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# SMALL LOCAL SERVICE PROVISION FOR WATER AND SANITATION SERVICES

## Mozambique Inception Report

**January 2024**

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Cover photo: Licensed private water provider's water system in Marracuene, Mozambique, 2023. Photo taken by the research team during field visit.

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# ACRONYMS

AdRMM	<i>Águas da Região Metropolitana de Maputo</i>
AFORAMO	<i>Associação de Fornecedores de Água de Moçambique</i>
AIAS	<i>Administração de Infraestruturas de Abastecimento de Água e Saneamento (Administration of Water Supply and Sanitation Infrastructure)</i>
AURA	<i>Autoridade Reguladora de Água (Water Regulatory Authority)</i>
DNAAS	<i>Direcção Nacional de Abastecimento de Água e Saneamento (National Directorate for Water Supply and Sanitation)</i>
FGD	Focus Group Discussion
FIPAG	<i>Fundo de Investimento e Património do Abastecimento de Água (Water Supply Investment and Asset Fund)</i>
FSM	Fecal Sludge Management
FSTP	Fecal Sludge Treatment Plant
GPS	Global Positioning System
HH	Household
IDI	In-depth Interview
LMIC	Low-and-Middle-Income Countries
MoU	Memorandum of Understanding
NGO	Nongovernmental Organization
NRW	Non-revenue Water
P&L	Profit and Loss
PWP	Private Water Provider
QA/QC	Quality Assurance/Quality Control
RQ	Research Question
SASB	<i>Serviço Autónomo de Saneamento da Beira</i>
SDG	Sustainable Development Goal
SLP	Small, Local Provider
SPSS	Statistical Package for Social Sciences
UNICEF	United Nations Children's Fund
URBAN WASH	Urban Resilience by Building and Applying New Evidence in Water, Sanitation, and Hygiene



USAID	United States Agency for International Development
WASH	Water, Sanitation, and Hygiene
WASHPaLS	Water, Sanitation, and Hygiene Partnerships and Learning for Sustainability
WHO	World Health Organization
WRM	Water Resource Management
WSUP	Water and Sanitation for the Urban Poor

# I.0 INTRODUCTION

## I.1 BACKGROUND

Globally, ~37 percent of the urban population lacks access to sewerage connections, and over 1.8 billion people lack access to safely managed sanitation services (World Health Organization [WHO] and United Nations Children’s Fund [UNICEF] n.d.). In sub-Saharan Africa and South Asia, about half<sup>1</sup> of urban residents do not have piped water connections<sup>2</sup> (Eberhard 2019; International Institute for Population Sciences [IIPS] and ICF 2021; National Institute of Population Research and Training [NIPORT] and ICF 2020; National Institute of Population Studies [NIPS] and ICF 2020). Water and sanitation utilities are constrained from serving this growing urban population due to a lack of financial resources, technical capacities, and other factors. In the absence of reliable public service provision, small, local providers (SLPs), who are often not officially recognized or regulated, informally serve a significant proportion of the people without access to piped water and sewerage connections.

United States Agency for International Development (USAID) Urban Resilience by Building and Applying New Evidence in Water, Sanitation, and Hygiene (URBAN WASH) conducted a literature review and case studies on approaches to formalize SLPs for expanding drinking water and fecal sludge management (FSM) services. The study indicated that the knowledge base on this topic is still nascent, with limited examples and documentation of cities formally leveraging SLPs to deliver services. This prompts the need for additional implementation research to generate learnings for the sector.

In Mozambique, URBAN WASH is entering into a partnership with the directorate, *Direcção Nacional de Abastecimento de Água e Saneamento* (National Directorate for Water Supply and Sanitation or DNAAS), and the national regulator, *Autoridade Reguladora de Água* (Water Regulatory Authority or AURA), to conduct implementation research in several cities. URBAN WASH finalized this partnership after conducting a scoping trip in August 2023 and meeting stakeholders from 14 organizations. The implementation research will generate learnings in Mozambique for DNAAS, AURA, the Mozambican authorities, and the global water sector.

Mozambique presents an interesting opportunity to conduct implementation research due to the high prevalence of SLPs in both the water and FSM sector and a complex institutional framework. Both authorities and communities recognize the role of the private sector in extending the coverage of water and sanitation services in the country, with several interventions already being implemented.

## I.2 ACTIVITY PURPOSE AND AUDIENCE

This activity aims to address critical evidence gaps on the topic of engaging private water providers (PWWPs) and emptiers (the local terms used for water and sanitation SLPs, respectively) highlighted in the desk research and has two primary audiences—at the country level and at the global level.

The URBAN WASH desk research on SLPs highlighted several evidence gaps (USAID URBAN WASH 2023). The case studies focused on better understanding the positive deviants, i.e., contexts where engagements have been implemented such as southern Mozambique; Manila, Philippines; and Kisumu, Kenya. As such, limited evidence exists on what conditions may deter engagements. Further, the benefits

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<sup>1</sup> The proportions for urban South Asia were estimated using a weighted average of the proportions across three countries—India, Pakistan, and Bangladesh—representing 97 percent of South Asia’s urban population.

<sup>2</sup> This could include piped connections from a formal utility or a private vendor or a small-scale service provider. The source data does not define the source of the piped connections.

and challenges of different implementation approaches, including the costs borne by the municipalities/utilities and the SLPs are not well understood. Finally, there is a lack of documentation on the impact of engaging SLPs on access, affordability, quality, and resilience of services.

At the country level, the research aims to generate evidence to guide policy and decision-making by AURA, DNAAS, and other authorities to engage with SLPs in the water and sanitation sector. To ensure that the research is contextually relevant and has buy-in from local decision-makers and implementers, URBAN WASH created and convened water and FSM Technical Working Groups for co-design workshops in November 2023 (refer to Section 10.1 for a list of members of both working groups). The research design proposed in this document is based on inputs and validation from the co-design workshops.

At the global level, the research will generate learnings for water and sanitation sector funders, implementers, and associations of regulators, such as Eastern and Southern Africa Water and Sanitation, by addressing three critical evidence gaps:

- Identifying the conditions that influence cities' **choices** to engage SLPs,
- Understanding how cities **implement** engagements with SLPs, and
- Generating data on the **impact** of engaging SLPs from the perspective of households and vendors.

### 1.3 ORGANIZATION OF REPORT

This document presents the details of the research partnership in Mozambique and includes the following:

- **Overview of the implementation research**, including the framing, three overarching research questions (RQs), and the timelines of research.
- **Background of the water and sanitation service provision context** in Mozambique and the need for implementation research.
- **Research design**, including analytical approaches and data collection plans for the three research questions. The sectors covered are split by research question in the following sequence:
  - RQ1 for water and FSM together,
  - RQ2 and RQ3 for water, and
  - RQ2 and RQ3 for FSM.
- **Additional information about the research**, including the data and activity management plan, stakeholder engagement plan, monitoring and evaluation indicators, and timelines and deliverables.

## 2.0 RESEARCH OVERVIEW

### 2.1 RESEARCH FRAMING

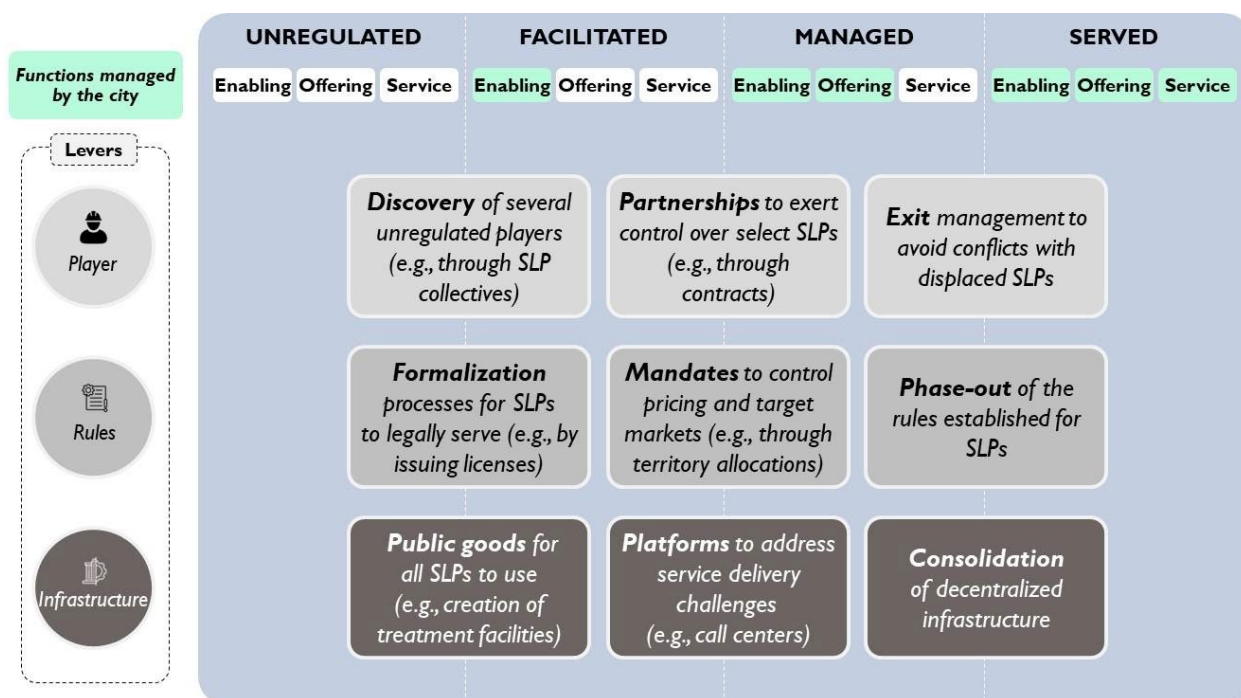
The implementation research in Mozambique is framed around studying **market transitions**. URBAN WASH’s desk research on SLPs (USAID URBAN WASH 2023) highlighted that when cities engage with SLPs, they transition *unregulated* areas to different market archetypes, depending on the type of engagement with the SLPs. Cities can either *facilitate* the participation of SLPs (e.g., by giving them licenses or sources for water) or *manage* the market by actively influencing SLPs’ service offerings, such as by setting pricing or taking on marketing roles. Market transitions to these facilitated or managed archetypes may allow cities to improve and expand services to households that they are unable to serve directly.

Cities implement transitions using three types of actions or “levers”:

- *Player* lever, by managing the engagement with SLPs (e.g., by engaging one-on-one with SLPs or with SLP collectives, designing various types of partnership agreements, providing capacity building or trainings);
- *Rules* lever, by defining terms of their engagement with SLPs and influencing their service delivery (e.g., formalization processes to issue licenses, defining pricing as part of contracts); and
- *Infrastructure* lever, by making complementary business environment investments to support service delivery (e.g., setting up kiosks, marketing or customer service departments).

The URBAN WASH Market Transitions Framework (refer to Figure 1) visually represents the implementation of market transitions. Appendix I provides further details on the framework.

**Figure 1: URBAN WASH Market Transitions Framework**



## 2.2 RESEARCH QUESTIONS, ACTIVITIES, AND TIMELINES FOR STUDY

The implementation research will aim to answer three research questions on the topic of market transitions:

- **RQ1 (Choice of transitions):** What choices do cities make to implement transitions with SLPs, and what conditions influence these choices?
- **RQ2 (Implementation of transitions):** How do cities implement transitions with SLPs?
- **RQ3 (Impact of transitions):** What is the impact of these transitions on service delivery outcomes?

Each question was developed based on the evidence gaps from literature review and case studies and refined through stakeholder consultations in Mozambique.

The research will run from February 2024 to January 2025, and the data collection timelines and activities will vary by research question (refer to Figure 2).

For RQ1, URBAN WASH will conduct the following:

- In-depth interviews (IDIs) with municipalities, utilities, and influencers<sup>3</sup> in February/March 2024;
- In-person workshop with all stakeholders in March/April 2024; and
- Targeted in-person IDIs with community and other stakeholders in March/April 2024.

For water, URBAN WASH will conduct the following:

- For RQ2: In-person IDIs with multiple respondents (municipalities, utilities, formal and informal PWPs) in March/April 2024, and
- For RQ3:
  - From February to April 2024, household surveys in two settlements<sup>4</sup> and in-person IDIs with multiple respondents (municipalities, utilities, formal and informal PWPs, and community leaders); and
  - From August to September 2024, household surveys in a settlement where a transition was recently implemented (i.e., in 2023), focus group discussions (FGDs) with households, and in-person IDIs with formal and informal PWPs.

For FSM, URBAN WASH will conduct the following:

- For RQ2: In-person IDIs with multiple respondents (municipalities, utilities, formal and informal private emptiers, and fecal sludge treatment plant [FSTP] and transfer station operators) in March/April 2024.

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<sup>3</sup> For the purposes of this study, influencers (e.g., DNAAS, FIPAG) are those who influence a decision-maker's (e.g., municipality, utility) choice of transition.

<sup>4</sup> A settlement is an area (or micro-market) receiving a specific type of drinking water service, based on the engagement between the city and SLPs. Refer to Appendix I for details on micro-markets.

- For RQ3:
  - From February to April 2024, household surveys in two settlements<sup>5</sup> and in-person IDIs with multiple respondents (municipalities, utilities, formal and informal private emptiers, FSTP, transfer station operators, and community leaders); and
  - From August to September 2024, FGDs with households.

