investments to fund interventions. Their ability to obtain funds is also marked by geographical inequities, with the CSO located in the state capital having more opportunities and support from other organizations, while those in the periphery face hardships in writing successful grants.

I received training from a National CSO and empowered myself as a social leader. Then, CSO1 went from supporting 100 people to 550. In 2019, fundraising was chaotic and today we raise 30% to 40% more and we have 32 employees. (K11, Rio de Janeiro, urban community).

The economic survival of the organization is at stake today. We've been doing a lot of tiring work with few results in terms of fundraising. I'm waiting for an e-mail from a fundraising agency to see if they're going to provide us with technological support to improve our media and website. (K17, Duque de Caxias, peri-urban community).

We received BRL 50,000 [USD 9,227] in funding from the Ministry of Culture to support artisans in the municipality, but for WASH we have very few volunteers and no external resources to implement projects. So, we act in the macro scale, demanding a basic sanitation plan from the local government since we're the only municipality in Baixada Fluminense that doesn't have one. (K14, Japeri, rural community).

These disparities in the level of success from each CSO in fundraising points to potential for cooperation and joint equity-promoting action. The CSOs in this research already partner with other local, national, and international CSOs for specific projects. However, a sustained exchange of expertise and experience can enhance CSOs' ability to raise more funds and amplify their impact locally as shared by key-informant 1, who partnered with a national incubator and received training to better manage the organization.

4.4.3 Summary of results for objective 3

Civil society organizations in the Metropolitan Region of Rio de Janeiro support low-income communities in accessing water, sanitation, and hygiene in two ways: 1) through CSO-led initiatives and 2) by acting as intermediaries between the communities and outside actors. CSO-led initiatives include building and fixing WASH infrastructure, like water wells, drinking water pipes, and flood control infrastructure. In times of water shortage, they donate bottled water or supply houses with water tankers. Their initiatives also aim to improve drinking water quality through the donation and installation of water-filtering systems, and the evaluation of water well quality. Finally, CSOs promote political activism, by engaging with residents in critically reflective dialogues, demanding

accountability from responsible actors, and serving as civil society consultants in municipal councils and watershed committees.

CSOs are skilled intermediaries, liaising with residents and outside actors, like other CSOs, government agencies, private companies, and social enterprises. As respected community leaders, CSO representatives are able to navigate local tensions, such as conflicts between drug cartels and the police. Their proximity to the community allows them to communicate residents' needs and preferences and adapt solutions to the unique characteristics of the territory. They use their expertise and know-how to raise funds for direct interventions. There are, however, geographical inequities that privilege communities located in the state capital since they receive more attention from the media and civil society at large.

Chapter summary

Residents in the research locations access water mainly through illegal pipe connections to water mains. These connections are built in an improvised manner, which compromises the quality and reliability of drinking water services. For this reason, residents also access water through alternative means, such as communal sources and water donation. Sanitation is the main concern since residents lack sewage collection and treatment, having to cope with open sewers and polluted rivers. Water shortage, flooding, damaged water infrastructure, and limited storage space act as additional barriers to access WASH, complicating the already precarious WASH conditions. Participants attribute the persistence of WASH barriers to inadequate WASH and housing infrastructure, limited social capital, political negligence, and residents' unwillingness and inability to pay for WASH. The presence and work of civil society organizations supporting low-income communities is the main facilitator to WASH access, but participants agree that government support is needed to address systemic inequities and keep WASH companies accountable.

WASH inequities affect multiple dimensions of wellbeing, including physical, mental, and emotional health. Participants revealed that they understand wellbeing as consisting of good health, climate resilience, feeling dignified, having access to proper neighbourhood infrastructure, being able to access education and leisure, practice spirituality, feeling capable of promoting social change, feeling safe and part of a community, accessing consumer products, and being able to preserve historical patrimony. WASH inequities are intersected by global systems of inequity, such as

capitalism, racism, sexism, and colonialism. Structural inequities manifest differently in place, presenting clear geographical disparities within and between communities, and between municipalities. Low-income communities in the capital receive more support and attention from civil society at large, with civil society organizations in peripheral municipalities facing more challenges to implement WASH interventions and find impactful partnerships. These geographical inequities manifest in the form of peripheries within peripheries, i.e., places of higher inequality within low-income communities.

CSOs' solutions to WASH inequities range from direct interventions to political activism. Interventions include water donation, construction and renovation of WASH infrastructure, and efforts to improve drinking water quality. Partner CSOs shared a critical worldview that frames WASH inequities as one of the main exponents of poverty. Therefore, key-informants believe that direct interventions are short-term solutions and systemic change requires government support. In this sense, they attempt to keep local authorities accountable by navigating WASH governance and demanding structural solutions for low-income communities. Additionally, their main mission is to foster autonomy through educational and income-generating projects aimed to overcome poverty. Some CSOs also promote critically reflective dialogue to equip residents with knowledge and vocabulary to identify and understand the root causes of inequity.

Finally, CSOs are skilled intermediaries and often partner with other CSOs, social enterprises, private donors, and for-profit organizations to fund and facilitate interventions. They also liaise with criminal groups, local and regional governments, and residents to address competing interests and advance WASH-equity in assisted communities. Their ability to succeed in each of these fronts varies by geographical location, with those in the capital having access to more opportunities than those in the periphery.

Chapter 5

Discussion and Conclusion

Chapter introduction

In this chapter, I review the key findings and situate them within the relevant literature on WASH, civil society organizations, and wellbeing. I also reflect on the contributions to theory, methodology, and to substantive research on WASH inequities in UMICs and CSOs. Additionally, I propose implications to practice, civil society action, and policy. Finally, I reflect on the research limitations, as well as future research directions.

5.1 Key findings

5.1.1 WASH inequities in Brazil

The first research objective was to describe barriers and facilitators in access to water, sanitation, and hygiene in low-income communities in Brazil. The first key findings were related to WASH access. Firstly, most community residents had access to piped water at home, which justifies the notably high indicator for water access in the state of Rio de Janeiro, of 89.1% (SNIS, 2024). However, participants contested this data, arguing that it did not correspond to reality since they frequently experience water shortages and compromised water quality. Similar critiques are made by researchers, civil society organizations, and most-affected populations in other high- and upper-middle income countries, who argue that global WASH data is informed by governments who provide what is called “administrative data” rather than by direct analysis of household surveys, which hampers visualization of WASH inequities compromised by reliability of services, affordability, and quality (Mattos et al., 2021). Additionally, access to safe sanitation is virtually non-existent among communities in this research since they have no sewage collection or treatment. Unlike drinking water, sanitation measures do reflect this reality, with indicators in two of the research locations, Duque de Caxias and Japeri, being below 10% (SNIS, 2024). In the city of Rio de Janeiro, however, the sanitation indicator of 95.8% also masks challenges faced by residents of urban slums.

One of the identified reasons for persistence of WASH inequities were the illegal pipe connections to water mains. In addition to being constructed by residents without expertise using precarious materials, these connections are exposed to damage caused by individuals, weather events, and deterioration over time. Furthermore, the need to store water to withstand shortages increases the risk of water contamination in low-income communities as confirmed by water quality analyses conducted in favelas in the city of Rio de Janeiro, which found chemical and biological contaminants above safety limits in water tanks and filters (Handam et al., 2020; Remigio et al., 2019). The findings in this research thus suggest that similar results would be encountered in peripheral municipalities in Baixada Fluminense who face the same challenges and implement similar coping mechanisms.

Despite the lack of water quality assessments in peripheral municipalities, Britto et al. (2019) and Maiello et al. (2021) identified threats to water quality in studies of residents' practices of accessing drinking water through alternative sources in other municipalities, which increases the likelihood of water contamination. This research confirms these concerns by demonstrating that such practices are common across several municipalities and that residents are aware of the risks of contamination. Moreover, the findings expand the understanding of why these practices remain in place by highlighting the reasons why residents prefer to access water in the current state over joining regulated piped networks. The political ecology of health approach allowed the understanding that WASH is not a priority for low-income families who, in the face of limited income-generating opportunities and other socio-economic conditions, prioritize food and other housing needs over safe drinking water. Additionally, participants revealed lack of trust of responsible actors, such as water companies, which disincentivizes a shift from illegal to legal water connections. The latter point confirms Britto et al.'s (2019) findings that powerful actors in the region have historically used WASH services as political mechanisms, which was illustrated in the research by participants who believed that politicians use WASH inequities to gather votes by providing short-term solutions during electoral periods.

Sanitation appears to be the main concern among residents, which contrasts with the empirical focus on drinking water quality in the region (Formiga-Johnsson & Britto, 2020; Handam et al., 2020; Maiello et al., 2021; Pierobon & Fernandes, 2023; Remigio et al., 2019). In addition to the visual pollution of open sewers, lack of sewage collection and treatment presents risks to residents' health

by increasing the chance of direct contact with wastewater and contamination of drinking water. This is one of the reasons why participants framed floods as a relevant barrier to WASH access.

While water storage was seen as a coping mechanism for limited water supply and even supported by the federal government as a solution to water shortages in other parts of the country (Marcynuk et al., 2013), it presents limitations when residents are not capable of doing maintenance as frequently as necessary. Handam et al. (2020) found that water stored in water tanks in favelas presented more contaminants than untreated tap water because residents faced challenges in cleaning reservoirs, like being unable to reach water tanks placed on top of houses without accidents. This research expands on that by reporting cases where residents cannot buy water tanks due to limited purchasing power or are incapable of installing them due to the precariousness of roof structure. Likewise, limited housing infrastructure was also a barrier to short-term solutions like the filtering backpack which could not be installed on some residents' walls without damaging housing infrastructure. A similar situation was found in Duque de Caxias-Jardim Gramacho, where houses were so precarious that residents did not possess basic sanitation and handwashing facilities. These findings expand and add nuance to our understanding of how poverty keeps people from accessing safe drinking water and sanitation in Brazil, strengthening the notion that structural social change is needed to overcome WASH inequities.

Finally, support from civil society organizations was considered the main facilitator to WASH access in low-income communities. While other WASH studies in the region do not focus on the role of CSOs, some mention how these organizations support residents in their own initiatives to access basic services (Maiello et al., 2021; Remigio et al., 2019). This research found that local organizations have indeed supported residents in grassroots solutions, but the findings include CSO-led solutions that are much more ambitious and coherent with equity-promotion than the ones led by residents, which are more limited in scope and sometimes illegal. In the Global North, Wolch (1990) argued that civil society organizations took over the role of providing essential social services to marginalized populations after neoliberal political forces promoted the dismantling of the welfare state, constituting a "shadow state" where CSOs offered essential services with support from governments through grants, contracts, and tax benefits. In Brazil, however, essential WASH services have historically not been offered to specific populations, so civil society organizations took over roles that have been attributed to the state by legislation but not in practice. These findings suggest that, in the Global South, the concept of a shadow state may not apply because CSOs work independently and struggle to gain any support from governments.

In the absence of government support, CSOs in the Metropolitan Region of Rio de Janeiro are central to recent WASH solutions in the same manner as in other regions of Brazil, where CSOs propose, lead, and manage WASH projects like common pool-resource management in the Northeast (Brannstrom et al., 2004; Gasmi et al., 2022) and menstrual hygiene support in the North (Soeiro et al., 2021). This research, thus, highlights the relevance of these actors in regions of the country where civil society action to improve WASH is still understudied.

5.1.2 Impacts of WASH inequities on wellbeing

The second research objective was to explore the impacts of WASH inequities on the wellbeing of low-income communities in Brazil through political ecology of health. By investigating the impact of WASH inequities on wellbeing, this research revealed what participants understand as wellbeing, which includes dimensions beyond physical and psychosocial health (Figure 5.1). These findings confirm health geographers' arguments that wellbeing is highly contextual and dependent on material and social conditions (Andrews et al., 2014; Hanlon, 2014; Severson & Collins, 2018). Furthermore, this research expands on past health geographers' efforts to identify local shared understandings of wellbeing through political ecology of health (Kangmennaang et al., 2019; Kangmennaang & Elliott, 2019; Richmond et al., 2005), proving that this exercise can lead to more detailed knowledge of shared values and preferences, which helps make sense of incoherencies between official data and community WASH experiences.



Figure 5.1. Wellbeing dimensions affected by WASH inequities in research locations.

Trindade et al. (2021) argues that elements of quality of life related to WASH are hard to quantify and qualitative studies are needed to categorize them. The qualitative approach in this research revealed that WASH inequities have a profound effect on residents' emotional health and sense of dignity. Not having safe access to water and sanitation makes people feel less worthy than others, neglected, and frustrated. Encountering such findings in Brazil expands the literature on the psychosocial impacts of WASH inequities in LMICs to UMICs. In Kenya, for example, Bisung and Elliott (2016) found that communities experiencing WASH inequities felt embarrassed using contaminated water when they had visitors or neglected by government authorities when considering their limitations in comparison to other neighbourhoods. Similar results are seen in de Oliveira Rolo et al.'s (2022) investigation of water conservation efforts in an urban slum in São Paulo, where they found that the presence of a polluted stream in the community hurt social identification and caused feelings of disgust and unpleasantness among residents. Comparable themes emerged in Ghana, India,

and Mexico, where WASH deprivation exacerbated social stigma and exclusion of low-income groups (Dery et al., 2020; Liera et al., 2023). The focus on subjective aspects of wellbeing allows for a more nuanced understanding of how inequities in the distribution of natural resources can aggravate social stratification, feeding back into the cycle of poverty that determines who gets access to what.

WASH inequities also hurt communities' ability to cope with extreme weather events, an issue of increasing importance in the face of climate change. It is not only harder for residents to access drinking water during severe weather events, but they are also exposed to additional health risks, such as WASH-related diseases, accidents, and landslides. Past studies in Kenya (Ototo et al., 2024), Germany (Anthonj et al., 2024), and Ghana (Abu et al., 2021) cover how communities with limited access to WASH face additional barriers to cope with extreme temperatures and heavy rainstorms. In Germany, public water is rationed during heatwaves, public restrooms are inaccessible during floods; and water supply is shut off during periods of extreme cold; people in condition of homelessness, in this scenario, face additional challenge to access WASH (Anthonj et al., 2024). Similarly, communities in Kenya who rely on surface water for drinking and hygiene practices experience water contamination from industrial and domestic runoff during heavy rainstorms and are left with no alternative to consume safe water (Ototo et al., 2024). In Ghana, yearly floods challenge the resilience of health care facilities and cause the collapse of communal latrines, thus reinforcing WASH inequities among low-income communities (Abu et al., 2021). Highlighting how WASH inequities hinder climate resilience is a necessary approach for future research and policymaking since extreme weather events are expected to become more frequent and severe, and cities like Rio de Janeiro are not prepared to deal with it (Formiga-Johnsson & Britto, 2020).

This research also identified geographical inequities among the research locations. Although all the communities experience poverty and WASH deprivation, the one in the state capital possess neighbourhood infrastructure that is absent in peripheral communities, like paved roads, which help reduce the negative impacts of floods. Inequities in access to determinants of wellbeing, like WASH and neighbourhood infrastructure, also exist within communities, showing how small differences in income – and other sociodemographic categories like race and gender - determine where families live and how spatially close they are in relation to landscape elements associated with WASH inequities and stigma, like polluted rivers. These local geographical inequities are marked by global structures such as capitalism, colonialism, and racism as suggested by earlier political ecology work from

Mayer (1996), who emphasized the relevance of multiscalar analysis to understand the unequal distribution of natural resources and its impacts on health.

Geographical inequities in WASH access are also present in other high- and upper-middle income countries where similar intersectional dynamics are easily identified due to the wide gap in access between privileged and marginalized groups. Wutich et al. (2022), for example, shows how Hispanic populations in irregular settlements in the US are systematically deprived of WASH access in a process of political exclusion that is clearly marked by racialization and stigmatization. Similarly, in Spain, seasonal migrant workers are temporarily welcome to meet yearly agricultural demands for cheap labour but deprived of safe WASH access in precarious housing conditions offered by employers (Rodríguez-Guerrero et al., 2024). These community-level inequities reveal marginalized groups within already marginalized populations, like seen in Usoma, Kenya, where rural and peri-urban communities struggle to access drinking water even with the support of CSOs (Bisung et al., 2016). Similar to what is seen in peripheral communities in Brazil, the water company in Kenya refused to expand WASH infrastructure to Usoma for considering that the community did not have enough potential clients in condition to pay for water services to cover the necessary investment costs in building community water stations (Bisung et al., 2016).

A novel research finding, though, is the discovery of how geographical inequities are also reflected on the support from civil society organizations received by each community. While CSOs offer essential assistance to low-income communities in accessing basic services, including WASH, this research highlights how the populations located further from the regional centre of power receive less attention and resources from civil society actors. The perception of lack of support from CSOs affects the wellbeing of peripheral communities through dimensions of emotional health, sense of dignity, agency, and community integration (Figure 5.1). While residents in the city of Rio de Janeiro felt supported by CSOs, those in Japeri felt further neglected and forgotten by the third sector, which they used to justify political apathy and lack of dedication to community initiatives. These findings expand on our knowledge about the role of CSOs in supporting low-income communities, suggesting that their presence, or absence, is also subject to and reflective of geographical inequities.

5.1.3 CSO solutions to WASH inequities

The third research objective was to investigate solutions to water, sanitation, and hygiene inequities implemented by civil society organizations in low-income communities in Brazil. CSO initiatives consisted of direct WASH interventions, water donation, and political activism. The CSO in the capital had more resources to build or renovate WASH infrastructure in the community, which generated short-term impacts appreciated by residents. The CSO in Duque de Caxias constructed wells in partnership with other organizations and faith-based groups in response to demands from residents. The CSO in Japeri, the most rural community, supported residents in direct interventions but focused on political activism, which yielded results at a larger scale and with longer-term impacts, as illustrated by the construction of a municipal water treatment station; these efforts, however, were not attributed to the organization by the population.

While all partner CSOs prioritized systemic social change in narrative, the one located in Japeri was the most coherent in action for its focus on government accountability. This finding challenges one of the traditions in civil society research that argues that CSOs are used as tools to justify inequities and delay systemic change (Coule et al., 2022). Although this trend may be observed among organizations of different nature, it does not apply to the local CSOs in this research. The other partner CSOs implement educational programs and promote critically reflective dialogue with assisted populations, thus incentivizing citizen-led activism, which is considered a more effective civil society mechanism to promote long-term change (Vu, 2017). Through the promotion of critically reflective dialogue and community action, the partner CSOs facilitate a process of empowerment whereby “those who have been denied the ability to make choices acquire such an ability” (Kabeer, 2005, p. 13). This orientation towards equity-promoting action and political activism is attributed to the grassroots origin of CSOs in this research, which are composed of residents and committed to represent their interests authentically rather than compromise critical discourse over pleasing funders, as seen in Palestine and Morocco (Atia & Herrold, 2018). On the other hand, CSOs that originate outside of the community or who do not build trust with residents can establish an extractive relationship and threaten community engagement.

The research also highlights how partner CSOs are skilled intermediaries, who liaise between various groups with competing interests, a common tactic among NGOs in other parts of the country (Gasmi et al., 2022). This expands on the CSO-WASH literature by highlighting how the proximity to communities equips CSOs with knowledge of how the territory works and ability to navigate unequal

power relations. Seen as benefactors, they hold prestige in the community, thus being capable to facilitate service delivery. This observation confirms Srinivas's (2009) arguments that grassroots NGOs are more aligned with the interests of marginalized groups when compared to outsider organizations, as seen in the cases where residents complained about the lack of commitment demonstrated by outside donors.

Further, CSOs in this research were able to critically evaluate potential partnerships and filter out those who reinforce colonial ties and dependency, exemplifying how organizations can provide immediate relief while being coherent with the discourse of equity-promotion. They do so by consulting residents and employing them in the organization's staff, which not only generates opportunities for community members, but also facilitates authenticity in the organization's *modus operandi*. This relates to Cooperman et al.'s (2022) findings that community discussion was the most influential factor for the success of community initiatives related to the use of groundwater resources in rural communities in Ceará.

Finally, the research conclusion is that CSOs play the role of intermediaries, fundraisers, community representatives, advocates, community mobilizers, and direct project implementers. This is a step further in the study of WASH inequities globally since the field is rich in partnerships with the third sector but comes short of providing an overall analysis of the role of CSOs in advancing WASH access. An exception is Lu et al.'s (2017) evaluation of small NGOs working in water development in LMICs, which found similar challenges, such as limited funding and expertise for WASH projects, but focused on identifying accessible evaluability assessment tools to be used by CSOs for optimization and project planning. Additionally, Lu et al. (2017) identified upward accountability as a limitation to WASH NGOs, arguing that CSOs can rarely address long-term structural change because of pressures from donors to be non-political, which was clearly not the case among local CSOs in this research. On the contrary, partner CSOs were political in narrative and action even when partnering with other actors; their political worldviews were in fact fundamental parameters to select partnerships.

5.2 Research contributions

5.2.1 Theoretical contributions

This research contributes to the understanding of wellbeing in health geography. As argued by Elliott (2018), the sub-discipline lacks a conceptual framework to study this concept independently, as well as techniques and methods to measure and analyze wellbeing. By employing a broad definition of wellbeing, i.e., the notion that it consists of “that space between expectation and reality” (Elliott, 2021, p. 229), this research highlighted aspects of wellbeing unique to the populations under study, such as emotional health, sense of dignity, and access to education and leisure (Figure 5.1). These findings reinforce the idea that the understanding of wellbeing is shared among societal groups at different scales (Andrews et al., 2014; Severson & Collins, 2018).

Moreover, I propose that determining a common and fixed definition of wellbeing is counterproductive as it may exclude dimensions of wellbeing that vary from culture to culture. Instead, a more flexible and culturally sensitive approach to wellbeing research can be implemented, where 1) an environmental determinant of wellbeing is selected (e.g., water), and 2) its impacts on the wellbeing of most affected populations are investigated according to their lived experiences. This may require a starting point, i.e., a general notion of what wellbeing usually implies. In this research, I approached the term from the perspective of other health geographers who consider wellbeing to encapsulate physical and mental health but also involve spiritual and emotional dimensions, as well as societal expectations of ownership and purchasing power (Andrews et al., 2014; Dean & Edge, 2024).

This research also advances political ecology of health by proposing *a political ecology of wellbeing* (PEW), which implies the investigation of how unequal power relations shape the distribution of natural resources, ultimately affecting human health (King, 2010) and causing *wellbeing inequities*. Going beyond health is necessary because prioritizing wellbeing can sometimes be detrimental to health promotion (Severson & Collins, 2018), as exemplified in this research by residents who preferred to consume untreated tap water over joining the regulated water network or utilizing water-filtering systems despite knowing the risks to physical health. Participants criticized this behaviour, but also argued that residents did so because they had to prioritize allocating their income to purchase food or because they did not trust that joining the regular water connection would be beneficial, since other dimensions of wellbeing (e.g., neighbourhood infrastructure and sense of dignity) were not previously satisfied.

The wellbeing-health dichotomy is also seen in other WASH studies. In India, Bangladesh, and Ghana, Dery et al. (2020) found that informal sanitation workers prefer to work at night and without personal protection equipment to avoid being recognized for their occupation and risking stigmatization, thus revealing that social acceptance takes priority over safety and physical health. Understanding population priorities and values can lead to a conciliation between health and wellbeing promotion. In this research, residents prioritized having paved streets and sewage collection before joining the regular water network in order to trust that the water quality would improve. If these needs were prioritized, both health and wellbeing could be advanced since water contamination would be reduced and residents' relationship with the physical environment would improve.

A political ecology of wellbeing also identifies *subaltern wellbeing narratives*, in a similar manner that King (2010) proposed identifying health narratives. These are the discourses from most-affected groups that help make sense of the unequal distribution of natural resources and its impacts on wellbeing. By considering wellbeing narratives, researchers can then identify the dimensions of wellbeing considered relevant in each context, therefore adding to and adapting the initial notion of what wellbeing implies to form a pastiche of wellbeing in place (Figure 5.1). This representation will necessarily vary according to material conditions, cultural expectations, and population perceptions of having potential to promote social change (Severson & Collins, 2018).

Honoring the political ecology tradition, this research also identifies unequal power relations determining the distribution of natural resources in place. In this research, the unequal power relations and involved actors were identified through the application of the systematic equity action-analysis framework, which served to highlight competing worldviews, accountability for WASH distribution, and incoherencies in narrative and practice (Plamondon et al., 2023). By applying this framework, I identified latent systems of inequity that populated participants' wellbeing narratives, such as classism, racism, and colonialism. Additionally, the concepts of accountability and coherence were expanded beyond the original proposition of the framework to reflect not only responsibilities from decision-makers (e.g., governments and WASH companies), but also those of residents and supporting CSOs. The results highlighted behaviours from both actors that may counterintuitively contribute to keep inequities in place, such as residents' relationship with local politicians who do not prioritize systemic social change.

Past research in political ecology of health has utilized the expression “health and wellbeing” (Bisung et al., 2016; King, 2010) and even considered local definitions of wellbeing (Kangmennaang et al., 2019; Kangmennaang & Elliott, 2019; Nunbogu & Elliott, 2021; Richmond et al., 2005), but this research proposes a systematic approach to the concept, putting it in the centre of analysis (Figure 5.2). Informed by political ecology traditions, PEW considers unequal power relations affecting the distribution of determinants of wellbeing. By doing so, it unveils competing wellbeing narratives and helps identify place-based understandings of wellbeing. This approach can reveal which wellbeing dimensions are prioritized by most affected groups and inform decision-making that simultaneously advances both health and wellbeing.

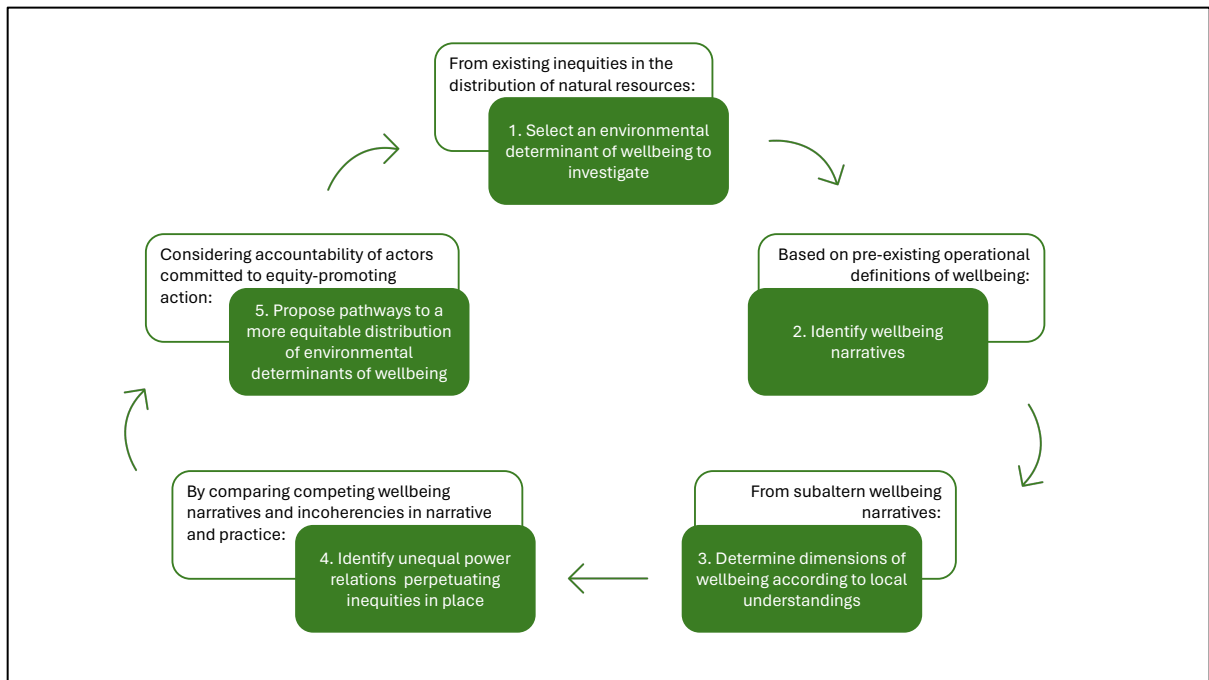


Figure 5.2. Process of application of Political Ecology of Wellbeing

Considering that wellbeing is specific to context and consists of “that space between expectation and reality” (Elliott, 2021, p. 229), its definition will vary in both space and time. As communities gain access to natural resources, their expectations on how they access such resources will be updated. Therefore, that “space between expectation and reality” may be reduced, but not necessarily filled. A political ecology of wellbeing, then, can be cyclical (Figure 5.2), with findings from case studies conducted at a particular time and space serving to inform future investigations until the gap that categorizes wellbeing inequities is completely closed. Re-starting the cycle will also support

actors committed to equity-promoting action (e.g., CSOs and community leaders) in evaluating previous solutions and addressing limitations identified by assisted communities.

5.2.2 Methodological contributions

This research has four main methodological contributions: 1) it provides examples of flexible methodology following the proposed integrated knowledge translation approach and commitment to the equity principles of global health research; 2) it employs a mix of go-along interviews and focus groups to adapt to local needs and dynamics of participating communities; 3) it proposes an insider/outsider perspective for the role of the researcher; and 4) it utilizes the systematic equity action-analysis framework to investigate WASH inequities.

Firstly, the commitment to the equity principles of global health research, particularly to authentic partnering and humility, can be seen in adaptations made to accommodate input from local partners during recruitment and data collection. The original study design aimed to conduct traditional focus groups with residents, but CSO leaders in Japeri argued that the recruitment strategy was unlikely to work in the municipality since they faced challenges in organizing scheduled meetings with participants. They suggested, instead, walking through the streets of the community and engage small groups of participants on the go. These suggestions were accepted and implemented.

This leads to the second contribution, i.e., the combination of go-along interviews and focus groups. Despite changes to the data collection method in two communities, I was still able to engage smaller groups of residents and observe social interactions between them, including agreements, disagreements, and the expansion of sub-themes as residents built upon each other's experiences. Additionally, the ability to move along the community allowed participants to illustrate WASH issues collectively faced by showing open sewers, unpaved roads, improvised WASH solutions, and other examples recorded in the results chapter. Consequently, the mixed go-along interviews and focus groups presented limitations, but also led to deeper understanding of residents' personal experiences, e.g., through visual and other sensory cues like the smell of sewers.