URBAN WASH will conduct the analysis for all research questions on an ongoing basis as data is collected, ending in August 2024 for RQ1 and January 2025 for RQs 2 and 3.

The subsequent sections detail the activities for each research question and is structured as follows:

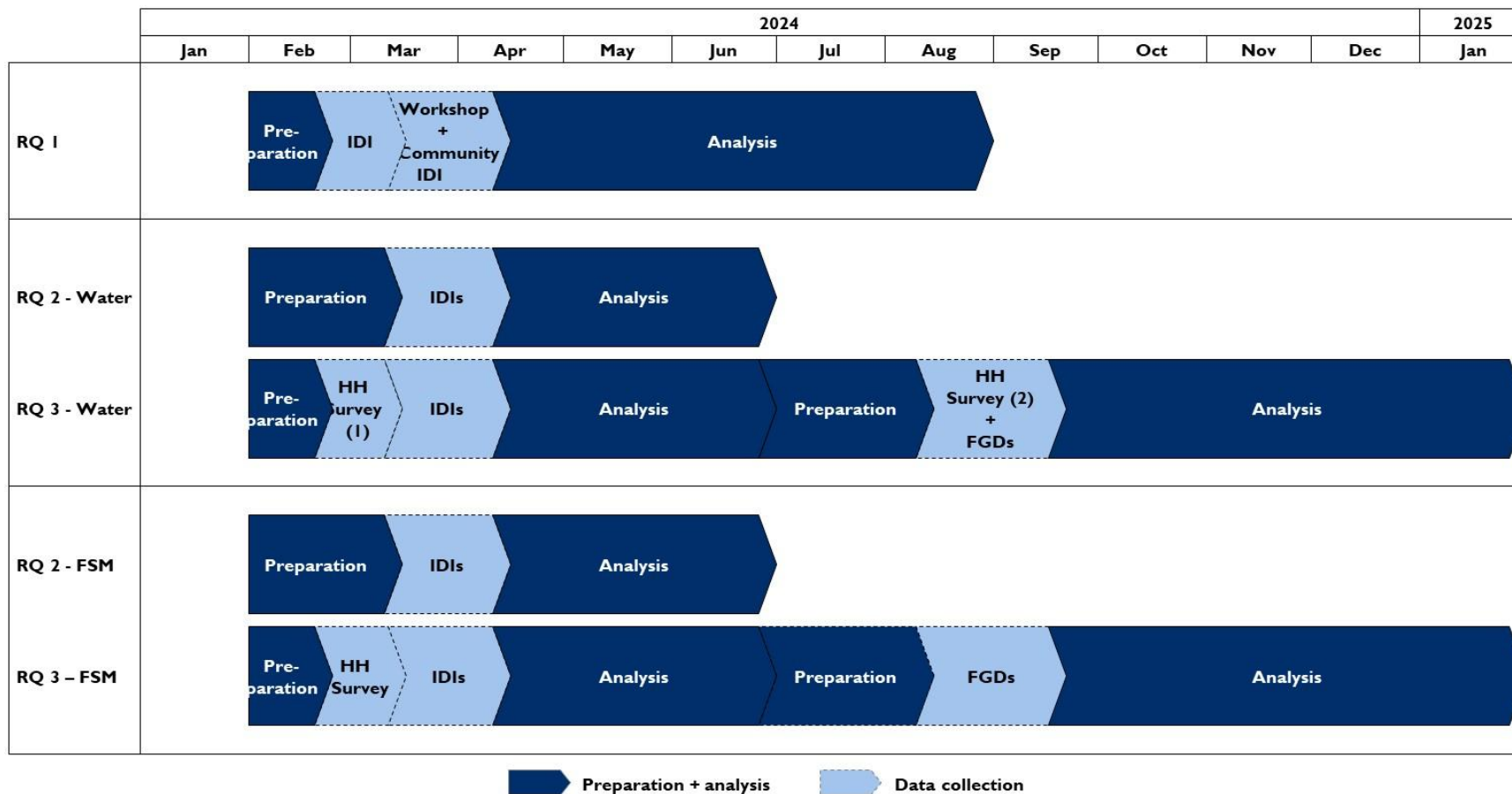
- **Overall approach**, including the sub-research questions and justification for their study;
- **Data collection plan**, including the data URBAN WASH will collect, and the methods and sample for data collection; and
- **Analysis plan**, detailing the approach for analyzing the data collected for each sub-research question.

The analysis for RQ1 will be common for water and FSM. The analysis of RQ2 and RQ3 will be done separately for each sector.

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<sup>5</sup> A settlement is an area (or micro-market) receiving a specific type of emptying service, based on the engagement between the city and SLPs. Refer to Appendix I for details on micro-markets.

**Figure 2: Research timelines**



Acronyms: IDI: In-depth interview; HH: Household; FGD: Focus group discussion

## 3.0 PROVISION OF WATER AND SANITATION SERVICES IN MOZAMBIQUE

### 3.1 OVERVIEW OF WATER AND SANITATION SERVICES IN MOZAMBIQUE

A mix of public utilities, municipalities, and private operators (formal and informal) provide water and sanitation services in Mozambique. For both urban and rural water and sanitation services, DNAAS operates as the primary policy agency within the Ministry of Public Works, Housing, and Water Resources. Additionally, AURA is responsible for regulating public and private entities involved in urban water and sanitation services (Drabble et al. 2019).

#### 3.1.1 WATER

*Fundo de Investimento e Património do Abastecimento de Água* (Water Supply Investment and Asset Fund or FIPAG), a national public institution, is the urban water infrastructure asset owner in Mozambique and holds shares in the four sub-national utilities (i.e., *Aguas da Região de North*, *Aguas da Região de Centro*, *Aguas da Região de South*, and *Aguas da Região Metropolitana de Maputo* [AdRMM]). These four utilities are responsible for providing water to urban households in the north, central, south, and Maputo metropolitan regions, respectively (World Bank 2023). These utilities provided water to 64 percent of the population in their service areas in 2020, and there are still extensive underserved low-income settlements in peri-urban areas (Ministry of Public Works, Housing and Water Resources 2022). Another national institution, *Administração de Infraestruturas de Abastecimento de Água e Saneamento* (Administration of Water Supply and Sanitation Infrastructure or AIAS), serves as the water infrastructure asset owner in peri-urban and rural areas (Borja-Vega et al. 2018).

Municipalities in Mozambique provide commercial licenses for drinking water provision but do not play an active role in the operations of water providers. They also liaise with SLPs, known locally as PWP (Collignon, Chaponniere, and Valfrey 2008). PWPs serve the population that lacks access to formal water provision (Ahlers et al. 2012).

#### 3.1.2 SANITATION

Municipalities are responsible for providing sanitation services in Mozambique (Drabble et al. 2019). In some northern cities, such as Beira and Quilemane, municipalities that are responsible for handling sewerage networks have formed autonomous bodies (Weststrate et al. 2019). However, sanitation data for urban areas in Mozambique indicates a reliance on pit latrines and septic tanks, with only 2.84 percent of the population in urban Mozambique connected to the sewerage network (as of 2022) (WHO and UNICEF n.d.). There is a lack of clarity on roles for emptying of on-site sanitation facilities (Weststrate et al. 2019).

The population using on-site sanitation facilities relies on services by informal private emptiers, who offer either mechanized or manual emptying services (Weststrate et al. 2019). A few private emptiers have started using vacuum trucks, as mentioned by stakeholders during the co-design workshop.

Mozambique currently has two treatment plants—one functional treatment plant in Maputo, and a non-functional treatment plant in Beira that is undergoing rehabilitation. The lack of treatment plants and the distance of the treatment plant from nearby cities (and even within Maputo) often results in



indiscriminate disposal by both formal and informal emptiers. There are, however, plans to set up additional treatment plants in places, such as Matola, as mentioned by Ministry of Health during the co-design workshop, and in Quelimane and Tete (World Bank 2019).

### **3.2 LEVERAGING THE PRIVATE SECTOR TO EXPAND WATER AND SANITATION SERVICES' COVERAGE**

Given the low coverage of both water and sanitation services through the mandated authorities, regulatory institutions recognize the need to engage the private sector in achieving Mozambique's sustainable development goals and goals outlined in the Ngor Declaration on Sanitation and Hygiene of 2015 (DAI 2020).

The number of PWWPs has grown significantly in the last two decades, from ~800 in 2010 to over 1,800 in 2018 (USAID SPEED+ 2018b), serving two million customers (USAID 2021). Private emptiers have also increased in prevalence per local stakeholders, though there is no documented data on the change in number of emptiers over time.

### **3.3 INSTITUTIONAL FRAMEWORK AND HISTORY OF ENGAGING SLPs**

The institutional framework for engaging SLPs in the water sector is more mature than the sanitation sector. In 2015, DNAAS released a national licensing and regulatory framework, with funding from USAID and the help of FIPAG, AURA, AIAS, and *Associação de Fornecedores de Água de Moçambique* (AFORAMO) (USAID URBAN WASH 2023). The regulation, Decreto 51/2015, aimed to regulate water supply activities of hundreds of unregulated PWWPs in the market. The regulatory framework evolved when AURA introduced tariff regulations in 2017 (USAID SPEED+ 2018b). However, these tariffs were unviable for PWWPs, and AFORAMO intervened as a mediator to negotiate an increase in tariffs (USAID URBAN WASH 2023).

In contrast, on-site sanitation lacks a national-level regulatory framework. Each municipality independently creates its framework to engage with the private sector, leading to diverse approaches (Weststrate et al. 2019). For instance, Maputo issues licenses to emptiers with requirements such as employee training in FSM and safety measures to protect workers, households, and the environment (Weststrate et al. 2019). Beira's autonomous sanitation body, *Serviço Autónomo de Saneamento da Beira* (SASB), issues licenses to SLPs with requirements such as details of sludge transportation means, suction systems, personal protective equipment for workers, a physical address, and documentation for identification (USAID URBAN WASH 2023). Matola has been issuing licenses since before 2015 (before Decreto 51/2015), but little information is available on the terms of the license.

Decision-making is also complex for both sectors. In the water sector, DNAAS has empowered three distinct organizations to provide services: FIPAG for urban areas, AIAS for smaller towns, and municipalities for their jurisdictions. Each of these organizations creates individual five-year plans without any national or provincial coordination, leading to overlaps in service delivery (USAID SPEED+ 2018b).

Transitions in the water sector involving licensing have been initiated by municipalities since 2015 after the introduction of a licensing framework. Approximately 800 PWWPs across the country have received licenses, with around 500 in the greater Maputo region, covering Maputo and Matola (USAID URBAN WASH 2023), with a total of ~1,800 PWWPs identified across the country (USAID SPEED+ 2018b). FIPAG piloted the provision of bulk water in 2010 to three PWWPs in Maputo (Chaponniere and Collingnon 2019), and, more recently in 2023, utilities provided bulk water to PWWPs to sell, triggered by territorial conflicts between FIPAG and some existing licensed PWWPs. Currently, FIPAG has contracted

10–12 PWWPs in Maputo to provide water, with plans to expand contracting to PWWPs in other areas (FIPAG 2023).

In the sanitation sector, decision-making differs by region. In the southern regions, such as in Maputo and Matola, municipalities are responsible for sanitation service provision. However, in the central and north regions, including Beira (Valuing Water Initiative n.d.; SASB 2023), Quelimane, or Nampula (Millennium Challenge Corporation and Ministry of Planning and Development 2013), municipalities have formed autonomous organizations for sanitation service provision. Scoping conversations also indicate that DNAAS more actively engages in the northern region of Mozambique (e.g., building of treatment plants, engaging with private emptiers to serve low-income communities).

Transitions in the sanitation sector are more recent and localized. Beira municipality created a framework for licensing private emptiers through SASB in 2016, focusing on peri-urban areas (SASB 2023). Matola municipality also licensed SLPs around 2019. Maputo municipality licensed vacuum truck operators in 2019, as per the sanitation regulations in Maputo (Weststrate et al. 2019), largely serving affluent areas. The municipality also worked with Water and Sanitation for the Urban Poor (WSUP) in 2015 to serve 11 low-income neighborhoods by eight private emptiers, but this intervention failed as the emptiers exited the business line and started providing solid waste management services (Muximpua et al. 2017; Drabble and Parente 2018). In October 2023, WSUP began piloting a new intervention involving a public-private partnership model with Maputo municipality for service provision in three low-income areas at subsidized rates (WSUP 2023).

### 3.4 CHALLENGES AND EVIDENCE GAPS

Despite public authorities like DNAAS and AURA recognizing the importance of engaging the private sector, most cities are not actively engaging them (refer to Table 1). DNAAS and AURA want to understand the different ways to incentivize cities to engage the private sector, as there are regional and sectorial differences in decision-making. AURA acknowledges the need for a centralized approach for larger cities and a localized strategy for smaller cities (AURA 2023). Literature notes that the water sector lacks comprehensive water supply strategies and specific plans for each province, especially for north and central Mozambique<sup>6</sup> (USAID SPEED+ 2018b), and the sanitation sector lacks clarity of roles (e.g., infrastructure, licensing) at the national level, particularly between DNAAS and AIAS. Additionally, the sanitation sector lacks coordination with municipalities responsible for the construction and operation of sanitation systems, along with policy overlaps and outdated laws (DAI 2020).