The third methodological contribution is the insider/outsider perspective. As a native to Japeri, I grew up in Baixada Fluminense and experienced the capital-periphery dynamic by working and living in Rio de Janeiro and in other municipalities of the MRRJ. Nonetheless, I initially approached the

research as an outsider for enjoying privileges such as having piped water and sewage collection for most of my life. As I reflected on the nuanced quality of WASH access in these locations, however, I realized that I also experienced many of the challenges documented. Frequent water shortages, reduced water quality, alternative solutions such as water filters, water pumps, and illegal connections were part of the routine in my lower-middle income household. In addition, polluted rivers and unpaved roads were part of the landscape, and floods were a constant fear during rainstorms.

On the one hand, I was an outsider because the researched communities experienced more social vulnerability, lower educational and income levels, as well as the systemic challenges of racism, which I never experienced as a white man. On the other hand, I was considered an insider by residents and referred to as a “neighbour” for sharing the same cultural and socioeconomic background, especially when it came to WASH inequities. Participants also often correctly assumed that they did not need to provide more context about challenges such as political negligence, high criminality, lack of urban planning, corruption, and environmental racism, as they expected awareness of regional dynamics.

As a result, I assumed the position of an *insider/outsider*, which contributed to cultural translation and the creation of strong linkages with participants. I believe this reflection exercise provides a tangible example of reflexivity and indicates ways in which research in human geography may address the power dynamics between researchers and participants. While I had the advantage of being native to the region, it was the first-hand understanding of the research problem that made participants comfortable to share and expand on more nuanced aspects of WASH inequities. The recognition that my experience was not exactly the same as theirs, on the other hand, allowed all those involved (i.e., the researcher, participants, and research partners) to see the issue from different perspectives, which further highlighted inequities that would be otherwise naturalized.

Finally, this research constitutes the first application of the SEA framework to the study of WASH inequities. This conceptual framework helped refine the findings and highlight root causes of inequities, incoherencies between action and narrative from multiple actors, and potential pathways to promote equity. This led to critical consideration of the agency of residents, whose accountability in perpetuating WASH inequities is also identified, particularly through their role in electing representatives who are not invested in changing the *status quo*. The utilization of the SEA

framework in this research advances its applicability to empirical studies since former applications relied mostly on document and secondary data analysis (Plamondon et al., 2023).

5.2.3 Substantive contributions

This research contributes to the empirical body of knowledge on (1) WASH inequities in the state of Rio de Janeiro, (2) CSOs addressing WASH inequities in Brazil, and (3) WASH inequities in HICs and UMICs. First, recent research on WASH inequities in the state of Rio de Janeiro is limited, with most studies relying on secondary data analysis or water quality assessments (da Rocha & de Oliveira, 2023; Da Silveira Pereira et al., 2021; Formiga-Johnsson & Britto, 2020; Remigio et al., 2019; Trindade et al., 2021). Additionally, those employing primary data collection methods are concentrated in the city of Rio de Janeiro or in the MRRJ in general, without a specific focus on municipalities (Britto et al., 2019; Handam et al., 2020; Pierobon & Fernandes, 2023; Remigio et al., 2019), with exceptions in the townships of Queimados (Maiello et al., 2021) and Paraty (Machado et al., 2021), the latter being outside of the MRRJ. Therefore, this research is unique for comparing multiple case studies in the city of Rio de Janeiro and peripheral municipalities in the metropolitan region, which provides insights on geographical inequities related to capital-periphery dynamics. Additionally, the research contains case studies in the municipalities of Japeri and Duque de Caxias, which were not contemplated in other identified studies, and, for its qualitative approach, it also functions as a vehicle of expression for marginalized populations, which was confirmed by participants who reported never being approached by researchers interested in understanding the manifestation of WASH inequities in these territories.

Secondly, research on CSOs supporting WASH inequities in Brazil is concentrated in the North (Soeiro et al., 2021) and Northeast regions (Brannstrom et al., 2004; Cooperman et al., 2022; Gasmi et al., 2022; Marcynuk et al., 2013), where low-income populations face the largest gaps in WASH inequities due to wide socioeconomic disparities and reduced availability of freshwater, respectively. Exceptions include Neves-Silva et al.'s (2020) investigation of the experience of people in condition of homelessness in the capital of the state of Minas Gerais and Brannstrom et al.'s (2004) comparison of WASH governance in São Paulo and Paraná. This research adds to the literature by demonstrating how CSOs also address WASH inequities in the Southeast, highlighting the political and economic drivers of the distribution of determinants of wellbeing in a region where WASH is abundant and

financial resources are readily available. More research exists on the role of CSOs in WASH-related themes in Brazil, including investigations of CSO-led rehabilitation of natural water bodies in São Paulo (de Moraes et al., 2022; de Oliveira Rolo et al., 2022) and marine conservation in Bahia (Hastings, 2011), but they focus on environmental conservation efforts rather than addressing WASH inequities among low-income communities, which is unique to this research.

Moreover, the findings add to the CSO-WASH literature by focusing on the overall role of CSOs navigating local political ecologies, whereas other studies have a more technical approach, aiming to evaluate the effectiveness of specific CSO-led initiatives without paying attention to unequal power relations. Although technical, past research on this topic uncovers similar challenges in accessing WASH inequities in Brazil, such as inequalities in land distribution and political clientelism – i.e., politicians trading short-term favours for votes – in rural communities in Ceará, Brazil (Gasmi et al., 2022). Despite focusing more on communities as drivers of action, Gasmi et al. (2022) also provide examples of how CSOs, in partnership with the state government and community leaders, have implemented impactful WASH infrastructure projects that help address inequities in the distribution of water resources, like the construction of water wells, pumps, pipes, and reservoirs shared by multiple families. In the same state, Cooperman et al. (2022) found drivers of success for community water management that resonate with findings in this research, such as the idea that NGO-led water solutions are more likely to be well-received by residents when they are able to give input on where the solution must be located. This research adds context to these findings by explaining how CSOs in Rio de Janeiro seek input from residents to implement contextually informed WASH initiatives.

Thirdly, at the global scale, the research adds to a growing literature investigating WASH inequities in high- and upper-middle income countries by expanding the geographical scope from North America (Deitz & Meehan, 2019; Galway, 2016; Lauret et al., 2025; Liera et al., 2023; O’Gorman, 2021; Wutich et al., 2022) and Europe (Anthonj et al., 2024; Rodríguez-Guerrero et al., 2024) to South America. Additionally, this research helps add nuance to the lived experiences of populations experiencing WASH inequities in rich countries since most of these studies aim to identify marginalized groups using secondary data, statistics, and spatial analysis without engaging most-affected communities directly.

While some studies highlight CSO-led WASH initiatives, they rarely investigate the potential that these organizations have to advance WASH equity in rich countries. For example, Anthonj et al.

(2024) worked alongside *Verein für Gefährdetenhilfe e.V.* (VfG) and Caritas, two CSOs supporting people in condition of homelessness in Germany, and found that they offer essential WASH services, such as access to showers, toilets, and drinking water. Liera et al. (2023) partnered with *El Caracol*, an NGO that advocates for people in condition of homelessness in Mexico and offers basic water and sanitation supplies but, despite interviewing key-informants from the partner CSO, captured only their perspectives on the challenges faced by the assisted population rather than on the role of the organization. A notable exception was Rodríguez-Guerrero et al.'s (2024) study on WASH inequities among seasonal migrant workers in Spain, which focused on the perceptions of professionals assisting this population and interviewed 31 CSO representatives in addition to other relevant key-informants. Again, though, the focus was not on the role of the organizations, but what they perceived to be challenges faced by the target population. This research, thus, fill a gap by exploring not only communities' perspectives, but also their relationship with supporting CSOs. This exercise helps us better understand the function that these important actors have in the WASH sector, evaluate their guiding worldviews, consider incoherencies in narrative and action, reflect on how they are accountable for proposed interventions, and identify potential equity-promoting pathways for the third sector.

5.3 Research implications

5.3.1 Implications to civil society practice

The research findings have practical implications to the work of civil society organizations supporting low-income communities in accessing water, sanitation, and hygiene. CSOs are skilled intermediaries and capable to liaise with various partners, including other CSOs (Hassan et al., 2020). Nonetheless, this potential is underutilized in the Metropolitan Region of Rio de Janeiro, with geographical inequities determining the level of success and scope of WASH interventions. These differences in expertise and results indicate opportunities for mutual learning partnerships. CSO1, located in the city of Rio de Janeiro, demonstrated success in raising funds and implementing ambitious WASH solutions with immediate impact on residents' wellbeing. Additionally, they presented a stronger capacity to mobilize residents and promote critically reflective dialogue through ongoing consultation with community members. These practices could serve as examples for other CSOs who faced

challenges engaging with the assisted communities since resident-led activism is considered a more effective and coherent practice to promote social change (Atia & Herrold, 2018; Vu, 2017).

CSO2, located in Japeri, employed tactics to escalate local needs to state- and national-level authorities through formal channels, such as petitions and judicial processes, in a similar tactic utilized by CSOs that advocate for environmental conservation (Hastings, 2011). Although these initiatives take longer and residents fail to recognize the role of organizations in it, the results can be structural and promote long-term social change not only in the supported community, but in the entire municipality as demonstrated by the construction of a water treatment station in Japeri. The other organizations could learn from this experience to overcome the challenge faced in escalating WASH projects to more families.

CSO3, located in Duque de Caxias, and CSO1 focused on educational and entrepreneurial projects to foster autonomy among residents in the long-term. Both organizations have a structural view of poverty and believe that education, economic independence, and political activism are key to break the cycle of poverty and political clientelism that contribute to WASH inequities (Britto et al., 2019). While CSO2 had a similar worldview, their engagement with the population may benefit from a clearer focus on autonomy-building and discussing the root causes of inequities in the community to facilitate resident empowerment.

To be coherent with the equity promoting narrative, CSOs in position of privilege may support CSOs in peripheral municipalities to access resources, partnerships, and attention from the media and potential donors. Partnerships between CSOs and other stakeholders (including communities, government agencies, and other CSOs) help translate science to policy, and strengthen political platforms benefitting local communities' wellbeing (Cooperman et al., 2022; de Moraes et al., 2022; Hastings, 2011; Marcynuk et al., 2013). Additionally, partnerships with researchers and academia are important to identify and fill knowledge gaps. In this research, I found that residents have difficulty linking WASH inequities to WASH-related diseases, indicating that they may benefit from awareness-raising campaigns on transmission pathways. This is a concern for CSOs, but there were no projects to tackle the issue. This and other related knowledge gaps could be addressed through sustained partnerships with researchers.

Finally, some key-informants identified that illegal connections to water mains may perpetuate WASH inequities and that, eventually, residents who can pay should contribute. This would increase

the interest of WASH companies in investing in peripheral municipalities. However, many residents have financial limitations and prioritize food security, so a compromise must be found. CSOs are highly qualified to intermediate this negotiation and could benefit from the research findings to identify residents' priorities. In other case studies on WASH inequities in Brazil, community residents became aware of their accountability for WASH provisions, reaping immediate benefits from common-resource management (Cooperman et al., 2022; Machado et al., 2021); likewise, hybrid solutions that forego formal WASH connections can cause more harm than good, as shown by studies of the water quality of illegal connections (Handam et al., 2020; Maiello et al., 2021; Remigio et al., 2019), so transitioning to formal water connections can tackle many of the problems faced by these communities and CSOs are the ideal actors to promote this conversation.

5.3.2 Implications to policy

This research has direct implications for policymaking since WASH inequities exist in low-income communities mostly due to limited WASH infrastructure, which is a responsibility of municipal governments (Ministério do Desenvolvimento Regional, 2021) that was conferred to the private WASH company that took over the distribution of WASH services in the region in 2021 (da Rocha & de Oliveira, 2023). Municipal governments must enforce their contracts with the WASH company and demand ample access to safe water and sanitation. They must also build the urban infrastructure needed to support the company in expanding WASH and meet residents' demands to join the regular pipe networks, e.g., paved roads, rainwater collection, and alternative transportation services during construction work. The research findings also suggest that governments must implement and expand policies that consider income inequities when determining the fee to be paid by low-income families to offer a safe and alternative solution to irregular connections.

WASH companies must also prioritize sanitation services since they have been neglected as reflected by official indicators on sewage collection and treatment in the region (SNIS, 2023). Large investments in building sewage collection networks and treatment stations are needed to address WASH inequities in the region. Local governments can support these efforts by rehabilitating polluted rivers and supporting formal housing construction in low-income communities. Both WASH companies and governments can seek support from CSOs to navigate local tensions and design WASH plans adapted to communities' unique physical and social characteristics.

Considering a scenario where policymakers represent the interest of the population, these recommendations should be simple to achieve through continuous investment and law-enforcement. However, political traditions in the state of Rio de Janeiro are marked by predatory relationships between elected representatives and low-income communities, where individual gains are prioritized over social change (Britto et al., 2019; da Rocha & de Oliveira, 2023). For that reason, before policies like these are implemented, CSOs, communities, activist groups, and political parties oriented towards social change must promote critical political dialogue with residents and raise awareness on the importance of electing politicians based on their long-term political agenda rather than on the short-term benefits they may offer.

Potential routes to promote this change are offered by CSOs through educational programs, community discussion groups, black and female empowerment programs, and income generation activities. The CSOs in this research were aware of the importance of discussing social class as a unifying topic to explain the pervasiveness of WASH inequities and the need for bottom-up initiatives, but expressed frustration when working with other actors that were more interested in practicing charity, such as faith-based organizations. One recommendation would be for these organizations to create a network of autonomy-promoting actors so that they can better utilize common resources and share experiences that benefit the entire region. This could enhance social capital in low-income communities and promote partnerships that address the existing regional WASH inequities through a structural lens.

Finally, this research highlights the importance of studying WASH beyond official data, which fails to capture challenges related to reliability, quality, and affordability (Mattos et al., 2021). This limitation is clear in HICs and UMICs, where inequities between privileged and marginalized communities are apparent and manifest in access to WASH and many other basic services. This has implications for policy at the international level, since WHO's and UNICEF's Joint Monitoring Program for Water Supply and Sanitation (JMP) serves as the main source of information for WASH access but fails to reflect the systemic limitations in utilizing official government data (Mattos et al., 2021). While an alternative solution to gather data on WASH access at a global level may be impractical, the JMP reports can, at minimum, recognize these limitations, estimate the size of the population left behind in rich countries, and highlight qualitative studies that help tell the stories of these groups.

5.4 Limitations

By altering the focus group methodology to implement local partners' recommendations, there were some limitations to the trustworthiness of the research findings since smaller groups of residents were engaged in two of the research locations (i.e., Japeri-Nova Belém and Japeri-Belo Horizonte). For this reason, residents in these neighbourhoods had less time to express their experiences and opinions when compared to those in Rio de Janeiro-Morro da Providência, where a traditional focus group was conducted. Consequently, themes were expressed more superficially, and social dynamics were not as clear. On the other hand, I learned more about the spatial dynamics of these communities through direct observation, which indicates that all research locations would benefit from hybrid and consistent data collection methods involving the most affected groups.

Additionally, residents in Rio de Janeiro-Morro da Providência already gathered bi-weekly under a community integration project led by CSO1, which might have biased their judgement of the role of the organization in the community. Similarly, residents in Duque de Caxias-Jardim Gramacho were not consulted because the partner CSO was facing financial challenges and could not make staff available to support in the recruitment and data collection. CSO support was crucial in this community due to the presence of criminal groups and the strict control they exert on who accesses the territory. Presented with this challenge, I pivoted to conduct another focus group in a more urbanized area of Japeri, where research partners were readily available to offer support. While the area presented similar characteristics to Duque de Caxias-Jardim Gramacho (e.g., peri-urban profile, presence of criminal groups), this change does not replace the unique perspectives that the residents of the third research location would add, particularly considering their relationship to CSO3.

Another limitation to focus groups was the presence of key-informants, which potentially biased residents' responses, particularly in FG1. However, in that focus group, the key-informant barely intervened, only occasionally prompting responses on topics that residents seemed to have forgotten about. Furthermore, in other focus groups, the residents did not know much about the partner CSO due to limitations explored earlier, and seemed to ignore that the key-informants were members of a CSO. In general, the presence of key-informants was more beneficial than detrimental since they helped navigate community dynamics that could pose security risks and helped understand nuances in the relationships between residents and the environment.

Another important limitation was the exclusion of observational field notes in the ethics application, which prevented the utilization of notes from field visits for triangulation. Before key-informant interviews and focus groups, I visited several other communities in the selected municipalities and other nearby ones. These notes recorded alternative community-led solutions to WASH, observations of the water treatment station, public government gatherings, physical infrastructure, and the natural environment. While the observations informed the interpretation of the findings and the framing of questions during data collection, I could not analyze them in the results section due to the lack of ethics liberation.

Finally, WASH is a gendered issue as illustrated by extensive literature (Bisung & Elliott, 2017; Dickin et al., 2021; Nunbogu & Elliott, 2021) but the research did not have a systemic approach to gender. In this research, gender sub-themes emerged during data collection, with female participants indicating that they were responsible for budgeting water use at home, whereas male partners dealt with water collection and fixing damaged WASH infrastructure. While these findings could contribute to the WASH-gender literature for its uniqueness, the research did not collect sociodemographic information about residents, which does not allow for documentation of participants' gender identities. While initially part of the research design, the ethics revision board did not consider that the research objectives justified the collection of sociodemographic data, so the questionnaire that would be used to collect it was removed. In retrospect, it would have been productive to alter the objectives to allow for such latent observations.

5.5 Future research directions

Future qualitative research on WASH inequities in HICs and UMICs must consider gender dynamics since the findings revealed how gender roles around water among low-income communities in the research locations differ from the ones commonly found in LMICs. A Feminist Political Ecology approach could explore emerging themes, such as the burden faced by women responsible for taking children to school even during floods, budgeting water use in the household, and navigating social stigma related to hygiene. Also, different interpretations of masculinity could be explored when considering how men are responsible for collecting water and how parental abandonment may place single mothers in increased risk to suffer WASH inequities.

Quantitative studies on WASH service reliability and quality in the MRRJ would allow knowledge users to formally contest the official WASH data provided by water companies, local governments, and monitoring agencies. While there are studies surveying residents on water shortages and testing the quality of piped water in some communities in the region, they are concentrated in the state capital (Handam et al., 2020; Remigio et al., 2019), highlighting the geographical inequities experienced by peripheral municipalities. Some CSOs have looked into WASH data in the region, but mostly relied on secondary data provided by monitoring agencies (Casa Fluminense, 2023). An independent study with ample sampling across the metropolitan region could fill this data scarcity and equip CSOs and residents to demand change via legal mechanisms, a tactic considered effective in the long-term.

Continuous IKT engagement with the research partners would help scale up the impact of this research. In previous sections, potential pathways to equity-promoting action were suggested to address WASH inequities, such as partnerships between CSOs. These ideas must be considered by local partners and ground-truthed with residents. Doing so will help adapt the proposed actions to local contexts and support CSOs in efforts to foster a sense of autonomy and critically reflective dialogue among residents.

The research could also be expanded through the study of the role of CSOs in providing essential services to marginalized communities in other countries of the Global South. Better understanding how and why CSOs take over state roles is necessary to inform more coherent equity-promoting action in the third sector. While the concept of “shadow state” may not apply to countries that did not experience the welfare state model, the relationship between state and CSOs in developing countries can reveal pathways to independent civil society action in other countries. In exchange, the shadow state model can inform how governments may support CSOs in areas where public agencies are not present, e.g., through grants, contracts, and tax benefits to donors (Wolch, 1990).

Finally, the proposed framework of political ecology of wellbeing needs to be tested in other contexts. It could be applied to other regions of Brazil with similar WASH governance but distinct natural environment characteristics, such as the semiarid and the Amazonian regions, where research in water security is abundant but not informed by political ecology (Cooperman et al., 2022; Gasmi et al., 2022; Marcynuk et al., 2013; Soeiro et al., 2021). This framework could also be expanded to other

UMICs, not only to explore context-specific problems, but to identify similarities in challenges and solutions.

Chapter summary

In this chapter, I identified the research contributions to the study of WASH inequities, the role of CSOs in promoting community development particularly in UMICs, and pathways to conceptualizing wellbeing in different communities from a political ecology lens. Additionally, I proposed implications for civil society action and policy, mainly focusing on partnerships between CSOs and the promotion of political debates among most affected communities. Finally, I indicated future research directions that can build on this knowledge and expand our understanding of WASH inequities in a more nuanced and flexible way, which is particularly valuable for developing countries as they reach more advanced indicators of WASH access.

In conclusion, low-income communities in Brazil face unique challenges to access safe water, sanitation, and hygiene despite technically having access to piped water. The challenges are linked to geographical and structural inequities that reveal how unequal power relations determine the distribution of safe WASH and, consequently, the distribution of wellbeing. Communities in the Metropolitan Region of Rio de Janeiro share a similar notion of wellbeing, which involves subjective aspects of the human experience, such as emotional health, sense of dignity, ability to cope with climate events and promote change, and access to leisure, education, and spirituality. These dimensions of wellbeing have been tarnished by political negligence in the study region, which limits social capital and contributes to a self-perpetuating cycle of poverty and individualism. Local civil society organizations offer an alternative practice, that recognizes the potential in communal solutions to solve short-term WASH needs and promote long-term autonomy building. This research proposes a more positive worldview of the research problem by identifying the potential in social technologies invented and implemented by CSO leaders, which consist of authentic relations with community member, identification of unique challenges and needs, and partnerships with outside actors to propose equity-promoting solutions. This worldview does not ignore the limitations on the ground but recognizes that subaltern wellbeing narratives can help disrupt the root causes of inequities while still addressing immediate needs.

References

- Abu, T. Z., Bisung, E., & Elliott, S. J. (2019). What If Your Husband Doesn't Feel the Pressure? An Exploration of Women's Involvement in WaSH Decision Making in Nyanchwa, Kenya. *International Journal of Environmental Research and Public Health* 2019, Vol. 16, Page 1763, 16(10), 1763–1763. <https://doi.org/10.3390/IJERPH16101763>
- Abu, T. Z., Elliott, S. J., & Karanja, D. (2021). 'When you preach water and you drink wine': WASH in healthcare facilities in Kenya. *Journal of Water, Sanitation and Hygiene for Development*, 11(4), 558–569. <https://doi.org/10.2166/WASHDEV.2021.238>
- Aith, F. M. A., & Rothbarth, R. (2015). O estatuto jurídico das águas no Brasil. *Estudos Avançados*, 29(84), 163–177. <https://doi.org/10.1590/S0103-40142015000200011>
- Albuquerque, E. A. A. (2020). Baixada Fluminense, uma Periferia por Excelência. *Geografia (Londrina)*, 30(1), 63–63. <https://doi.org/10.5433/2447-1747.2021v30n1p63>
- Andrews, G. J., Chen, S., & Myers, S. (2014). The 'taking place' of health and wellbeing: Towards non-representational theory. *Social Science & Medicine*, 108, 210–222. <https://doi.org/10.1016/J.SOCSCIMED.2014.02.037>
- Anthonj, C., Stanglow, S. N., & Grunwald, N. (2024). Co-defining WASH (In)Security challenges among people experiencing homelessness. A qualitative study on the Human Right to Water and Sanitation from Bonn, Germany. *Social Science & Medicine*, 342, 116561. <https://doi.org/10.1016/j.socscimed.2024.116561>
- Atia, M., & Herrold, C. E. (2018). Governing Through Patronage: The Rise of NGOs and the Fall of Civil Society in Palestine and Morocco. *Voluntas: International Journal of Voluntary and Nonprofit Organizations*, 29(5), 1044–1054.
- Baxter, J. (2021). Case Studies in Qualitative Research. In I. Hay & M. Cope (Eds.), *Qualitative research methods in human geography* (Fifth edition., pp. 109–124). Oxford University Press.
- Baxter, J., & Eyles, J. (1997). Evaluating Qualitative Research in Social Geography: Establishing "Rigour" in Interview Analysis. *Source: Transactions of the Institute of British Geographers*, 22(4), 505–525.

- Bisung, E., & Elliott, S. J. (2016). 'Everyone is exhausted and frustrated': Exploring psychosocial impacts of the lack of access to safe water and adequate sanitation in Usoma, Kenya. *Journal of Water Sanitation and Hygiene for Development*, 6(2), 205–214.
<https://doi.org/10.2166/washdev.2016.122>
- Bisung, E., & Elliott, S. J. (2017). Psychosocial impacts of the lack of access to water and sanitation in low- and middle-income countries: A scoping review. *Journal of Water and Health*, 15(1), 17–30. <https://doi.org/10.2166/WH.2016.158>
- Bisung, E., Karanja, D. M., Abudho, B., Ogunu, Y., Mwaura, N., Ego, P., Schuster-Wallace, C. J., & Elliott, S. J. (2016). One community's journey to lobby for water in an environment of privatized water: Is Usoma too poor for the pro-poor program? *African Geographical Review*, 35(1), 70–82.
<https://doi.org/10.1080/19376812.2015.1088391>
- Blaikie, P. (2012). Should some political ecology be useful? The Inaugural Lecture for the Cultural and Political Ecology Specialty Group, Annual Meeting of the Association of American Geographers, April 2010. *Geoforum*, 43(2), 231–239.
<https://doi.org/10.1016/J.GEOFORUM.2011.08.010>
- Brannstrom, C., Clarke, J., & Newport, M. (2004). Civil Society Participation in the Decentralisation of Brazil's Water Resources: Assessing Participation in Three States. *Singapore Journal of Tropical Geography*, 25(3), 304–321. <https://doi.org/10.1111/j.0129-7619.2004.00188.x>
- Brauer, M., Zhao, J. T., Bennitt, F. B., & Stanaway, J. D. (2020). Global access to Handwashing: Implications for COVID-19 control in low-income countries. *Environmental Health Perspectives*, 128(5). <https://doi.org/10.1289/EHP7200>
- Britto, A. L., Maiello, A., & Quintslr, S. (2019). Water supply system in the Rio de Janeiro Metropolitan Region: Open issues, contradictions, and challenges for water access in an emerging megacity. *Journal of Hydrology*, 573, 1007–1020. Scopus.
<https://doi.org/10.1016/j.jhydrol.2018.02.045>
- Brown, J., Acey, C. S., Anthonj, C., Barrington, D. J., Beal, C. D., Capone, D., Cumming, O., Fedinick, K. P., Gibson, J. M., Hicks, B., Kozubik, M., Lakatosova, N., Linden, K. G., Love, N. G., Mattos, K. J., Murphy, H. M., & Winkler, I. T. (2023). The effects of racism, social exclusion,

- and discrimination on achieving universal safe water and sanitation in high-income countries. *The Lancet Global Health*, 11(4), e606–e614. [https://doi.org/10.1016/S2214-109X\(23\)00006-2](https://doi.org/10.1016/S2214-109X(23)00006-2)
- Bryant, R. L. (1998). Power, knowledge and political ecology in the third world: A review. *Progress in Physical Geography: Earth and Environment*, 22(1), 79–94. <https://doi.org/10.1177/030913339802200104>
- Câmara Metropolitana de Integração Governamental. (2024). *RMRJ. Modelar a Metrópole*. <https://www.modelarametropole.com.br/rmrj/>
- Cameron, J. (2021). Focusing on Focus Groups. In I. Hay & M. Cope (Eds.), *Qualitative research methods in human geography* (Fifth edition., pp. 200–221). Oxford University Press.
- Casa Fluminense. (2020). *Mapa da Desigualdade. Região Metropolitana do Rio de Janeiro*. https://www.casafluminense.org.br/wp-content/uploads/2020/07/mapa-da-desigualdade-2020-final_compressed.pdf
- Casa Fluminense. (2023). *Mapa da Desigualdade Região Metropolitana do Rio de Janeiro*. <https://casafluminense.org.br/mapa-da-desigualdade/>
- Casa Fluminense. (2024). *Casa Fluminense | Perfis Municipais 2024*. <https://mailchi.mp/casafluminense/perfis-municipais-2024>
- Catungal, J. P., & Dowling, R. (2021). Power, Subjectivity, and Ethics in Qualitative Research. In I. Hay & M. Cope (Eds.), *Qualitative research methods in human geography* (Fifth, pp. 18–39). Oxford University Press.
- Clonan, A., Roberts, K. E., & Holdsworth, M. (2016). Socioeconomic and demographic drivers of red and processed meat consumption: Implications for health and environmental sustainability. *The Proceedings of the Nutrition Society*, 75(3), 367–373. <https://doi.org/10.1017/S0029665116000100>
- Colucci, E. (2007). “Focus groups can be fun”: The use of activity-oriented questions in focus group discussions. *Qualitative Health Research*, 17(10), 1422–1433. <https://doi.org/10.1177/1049732307308129>

- Cooperman, A., McLarty, A. R., & Seim, B. (2022). Drivers of successful common-pool resource management: A conjoint experiment on groundwater management in Brazil. *Global Environmental Change*, 74, 102512. <https://doi.org/10.1016/j.gloenvcha.2022.102512>
- Cope, M. (2021). Organizing, Coding, and Analyzing Qualitative Data. In I. Hay & M. Cope (Eds.), *Qualitative research methods in human geography* (Fifth edition., pp. 355–375). Oxford University Press.
- Coule, T. M., Dodge, J., & Eikenberry, A. M. (2022). Toward a Typology of Critical Nonprofit Studies: A Literature Review. *Nonprofit and Voluntary Sector Quarterly*, 51(3), 478–506. <https://doi.org/10.1177/0899764020919807>
- Cunha, A. dos S. (2011). Saneamento básico no Brasil: Desenho institucional e desafios federativos. *IPEA: Textos Para Discussão*, 1565, 27.
- Curty Pereira, R., Elliott, S. J., & Llaguno Cárdenas, P. (2023). Stepping into the Void: Lessons Learned from Civil Society Organizations during COVID-19 in Rio de Janeiro. *International Journal of Environmental Research and Public Health*, 20(8), 5507. <https://doi.org/10.3390/ijerph20085507>
- da Rocha, A. S., & de Oliveira, L. D. (2023). Political ecology and basic sanitation: Analysis from the metropolitan periphery of the Rio de Janeiro. *Ateliê Geográfico*, 17(1), 112–133. Scopus. <https://doi.org/10.5216/ag.v17i1.74784>
- Da Silveira Pereira, R., Cordeiro, R. C., Sabadini-Santos, E., & Bidone, E. D. (2021). Urbanization, environmental and socioeconomic trends in a coastal zone under an Anthropocene approach: 1940 – 2020 (Guanabara Bay Hydrographic Basin, Rio de Janeiro, Brazil). *Revista Brasileira de Gestao e Desenvolvimento Regional*, 17(1), 194–209. Scopus.
- de Moraes, A. R., Seixas, C. S., Farinaci, J. S., & Vieira, S. A. (2022). Collective action for ecosystem services in the Paraíba Valley from São Paulo state, Brazil: A multilevel panorama. *Desenvolvimento e Meio Ambiente*, 60, 436–458. Scopus. <https://doi.org/10.5380/dma.v60i0.78132>
- de Oliveira Rolo, D. A. M., Gallardo, A. L. C. F., Ribeiro, A. P., & Siqueira-Gay, J. (2022). Local Society Perception on Ecosystem Services as an Adaptation Strategy in Urban Stream Recovery