**Table 1: Engagement with SLPs by sector and city**

Cities	Population within Jurisdiction	Status of Water SLP Engagement	Status of FSM SLP Engagement
Maputo	~1,124K	Facilitated	Facilitated
Matola	~1,029K	Facilitated	Facilitated
Nampula	~757K	None	Facilitated
Beira	~592K	Facilitated	Facilitated
Mocuba	~400K	Unknown	Facilitated
Monapo	~394K	Unknown	None
Alto Molocue	~346K	Unknown	None
Quelimane	~345K	None	Facilitated
Chiure	~299K	Unknown	None

<sup>6</sup> FIPAG defines four regions of water supply: north, central, south, and Maputo city.

Cities	Population within Jurisdiction	Status of Water SLP Engagement	Status of FSM SLP Engagement
Nacala	~288K	Unknown	Facilitated
Cuamba	~268K	Unknown	Facilitated
Marracuene	~219K	Facilitated	Unknown
Pemba	~200K	None	Unknown
Mueda	~170K	Unknown	None
Zawala	~151K	Unknown	None
Maganja da Costa	~145K	None	Unknown
Xai Xai	~145K	Facilitated	Unknown
Tete	~129K	Unknown	Facilitated
Lichinga	~110K	None	Facilitated
Boane	~105K	Facilitated	None
Dondo	~103K	None	Unknown
Inhambane	~74K	Facilitated	Unknown
Chokwe	~68K	None	Unknown
Namaacha	~47K	Unknown	None

Note: The status of SLP engagement was learned through the co-design workshops.

Source: Two websites (UN Habitat 2021; City Population n.d.).

Sector stakeholders also highlight three implementation-specific challenges. The first challenge is that regulators and municipalities do not know the cost of service delivery by water and sanitation SLPs in order to set viable tariffs, although they have reference tariffs set for PVPs in the water sector (USAID URBAN WASH 2023). In the water sector, a national-level survey of ~1,800 PVPs captured high-level revenue and costs of service delivery of PVPs (USAID SPEED+ 2018a), including monthly revenue from domestic and commercial customers and costs such as operating costs, personnel costs, energy costs, water treatment costs, and loan repayments at a point in time. However, the survey did not cover the impact of transitions on the cost of service delivery and the key drivers of these costs and the sources of funds (e.g., funders, municipality) to deliver the services. In the FSM sector, literature predominantly documents donor-funded interventions, such as WSUP's intervention in Nhlamankulo and KaMaxaquene districts of Maputo (Drabble and Parente 2018), but not the cost of licensing by municipalities or the cost of service delivery of emptiers.

The second challenge is that SLPs face barriers to get formalized and to remain formalized. In the water sector, some PVPs do not renew their licenses, and in the FSM sector, emptiers may exit the sector after becoming formalized (WSUP 2023).

The third challenge is the absence of monitoring processes, as mentioned by AURA during the co-design workshop. In the water sector, while Decreto 51/2015 outlines responsibilities for monitoring and evaluating PVP performance, it lacks specificity on which PVP practices should be monitored. In the FSM sector, literature on WSUP's intervention presents little information on the instituted monitoring practices (Muximpua et al. 2017). Similarly, for emptier licensing in Beira, there is no information on the monitoring and compliance of emptiers.

Finally, the impact of transitions on households' access, affordability, quality, and experience are currently unknown, and local stakeholders highlighted the need to understand the impact. For the water sector, literature does not provide information about how transitions affect the mix of sources used by households and the usage of water through each of these sources. A gap also exists in understanding how access to water services changes post licensing of PVPs in an area. For PVPs, existing data covers

indicators, such as PWWPs' water quality (Chaponniere and Collingnon 2019; Ahlers et al. 2012) and tariffs (Chaponniere and Collingnon 2019), but it has little information on water handling practices and the impact of transitions on water quality. Data on the impact of transitions is even more limited in the FSM sector, with some evidence on service provision only coming from donor-funded interventions (Drabble and Parente 2018) in specific areas.

DNAAS and AURA see the URBAN WASH implementation research as important to incentivize cities to transition; inform decision-making on tariffs, licensing processes, and monitoring of SLPs; and understand the impact of engaging the private sector on households.

## 4.0 RESEARCH QUESTION I – CHOICE OF TRANSITIONS

### 4.1 OVERALL APPROACH

The aim of RQI is to understand municipalities and utilities<sup>7</sup> choice of implementing transitions. It is framed around three sub-research questions, which are common across both the water and FSM sectors:

- How did municipalities and utilities (where relevant) make the choice on:
  - **Why** to implement a transition?
  - **Which** transition to implement?
  - **Where** to implement the transition?
- Who influences these choices, and how?
- What is the perspective of community stakeholders on the conditions and influencers impacting these choices?

Understanding the perspectives of municipalities and utilities is important because they are the mandated or legalized decision-makers for transitions. In the water sector, the decision-makers differ by the nature of the transition. The decision-makers for transitions involving licensing of PWWPs are municipalities; for bulk water arrangements, utilities sub-contract PWWPs in areas where both private and public water provision are happening concurrently (FIPAG 2023). In the FSM sector, the decision-maker varies by region, as explained in Section 3.

However, the conditions that prompt these decision-makers to implement a transition are not known. Stakeholders noted multiple considerations during scoping conversations and the co-design workshops, such as the water table in an area, the likelihood of water contamination, and prevalent non-revenue water rates, which influence decisions in the water sector. In the FSM sector, the conditions that stakeholders noted in co-design included the availability of disposal sites (e.g., treatment plants, transfer stations) and the number of emptiers operating in an area. However, the degree to which these conditions affect choice and the other conditions that affect choices of implementing a transition are unclear.

Understanding who influences decision-makers' choices and how they exert this influence is important because decisions on transitions in Mozambique's water and FSM sectors are impacted by various stakeholders, such as DNAAS and FIPAG in the water sector, along with development organizations such as WSUP and the World Bank funding work on FSM at the city level (Weststrate et al. 2019). While literature acknowledges the existence of influencers (Valuing Water Initiative n.d; Weststrate et al. 2019), more knowledge is needed on how they exert their influence to support DNAAS' and AURA's agenda of expanding private sector engagement (e.g., more cities, more SLPs, more households served). Moreover, influencers identified in literature predominantly enable transition choices, whereas those who inhibit transitions are yet to be uncovered. Research addressing these evidence gaps can support

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<sup>7</sup> For this chapter, utilities refer to both sub-national utilities (e.g., AdRMM) in the water sector and autonomous sanitation bodies (e.g., SASB in Beira) in the FSM sector.

AURA and DNAAS and incentivize cities to leverage the private sector and development organizations to identify the enablers or inhibitors for transition decisions.

Understanding the perspective of community stakeholders, such as SLPs and households, is important since they are the most impacted and can play an enabling role in transitions. Speaking to community stakeholders can provide a diverse perspective on conditions and influencers impacting decision-making.

The overall approach for answering these research questions is:

- A retrospective analysis of the choices that individual municipalities and utilities make and the conditions and influencers impacting these choices,
- Validation and refinement of the conditions and influencers by multiple municipalities and utilities, and
- Capturing perspectives of community stakeholders on the conditions and influencers.

## 4.2 STUDY SITES

URBAN WASH will conduct this analysis for four cities in Mozambique. The selection was based on ensuring diversity across the degree of engagement with PWWPs and emptiers, the size of the jurisdiction covered, and the variety of decision-makers and influencers (refer to Table 2). The diversity across degrees of engagement is important for the comparison of choices on “**why**” to allow the team to compare cities that did not engage vendors with those that did. The diversity in jurisdictions, size, and variety of decision-makers and influencers allows comparison across a wider range of cities and decision-making structures.

The team determined the degree of engagement, decision-makers, and influencers based on the information gathered from co-design. “Low” indicates no or low engagement with vendors over the past three years. “High” indicates cities have formally engaged with vendors in the past three years. The influencers in Table 2 are an initial list based on scoping and co-design, and URBAN WASH may discover more after the initial interviews.

**Table 2: Degree of engagement with SLPs for the water and FSM sector**

Cities	Population within Jurisdiction	Population with Private Water Access <sup>8</sup> /Sewerage Access (%)	Degree of Engagement with SLPs	Decision-makers <sup>9</sup>	Influencers
<b>Water</b>					
Maputo	~1,124K	~84%	High	Maputo municipality, AdRMM	DNAAS, FIPAG
Matola	~1,029K	~81%	High	Matola municipality	DNAAS
Beira	~592K	~54%	Low	Beira municipality	DNAAS
Boane	~105K	~44%	Low	Boane municipality	DNAAS
<b>FSM</b>					
Maputo	~1,124K	10%	High	Maputo municipality	DNAAS, WSUP

<sup>8</sup> “Private access to water” means safe access to piped water in the household’s own yard or inside the house. The remaining percentage indicates access to shared water sources (e.g., wells) or to water from unsafe sources.

<sup>9</sup> As per inputs received in co-design, utilities (e.g., AdRMM) and FIPAG are involved only in bulk-water transitions and not in licensing transitions. If URBAN WASH discovers that they are decision-makers or influencers, then the team will also interview them for other transitions.

Cities	Population within Jurisdiction	Population with Private Water Access <sup>8</sup> /Sewerage Access (%)	Degree of Engagement with SLPs	Decision-makers <sup>9</sup>	Influencers
Matola	~1,029K	0%	Low	Matola municipality	DNAAS
Beira	~592K	<10%	High	Autonomous sanitation body	DNAAS, World Bank, Beira municipality
Boane	~105K	<10%	Low	Boane municipality	DNAAS

Note: Maputo's degree of engagement with SLPs for FSM is high with the support of WSUP for transitions.

Source for population data and water access: One website (UN Habitat 2021).

Source for sewerage access: One report (Capone 2020).

### 4.3 DATA COLLECTION PLAN

For analysis of municipalities and utilities' (where relevant) choices and who influences these choices, URBAN WASH will conduct:

- IDIs with an initial list of staff from the 8–9 decision-makers and 8–12 influencers identified (see Table 3 and Table 4 for a list of decision-makers and influencers) to understand conditions and other influencers impacting the choices. Given the emergent nature of the research, the team may conduct a second, more targeted interview per decision-maker or influencer (with the respondent profile depending on who is best placed to answer the targeted question). The team will conduct these interviews either in-person by an engagement manager with significant research experience or virtually by the FSG team. URBAN WASH will interview the specific stakeholders below:
  - For the decision-makers: The “Director of Public Works” at each municipality, the “Director, Commercial Manager, and Monitoring Department Head” at AdRMM, and the “Deputy General Manager, Operations” at the autonomous sanitation body.
  - For influencers: The “Director of Services” at FIPAG, the “Sanitation Lead” at DNAAS, the “Program Head” at WSUP, the “Water and Sanitation Specialist” at the World Bank, and the “Director of Public Works” at the Beira municipality.
- IDIs with one to three additional decision-makers and influencers identified during the initial list of IDIs to understand conditions and influences. URBAN WASH may also conduct one to two additional one-on-one IDIs with stakeholders from the initial list of decision-makers and influencers (to further understand the conditions and influences) if they strongly impact the choice. The team will conduct these interviews either in-person by an engagement manager with significant research experience or virtually by the FSG team.
- Two in-person, multi-stakeholder workshops (one for water and one for FSM) with 12–16 stakeholders each to validate the conditions and influencers. FSG will conduct these workshops with translation and facilitation support from a local research agency. Each workshop will include:
  - The decision-makers and influencers listed in Table 3 and Table 4,
  - One to three additional decision-makers and influencers identified during IDIs, and
  - One community stakeholder and one SLP representative for each sector and city for their perspective on the decision-makers and influencers.

- After each workshop, URBAN WASH will conduct six to eight one-on-one IDIs with the community stakeholders and SLP representatives (to capture their perspectives on a conflict map). FSG will conduct these IDIs with translation support from a local research agency.

**Table 3: Initial list of water sector decision-makers and influencers**

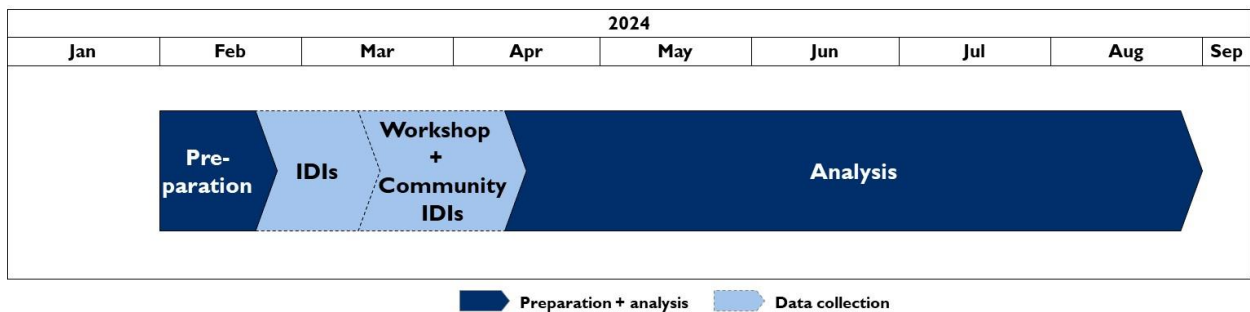
City	Decision-maker	Influencers
Maputo	Maputo municipality, AdRMM	DNAAS, FIPAG
Matola	Matola municipality	DNAAS
Beira	Beira municipality	DNAAS
Boane	Boane municipality	DNAAS

**Table 4: Initial list of FSM sector decision-makers and influencers**

City	Decision-maker	Influencers
Maputo	Maputo municipality	DNAAS, WSUP
Matola	Matola municipality	DNAAS
Beira	Autonomous sanitation body	DNAAS, World Bank, Beira municipality
Boane	Boane municipality	DNAAS

The timelines for the activities described above are summarized (light blue) in Figure 3. The activities are detailed in subsequent sections.

**Figure 3: Timeline for RQ1 data collection and analysis**



Acronyms: *IDI: In-depth interview*

For additional details on the data collection plan for each municipality and utility choices, influencer’s impact on choice, and community perspectives, please refer to Appendix 2.

## 4.4 ANALYSIS PLAN

### 4.4.1 FOR MUNICIPALITY AND UTILITY CHOICES AND CONDITIONS

**Question:** How did municipalities and utilities make the choice on:

- **Why** to implement a transition?
- **Which** transition to implement?
- **Where** to implement the transition?



URBAN WASH will **develop an initial framework of the conditions** influencing each choice. For each choice, the team will generate the framework comparing conditions:

- For **“why”**: municipalities and utilities that implemented transitions versus those that did not.
- For **“which”**: transitions to facilitated markets versus those to managed.
- For **“where”**: settlements where transitions were implemented versus where they were implemented but withdrawn versus those that were considered but did not get implemented.

URBAN WASH will also disaggregate how the conditions may vary by different municipality and utility archetypes if the data suggests differences between them.

To develop an initial view of the conditions influencing the choices, the team will use the data from the IDIs with the municipalities and utilities (from both the initial list and additional decision-makers and influencers identified during IDIs). This will be done in an emergent manner.

- First, the team will develop transcripts of each interview with the municipality and utility.
- Then, the team will read transcripts from each interview with the municipality and utility and use open coding<sup>10</sup> to generate themes of conditions for each choice. URBAN WASH will capture these themes as sub-categories under three broad categories:
  - Political and legal (e.g., rules, leadership, events),
  - Economic and technical (e.g., availability of financial resources or infrastructure), and
  - Social and environmental (e.g., rules, relationships, events, political capital, and incentives).

For example, responses such as “settlement leader has influence over municipality” and “settlement leader has links to development organization representatives” would be captured under the theme “political influence of settlement leadership” under political and legal.

- Then, a second team member will read the transcripts and review the themes generated by the first member to reduce the bias of only one person reviewing data.
- Then, the research team will read transcripts from the second round of interviews, with the municipalities and utilities the team conducts them with and use axial coding<sup>11</sup> on these transcripts to refine the captured data.

Finally, the team will validate and refine the framework of conditions for each sector (refer to Appendix 3) at the workshop by gathering the collective perspective of multiple municipalities and utilities. URBAN WASH will use selective coding<sup>12</sup> on the data generated from the workshop to finally refine the conditions (i.e., collapse conditions together or reorder conditions). The team will first read the data collected from the workshop and conduct the selective coding. The approach for capturing data will vary based on the different facilitation methods used (refer to Appendix 2), including:

- Listing additional conditions for each choice by reading through the sticky wall notes, and
- Assigning rankings and degree of importance to each condition by reviewing inputs from the pairwise comparison and scoring activities.

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<sup>10</sup> Refers to reading the transcript data several times, breaking down the qualitative research data into excerpts, and making summaries of the concept or theme (Qualtrics 2023).

<sup>11</sup> Refers to comparing data from further data collection to summarize concepts or themes to look for similarities and differences (Qualtrics 2023).

<sup>12</sup> Selective coding aims to integrate and validate the different categories developed during axial coding. It aims to understand the root causes of different categories to develop a common core category (Vollstedt and Rezat 2019).

URBAN WASH will also **develop a list of the support required by municipalities and utilities** to implement transitions. This will be a simple exercise of gathering workshop data on the support required, as stated by the municipalities and utilities.

#### 4.4.2 FOR INFLUENCERS

**Question:** *Who influences the municipalities and utilities' choices, and how?*

URBAN WASH will **develop an initial map of the influencers** impacting each choice for each city. For each choice, the team will understand the kinds of influence (inhibiting, enabling, or neutral) exerted by each influencer. To develop an initial view of the influencers impacting the choices and the kinds of influence of each, the team will use the data from the IDIs with the municipalities, utilities, and the initial list of influencers (identified through scoping and co-design conversations). This will be done in an emergent manner.

- First, the team will develop transcripts of each interview with municipalities, utilities, and influencers.
- Then, the team will read transcripts from each interview with municipalities, utilities, and influencers to identify influencers and generate themes on the kinds of influence (inhibiting, enabling, or neutral).
- Then, a second team member will read the transcripts and review the themes generated by the first member to reduce the bias of only one person reviewing data.

Finally, the team will validate and refine the kinds of influence (inhibiting, enabling, or neutral) for each influencer for each sector at the workshop by gathering the collective perspective of multiple municipalities, utilities, and influencers. The team may also interview decision-makers who are strongly influenced (especially inhibiting influence) and the influencers exerting this influence from the initial list of decision-makers and influencers, again to refine the kinds of influence.

The URBAN WASH team will generate a visual summary of the influencers, kinds of influence they exert, and how they influence (refer to Figure 4 for an illustrative output).

Additionally, the team will capture the degree of influence using the sticky wall exercise. This exercise will involve asking participants to assign a set number of tokens on a map to denote the degree of influence. Participants can assign more than one token to a component on the map to denote a higher degree of influence. URBAN WASH will use this to prioritize the kinds of influence shown in Figure 4, or the team may create a visual summary of the degree of influence by influencer.

**Figure 4: Illustrative summary of the kinds of influence and the degree of influence by influencer**

Summary of kinds of influence

	DNAAS	Influencer 1	Influencer 2	Influencer 3
Inhibiting influence	<ul style="list-style-type: none"> <li>Creation of multiple concessionary agreements</li> </ul>	<ul style="list-style-type: none"> <li>xx</li> <li>xx</li> </ul>	<ul style="list-style-type: none"> <li>xx</li> <li>xx</li> </ul>	<ul style="list-style-type: none"> <li>xx</li> <li>xx</li> </ul>
Both Enabling and inhibiting influence	<ul style="list-style-type: none"> <li>Allocation of funds</li> </ul>	<ul style="list-style-type: none"> <li>xx</li> </ul>	<ul style="list-style-type: none"> <li>xx</li> </ul>	<ul style="list-style-type: none"> <li>xx</li> </ul>
Enabling influence	<ul style="list-style-type: none"> <li>Provides implementation guidelines</li> <li>Conduct spatial mapping study</li> </ul>	<ul style="list-style-type: none"> <li>xx</li> <li>xx</li> </ul>	<ul style="list-style-type: none"> <li>xx</li> <li>xx</li> </ul>	<ul style="list-style-type: none"> <li>xx</li> <li>xx</li> </ul>

#### 4.4.3 FOR COMMUNITY PERSPECTIVES

**Question:** What is the perspective of community stakeholders on the conditions and influencers impacting municipalities and utilities' choices?

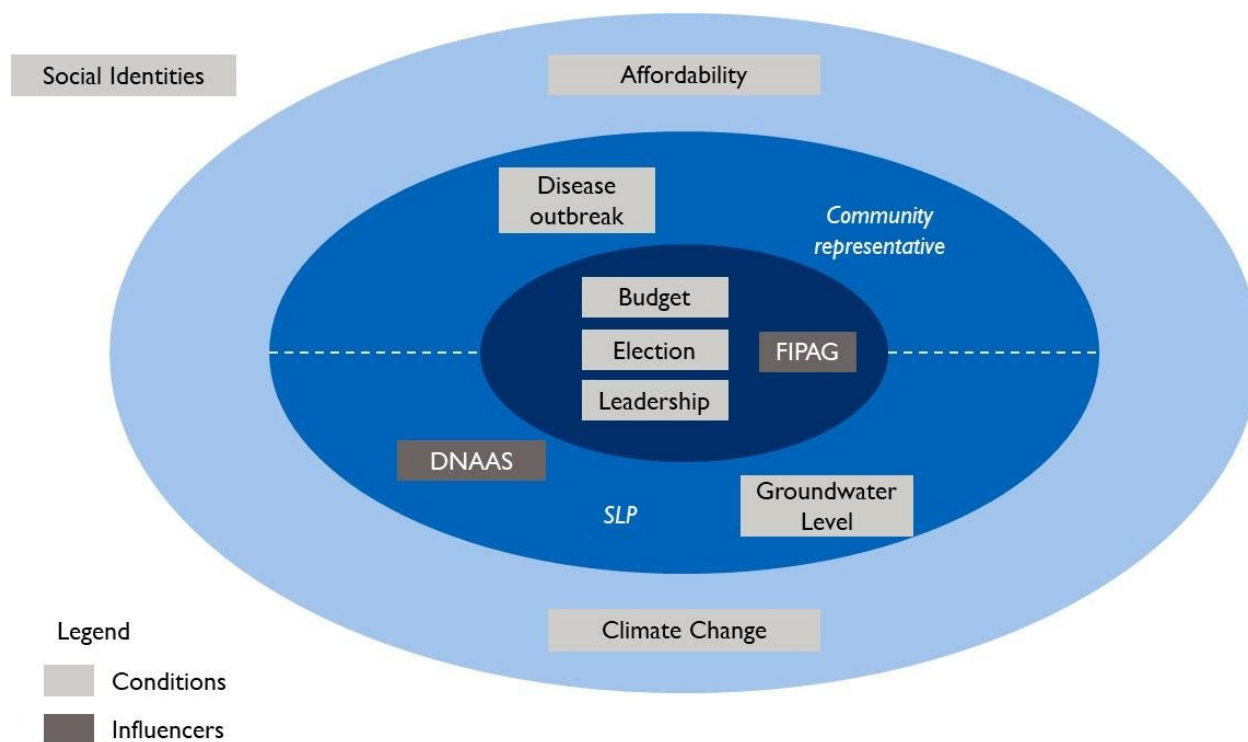
URBAN WASH will capture the perspective of community stakeholders (i.e., community representative and SLPs) by **categorizing conditions and influencers along four dimensions**, which can be visually depicted using a conflict map<sup>13</sup> (refer to Figure 5):

- Conditions and influencers validated by all community stakeholders (dark blue circle in Figure 5),
- Conditions and influencers where either the community representative or SLP agree (medium blue circle in Figure 5),
- Conditions and influencers where no community stakeholders agree with the decision-makers or influencers (light blue outer circle in Figure 5), and
- Additional conditions and influencers not stated by decision-makers or influencers but stated by community representatives (outside the map in Figure 5, e.g., social identities).

The team will produce a conflict map for each choice made by the decision-maker, with the conditions and influencers as the units of analysis.

<sup>13</sup> URBAN WASH will generate this by adapting the conflict map (Anglo American n.d.) approach, which typically maps different stakeholders and their relationships over a specific issue.

**Figure 5: Indicative conflict mapping<sup>14</sup>**



URBAN WASH will capture if different community stakeholders agreed or disagreed with the decision-makers and influencers by reading transcripts from the IDIs (after the workshop) with the community stakeholders. This will be conducted by either FSG with the help of a translator or by an engagement manager with strong research experience, with whom FSG will regularly debrief.

The team will read the notes at the end of the day of data collection and process it into a template that lists each condition, influencer, stakeholder type, and city. The team members will capture the number and type of stakeholders that agreed with each condition and each influencer. The team will then transfer this data onto the map once they have the final list of refined conditions and influencers.

The team will capture any new themes that emerge from the IDIs with the community stakeholders for the additional conditions and influencers. At the end of each data collection day, the team will produce a long list of the additional conditions and influencers. During the analysis, the team members will read the transcripts and develop categories using open and axial coding and the same steps as detailed.

<sup>14</sup> If required, URBAN WASH may take additional cuts for the conflict map (e.g., separating community representatives and SLPs, separate by cities).

## 5.0 RESEARCH QUESTION 2 FOR WATER – IMPLEMENTATION OF TRANSITIONS

### 5.1 OVERALL APPROACH

RQ2 for water is framed around an overall question on cost of service delivery and two lever-specific questions.

- What is the cost of service delivery for PWWPs?
- What are the challenges to formalization and the reasons for conflicts and drop-offs post-formalization? (player lever)
- What are the challenges for PWWPs to comply with current guidelines? (rules lever)

Understanding the cost of service delivery is important because AURA and DNAAS are eager to develop tariffs that are viable for both licensed PWWPs and bulk water provision. For both, the regulators have cited a lack of data, and two attempts in the past to set tariffs for licensed PWWPs have not worked. As mentioned in Section 3, literature captures high-level costs of service delivery (USAID SPEED+ 2018a), but it does not examine financial viability, the drivers and barriers faced by the PWWPs for providing services, or how financial viability changes after a transition. Additionally, most of the data on tariffs of PWWPs and utilities is outdated and may not enable AURA and DNAAS to determine viable tariffs for further transitions.