- Programs in the City of São Paulo, Brazil. *Environmental Management*, 69(4), 684–698. Scopus. <https://doi.org/10.1007/s00267-021-01471-0>
- Dean, J. (2016). Walking in their shoes: Utilizing go-along interviews to explore participant engagement with local space. In *Practicing Qualitative Methods in Health Geographies*. Routledge.
- Dean, J., & Edge, S. (2024). Migration and wellbeing in and of place. *Wellbeing, Space and Society*, 6, 100199. <https://doi.org/10.1016/j.wss.2024.100199>
- Deitz, S., & Meehan, K. (2019). Plumbing Poverty: Mapping Hot Spots of Racial and Geographic Inequality in U.S. Household Water Insecurity. *Annals of the American Association of Geographers*, 109(4), 1092–1109. <https://doi.org/10.1080/24694452.2018.1530587>
- Department of Health and Social Security. (1980). *Inequalities in Health: Report of a Research Working Group*.
- Dery, F., Bisung, E., Abudho, B., Soliku, O., & Dery, G. (2023). Examining the health and wellbeing of women sanitation workers in Ghana and Kenya. *Wellbeing, Space and Society*, 5, 100167. <https://doi.org/10.1016/j.wss.2023.100167>
- Dery, F., Bisung, E., Dickin, S., & Dyer, M. (2020). Understanding empowerment in water, sanitation, and hygiene (WASH): A scoping review. *Journal of Water, Sanitation and Hygiene for Development*, 10(1), 5–15. <https://doi.org/10.2166/WASHDEV.2019.077>
- Dickin, S., Bisung, E., Nansi, J., & Charles, K. (2021). Empowerment in water, sanitation and hygiene index. *World Development*, 137, 105158–105158. <https://doi.org/10.1016/J.WORLDDEV.2020.105158>
- Dunn, K. (2021). Engaging Interviews. In I. Hay & M. Cope (Eds.), *Qualitative research methods in human geography* (Fifth edition., pp. 148–185). Oxford University Press.
- Eikenberry, A. M., Dodge, J., & Coule, T. M. (2023). Critical Scholarship on Global Civil Society: NGO/CSO–Funder Relationships. *VOLUNTAS: International Journal of Voluntary and Nonprofit Organizations*, 34(3), 439–441. <https://doi.org/10.1007/s11266-023-00569-9>

- Elliott, S. J. (2011). The transdisciplinary knowledge journey: A suggested framework for research at the water-health nexus. *Current Opinion in Environmental Sustainability*, 3(6), 527–530. <https://doi.org/10.1016/j.cosust.2011.10.005>
- Elliott, S. J. (2018). 50 years of medical health geography(ies) of health and wellbeing. *Social Science & Medicine*, 196, 206–208. <https://doi.org/10.1016/J.SOCSCIMED.2017.11.013>
- Elliott, S. J. (2021). Commentary to Part III: Wellbeing: a means for informed policy-making. In *A Modern Guide to Wellbeing Research* (pp. 229–233). Edward Elgar Publishing. <https://www.elgaronline.com/display/edcoll/9781789900156/9781789900156.00024.xml>
- Elliott, S. J. (2022). Global health for all by 2030. *Canadian Journal of Public Health* 2022 113:2, 113(2), 175–177. <https://doi.org/10.17269/S41997-022-00623-X>
- Food and Agriculture Organization. (2021). *AQUASTAT Dissemination System*. AQUASTAT Dissemination System. <https://data.apps.fao.org/aquastat/?lang=en>
- Formiga-Johnsson, R. M., & Britto, A. L. (2020). Water security, metropolitan supply and climate change: Some considerations concerning the Rio de Janeiro case. *Ambiente e Sociedade*, 23, 1–24. Scopus. <https://doi.org/10.1590/1809-4422ASOC20190207R1VU2020L6TD>
- Freitas, F. G. D., & Magnabosco, A. L. (2024). *Saneamento é saúde: Como a falta de acesso à infraestrutura básica afeta a incidência de doenças relativas ao saneamento ambiental inadequado no Brasil?* <https://tratabrasil.org.br/wp-content/uploads/2025/03/ESTUDO-COMPLETO-Saneamento-e-saude-Como-a-falta-de-acesso-a-infraestrutura-basica-afeta-as-incidencias-de-doencas-relacionadas-ao-saneamento-ambiental-inadequado-no-Brasil-TRATA-BRASIL.pdf>
- Galway, L. P. (2016). Boiling over: A Descriptive Analysis of Drinking Water Advisories in First Nations Communities in Ontario, Canada. *International Journal of Environmental Research and Public Health*, 13(5), Article 5. <https://doi.org/10.3390/ijerph13050505>
- Garcia, C. M., Eisenberg, M. E., Frerich, E. A., Lechner, K. E., & Lust, K. (2012). Conducting Go-Along Interviews to Understand Context and Promote Health. *Qualitative Health Research*, 22(10), 1395–1403. <https://doi.org/10.1177/1049732312452936>

- Gasmi, H., Kuper, M., Martins, E. S. P. R., Morardet, S., & Burte, J. (2022). Sustaining community-managed rural water supply systems in severe water-scarce areas in Brazil and Tunisia. *Cahiers Agricultures*, 31, 21. <https://doi.org/10.1051/cagri/2022019>
- Gatrell, A. C., & Elliott, S. J. (2015). *Geographies of health: An introduction* (Third edit). John Wiley & Sons Inc.
- Goodrick, D. (2019). *Comparative Case Studies*. SAGE Publications Ltd.
<https://doi.org/10.4135/9781526421036849021>
- Graham, I. D., Logan, J., Harrison, M. B., Straus, S. E., Tetroe, J., Caswell, W., & Robinson, N. (2006). Lost in knowledge translation: Time for a map? *The Journal of Continuing Education in the Health Professions*, 26(1), 13–24. <https://doi.org/10.1002/CHP.47>
- Handam, N. B., Dos Santos, J. A. A., Neto, A. H. A. M., Alencar, M. F. L., Ignacio, C. F., & Sotero-Martins, A. (2020). Sanitary quality (Bacteriological and physical-chemical) of drinking water in urban slums in Rio de Janeiro, RJ, Brazil. *Journal of Water Sanitation and Hygiene for Development*, 10(3), 413–424. Scopus. <https://doi.org/10.2166/washdev.2020.118>
- Hanlon, N. (2014). Doing health geography with feeling. *Social Science and Medicine*, 115, 144–146. <https://doi.org/10.1016/j.socscimed.2014.05.039>
- Hassan, M. M., Lee, K. E., & Mokhtar, M. (2020). Mainstreaming, Institutionalizing and Translating Sustainable Development Goals into Non-governmental Organization's Programs. In K. E. Lee (Ed.), *Concepts and Approaches for Sustainability Management* (pp. 93–118). Springer International Publishing. https://doi.org/10.1007/978-3-030-34568-6_6
- Hastings, J. (2011). International Environmental NGOs and Conservation Science and Policy: A Case from Brazil. *Coastal Management*, 39(3), 317–335.
<https://doi.org/10.1080/08920753.2011.566125>
- Institute for Health Metrics and Evaluation. (2021). *Global Burden of Disease 2021: Findings from the GBD 2021 Study* | Institute for Health Metrics and Evaluation (p. 24).
<https://www.healthdata.org/research-analysis/library/global-burden-disease-2021-findings-gbd-2021-study>

- Intergovernmental Panel on Climate Change. (2023). Health, Wellbeing and the Changing Structure of Communities. In *Climate Change 2022 – Impacts, Adaptation and Vulnerability* (1st ed., pp. 1041–1170). Cambridge University Press. <https://doi.org/10.1017/9781009325844.009>
- Jenkins, E. K., Slemon, A., Haines-Saah, R. J., & Oliffe, J. (2018). A Guide to Multisite Qualitative Analysis. *Qualitative Health Research*, 28(12), 1969–1977. <https://doi.org/10.1177/1049732318786703>
- Kabeer, N. (2005). Gender Equality and Women’s Empowerment: A Critical Analysis of the Third Millennium Development Goal. *Gender and Development*, 13(1), 13–24.
- Kangmennaang, J., & Elliott, S. J. (2019). ‘Wellbeing is shown in our appearance, the food we eat, what we wear, and what we buy’: Embodying wellbeing in Ghana. *Health & Place*, 55, 177–187. <https://doi.org/10.1016/j.healthplace.2018.12.008>
- Kangmennaang, J., Smale, B., & Elliott, S. J. (2019). ‘When you think your neighbour’s cooking pot is better than yours’: A mixed-methods exploration of inequality and wellbeing in Ghana. *Social Science & Medicine*, 242, 112577–112577. <https://doi.org/10.1016/J.SOCSCIMED.2019.112577>
- Kearns, R. (1993). Place and Health: Towards a Reformed Medical Geography. *The Professional Geographer*, 45(2), 139–147. <https://doi.org/10.1111/J.0033-0124.1993.00139.X>
- Kearns, R., & Collins, D. (2010). Health Geography. In T. Brown, S. McLafferty, & G. Moon (Eds.), *A companion to health and medical geography* (1st ed., pp. 15–32). Wiley-Blackwell.
- Kiger, M. E., & Varpio, L. (2020). Thematic analysis of qualitative data: AMEE Guide No. 131. *Medical Teacher*, 42(8), 846–854. <https://doi.org/10.1080/0142159X.2020.1755030>
- King, B. (2010). Political ecologies of health. *Progress in Human Geography*, 34(1), 38–55. <https://doi.org/10.1177/0309132509338642>
- Kruth, M. L., Herron, R. V., Waddell-Henowitch, C. M., Allan, J. A., & Roger, K. S. (2023). A qualitative study of refugee men’s mental health in non-metropolitan Manitoba. *Wellbeing, Space and Society*, 5, 100156. <https://doi.org/10.1016/j.wss.2023.100156>
- Lauret, A., Black, K., Golwala, S., & Vogel, T. (2025). Out of sight, out of mind? The crisis of decentralized water and wastewater servicing in Indigenous communities. *Environmental Science & Policy*, 168, 104058. <https://doi.org/10.1016/j.envsci.2025.104058>

- Liera, C., Dickin, S., Rishworth, A., Bisung, E., Moreno, A., & Elliott, S. J. (2023). Human rights, COVID-19, and barriers to safe water and sanitation among people experiencing homelessness in Mexico City. *Frontiers in Water*, 5. <https://doi.org/10.3389/frwa.2023.1054182>
- Lu, S. K., Elliott, S. J., & Perlman, C. M. (2017). Evaluability assessment of a small NGO in water-based development. *Evaluation*, 23(2), 226–241. <https://doi.org/10.1177/1356389017697620>
- Lusambili, A. (2011). *'It is our Dirty Little Secret': An Ethnographic Study of the Flying Toilets in Kibera Slums, Nairobi* [Report]. The Institute of Development Studies and Partner Organisations. https://opendocs.ids.ac.uk/articles/report/_It_is_our_Dirty_Little_Secret_An_Ethnographic_Study_of_the_Flying_Toilets_in_Kibera_Slums_Nairobi/26449198/1
- Machado, G. C. X. M. P., Maciel, T. M. de F. B., & Thiollent, M. J. M. (2021). The common and the unfolding in the solidarity economy from ecological sanitation. *Saúde e Sociedade*, 30, e181188. <https://doi.org/10.1590/S0104-12902021181188>
- Maiello, A., De Paiva Britto, A. L. N., & Quintslr, S. (2021). The spotted zebra: Cohabitation between informal solutions and public-owned infrastructures for water supply in the Rio de Janeiro Metropolitan Region. *Water Policy*, 23(1), 187–204. Scopus. <https://doi.org/10.2166/wp.2020.115>
- Mansvelt, J., & Berg, L. D. (2021). Constructing Meaningful Geographical Knowledges, Writing Qualitative Geographies. In I. Hay & M. Cope, *Qualitative research methods in human geography* (Fifth edition., pp. 376–397). Oxford University Press.
- Marcynuk, P. B., Flint, J. A., Sargeant, J. M., Jones-Bitton, A., Brito, A. M., Luna, C. F., Szilassy, E., Thomas, M. K., Lapa, T. M., Perez, E., Andrñ, & Costa, M. (2013). Comparison of the burden of diarrhoeal illness among individuals with and without household cisterns in northeast Brazil. *BMC Infectious Diseases*, 13, NA-NA. <https://doi.org/10.1186/1471-2334-13-65>
- Mattos, K. J., Mulhern, R., Naughton, C. C., Anthonj, C., Brown, J., Brocklehurst, C., Brooks, C., Desclos, A., Escobedo Garcia, N. E., Gibson, J. M., Linden, K. G., Lindsay, C. A., Newby, J., Sinclair, R., & Smith, A. (2021). Reaching those left behind: Knowledge gaps, challenges, and approaches to achieving SDG 6 in high-income countries. *Journal of Water, Sanitation and Hygiene for Development*, 11(5), 849–858. <https://doi.org/10.2166/washdev.2021.057>