Understanding the challenges to formalization is important since regulators are unclear on how to effectively engage with PWWPs as the municipalities continue to license PWWPs and utilities scale up bulk water provision. AURA highlighted the need to understand why PWWPs drop off from the process of licensing and why some do not renew their licenses.

Stakeholders are also keen to improve the monitoring process for PWWPs, but AURA needs to understand the challenges for PWWPs to comply with guidelines before designing sustainable guidelines and monitoring processes (AURA 2023).

The overall approach for RQ2 will be retrospective research of two transitions in the Greater Maputo region—the licensing of SLPs (across Maputo and Matola) and the more recent bulk water arrangement in Maputo. The research will include:

- Financial analysis of the following:
  - Impact of transitions on the viability of the PWWPs by developing their profit and loss (P&L) statements for pre- and post-transition, and
  - Costs incurred by municipalities and utilities for implementation of transitions.
- Thematic analysis of the challenges to licensing and compliance with guidelines, and reasons for drop-offs.

### 5.2 STUDY SITES

URBAN WASH will conduct this study in Maputo and Matola, two cities where the licensing and bulk water transitions are active.

Table 5 provides details of these transitions.

**Table 5: Transitions for study by shortlisted cities**

Transition	Cities	Transition Details				
		Settlements	Status	Licensing/Contracting Authority	No. of PWP's	Transition Details
Licensing of PWP's	Maputo and Matola	Multiple low-income and peri-urban settlements	Started in 2015	Local municipality	~500	<b>Unregulated to facilitated</b> , by providing licenses to PWP's
Bulk water provision to PWP's	Maputo		Started in 2023	AdRMM, the public utility	~10	<b>Facilitated to managed</b> , by contracting licensed PWP's and providing them with bulk water

### 5.3 DATA COLLECTION PLAN

URBAN WASH will gather data through:

- In-person IDIs with ~40 formal and informal PWP's across different categories (e.g., size, gender, type of transition as detailed in Table 7). The FSG team will conduct these IDIs with translation support from a local research agency.
- In-person IDIs with the Director of Public Works in charge of licensing at the Maputo and Matola municipalities and the Director, Commercial Manager, and Monitoring Department Head in charge of bulk water provision at the utility (i.e., AdRMM).

The sample of the PWP's will aim to capture diversity across different types of the PWP's prevalent in Maputo and Matola. URBAN WASH analyzed a survey of PWP's by USAID SPEED+ in 2018 (refer to Table 6) to map the active PWP's in Maputo and Matola.

**Table 6: USAID SPEED+ 2018 data for Maputo and Matola**

Type of SLP by City	Informal				Licensed				Total
	Small		Large		Small		Large		
	Male	Female	Male	Female	Male	Female	Male	Female	
<b>Maputo</b>	127 (22%)	40 (7%)	30 (5%)	3 (1%)	33 (6%)	18 (3%)	19 (3%)	2 (0%)	<b>272 (48%)</b>
<b>Matola</b>	129 (23%)	22 (4%)	48 (8%)	9 (2%)	28 (5%)	4 (1%)	52 (9%)	5 (1%)	<b>297 (52%)</b>
<b>Total</b>	<b>256 (45%)</b>	<b>62 (11%)</b>	<b>78 (14%)</b>	<b>12 (2%)</b>	<b>61 (11%)</b>	<b>22 (4%)</b>	<b>71 (12%)</b>	<b>7 (1%)</b>	<b>569 (100%)</b>

Note:

- Small is defined as PWP's with less than 200 active connections.
- PWP entrepreneurs include both males and females.
- The research team has excluded PWP's who have zero active connections.

**Table 7: Sampling plan for RQ2 water**

Type of SLP by City	Dropped-Off	Informal				Licensed				Bulk Water	Total
		Small		Large		Small		Large			
		Male	Female	Male	Female	Male	Female	Male	Female		
Maputo	4	4	2	2	1	2	2	2	0	4	23
Matola	4	4	1	2	1	2	1	3	1	NA	19
<b>Total</b>	<b>8</b>	<b>8</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>4</b>	<b>3</b>	<b>5</b>	<b>1</b>	<b>4</b>	<b>42</b>

Note:

- Small is defined as PWP with less than 200 active connections.
- PWP entrepreneurs include both males and females.
- The team currently does not have information on the sizes and genders of the bulk water and dropped-off PWPs.

URBAN WASH plans to cover SLPs across each of these categories (i.e., size, gender, licensing/informal) in addition to two new categories that are relevant in 2023—PWPs part of the bulk water transition and previously licensed PWPs that have not renewed their licenses (termed here as “drop-offs”). Within the categories of informal, licensed, bulk water, and dropped-off PWPs, the team will capture PWPs that are serving dense low-income areas within the city and those that are serving peri-urban areas. The team will also include one to two formal and one to three informal providers in the settlements selected under RQ3 (refer to Table 8) as part of the above sample. The team will also verify whether the proportion of SLPs across categories has significantly changed with AURA and AFORAMO (the PWP association) and adjust the sample, if needed.

The timelines for the activities mentioned above are summarized (light blue) in Figure 6. The activities are detailed in subsequent sections.

**Figure 6: Timeline for RQ2 water data collection and analysis**



Acronyms: IDI: In-depth interview

For additional details on the data collection plan for formal PWPs, informal PWPs, and municipalities/ AdRMM, please refer to Appendix 2.

## 5.4 ANALYSIS PLAN

### 5.4.1 COST OF SERVICE DELIVERY

URBAN WASH will understand the cost of service delivery for informal and licensed PWPs and those PWPs part of the bulk water arrangement by building their P&L statements. The time periods for the P&L statements will vary based on the type of PWP:

- Informal PWWs, for the most recent year and the year before transition in their settlement (if there are licensed PWWs in the areas they operate);
- Dropped-off PWWs (i.e., previously licensed), for the most recent year (if still providing services) and when they were licensed;
- Licensed PWWs, for the most recent year and the year before they got a license; and
- Bulk water PWWs, for the most recent year and the year before the bulk water arrangement.

The P&L statement of the PWWs will capture the revenues earned and costs incurred for providing water. To build the P&L statements, URBAN WASH will capture the notes from interview transcripts with the PWWs conducted in-person every day (to ensure better recall from the interviews) into a standardized P&L template with line items for the different revenues and costs.

The team will then conduct several comparative analyses of the P&L statements to:

- Compare the P&L statements of bulk water PWWs with licensed and informal PWWs to understand the impact of bulk water transitions on viability of service delivery;
- Compare the P&L statements of licensed PWWs with the informal and dropped-off PWWs to understand the impact of licensing on viability of service delivery; and
- Compare the P&L statements of different types of PWWs (e.g., large versus small, male versus female, Maputo-based versus Matola-based) to understand how these various factors can impact viability.

The team will also capture the costs borne by the municipalities/AdRMM for implementing the transition (e.g., cost of generating a license, monitoring, subsidies for costs/services, provision of bulk water). The team will add these costs to the P&L analysis above to derive the cost of service delivery.

The team will capture the notes from interview transcripts with the municipalities/AdRMM conducted in-person every day (to ensure better recall from the interviews) into a standardized P&L template with line items for the different revenues and costs incurred.

#### 5.4.2 CHALLENGES TO FORMALIZATION

**Question:** What are the **challenges to formalization** and the reasons for **conflicts and drop-offs post-formalization**?

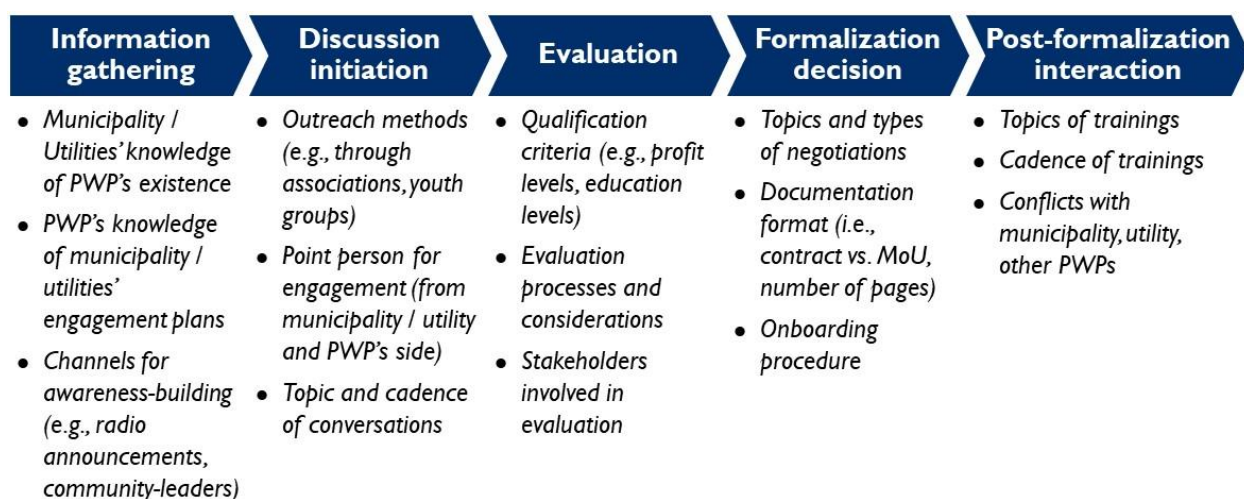
URBAN WASH will **produce an engagement journey map** for the PWWs (similar to a consumer buying process journey<sup>15</sup>) through deductive thematic analysis.<sup>16</sup> The map will describe the stages and activities for engaging PWWs (see Figure 7 for an illustrative engagement journey). The team may produce different maps for each stakeholder under each transition (e.g., municipality/AdRMM, licensed PWP, informal PWP) if their perspectives on the stages are significantly different from each other and understand the reasons for these differences.

<sup>15</sup> The consumer buying process journey map is a tool used by companies to understand the various stages of decision-making a consumer goes through, with the aim of understanding the stages that are most successful and those that need improvements (The Chartered Institute of Marketing 2022).

<sup>16</sup> Deductive thematic analysis because literature is an appropriate method for qualitative analysis when you have a hypothesized theme (Dovetail Editorial Team 2023). In this case, URBAN WASH has already hypothesized themes for the stages and activities in the journey and the challenges at each stage.



**Figure 7: Stages of the identification and engagement process**



Acronyms: PWP: Private water provider; MoU: Memorandum of understanding

URBAN WASH will produce the maps in two steps, using data from the transcripts from the IDIs with PWPs and the municipalities/AdRMM:

- At the end of each day of data collection, the team will capture notes from the interviews and the logbooks onto the hypothesized engagement stages (refer to Figure 7), capturing activities that do not fit in these separately as “additional stages.”
- Post-data collection, the team will read through the notes to identify the different activities mentioned across the interviews, especially for data captured under “additional stages,” to generate a refined engagement journey map (collapsing or adding stages where required).

Then the team will **evaluate and compare the experiences of different PWPs** to understand the challenges faced, decisions made, and reasons for conflict and drop-offs at each stage of the refined engagement journey through a deductive thematic analysis.

- For licensed and bulk water PWPs, the team will understand their key decisions, challenges, and motivations to continue through each stage.
- For informal PWPs, the team will understand their key decisions and motivations to continue as long as they did (if they engaged in the formalization process at all).
- For dropped-off PWPs, the team will understand the key reasons for not renewing their license.
- For municipalities/AdRMM, the team will understand their involvement, cost, and challenges mentioned for each of the stages.

For each of the above PWPs, if URBAN WASH observes significant differences, then the team will disaggregate the experiences, challenges, decisions, and conflicts by size, gender, or location of PWPs.

The team will do this analysis in two steps, using data from the transcripts from the IDIs with municipalities/AdRMM, formalized PWPs, and informal PWPs.

- At the end of each day of data collection, URBAN WASH will capture notes from the interviews onto each stage of the hypothesized engagement map, capturing responses that do not fit on this map separately under “additional stages.”

- Following data collection, the team will read through the captured notes to identify themes of challenges, key decisions, and motivations for each type of PWP and the municipalities/AdRMM.

### 5.4.3 CHALLENGES TO COMPLIANCE

**Question:** *What are the **challenges for PWP**s to comply with guidelines?*

First, URBAN WASH will **map the current guidelines** provided by AURA, municipalities, and/or AdRMM to the PWP's that are part of transitions. The team will gather this data by reviewing the licenses and contracts of the PWP's (where these are available) and by asking AURA.

Then, the team will **measure the degree of compliance** by PWP's to these guidelines on a scale of 0–5 based on their self-reported compliance. The team will capture notes at the end of each day of data collection from the transcript onto a template mapping their stated compliance against each guideline.

URBAN WASH will **identify and analyze key barriers** for PWP's to comply with the guidelines by:

- Estimating **costs for implementation**, and its impact on viability; and
- Conducting a **deductive thematic analysis of reasons** stated for not being able to implement them.

For costs of implementation, the team will analyze the cost of compliance by:

- Quantifying the impact of compliance on their viability for the guidelines they are following, and
- Estimating the impact of compliance on their viability for the guidelines they do not follow.

For the thematic analysis of barriers, the team will study the rating provided by PWP's, and the reasons they state on awareness of, ability to comply to (self-reported), and willingness to comply with different guidelines.