- Mayer, J. D. (1996). The political ecology of disease as one new focus for medical geography: *Progress in Human Geography*, 20(4), 441–456. <https://doi.org/10.1177/030913259602000401>
- Meeuwisse, S., Elliott, S. J., Bennett, A., & Kapoor, V. (2024). Water fetching and musculoskeletal health across the life-course in Sub-Saharan Africa: A scoping review. *PLOS Global Public Health*, 4(9), e0003630. <https://doi.org/10.1371/journal.pgph.0003630>
- Miller, W. L., & Crabtree, B. F. (2003). Depth Interviewing. In S. N. Hesse-Biber & P. Leavy (Eds.), *Approaches to qualitative research: A reader on theory and practice* (1st ed.). Oxford University Press.
- Ministério da Saúde. (2024a). *Data SUS: Morbidade Hospitalar do SUS - por local de internação—Brasil*. <http://tabnet.datasus.gov.br/cgi/deftohtm.exe?sih/cnv/niuf.def>
- Ministério da Saúde. (2024b). *Painéis Saúde Brasil: Mortalidade geral—Causas de óbito—Saúde Brasil—Painéis de Monitoramento—Centrais de Conteúdos—DAENT - SVSA/MS*. <https://svs.aids.gov.br/daent/centrais-de-conteudos/paineis-de-monitoramento/saude-brasil/mortalidade-geral/>
- Ministério do Desenvolvimento Regional. (2021, December). *Panorama do Saneamento Básico no Brasil*. https://www.gov.br/cidades/pt-br/aceso-a-informacao/acoes-e-programas/saneamento/snis/produtos-do-snis/PANORAMA_DO_SANEAMENTO_BASICNO_BRASIL_SNIS_2021compactado.pdf
- Ministry of National Health and Welfare (with Lalonde, M.). (1974). *A new perspective on the health of Canadians; a working document*.
- Molina-Betancur, J. C., Martínez-Herrera, E., Pericàs, J. M., & Benach, J. (2021). Coronavirus disease 2019 and slums in the Global South: Lessons from Medellín (Colombia). *Global Health Promotion*, 28(1), 65–69. <https://doi.org/10.1177/1757975920962797>
- Neves-Silva, P., De Oliveira Lopes, J. A., & Heller, L. (2020). The right to water: Impact on the quality of life of rural workers in a settlement of the Landless Workers Movement, Brazil. *PLoS ONE*, 15(7). <https://doi.org/10.1371/JOURNAL.PONE.0236281>
- Nguyen, T., Graham, I. D., Mrklas, K. J., Bowen, S., Cargo, M., Estabrooks, C. A., Kothari, A., Lavis, J., MacAulay, A. C., MacLeod, M., Phipps, D., Ramsden, V. R., Renfrew, M. J., Salsberg, J., & Wallerstein, N. (2020). How does integrated knowledge translation (IKT) compare to other

- collaborative research approaches to generating and translating knowledge? Learning from experts in the field. *Health Research Policy and Systems*, 18(1), 1–20. <https://doi.org/10.1186/S12961-020-0539-6/TABLES/4>
- Novo Marco Legal do Saneamento. (2020). *Lei nº 14.026/2020*.
https://www.planalto.gov.br/ccivil_03/_ato2019-2022/2020/lei/114026.htm
- Nunbogu, A. M., & Elliott, S. J. (2021). Towards an integrated theoretical framework for understanding water insecurity and gender-based violence in Low-and middle-income countries (LMICs). *Health & Place*, 71, 102651. <https://doi.org/10.1016/j.healthplace.2021.102651>
- Nunbogu, A. M., & Elliott, S. J. (2022). Characterizing gender-based violence in the context of water, sanitation, and hygiene: A scoping review of evidence in low- and middle-income countries. *Water Security*, 15, 100113. <https://doi.org/10.1016/j.wasec.2022.100113>
- Nunes, N. R. D. A. (2021). The power that comes from within: Female leaders of Rio de Janeiro's favelas in times of pandemic. *Global Health Promotion*, 28(2), 38–45.
<https://doi.org/10.1177/1757975921994690>
- O’Gorman, M. (2021). Mental and physical health impacts of water/sanitation infrastructure in First Nations communities in Canada: An analysis of the Regional Health Survey. *World Development*, 145, 105517. <https://doi.org/10.1016/j.worlddev.2021.105517>
- Ortega, F., & Béhague, D. (2022). Contested leadership and the governance of COVID-19 in Brazil: The role of local government and community activism. *Global Public Health*, 17(4), 483–495.
<https://doi.org/10.1080/17441692.2022.2028304>
- Ototo, E. N., Karanja, D. S., & Elliott, S. J. (2024). “If I was in charge”: A qualitative investigation of water security, gender-based violence and wellbeing in Kenya. *Wellbeing, Space and Society*, 7, 100230. <https://doi.org/10.1016/j.wss.2024.100230>
- Patel, A. (2020). Preventing COVID-19 Amid Public Health and Urban Planning Failures in Slums of Indian Cities. *World Medical and Health Policy*, 12(3), 266–273.
<https://doi.org/10.1002/wmh3.351>
- Paula, H. C., Daher, D. V., Koopmans, F. F., Faria, M. G. A., Lemos, P. F. S., & Moniz, M. A. (2020). No place to shelter: Ethnography of the homeless population in the COVID-19 pandemic.

Revista Brasileira de Enfermagem, 73, e20200489–e20200489. <https://doi.org/10.1590/0034-7167-2020-0489>

Pierobon, C., & Fernandes, C. (2023). Caring for others, taking care of water: Gender and race in the production of the city. *Estudos Avançados*, 37(107), 25–44. Scopus. <https://doi.org/10.1590/s0103-4014.2023.37107.003en>

Plamondon, K. M., & Bisung, E. (2019). The CCGHR Principles for Global Health Research: Centering equity in research, knowledge translation, and practice. *Social Science & Medicine*, 239, 112530. <https://doi.org/10.1016/J.SOCSCIMED.2019.112530>

Plamondon, K. M., Dixon, J., Brisbois, B., Pereira, R. C., Bisung, E., Elliott, S. J., Graham, I. D., Ndumbe-Eyoh, S., Nixon, S., & Shahram, S. (2023). Turning the tide on inequity through systematic equity action-analysis. *BMC Public Health*, 23(1), 890. <https://doi.org/10.1186/s12889-023-15709-5>

Programa de Educação Tutorial & data_labe. (2023). *Desbravando o saneamento básico no Rio de Janeiro Governança, atores e justiça* (p. 9). <https://datalabe.org/download/20097/?tmstv=1720809023>

Prüss-Ustün, A., Wolf, J., Bartram, J., Clasen, T., Cumming, O., Freeman, M. C., Gordon, B., Hunter, P. R., Medlicott, K., & Johnston, R. (2019). Burden of disease from inadequate water, sanitation and hygiene for selected adverse health outcomes: An updated analysis with a focus on low- and middle-income countries. *International Journal of Hygiene and Environmental Health*, 222(5), 765–777. <https://doi.org/10.1016/j.ijheh.2019.05.004>

Remigio, R. V., Rabello, R. S., Zulaika, G., Carvalho, M. S., Barrocas, P. R. G., & Lovasi, G. S. (2019). Household-level drinking water quality, access, and management practices within an informal community: A case study at Rio das Pedras, Rio de Janeiro. *Journal of Water Sanitation and Hygiene for Development*, 9(1), 80–89. Scopus. <https://doi.org/10.2166/washdev.2018.082>

Richmond, C., Elliott, S. J., Matthews, R., & Elliott, B. (2005). The political ecology of health: Perceptions of environment, economy, health and well-being among ‘Namgis First Nation. *Health & Place*, 11(4), 349–365. <https://doi.org/10.1016/J.HEALTHPLACE.2004.04.003>

Rodríguez-Guerrero, L. A., Pérez-Urdiales, I., Escrig-Piñol, A., Jiménez-Lasserrotte, M. del M., Pastor-Bravo, M. del M., Mateos, J. T., & Briones-Vozmediano, E. (2024). Water insecurity

- among seasonal agriculture workers: Perspectives from Spanish professionals. *International Journal for Equity in Health*, 23(1), 31. <https://doi.org/10.1186/s12939-024-02112-8>
- Rusca, M., Boakye-Ansah, A. S., Loftus, A., Ferrero, G., & van der Zaag, P. (2017). An interdisciplinary political ecology of drinking water quality. Exploring socio-ecological inequalities in Lilongwe's water supply network. *Geoforum*, 84, 138–146. <https://doi.org/10.1016/J.GEOFORUM.2017.06.013>
- Schuster-Wallace, C. J., Elliott, S. J., & Bisung, E. (2015). The Water-Health Nexus. In *Geographies of Health and Development*. Routledge.
- Secretaria do Ambiente e Sustentabilidade. (2025). *Dados Abertos*. <https://www.rj.gov.br/seas/Dados-Abertos>
- Severson, M., & Collins, D. (2018). Well-being in health geography: Conceptualizations, contributions and questions. In V. A. Crooks, G. J. Andrews, & J. Pearce (Eds.), *Routledge Handbook of Health Geography* (1st ed.). Routledge. <https://doi.org/10.4324/9781315104584>
- Shermin, N., & Rahaman, S. N. (2021). Assessment of sanitation service gap in urban slums for tackling COVID-19. *Journal of Urban Management*. <https://doi.org/10.1016/j.jum.2021.06.003>
- Sistema Nacional de Informações Sobre Saneamento. (2023). *Diagnóstico Temático Serviços de Água e Esgoto: Visão Geral* (p. 108). Secretaria Nacional de Saneamento Ambiental. https://www.gov.br/cidades/pt-br/acao-a-informacao/acoes-e-programas/saneamento/snis/produtos-do-snis/diagnosticos/DIAGNOSTICO_TEMATICO_VISAO_GERAL_AE_SNIS_2023.pdf
- Sistema Nacional de Informações Sobre Saneamento. (2024). *SNIS - Série Histórica* (Version 2024.006) [Dataset]. <http://app4.mdr.gov.br/serieHistorica/#>
- Sistema Nacional de Informações Sobre Saneamento. (2025). *SNIS - Home page*. Ministério das Cidades. <https://www.gov.br/cidades/pt-br/acao-a-informacao/acoes-e-programas/saneamento/snis/snis-1>
- Soeiro, R. E., Rocha, L., Surita, F. G., Bahamondes, L., & Costa, M. L. (2021). Period poverty: Menstrual health hygiene issues among adolescent and young Venezuelan migrant women at the northwestern border of Brazil. *Reproductive Health*, 18(1), 238. <https://doi.org/10.1186/s12978-021-01285-7>

- Souza, J. de, & Terra, D. C. T. (2017). Rio de Janeiro: Rumo a uma nova região metropolitana? *Cadernos Metrópole*, 19, 817–840. <https://doi.org/10.1590/2236-9996.2017-4006>
- Speers, S. J., Lau, L. L., Neufeld, H. T., Servano, D., Go, D. J., Kipp, A., Brubacher, L. J., & Dodd, W. (2023). Caring in crisis: The experiences of local religious leaders meeting community food needs in the Philippines during the COVID-19 pandemic. *Wellbeing, Space and Society*, 5, 100154. <https://doi.org/10.1016/j.wss.2023.100154>
- Srinivas, N. (2009). Against NGOs?: A Critical Perspective on Nongovernmental Action. *Nonprofit and Voluntary Sector Quarterly*, 38(4), 614–626. <https://doi.org/10.1177/0899764009334308>
- Stratford, E., & Bradshaw, M. (2021). Rigorous and Trustworthy: Qualitative Research Design. In I. Hay & M. Cope (Eds.), *Qualitative research methods in human geography* (Fifth edition., pp. 92–105). Oxford University Press.
- Tenzek, K. E. (2017). *The SAGE Encyclopedia of Communication Research Methods*. <https://doi.org/10.4135/9781483381411>
- TETO. (2024a). *Relatório de Impacto 2023*. https://conteudo.teto.org.br/relatoriodeimpacto2023?utm_source=site&utm_medium=organic&utm_campaign=relatoriodeimpacto2023&utm_content=site-teto&utm_term=
- TETO. (2024b, April 25). *Mapa de Direitos—TETO Brasil*. <https://br.techo.org/mapa-de-direitos/>
- Trindade, T. C. G., MacLean, H. L., & Posen, I. D. (2021). Slum infrastructure: Quantitative measures and scenarios for universal access to basic services in 2030. *Cities*, 110. Scopus. <https://doi.org/10.1016/j.cities.2020.103050>
- Truelove, Y. (2011). (Re-)Conceptualizing water inequality in Delhi, India through a feminist political ecology framework. *Geoforum*, 42(2), 143–152. <https://doi.org/10.1016/J.GEOFORUM.2011.01.004>
- United Nations. (2010, July). *Resolution A/RES/64/292. The human right to water and sanitation*. United Nations. <https://digitallibrary.un.org/record/687002?ln=en&v=pdf>
- United Nations. (2015). *Transforming our World: The 2030 Agenda for Sustainable Development*. <https://sustainabledevelopment.un.org/post2015/transformingourworld/publication>

- United Nations. (2020). *Roadmap for the COVID-19 Recovery*.
<https://www.un.org/en/pdfs/UNCOVID19ResearchRoadmap.pdf>
- United Nations Children's Fund & World Health Organization. (2023). *Progress on household drinking water, sanitation and hygiene 2000-2022: Special focus on gender* (United Nations, pp. 1–172). <https://data.unicef.org/resources/jmp-report-2023/>
- UNDP. (2013). *IDHM Municípios 2010*. <https://www.undp.org/pt/brazil/idhm-municípios-2010>
- UN-Water. (2021). *The Sustainable Development Goal 6 Global Acceleration Framework*.
<https://www.unwater.org/sites/default/files/app/uploads/2020/07/Global-Acceleration-Framework.pdf>
- UN-Women. (2023, September 7). *Progress on the Sustainable Development Goals: The gender snapshot 2024*. UN Women – Headquarters. <https://www.unwomen.org/en/digital-library/publications/2024/09/progress-on-the-sustainable-development-goals-the-gender-snapshot-2024>
- US Department of Health and Human Service. (1985). *Report of the Secretary's Task Force on Black and Minority Health*.
- Vu, N. A. (2017). Grassroots Environmental Activism in an Authoritarian Context: The Trees Movement in Vietnam. *VOLUNTAS: International Journal of Voluntary and Nonprofit Organizations*, 28(3), 1180–1208. <https://doi.org/10.1007/s11266-017-9829-1>
- Wasdani, K. P., & Prasad, A. (2020). The impossibility of social distancing among the urban poor: The case of an Indian slum in the times of COVID-19. *Local Environment*, 25(5), 414–418. <https://doi.org/10.1080/13549839.2020.1754375>
- Webb, C. (1992). The use of the first person in academic writing: Objectivity, language and gatekeeping. *Journal of Advanced Nursing*, 17(6), 747–752. <https://doi.org/10.1111/j.1365-2648.1992.tb01974.x>
- Wesz Jr., V. J., Escher, Fabiano, & and Fares, T. M. (2023). Why and how is China reordering the food regime? The Brazil-China soy-meat complex and COFCO's global strategy in the Southern Cone. *The Journal of Peasant Studies*, 50(4), 1376–1404. <https://doi.org/10.1080/03066150.2021.1986012>

- Wolch, J. R. (1990). *The shadow state: Government and voluntary sector in transition*. Foundation Center.
- World Bank. (2024). *World Bank Open Data—GDP (current US\$)*. World Bank Open Data.
<https://data.worldbank.org>
- World Health Organization. Regional Office for Europe. (1984). *Health promotion: A discussion document on the concept and principles: Summary report of the Working Group on Concept and Principles of Health Promotion, Copenhagen, 9-13 July 1984. ICP/HSR 602(m01)*. WHO IRIS.
<https://iris.who.int/handle/10665/107835>
- World Health Organization. (2024a). *Indicator Metadata Registry Details*.
<https://www.who.int/data/gho/indicator-metadata-registry/imr-details/158>
- World Health Organization. (2024b). *Unsafe WASH deaths*. Datadot.
<https://data.who.int/indicators/i/C123B15/ED50112>
- World Health Organization & United Nations Children’s Fund. (2019). *Progress on household drinking water, sanitation and hygiene 2000-2017. Special focus on inequalities*. New York: United Nations Children’s Fund (UNICEF) and World Health Organization, 2019. 1–71.
- Wutich, A., Jepson, W., Velasco, C., Roque, A., Gu, Z., Hanemann, M., Hossain, M. J., Landes, L., Larson, R., Li, W. W., Morales-Pate, O., Patwoary, N., Porter, S., Tsai, Y., Zheng, M., & Westerhoff, P. (2022). Water insecurity in the Global North: A review of experiences in U.S. colonias communities along the Mexico border. *WIREs Water*, 9(4), e1595.
<https://doi.org/10.1002/wat2.1595>

Appendices

Appendix A. Key-Informant Interview Guide

Construct	Question	Probes & Notes
Background Information - Individual Role and Responsibilities - Scope of Organization	<i>I am going to start this interview by asking you some questions about yourself, your role at organization (x) and what organization (x) does.</i>	
	Can you tell me a little bit about yourself?	E.g., the work that you do, your personal and professional trajectory, your values etc.
	What is your role at organization (x)?	How long have you been working at organization (x)? What is your relationship with WASH-related projects?
	Can you tell me a little bit about organization (x)?	E.g., its mission, history, how it works etc.
	How would you describe the community(ies) that organization (x) supports?	Why is assistance needed? What are the challenges faced? What is the population like (race, gender, age, education, occupation)?
	What do you think the top priority is when it comes to improving people's health in these communities?	Is it investing in health care facilities, or providing safe water and sanitation etc.? Does your organization's top priority differ from the residents' top priority?
Barriers and facilitators to WASH access - Gaps in WASH services	<i>Thank you for answering those questions. I would like to ask you about access to water, sanitation, and hygiene facilities more generally within these communities.</i>	
	How do residents primarily access water at home in community (x)?	Piped water? Well water? Rainwater? Packaged or delivered?
	What is the quality of the water in general?	E.g., organoleptic (smell, visual, taste) indicators, other biological or physicochemical indicators?
	Can you tell me a little bit about sanitation practices among residents in community (x)?	Do they have facilities for the disposal of excreta at home? Is it shared with other households?

Construct	Question	Probes & Notes
- WASH solutions		How is it disposed of or transported offsite?
	Can you tell me a little bit about hygiene practices among residents in community (x)?	Presence of facilities on premises with soap and water.
	How do residents access water, sanitation, and hygiene facilities outside of the home?	E.g., at the CSO, school, healthcare facility etc.?
	Are there other challenges related to water, sanitation, or hygiene in community (x)? If so, can you describe them?	E.g., conflict between neighbours for excessive water collection, use of water pumps, excessive time dedicated to water collection etc.
	Can you tell me about any solutions that organization (x) has implemented in the past to improve/increase access to water in community (x)?	How about initiatives related to sanitation? And hygiene? How do they work? What resources are needed?
	Which solutions to WASH challenges are in place currently?	How do they work? What resources are needed?
	Have other actors implemented solutions to improve access to WASH in community (x)? Which solutions?	E.g., community residents, government agencies, other CSOs, companies.
	Are there any other service gaps experienced in these communities?	What are those? Education? Transportation? Security/police services? Etc. What about health services? Will some residents have more access to certain services than others in the same community?

Construct	Question	Probes & Notes
Perceived success of WASH solutions - Organization's initiatives - Perceived success	<i>I would like to now ask you some questions about the level of success of solutions to improve access to water, sanitation, and hygiene in community (x).</i>	
	In your opinion, how successful are WASH initiatives that are currently in place?	How about past ones? How would you categorize 'successful' in this context?
	What kind of improvements have you noticed in access to WASH, if any?	To what initiatives are they related?
	What challenges have undermined past WASH initiatives?	How about current ones? E.g., lack of financial resources, soil pollution, house infrastructure, criminal activity.
	Have you witnessed other WASH initiatives implemented by other actors in community (x)?	Which ones? What actors? How successful were they in your opinion? Why?
	How have these initiatives been received by residents?	E.g., with resistance, enthusiasm, resignation, suspicion.
	If you could do anything to solve WASH issues in community (x), what would you do?	What is stopping organization (x) from doing that? E.g., lack of funding, violence, public engagement.
Potential for transferability - CSO partnerships - Lessons learned	<i>Now I will shift to questions related to the potential for cooperation with other CSOs and communities in WASH projects.</i>	
	Can you tell me about times when organization (x) partnered with other CSOs?	Why did you partner? Who was involved? What worked and what did not? Were these projects related to WASH?
	Have you observed WASH initiatives in other communities that you think could work in community (x)?	Which ones? Why do you think they could work? What is keeping it from being implemented?

Construct	Question	Probes & Notes
	What services not offered by organization (x) would you like to see offered in community (x)?	What are other CSOs/actors who could (help) offer it?
	Which projects of organization (x) do you think could be expanded to other communities?	Why? Are these projects related to WASH?
	If other CSOs wanted to implement similar projects in other communities, what would you advise them?	What are the lessons learned?
Closing remarks - Concluding thoughts - Partnerships and collaborations	<i>I would like to now ask you some concluding questions.</i>	
	If your organization could do anything to improve the health of these communities, what would you do?	What is stopping your organization from doing that? (E.g., lack of funding, violence, public engagement?)
	If your organization could do anything to improve their access to water and hygiene, what would you do?	What is stopping your organization from doing that? (E.g., lack of funding, violence, public engagement?)
	What have you observed over your career that was successful in the work of your organization?	Why do you think it was successful?
<i>Thank you very much for your time. Is there anything else you would like to add that we have not already talked about?</i>		

Appendix B. Focus Group Guide

Construct	Question	Probes & Notes
Preamble	<i>Hello all,</i> <i>Thank you for agreeing to participate in this research. As you may remember from our previous encounters and from the information letter, this research is investigating the role of civil society organizations (CSOs) in providing solutions for communities facing inequities in access to water, sanitation, and hygiene (WASH) in Rio de Janeiro, Brazil.</i> <i>I would like to remind you that given the group format of this session, we will ask you to keep in confidence information that identifies or could potentially identify a participant and/or their comments.</i> <i>Everyone is welcome to speak so, I request that you be respectful of other participants and their opinions as they participate.</i> <i>You may decline answering any questions you feel you do not wish to answer at any time.</i> <i>You can also stop participating at any time by letting me know of your decision.</i>	
Background Information	<i>I am going to start this discussion by asking you some general questions about yourself.</i>	
- Personal history	Can you tell me a little bit about yourself?	E.g., what do you do for a living, what is your family like, where and how did you grow up?
- Experience in community	What is it like living in community (x)?	What do you like about it? What do you dislike?
	What has been your experience with organization (x)?	What projects have you been involved with? How would you describe their work?
	What has been your experience like with other CSOs?	How would you describe their work?

Construct	Question	Probes & Notes
	What do you think the top priority is when it comes to improving people's health in community (x)?	Is it investing in health care facilities, or providing safe water and sanitation etc.? Does it differ from CSO (x)'s top priority?
Solutions to WASH inequities - Gaps in WASH services - WASH solutions	<i>Thank you for answering those questions. I would like to ask you about access to water, sanitation, and hygiene facilities more generally within your community.</i>	
	How do residents primarily access water at home in community (x)?	Piped water? Well water? Rainwater? Packaged or delivered?
	What is the quality of the water in general?	E.g., organoleptic (smell, visual, taste) indicators.
	In your opinion, how do others practice sanitation in community (x)?	Do they have toilets at home? Is it shared with other households? How is it disposed of or transported offsite?
	Can you tell me a little bit about hygiene practices among residents in community (x)?	Presence of facilities on premises with soap and water.
	How do residents access water, sanitation, and hygiene facilities outside of the home?	E.g., at the CSO, school, healthcare facility etc.?
	Are there other challenges related to water, sanitation, or hygiene in community (x)? If so, can you describe them?	E.g., conflict between neighbours for excessive water collection, use of water pumps, excessive time dedicated to water collection etc.
	What kind of solutions to WASH challenges have you seen implemented in community (x)?	Who were they promoted by? What were they like?
	Have you or your neighbours tried to implement solutions to WASH issues? What was it like?	E.g., common water tanks, water pumps.
	Are there any other service gaps experienced in community (x)?	What are those? Education? Transportation? Security/police services? Etc.

Construct	Question	Probes & Notes
		What about health services? Will some residents have more access to certain services than others?
Perceived success of WASH solutions - Organization's initiatives - Perceived success	<i>I would like to now ask you some questions about the level of success of solutions to improve access to water, sanitation, and hygiene in community (x).</i>	
	How would you categorize a 'successful' WASH intervention in community (x)?	E.g., sustainability, cost, reach etc.
	How successful, then, are the solutions in place right now?	How about past ones?
	What kind of improvements have you noticed in access to WASH, if any?	To what initiatives are they related?
	What challenges have undermined past WASH initiatives? What helped?	How about current ones? E.g., lack of financial resources, soil pollution, house infrastructure, criminal activity.
	How have these initiatives been received by residents?	E.g., with resistance, enthusiasm, resignation, suspicion.
	Who do you think is responsible for fixing WASH issues in community (x)?	E.g., the government, water companies, residents. Why do you think they have not fixed it yet?
	If you could do anything to solve WASH issues in community (x), what would you do?	What is stopping it from being done? E.g., lack of funding, violence, public engagement.
	<i>Now I will shift to questions related to the potential for cooperation with other CSOs and communities in WASH projects.</i>	

Construct	Question	Probes & Notes
Potential for transferability - Community partnerships - Lessons learned	Have you observed WASH initiatives in other communities that you think could work in community (x)?	Which ones? Why do you think they could work? What is keeping it from being implemented?
	Are there WASH solutions in community (x) that you think could work elsewhere?	Which ones? Why?
	Can you tell me about times when residents have come together to fix an issue in community (x)?	What was it like? Why do you think people felt compelled to work together?
	What do you think community (x) could learn from other communities facing similar WASH issues?	What could other communities learn from community (x)?
Vignettes: Common WASH solutions from around the world - Rainwater harvesting - Well drilling - Village savings and loan scheme for sanitation	<i>I will now offer you some examples of solutions to limited access to WASH commonly used around the world and enquire you about the potential implementation of similar solutions in community (x).</i>	
	Example 1: Rainwater harvesting. This solution consists of the installation of PVC gutters to the roof of the house, and its connection to a storage water tank fixed in a slab. A tap with a lock is installed to the tank to allow for hand washing and daily extraction. Rainwater flows from the roof to the PVC gutter and is stored in the water tanks. A filter can be installed at the point of use to improve water quality. Do you think this solution could be implemented in most houses in community (x)? Why or why not?	What are the challenges? What are the facilitators? How could this solution be adapted to community (x)? E.g., houses are built of plywood/weak materials that would not support the gutter structures; houses do not have an inclined roof, which would require adaptation.

Construct	Question	Probes & Notes
- Community-led total sanitation	Example 2: Family-size manual well drilling. This solution relies on a hybrid of sludge and percussion drilling technology to drill boreholes up to 105m deep. Well drilling clubs are formed that borrow or purchase drilling rigs and drill wells for all club members under the guidance of a partner organization (Water For All International). Estimated costs are USD 550 for the first well and USD 150 for each following one. Water is accessed through a pump where the well is built, and the water quality is usually improved given that it originates from underground sources. Do you think this solution could be implemented in most houses in community (x)? Why or why not?	What are the challenges? What are the facilitators? How could this solution be adapted to community (x)? E.g., elevated cost, contaminated soil etc.
	Example 3: Village savings and loans scheme (VSLA) for sanitation. VSLAs are like sanitation clubs, with community members contributing a small amount per month to a fund, which will be used to finance the construction of family-owned pit latrines. Beneficiaries pay back monthly with a small interest, which allows the fund to grow and finance more pit latrines. These latrines are used	What are the challenges? What are the facilitators? How could this solution be adapted to community (x)? E.g., not enough space to build latrines, fear that it would contaminate the soil, not enough money for contributions.

Construct	Question	Probes & Notes
	for onsite waste management. They consist of a hole in the ground with a reinforcing material to contain human excreta. They can be used for 10 to 30 years before they are full and must be emptied or covered. Do you think this solution could be implemented in most houses in community (x)? Why or why not?	
	Example 4: Community-led total sanitation (CLTS). CLTS is a sanitation promotion based on stimulating a collective sense of disgust and shame among community members as they confront the crude facts about mass open defecation and its negative impacts on the entire community. It is based on awareness raising on the dangers of open defecation, followed by volunteer construction of latrines. Do you think this solution could be implemented in community (x)? Why or why not?	What are the challenges? What are the facilitators? How could this solution be adapted to community (x)? E.g., no interest in implementing a solution that could generate negative feelings, not enough capital for volunteer construction of latrines etc.
Closing remarks - Concluding thoughts	<i>I would like to now ask you some concluding questions.</i>	
	If you could do anything to improve the health of residents in community (x), what would you do?	What is stopping it from being done? (E.g., lack of funding, violence, public engagement?)

Construct	Question	Probes & Notes
- Health priorities		
	What have you observed over your life that was successful in the work of CSOs in community (x)?	Why do you think it was successful?
<i>Thank you very much for your time. Is there anything else you would like to add that we have not already talked about?</i>		

Appendix C. E-mail Recruitment Script

Hello,

My name is Rodrigo Curty Pereira, and I am a Ph.D. student working under the supervision of Dr. Susan J. Elliott in the Department of Geography and Environmental Management at the University of Waterloo, located in Waterloo, Canada. As part of my Ph.D. degree, I am conducting a research study on the role of civil society organizations (CSOs) in providing solutions for communities facing inequities in access to water, sanitation, and hygiene (WASH). Given your role at [name of organization], I feel that you are well suited to provide insight into this topic and I would like to invite you to participate in this study.

If you decide to volunteer for this study, your participation will consist of a semi-structured interview that will take approximately 60 minutes of your time. During the interview you will be asked questions about the work that your organization does with disadvantaged communities in creating solutions for improving access to water, sanitation, and hygiene. The interview will be conducted in-person, in a location that is convenient to you. With your permission, I would like to audio-record the interview to ensure accurate transcription and analysis.

In appreciation of your time commitment, we will share a summary of the findings with participating organizations and community residents to present the results of the research and to collect feedback on possible solutions to existing issues that your organization might face regarding WASH access after the study is completed.

This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Board (REB #45260). However, the final decision about participation is yours.

Please read the attached Information Letter for more details regarding what participation involves. If you would like to participate, or you require additional information to assist you in reaching a decision about participation, please contact me or Dr. Susan J. Elliott by e-mail respectively at rcurtype@uwaterloo and elliotts@uwaterloo.ca, or telephone at [Telephone number] and [Telephone number].

Sincerely,

Rodrigo Curty Pereira

Ph.D. Candidate

Department of Geography and Environmental Management

University of Waterloo

[Telephone number]

Appendix D. Verbal Recruitment Script

Dear Resident:

I am a Ph.D. candidate in the Department of Geography and Environmental Management at the University of Waterloo, located in Waterloo, Canada. I am conducting research under the supervision of Professor Susan J. Elliott on the role of civil society organizations (CSOs) in providing solutions for communities facing inequities in access to water, sanitation, and hygiene (WASH) in Rio de Janeiro, Brazil. Access to WASH is significantly unequal in Rio de Janeiro, despite the abundance of water in this region. As a resident of a community that faces challenges in accessing water, sanitation, and hygiene, your opinions may be important to this research. I would appreciate the opportunity to speak with you and your peers about your experience on this topic.