URBAN WASH will capture details from the interview transcripts at the end of each day onto a template against each guideline. After data collection, the team will analyze the costs and challenges by reading responses, identifying themes of challenges, and transferring the costs to the P&L statements generated above.

## 6.0 RESEARCH QUESTION 3 FOR WATER – IMPACT OF TRANSITIONS

### 6.1 OVERALL APPROACH

The aim of RQ3 for water is to understand the impact of transitions on households, the practices of PWP, and the resilience of services. It is framed around four research questions:

- What is the impact of transitions on **access to formalized services** in a settlement?
- What is the impact of transitions on **affordability and perceived quality** of water for households served by licensed PWP?
- What is the impact of transitions on the **water-handling practices of licensed PWP?**
- What is the impact of transitions on the **resilience of service delivery?**<sup>17</sup>

Understanding the impact of transitions on access to formalized water services in a settlement is important, as urban households generally have multiple sources of water, including water provided by the utility and by PWP (USAID SPEED+ 2018b). In areas served by both private and public water networks, customers often have two water connections and use the cheaper public water supplied as their primary source and supplement this with PWP water when necessary (USAID SPEED+ 2018b). However, changes in the amount of water consumed from different sources and the purpose of consumption after a transition are not known.

Understanding the impact of transitions on the affordability for households served by licensed PWP is important because PWP are often more expensive than public utilities (Kariuki and Schwartz 2005). Tariffs developed for PWP were lower than the price they were charging before formalization (USAID URBAN WASH 2023), and it is unclear how these tariffs compare to other sources of water used by households. Data on PWP tariffs does not cover whether affordability of water services changes after a transition.

Understanding the impact of transitions on water handling practices of PWP is important since it directly impacts quality and perceived quality of water, as it may impact the household's choice of provider. A 2008 midterm impact assessment of Mozambique's water sector by the One Million initiative found that quality often deteriorates between the source and point of use (Borja-Vega et al. 2018). There are also contrasting views on the impact of transitions on water handling practices. A PWP association representative at the co-design workshop stated that licensing did not change their practices. However, other stakeholders at the co-design workshop and literature believe that licensing leads to improvement in their quality of service (Bhatt 2013). While literature captures the perceived quality of water for utilities in 2014 (Borja-Vega et al. 2018) and water quality of PWP (Ahlers et al. 2012), there is no evidence on the impact of transitions on the actual quality of water and household perception.

Understanding the impact of transitions on the resilience of service delivery is important as it can provide insight into whether the drinking water service delivery systems can adapt to stresses. Climate change and urbanization are risks to the continuity of provision of safe drinking water (UNICEF 2023;

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<sup>17</sup> URBAN WASH has adapted the definition from the USAID Market Systems Resilience Framework (USAID 2018) for this analysis. Resilience of service delivery refers to the ability of the drinking water service delivery network, involving households, PWP, and the utilities to adapt to and recover from shocks. This involves the ability to allocate resources, draw on system-level resources (such as utility and PWP networks, PWP and community networks, guidelines regarding safety of drinking water, etc.), and innovate to solve problems in the face of shocks and stresses.

Rashid, Manzoor, and Mukhtar 2018) globally. During the co-design workshop, stakeholders noted that recent climatic events, such as flooding and cyclones, had made it difficult to provide water. However, there is no evidence on the impact of transitions on the resilience of drinking water services, which could inform future urban planning.

The overall approach for RQ3 will be a combination of retrospective and retrospective plus prospective methods to understand the impact of transitions at different points in time relative to when they began:

- Retrospective research will involve gathering historical pre- (i.e., the baseline) and post-transition data for transitions that started between 2020 and 2023.
- Retrospective + prospective research will involve gathering historical pre-transition (i.e., the baseline) and historical and real-time post-transition data for transitions that started in 2023.

## 6.2 STUDY SITES

URBAN WASH will conduct the research on impact in two settlements, one each in Maputo municipality and Matola municipality, the same cities studied for RQ2. The team will get recommendations for settlements from AFORAMO or DNAAS that have recently licensed a PWP (to improve recall data) in densely populated low-income areas (refer to Table 8).

**Table 8: Settlements for RQ3 Water**

Municipality	Settlement Details		Transition Details		Research Method
	Settlement	Population	Status	Type	
Maputo municipality	Low-income area in city	~5,000	Started between 2020 and 2023	<b>Unregulated to facilitated</b> , by licensing PWPs, usually providing piped water from borewells	Retrospective
Matola municipality	One peri-urban area	~5,000	Mid-2023	<b>Unregulated to facilitated</b> , by licensing PWPs, usually providing piped water from borewells	Retrospective + prospective

## 6.3 DATA COLLECTION PLAN

**For the research on access, affordability, and perceived quality of water**, the team will collect data from households through the following methods:

- Household surveys, administered by a local research agency, with 100–120 randomly selected households (50–60 per settlement) to generate pre- and post-transition data on access, indicators to measure affordability, and perceived water quality. For Maputo municipality, the team will collect data at one point in time (i.e., retrospective, for pre- and post-transition data) and for Matola municipality, the team will collect data at two points in time (i.e., retrospective + prospective) with the same households (refer to Table 20 for further sampling details).
- FGDs, facilitated by a local research agency in FSG’s presence, with ~20 households (8–10 per settlement) to help validate findings and understand reasons for changes in access to formalized services.

**For the research on licensed PWP’s water handling practices**, the team will gather data through the same in-person IDIs conducted by the FSG team for RQ2:

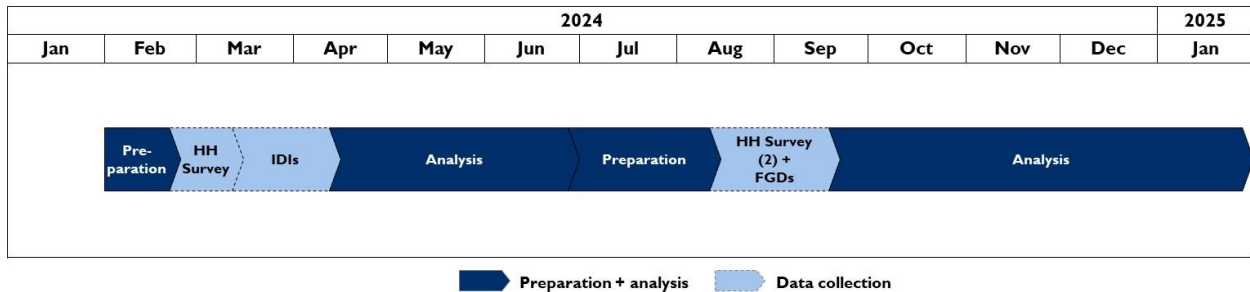
- Seventeen licensed PWP’s to capture changes in their stated water handling practices and reasons for the change (training received, enforcement processes, etc.), and

- Twenty-five informal PWP to capture their current practices for comparison for licensed PWP.

**For the research on resilience**, the team will gather data from one to three PWP (licensed and informal) and one to two community leaders in each of the two settlements as part of the surveys and interviews conducted under RQs 2 and 3 (refer to Table 9 in the analysis plan for the data source for each indicator).

Figure 8 provides the timeline for these activities, which are further detailed in subsequent sections.

**Figure 8: Timeline for RQ3 water data collection and analysis**



Acronyms: HH: Household; IDI: In-depth interview; FGD: Focus group discussion

For additional details on data collection plan for access, affordability and perceived quality, vendor’s water handling practices, and resilience, please refer to Appendix 2.

## 6.4 ANALYSIS PLAN

### 6.4.1 FOR ACCESS, AFFORDABILITY, AND CUSTOMER EXPERIENCE

**Question:** What is the impact of transitions on access to formalized services in a settlement?

#### **For Access to Formalized Services**

This study defines access as the share of a household’s total water consumption sourced from licensed PWP (in terms of percentage and liters), and their ability to do so in a timely and reliable manner.

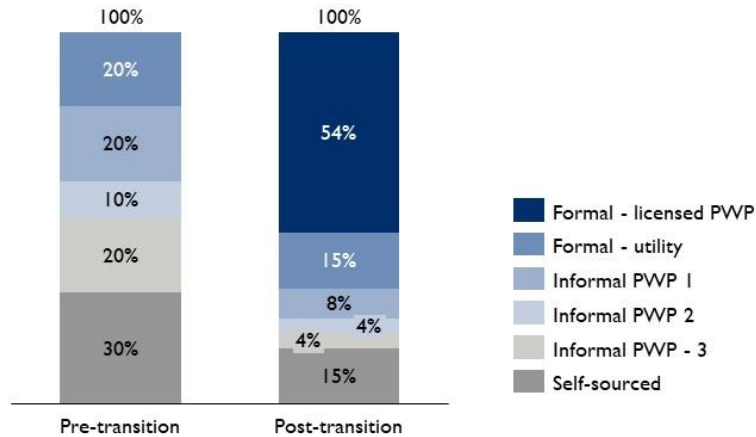
URBAN WASH will **measure the change in access within a settlement** by comparing households’ water portfolio pre- and post-transition to understand whether there has been a change in consumption from licensed PWP post-transition (refer to Figure 9). The portfolio refers to the split of the volume of water consumed in a month by a household across the different sources from which the household receives the water:

- Formal - licensed PWP refers to any PWP licensed by the municipality (only applicable post-transition).
- Formal - utility refers to any utility-owned source—piped or decentralized (e.g., standpipe).
- Informal PWP refers to any unlicensed PWP who is selling water informally.
- Self-sourced refers to when the household sources the water themselves (e.g., from a river, lake, or private boreholes).

URBAN WASH will produce two separate portfolios—one each for the total portfolio and for the drinking water portfolio. The sampling (refer to Table 8) will provide a portfolio representative of the

settlement’s water portfolio with 95 percent confidence interval and a five to six percent margin of error.

**Figure 9: Illustrative pre- and post-transition water portfolio in a settlement (m<sup>3</sup> per capita, per month)**



URBAN WASH will first build this portfolio for each household that the team gathers data from and then take an average (or median in case there are outliers in the data) across all the households in the settlement to create a single pre- and post-transition water portfolio for the entire settlement. The comparison will aim to determine if, and by how much, there is a shift in consumption to licensed PWPs post-transition in the settlement.

The team will then disaggregate the portfolios for different segments (e.g., by wealth quintiles, for male-versus female-led households, volume consumed) to determine if access to formalized sources varies by segment. The team will also collect seasonal consumption of water (i.e., for one rainy and one dry period) for pre- and post-transition and understand whether there are seasonal variations to accessing formalized services post-transition.

To build the water portfolio for both, pre- and post-transition for each household, the team will carry out the following steps, which have been adapted from the method used for the Indonesia Urban Resilient Water, Sanitation, and Hygiene Tangguh impact evaluation baseline conducted by URBAN WASH:

- Identify all sources and corresponding PWPs the household uses to purchase water;
- Gather data on the volume they consume from each PWP:
  - For all non-metered sources: Gather the total volume collected during the most recent trip based on capacity, frequency of trips, and number of containers used to fill water.
  - For metered sources: Gather data from their most recent water bill.<sup>18</sup>

<sup>18</sup> If the households are not able to produce a bill, URBAN WASH will ask them for the total volume consumed, billing period, and total amount paid in the last instance.

- Across both sources:
  - If water is used for drinking purposes, conduct a visual exercise where the household will be asked to split 10 rocks in the proportion used for drinking and non-drinking purposes.<sup>19</sup>
  - If water from any source is shared with the neighbor, ask the households to state the broad proportion (less than half, half or more than half) shared with neighbors, assuming the three categories as sharing 25 percent, 50 percent, and 75 percent, respectively.<sup>20</sup>
- Determine volume consumed per month from each PWP based on the frequency of sourcing for non-metered sources, and the billing period for metered sources;
- Calculate the total volume as the sum of volume from each PWP, and identify the volume consumed from each PWP as a proportion of the total volume; and
- Categorize the PWP as per the categories in Figure 9.

URBAN WASH will receive the household survey data, pre-coded in Statistical Package for Social Sciences (SPSS),<sup>21</sup> from the research agency, and the team will review this every day or every two days (based on the cadence with which the team receives the data) to monitor for errors or inconsistencies. Once URBAN WASH has a clean dataset, the team will use descriptive statistics and codes in SPSS to conduct the analysis stated above and develop the portfolio as per Figure 9.

The team will also **determine the reasons for households' choices** of PWP and their shifts in portfolios pre- and post-transition. URBAN WASH will do this by:

- **Developing an early hypothesis of the reasons** for households to choose different PWP through the household surveys. The team will do this by asking households to select their reason for selecting a PWP from a pre-populated list of possible reasons (price, proximity, unavailability of other sources, etc.). The team will analyze this data in SPSS using the same method as the survey data to measure change in access.
- **Understanding reasons in more detail**, through facilitated FGDs to understand why and how these reasons influence decisions. The team will also compare the reasons stated by households accessing water from licensed PWP versus those not post-transition. The team will do this through the following:
  - At the end of each day of data collection, the team will receive translated notes of the interview from the research agency and add additional detail from the team's notes (where needed).
  - The team will then map responses on to a template against each of the hypothesized reasons (mentioned above), and capture responses that do not fit on this template separately under "new reasons."

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<sup>19</sup> This method has worked well for applications where households must split a number into different proportions. For example, NORC conducted a similar activity for a project to estimate split of water consumed by the household versus their neighbor (Millennium Challenge Corporation 2022), and USAID through another project conducted a similar activity in Tanzania to estimate relative contributions of different household activities toward household income (Hess et al. 2017).