I plan to conduct this research as a focus group to be held at [**date and time to be determined in consultation with local partner**]. The focus group will be conducted in person at [**exact location to be determined in consultation with local partner**]. Your involvement in this focus group is entirely voluntary and the anticipated risks to participation are limited to psychological distress when describing challenges in accessing WASH. If you agree to participate, the focus group session should not take more than about an hour. The questions to be asked in the focus group discussion are about access to WASH in your community and how you perceive the work of CSOs regarding WASH (for example, “how do you access water at home?”, “what CSO solutions to improving access to water in your community have you benefited from?”). You may decline answering any questions you feel you do not wish to answer. Your identity will be confidential and will be grouped with responses from other participants. Further, you will not be identified by name in any thesis, report or publication resulting from this study. The data collected will be kept for at least seven years.

This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Board. For all other questions, or if you would like additional information to assist you in reaching a decision about participation, please feel free to contact Professor Susan J. Elliott at [Telephone number], or myself at [Telephone number].

Thank you in advance for your interest in this project.

Yours sincerely,

Rodrigo Curty Pereira

Ph.D. Candidate

Department of Geography and Environmental Management

University of Waterloo

[Telephone number]

Appendix E. Information Letter – Key-Informants

Project Title: Networks of solidarity: a comparative case study of civil society-led solutions to water, sanitation, and hygiene inequities in Rio de Janeiro, Brazil

Principal Investigator: Dr. Susan J. Elliott, Department of Geography and Environmental Management, University of Waterloo, Waterloo, Canada, elliotts@uwaterloo.

Student Investigator: Rodrigo Curty Pereira, Ph.D. Candidate, Department of Geography and Environmental Management, University of Waterloo, Waterloo, Canada, rcurtype@uwaterloo.ca.

This letter explains what the study is about, what participation involves, possible risks and benefits, and your rights as a research participant. If you do not understand something in the letter, please ask one of the investigators before consenting to participate.

The world is undergoing a water crisis, with persisting inequities in access to water, sanitation, and hygiene (WASH). Although the Brazilian government has committed to provide access to WASH for all by 2030, there are still 31 million people that lack access to safe water at home in the country. In this scenario, civil society organizations (CSOs) have played an important role in increasing and improving WASH services not only in the country, but globally. However, very little is known about the efficacy of these initiatives and how they are perceived by the assisted communities. The purpose of this study, therefore, is to understand the role of civil society organizations in promoting solutions to water, sanitation, and hygiene inequities in Brazil.

This research will focus on civil-society-led solutions to challenges in accessing water, sanitation, and hygiene. We are interested in better understanding what initiatives have been implemented in this sector for the past two decades, how successful they have been according to the perception of leaders of civil society organizations and community residents, and how transferrable they are to other similar contexts. Therefore, I would like to include your organization as one of three organizations to be involved in my investigation. I believe that because you are actively involved in the management and operation of your organization, you are best suited to speak to the various issues, such as WASH projects, its challenges, failures, and successes.

Participation in this study is voluntary. It will involve an interview of approximately 60 minutes in length to take place in a mutually agreed upon location. During the interview you will be asked questions about the work that your organization does with disadvantaged communities in creating

solutions for improving access to water, sanitation, and hygiene. You may decline to answer any of the interview questions if you so wish. Further, you may decide to withdraw from this study at any time without any negative consequences by advising the researcher. If you wish to withdraw your study data after participating, please contact the researchers. You can request your data be removed from the study up until March 2024 as it is not possible to withdraw your data once papers and publications have been submitted to publishers.

With your permission, the interview will be audio recorded to facilitate collection of information, and later transcribed for analysis. Shortly after data analysis has been completed, I will send you a summary of the findings to give you an opportunity to confirm the accuracy of your contribution to our results and to add or clarify any points that you wish.

Your identity will be confidential. Your name will not appear in any thesis or report resulting from this study, however, with your permission anonymous quotations may be used. Data collected during this study will be retained for at least 7 years to which only researchers associated with this project will have access. The data will be encrypted and stored in the student investigator's OneDrive, in a password protected folder. The anticipated risks to you as a participant in this study are limited to psychological distress when describing challenges in providing solutions to inadequate access to WASH. You may experience discomfort when sharing experiences that have not been successful in the past. Additionally, you might express critiques of local actors that could threaten the status of your organization in the region. We will provide a list of resources for mental health support for free in case you need it and keep the name of your organization confidential unless otherwise requested by you and the organization's legal representatives.

The name of your organization will be kept confidential unless you and the organization's legal representatives express interest in having it disclosed. In that case, the organization's name will be disclosed as a collaborator in reports stemming from this research. However, all quotations will be anonymized and not linked to you or your organization.

This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Board (REB #45260). If you have questions for the Board, contact the Office of Research Ethics, toll-free at 1-833-643-2379 (Canada and USA), 1-519-888-4440, or reb@uwaterloo.ca.

For all other questions or if you would like additional information to assist you in reaching a decision about participation, please contact me by email at rcurtype@uwaterloo.ca or telephone at [Telephone number]. You can also contact my supervisor, Professor Susan J. Elliott at [Telephone number] or email elliotts@uwaterloo.ca.

I hope that the results of my study will be of benefit to those organizations directly involved in the study, other organizations not directly involved in the study, as well as to the broader research community.

I very much look forward to speaking with you and thank you in advance for your assistance in this project.

Yours Sincerely,

Rodrigo Curty Pereira

Ph.D. Candidate

Department of Geography and Environmental Management

University of Waterloo

[Telephone number]

Appendix F. Information Letter – Focus Groups

Project Title: Networks of solidarity: a comparative case study of civil society-led solutions to water, sanitation, and hygiene inequities in Rio de Janeiro, Brazil

Lay-language project title: Networks of solidarity: a study of community-based solutions to challenges in accessing water, sanitation, and hygiene in Rio de Janeiro, Brazil

Principal Investigator: Dr. Susan J. Elliott, Department of Geography and Environmental Management, University of Waterloo, Waterloo, Canada, elliotts@uwaterloo.

Student Investigator: Rodrigo Curty Pereira, Ph.D. Candidate, Department of Geography and Environmental Management, University of Waterloo, Waterloo, Canada, rcurtype@uwaterloo.ca.

This letter explains what the study is about, possible risks and benefits, and your rights as a research participant. You may keep this letter for your records. If you do not understand something in the letter, please ask one of the investigators before consenting to participate.

This research will focus on solutions to challenges in accessing water, sanitation, and hygiene that have been implemented by civil society organizations (CSOs). We are interested in better understanding what initiatives have been implemented in this sector for the past two decades, how successful they have been according to the perception of leaders of civil society organizations and community residents, and whether these solutions can be transferred to other similar locations. Therefore, I would appreciate the opportunity to speak with you and other residents in your community about your experience on this topic in a group discussion.

These groups will discuss community residents' experiences with projects implemented by civil society organizations aiming to improve or increase access to water, sanitation, and hygiene (WASH) in your community. The discussion will be facilitated by Rodrigo Curty Pereira of the Department of Geography and Environmental Management. Participation in this session is voluntary and involves 60 minutes to discuss the issues associated with challenges in accessing water, sanitation, and hygiene in your community. The anticipated risks to participation are limited to feelings of embarrassment or discomfort when recounting experiences related to WASH practices. We are aiming to form focus groups with people that have also faced challenges in accessing WASH. We will provide a list of resources for mental health support for free in case you need it. You may decline answering any questions you feel you do not wish to answer and may decline contributing to the session in other

ways if you so wish. Your identity will be confidential. Your name will not be identified with what you say in this session. Further, you will not be identified by name in the report that is produced for this session. The information collected from this session will be kept for a period of at least seven years and will be protected by password and stored digitally, protected by a password.

If you wish to withdraw your contribution after participating, please contact the researchers.

You can request your contribution be removed from the study up until March 2024 as it is not possible to do so once the results of the study have been published.

Given the group format of this session we will ask you to keep in confidence information that identifies or could potentially identify a participant and/or their comments. Although other participants will be asked to keep what was said confidential, the researchers cannot guarantee this. If you have any questions about participation in this session, please feel free to discuss these with the facilitator, or later, by contacting Professor Susan J. Elliott at [Telephone number], elliotts@uwaterloo.ca. If you are interested in receiving a copy of the executive summary of the session outcomes, please contact Professor Susan J. Elliott or the facilitator, Rodrigo Curty Pereira, at rcurtype@uwaterloo.ca, [Telephone number].

This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Board (REB #45260). If you have questions for the Board, contact the Office of Research Ethics, toll-free at 1-833-643-2379 (Canada and USA), 1-519-888-4440, or reb@uwaterloo.ca.

For all other questions contact Rodrigo Curty Pereira, at rcurtype@uwaterloo.ca, [Telephone number], **[local phone number to be added]**.

Thank you for your assistance with this project. In appreciation of your time given to this session we will provide you with a **[token of appreciation valued at \$10 to be determined in consultation with local community partners]**.

Yours sincerely,

Rodrigo Curty Pereira

Ph.D. Candidate

Department of Geography and Environmental Management

University of Waterloo

[Telephone number]

Appendix G. Written Consent Form

Study Title: Networks of solidarity: a comparative case study of civil society-led solutions to water, sanitation, and hygiene inequities in Rio de Janeiro, Brazil

By providing your consent, you are not waiving your legal rights or releasing the investigator(s) or involved institution(s) from their legal and professional responsibilities.

I have read the information presented in the information letter about the study being conducted by Rodrigo Curty Pereira and Dr. Susan J. Elliott from the Department of Geography and Environmental Management at the University of Waterloo. I have had the opportunity to ask any questions related to this study, to receive satisfactory answers to my questions, and any additional details I wanted.

I am aware that I have the option of allowing my interview to be audio recorded to ensure an accurate recording of my responses.

I am also aware that sections from the interview may be included in the thesis and/or publications to come from this research, with the understanding that the quotations will be anonymous.

I was informed that I may withdraw my consent at any time without penalty by advising the researcher. Data cannot be withdrawn after results have been published.

This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Board (REB #45260). If you have questions for the Board, contact the Office of Research Ethics, toll-free at 1-833-643-2379 (Canada and USA), 1-519-888-4440, or reb@uwaterloo.ca.

For all other questions contact Rodrigo Curty Pereira, at rcurtype@uwaterloo.ca, 1-548-994-4848.

☐ YES ☐ NO I agree, of my own free will, to participate in this study.

☐ YES ☐ NO I agree to have my interview audio recorded.

☐ YES ☐ NO I agree to the use of “anonymous quotations in any paper or publication that comes from this research.”

☐YES ☐NO I agree to the use of the **[name of the organization]** as a research collaborator in upcoming reports from this research. I will have the opportunity to review how the quotations will be used and will be able to withdraw this permission afterwards if desired.

Participant Name: _____ (Please print)

Participant Signature: _____

Date: _____

Appendix H. Verbal Consent Form

This script is intended to be read on the day of the focus group session, individually with each focus group participant. Prospective participants should receive a copy of the information letter in advance of the session and the researcher will help them read through the information in detail. The information letter will be reviewed again verbally with the prospective participant at the start of the session. The following script can be used to obtain and document the participant's consent, the date, and their name. A copy of this form should be retained by the research team as a record of consent for the duration of the study, similar to how a written consent form would be stored.

Researcher: Hello. Thank you for showing up to this group discussion. As you may remember, I have provided you with an information letter, which we have reviewed together. Can I have your permission to review it once again to obtain your consent to participate in this research?

Participant: Yes.

Researcher: Thank you. I will go over the main points of the information letter. Please feel free to stop me and ask any questions during this process.

- This study investigates solutions to challenges in accessing water, sanitation, and hygiene (WASH) that have been implemented by civil society organizations. We want to hear from you and other members in your community about your experiences with these solutions and WASH in general.
- Your participation in the study will be in a group discussion with other members of your community, in which you will be asked about your experiences with projects implemented by civil society organizations aiming to improve or increase access to water, sanitation, and hygiene in your community.
- The discussion will be facilitated by Rodrigo Curty Pereira, Ph.D. candidate in the department of Geography and Environmental Management at the University of Waterloo, located in Canada.
- Participation in this session is voluntary and involves 60 minutes of discussion. You may leave the focus group session by advising me of your decision at any time.
- The findings of this research are expected to be beneficial for the implementation of solutions to challenges in access to water, sanitation, and hygiene by community actors and organizations in other locations.
- The anticipated risks are limited to feelings of embarrassment or discomfort when describing challenges in accessing WASH. You may decline answering any questions you feel you do not wish to answer at any time. We will provide a list of resources for mental health support for free in case you need it.

- We will ask you to keep in confidence information that identifies or could potentially identify a participant and/or their comments. Although other participants will be asked to keep what was said confidential, the researchers cannot guarantee this.
- With your permission, the focus group discussion will be audio recorded for accurate transcription.
- Your name or personal identifiers will be removed from the transcripts and not be linked to anything that has been said during the discussion.
- The information collected from this session will be kept for a period of at least seven years and stored digitally in a password protected folder.
- You can request your contribution be removed from the study up until March 2024 as it is not possible to withdraw it once papers and publications have been submitted for publication.
- In appreciation of your time given to this session we will provide you with a **[token of appreciation valued at \$10 to be determined in consultation with local community partners]**.

Do you have any questions before we move forward with the consent process?

Participant: Yes. **[Researcher proceeds to clarify questions]**.

OR

Participant: No.

Researcher: If you have questions for the Research Ethics Board, contact information for the Office of Research Ethics is listed on the information letter that you received prior to this session. For all other questions about the study, you may contact me at rcurtype@uwaterloo.ca, [Telephone number], or **[local number to be added when obtained]**.

Do you consent to participating in the focus group?

☐ YES ☐ NO

Do you give permission for your contribution to be audio-recorded?

☐ YES ☐ NO

Do you agree to the use of anonymous quotations in any paper or publication resulting from this research?

☐ YES ☐ NO

Participant's name: _____

Researcher's signature: _____

Date: _____

Appendix I. Letter of Appreciation

I would like to thank you for your participation in the study entitled “Networks of solidarity: a comparative case study of civil society-led solutions to water, sanitation, and hygiene inequities in Rio de Janeiro, Brazil”. As a reminder, the purpose of this study is to investigate the role of civil society organizations (CSOs) in providing solutions for communities facing inequities in access to water, sanitation, and hygiene (WASH).

The data collected during **[interviews/focus groups]** will contribute to a better understanding of how civil society can advance the universalization of access to water, sanitation, and hygiene.

This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Board (REB #45260). If you have questions for the Board, contact the Office of Research Ethics, toll-free at 1-833-643-2379 (Canada and USA), [Telephone number], or reb@uwaterloo.ca.

For all other questions contact Dr. Susan J. Elliott at [Telephone number], elliotts@uwaterloo.ca.

Please remember that your identity will be kept confidential. Once all the data are collected and analyzed for this project, I plan on sharing this information with the research community through seminars, conferences, presentations, and journal articles. If you are interested in receiving more information about the results of this study, or would like a summary of the results, please email me at rcurtype@uwaterloo.ca, and when the study is completed, I will send you the information. In the meantime, if you have any questions about the study, please contact me by email or telephone as noted below.

Rodrigo Curty Pereira

Ph.D. Candidate

Department of Geography and Environmental Management

University of Waterloo

[Telephone number]

rcurtype@uwaterloo.ca