<sup>20</sup> Adding questions (like conducting the rock exercise) may give marginally more precision than the assumption of 50 percent but will add significantly more questions and a repetitive exercise for the household.

<sup>21</sup> SPSS is a statistical software platform that allows users to perform data entry and conduct quantitative analysis on the same.

- Following data collection, the team will read through the captured notes to identify trends of reasons, key decisions, and motivations for households.

The team will also **measure the proportion of households that significantly change** their consumption from a licensed PWP post-transition, based on the research method employed.

- For retrospective + prospective research, the team can carry out real-time tracking of the changes. The team will measure this from the household survey data collected by:
  - Identifying households who stated a change in the volume consumed from a licensed PWP post-transition in the second round of data collection, compared to the first round;
  - Calculating differences in their consumption between both rounds of data collection; and
  - Analyzing the data by coding and using descriptive statistics on the data received from the research agency.
- For retrospective research, a limitation of the study is that the team will be unable to capture households that started using water and later dropped off from a licensed PWP, as the team is collecting data only once in the post-transition period. The team will instead rely on the PWPs to share the proportion of households in each settlement that significantly reduced or stopped consuming water from them and invite such households to the FGDs to understand the reasons for drop-off. The team will measure this from the IDIs from formal PWPs by:
  - Capturing whether and how many customers started but eventually stopped or significantly reduced using the PWP's services post-transition, during the IDIs with the PWPs; and
  - Calculating the proportion of the above in the PWP's total customers served, after data collection.

URBAN WASH will also **understand the reasons** (price levels, reliability of source, availability when needed, etc.) **for households' changes in consumption** by analyzing data on household decisions for changing sources from the household surveys for retrospective + prospective research and FGDs for the retrospective research. The team will do this through the following:

- At the end of each day of data collection, the team will receive translated notes of the interview from the research agency and add additional detail from the team's notes (where needed).
- Following data collection, the team will read through the captured notes to identify trends of reasons, key decisions, and motivations for households.

### ***For Affordability and Perceived Water Quality***

**Question:** *What is the impact of transitions on affordability and perceived quality of water for households served by licensed PWPs?*

URBAN WASH will **measure the change in affordability and perceived quality** within a settlement by comparing the price for drinking water availed from licensed PWPs post-transition with the general market prices (i.e., prices charged by other PWPs in the market) and perceived quality for drinking water, pre-transition and post-transition. The sample of 50–60 households per settlement will give the team a 95 percent confidence interval with a five to six percent margin of error for the prices and perceived quality of different suppliers for the market of drinking water in the settlement.



This study will assess the price households paid for drinking water availed from licensed PWWs, relative to general market prices for drinking water, and will benchmark costs against household willingness to pay and monthly expenditures. For **changes in price**, URBAN WASH will compare the price paid to a licensed PWP for a typical volume of drinking water (e.g., per m<sup>3</sup>, per 20-litre jerry can) to the price paid to (1) other informal PWWs post-transition, and (2) all PWWs pre-transition. The team will compare using averages or medians of prices, depending on the distribution of the data and outliers. The team will also account for inflation in the Mozambican economy when comparing the data.

To better understand **willingness to pay** and **change in affordability**, the team will also compare the price paid to a licensed PWP with:

- Willingness to pay for a typical volume of drinking water from a licensed PWP, and
- Households' stated monthly expenditure.<sup>22</sup>

Finally, URBAN WASH will disaggregate the data to understand the differential impact for different segments (e.g., top two versus bottom three wealth quintiles,<sup>23</sup> male- versus female-led households, volume consumed) within each settlement.

This study defines perceived quality as the households' perspective on the taste, odor, color, and clarity of drinking water they source from different PWWs. The study uses this as a proxy for water quality in the absence of being able to conduct actual household-level sample testing. For **changes in perceived quality**, URBAN WASH will compare households' ratings of the quality of water purchased from the licensed PWP to water sourced from other informal PWWs post-transition and from any PWP pre-transition. For this analysis, the team will gather data on households' ratings of drinking water quality along the four parameters—taste, smell, color, and clarity. In addition, the team will rate each parameter along a three-point scale (e.g., for taste: 1 = unpleasant, 2 = neutral, and 3 = pleasant).

For the affordability and perceived quality analysis, the team will use the data gathered through the household surveys. As noted above, for access, the team will receive this data coded in SPSS from the research agency and will monitor subsets of this data daily/every two days (based on the cadence the team receives from the agency), to monitor for inconsistencies or errors. Once URBAN WASH has a clean dataset, the team will use SPSS to analyze descriptive statistics.

#### 6.4.2 FOR PWWs' WATER HANDLING PRACTICES

**Question:** *What is the impact of transitions on the water handling practices of licensed PWWs?*

URBAN WASH will **understand the change in water handling practices** by analyzing PWWs' stated response on the degree to which they implement practices for maintaining water safety in each stage of the water service delivery chain. The team will check for the following water handling practices:<sup>24</sup>

- Regularly inspect wells and boreholes;
- Treat water before supplying it to households;
- Test water quality;

<sup>22</sup> URBAN WASH is using expenditure as a proxy for income, since the research team's experience suggests that it is more likely to get accurate data on expenditure rather than on income.

<sup>23</sup> Wealth quintiles for the settlement created using households' responses as per the equity tool (Equity Tool 2021).

<sup>24</sup> Adapted from guidelines published by USAID (The Cadmus Group Inc. 2017) and WHO (Bartram et al. 2009).

- Regularly inspect storage tanks/reservoirs;
- Monitor and record pipe pressure;
- Undertake regular maintenance of pipes and distribution network; and
- Ensure hygiene around pumps, kiosks, and pipes.

URBAN WASH will also map the water handling guidelines (where available) provided by AURA, municipality, and/or AdRMM to the PWPs that are part of the transition. The team will gather the water handling guidelines by reviewing the licenses and contracts of the PWPs (where these are available) and from AURA.

For the analysis, the team will compare PWPs' stated response for implementing practices post-transition to pre-transition practices by:

- Capturing post-transition and pre-transition practices in a template, along each practice, during the IDIs with the PWP;
- Comparing and identifying whether PWPs have stated a change in practice, after data collection; and
- Comparing the practices stated by licensed PWPs to those stated by informal PWPs.

For licensed PWPs who have stated a difference, the team will also conduct a deductive thematic analysis to **understand whether the changes are due to transitions** based on the reasons stated for changes. URBAN WASH will specifically look for themes such as licensing, guidelines or trainings by AURA, and other activities under the transition while capturing data from the interview transcripts. For this analysis, the team will use the data captured through IDIs with licensed PWPs in the following manner:

- Capture data from interview transcripts every day post-interviews on a template that checks whether specific factors (e.g., licensing, training by AURA) were mentioned,
- Capture any additional reasons stated in the interview verbatim into the template, and
- Conduct the full analysis of identifying themes after data collection.

Finally, the team will **understand the impact of changes in practices on the PWP's viability**. URBAN WASH will conduct this analysis in a similar manner to the viability analysis for guideline implementation under RQ2. The team will do this by:

- Capturing the costs for implementing practices during the IDIs with PWPs. For practices they are implementing, the team will understand current processes and costs. For practices they are not implementing, the team will understand their projected processes and costs.
- Understand impact of compliance on PWP's viability using P&L statements developed under RQ2 after data collection by:
  - For guidelines already being implemented: Remove the cost from the current P&L statements and capture the change in the P&L.
  - For guidelines they do not implement: Add the expected cost of complying and capture the change in the P&L.

### 6.4.3 FOR RESILIENCE

**Question:** What is the impact of transitions on the resilience of service delivery?

URBAN WASH will **measure the change in resilience pre- and post-transition** in each settlement through an indicator-led approach, adapted from USAID’s market system resilience tool (USAID 2018). URBAN WASH is using an indicator-led approach, given that the team may not be able to observe actual shocks or stresses during this research period. The team will measure the impact of transitions on three characteristics of the drinking water services market that indicate resilience:

- **Competition with rule of law:** Markets with rules for PWP’s service delivery and with lower concentration of power will be more resilient as they are likely to have more suppliers and hence a consistent supply of services meeting minimum standards during shocks.
- **Connectivity and cooperation:** Markets with avenues for interaction between and representation from communities, PWP’s, and the utility/municipality will be more resilient as they allow the various actors to support PWP’s to continue delivering services during shocks.
- **Strength and diversity of business models and supply chain(s):** Markets with viable and diverse PWP’s, access to safe drinking water sources, and equipment for sourcing and distributing water will be more resilient due to an increased chance of suppliers remaining in the market and possibly fewer price fluctuations.

URBAN WASH will **compare a composite score** per settlement, pre- and post-transition, for each market characteristic. The team will develop scores by taking an average score across indicators on a four-point scale. The team will develop a composite score by weighing each indicator equally unless the data observed suggests otherwise.

Table 9 shows the market characteristics, rationales, indicators, and indicative scoring. Based on the data, the team will define the full range of scores and refine the scoring developed. For example, the team will see whether quarterly utility/municipality and community association meetings are considered too frequent or too infrequent based on how often it takes place.

For this analysis, the team will use data from multiple sources across RQs 2 and 3. The team will maintain a separate template to capture data for these indicators when processing data from the interviews and surveys (as detailed earlier).

**Table 9: Market characteristics and indicative scoring of indicators**

Characteristic	Indicator	Rationale for Indicator	Indicative Scoring	Data Source
Competition with rule of law	Number of PWP’s and distribution of market share (quantitative)	More PWP’s indicate continuity of services during shocks	<ul style="list-style-type: none"> <li>• 4: Several PWP’s available with well-distributed market shares, with a few licensed PWP’s</li> <li>• 1: Only 1 PWP available in a settlement.</li> </ul>	IDIs with licensed PWP’s (Appendix 5_RQ2+3 Formal PWP Instrument)
	PWP’s degree of involvement in deciding guidelines (qualitative)	PWP’s having a say in guidelines improves the level of transparency and	<ul style="list-style-type: none"> <li>• 4: Active involvement of PWP’s with some contract rules (other than those</li> </ul>	IDIs with: <ul style="list-style-type: none"> <li>• Licensed PWP’s (Appendix 5_RQ2+3</li> </ul>

Characteristic	Indicator	Rationale for Indicator	Indicative Scoring	Data Source
		ease for formalization, ensuring more PWPs formalize (and remain formalized during shocks)	<p>defined by Decreto 51/2015 and AURA)</p> <p>defined by them.</p> <ul style="list-style-type: none"> <li>● 1: PWP having no discussions on the contract.</li> </ul>	<p>Formal PWP Instrument)</p> <ul style="list-style-type: none"> <li>● Informal PWPs (Appendix 4_RQ2+3 Informal PWP Instrument)</li> <li>● Municipalities / Utilities (Appendix 3_RQ2+3 Implementers Instrument – Water)</li> </ul>
	Degree of implementation of and compliance with recommended practices (qualitative)	High compliance indicates continued supply of better and safer services (i.e., with adherence to set tariffs, and quality standards)	<ul style="list-style-type: none"> <li>● 4: PWPs stating a high degree of compliance with most practices recommended by AURA.</li> <li>● 1: PWPs stating low compliance with most practices recommended by AURA.</li> </ul>	<ul style="list-style-type: none"> <li>● IDIs with Licensed PWPs (Appendix 5_RQ2+3 Formal PWP Instrument)</li> <li>● Municipality logbooks on PWPs' compliance</li> </ul>
Connectivity and cooperation	Degree of activity within PWP network (qualitative)	A network between PWPs provides support from different actors, for PWPs to be able to absorb or adapt to shocks	<ul style="list-style-type: none"> <li>● 4: An organized network of PWPs (licensed and informal), with activities/ information sharing every quarter.</li> <li>● 1: No interaction between PWPs.</li> </ul>	<p>IDIs with:</p> <ul style="list-style-type: none"> <li>● Licensed PWPs (Appendix 5_RQ2+3 Formal PWP Instrument)</li> <li>● Informal PWPs (Appendix 4_RQ2+3 Informal PWP Instrument)</li> </ul>
	Interactions between PWPs, community association and utility/ municipality (qualitative)	Interactions between different stakeholders also helps with support from different actors, to respond to shocks	<ul style="list-style-type: none"> <li>● 4: Interactions at least once a quarter between the PWPs, community association and utility.</li> <li>● 1: No interactions.</li> </ul>	<p>IDIs with:</p> <ul style="list-style-type: none"> <li>● Licensed PWPs (Appendix 5_RQ2+3 Formal PWP Instrument)</li> <li>● Community leaders (Appendix 7_RQ3 Community Leader Instrument – Water)</li> <li>● Municipality / Utilities (Appendix 3_RQ2+3 Implementers Instrument – Water)</li> </ul>
Strength and diversity of business models and supply chain(s)	Viability of PWPs (financial data)	Having drinking water service delivery as a profitable business improves likelihood of	<ul style="list-style-type: none"> <li>● 4: Most PWPs are profitable and water service delivery is a significant source of income.</li> </ul>	<p>IDIs with:</p> <ul style="list-style-type: none"> <li>● Licensed PWPs (Appendix 5_RQ2+3 Formal PWP Instrument)</li> <li>● Informal PWPs (Appendix 4_RQ2+3</li> </ul>

Characteristic	Indicator	Rationale for Indicator	Indicative Scoring	Data Source
		them continuing service provision during shocks	<ul style="list-style-type: none"> <li>● 1: Most PWWPs are unprofitable.</li> </ul>	Informal PWWP Instrument)
	Diversity of PWWPs for a settlement (qualitative)	Having access to different kinds of PWWPs (e.g., utility, piped water from formal player, kiosk) improves likelihood of improved services in shocks	<ul style="list-style-type: none"> <li>● 4: Access to multiple PWWPs, including at least one from outside the community</li> <li>● 1: Access to one (or less) PWWP operating only in the local community</li> </ul>	IDIs with: <ul style="list-style-type: none"> <li>● Licensed PWWPs (Appendix 5_RQ2+3 Formal PWWP Instrument)</li> <li>● Informal PWWPs (Appendix 4_RQ2+3 Informal PWWP Instrument)</li> <li>● Households (Appendix 6_RQ3 HH Instrument – Water)</li> </ul>
	Sources of water for PWWPs (qualitative)	Having easy access to clean, utility/ municipality-approved sources improves likelihood of improved services in shocks	<ul style="list-style-type: none"> <li>● 4: Easily accessible treated water source, as stated by PWWP.</li> <li>● 1: No access to treated water source.</li> </ul>	<ul style="list-style-type: none"> <li>● IDIs with:               <ul style="list-style-type: none"> <li>– Licensed PWWPs (Appendix 5_RQ2+3 Formal PWWP Instrument)</li> <li>– Informal PWWPs (Appendix 4_RQ2+3 Informal PWWP Instrument)</li> </ul> </li> <li>● Secondary data</li> </ul>
	Access to sourcing/storing equipment and repair services, and treatment facilities (qualitative)	Access to equipment and repair services improves the likelihood of sourcing required items to continue service delivery during shocks	<ul style="list-style-type: none"> <li>● 4: High access, as stated by PWWP.</li> <li>● 1: Negligible access, as stated by PWWP.</li> </ul>	IDIs with: <ul style="list-style-type: none"> <li>● Licensed PWWPs (Appendix 5_RQ2+3 Formal PWWP Instrument)</li> <li>● Informal PWWPs (Appendix 4_RQ2+3 Informal PWWP Instrument)</li> </ul>

## 7.0 RESEARCH QUESTION 2 FOR FSM – IMPLEMENTATION OF TRANSITIONS

### 7.1 OVERALL APPROACH

The aim of RQ2 for FSM is to understand the implementation of transitions. It is framed around one cost of service delivery question and two lever-specific questions.

- What is the cost of service delivery<sup>25</sup> for emptiers?<sup>26</sup>
- What are the implementation processes and challenges for identifying and engaging private emptiers and reasons for private emptiers to drop-off? (player lever)
- What are the challenges for emptiers to comply with licensing guidelines? (rules lever)

Understanding the cost of service delivery for emptiers is important as it supports AURA and DNAAS in developing tariffs that are viable for emptiers. Regulators currently do not provide guidance on pricing due to lack of data on cost of service delivery, for both emptying and disposal, and want to understand how to balance emptiers' viability with households' affordability. Although a recent global study has attempted to estimate the cost of service delivery across emptying and treatment (Sainati et al. 2020), Mozambique was not covered in the study. While literature indicates that the cost of emptying needs to be reduced (Muximpua et al. 2017), the amount of reduction is an evidence gap for ensuring viable service delivery. Additionally, most of the known costs are limited to donor-funded interventions (Muximpua et al. 2017). Similarly, the cost to the emptier for disposing of the waste at a treatment facility is not known (Drabble et al. 2019). This information will support authorities to design viable disposal fees as they are planning to set up more treatment plants in Mozambique, as mentioned in Section 3.

Understanding the processes for identifying and engaging private emptiers is important because the sanitation sector is still experimenting with approaches to incentivize formalization and lacks clarity on which approach is effective. The transition in Beira has been relatively successful, whereas a transition by WSUP in 11 low-income areas failed as the emptiers exited the market, but reasons for the drop-offs are not clear. Some of the challenges faced by emptiers within the FSM sector are known, for example an emptier from Matola cited large distances between sites for emptying and a lack of defined areas of operation, but it is unclear if these issues are the cause of emptiers dropping off. While the processes employed for identifying and engaging emptiers are known, emptiers' perspective on the engagement is unclear.

Moreover, informal manual emptiers are not involved during these interventions. Stakeholders acknowledged that households tend to switch to manual emptying due to affordability and easier accessibility (Muximpua et al. 2017), but that manual emptiers tend to practice unsafe dumping. Transitions implemented until now involve only truck operators (Drabble et al. 2019), so the specific challenges faced by manual emptiers are not well understood.

While stakeholders in Mozambique are keen to start monitoring emptiers after licensing them, there is a lack of clear national guidelines for emptying, and no monitoring framework. Decree 15/2004 provides guidelines on the dimension of the septic tank and on the frequency of emptying for households, and

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<sup>25</sup> Inclusive of depreciation.

<sup>26</sup> In this section, the cost of service delivery for emptiers includes the revenues and costs of the emptier, the cost of disposal, and the cost of emptying or disposal funded (e.g., providing equipment, grants) by implementors.

Decree 30/2003 stipulates that the disposal and treatment of wastewater must guarantee the protection of the environment and public health, but there is no regulation for the emptying and disposal practices for emptying fecal sludge (Weststrate et al. 2019). Further, the Water Regulatory Council has not taken the lead in developing standards for construction, emptying of on-site sanitation facilities, and treatment of fecal sludge due to limited guidelines provided by national policies and lack of human resources at the organization (Weststrate et al. 2019).

Some guidelines have, however, been instituted in parts of the country. For instance, Beira’s guidelines for emptiers include that they focus on peri-urban areas, and the municipality sets the fee for the waste they dispose at the transfer station (SASB 2023). In Maputo and Matola, community leaders called “*Chefes de Quarteirão*” were responsible for providing guidelines on waste collection to prevent illegal dumping (Weststrate et al. 2019). However, there is no evidence of the degree of emptiers’ compliance with guidelines or the cost of compliance. While literature mentions standards for building pit latrines and the challenges faced by households in complying (Weststrate et al. 2019), there is no evidence of challenges faced by emptiers. Studying these aspects of monitoring and compliance will help AURA, DNAAS, or municipalities modify regulations and design monitoring processes.

The overall approach for RQ2 is retrospective research to compare two transitions: an ongoing transition<sup>27</sup> involving private emptiers and a failed transition where private emptiers dropped out of the market (refer to Figure 10). The research will involve understanding the cost of service delivery, processes for implementation, and compliance with licensing guidelines by studying:

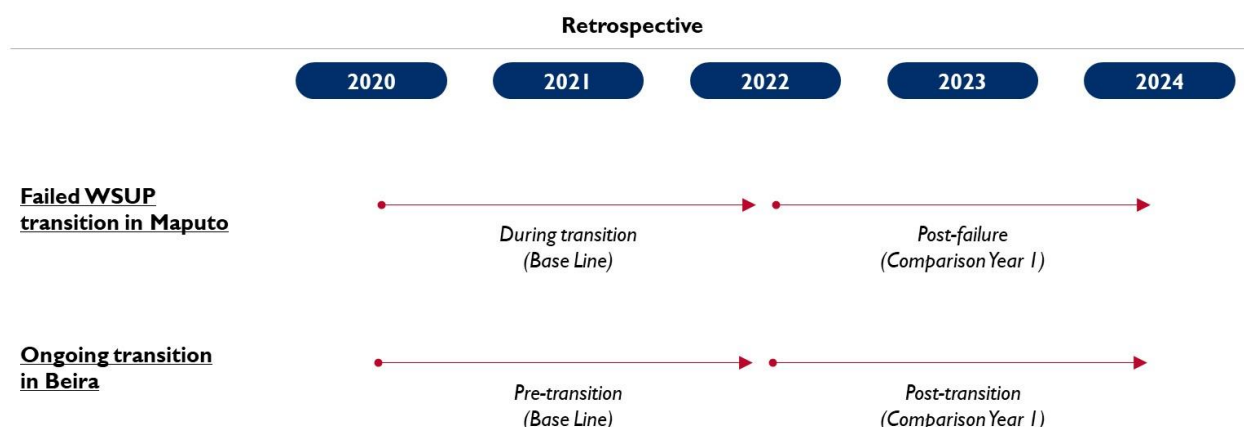
- A failed transition by WSUP in Maputo during:
  - One year of the transition (2020–2022), which will provide the view of the market during the transition and form the baseline for analysis; and
  - 2023, which will provide the view of the market post-failure.
- An ongoing transition by the autonomous sanitation body in Beira during:
  - The year before the transition, which will form the baseline for analysis; and
  - 2023, which will provide the current view of the market.

URBAN WASH will analyze the cost of service delivery by building P&L statements. The baseline years for analysis of P&Ls are different for each transition. For the failed WSUP transition, the team will use the first year of the transition since no FSM business line for P&L comparison existed before the transition. For the ongoing Beira transition, the team will use the year before the transition since the private emptiers were already involved in the emptying business.

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<sup>27</sup> For this study, “ongoing transition” refers to a transition that started in ~2020 and is the emptier is currently active (i.e., the emptier is currently licensed and is currently providing emptying services).

**Figure 10: Approach for RQ2 FSM**



## 7.2 STUDY SITES

URBAN WASH will conduct the analysis for this research question for one failed transition in Maputo and one ongoing transition in Beira (see Table 10). The team selected these transitions because they achieve diversity of low-income urban and peri-urban areas, regional variation between northern and southern Mozambique, and different types and relative success of the transitions implemented.

**Table 10: Background of the two shortlisted transitions**

City	Population of the City	Target Areas	Transition Details				
			Implementer	Type of Transition	Number of Emptiers	Status of the Transition	Details
Maputo	~1,124K	One low-income community in an urban area	WSUP and Maputo Municipality	Failed transition from unregulated to facilitated	8 emptying truck operators	Stopped in 2022	FSM emptying trucks provided by WSUP to solid waste management entrepreneurs to service low-income communities in 2015. Once the intervention ended in 2019, the emptiers stopped providing FSM services and exited the market in 2022.
Beira	~592K	One peri-urban area	SASB	Unregulated to facilitated	Multiple emptying truck operators	Ongoing transitions	Ongoing licensing of emptying trucks by SASB for private emptiers since 2016.

Acronyms: WSUP: Water and Sanitation for the Urban Poor; SASB: Beira Autonomous Sanitation Unit

Source for population data: One website (UN Habitat 2021).

## 7.3 DATA COLLECTION PLAN

For the research, URBAN WASH will gather data as follows:

- In-person IDIs with: ~20 emptiers (including ~5 licensed, ~5 previously licensed, and ~10 informal emptiers), implementers (e.g., WSUP, municipality, autonomous sanitation body), and



~3 disposal site operators (e.g., treatment plant, transfer station) who will provide information across different sub-research questions (refer to Table I I), conducted by either an engagement manager with significant research experience or the FSG team with translation support from a local research agency.

- Secondary data sources such as the disposal sites’ financial statements for costs and revenues, private emptier contracts for details on guidelines, municipalities and autonomous sanitation body’s logbooks on compliance data, etc.

**Table I I: Sub-RQs and sample for each respondent**

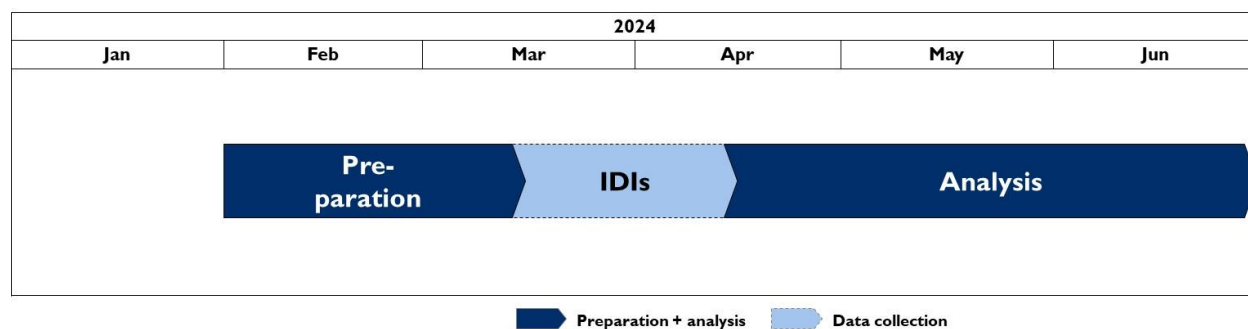
City	Type of SLP			Implementers	Disposal Sites	Total
	Dropped-off (previously licensed)	Informal (never licensed)	Licensed			
Maputo	~5	~5	NA	~1	1 (treatment plant)	~12
Beira	NA	~5	~5	~1	2 (treatment plant and transfer station)	~13
<b>Total</b>	~5	~10	~5	~2	~3	~25

Note:

- For dropped-off (previously licensed) in Maputo, the team will include at least one emptier who continues to provide FSM services after the failed transition (if any).
- For informal emptiers, the team will try to sample at least one emptier that has attempted to get licensed but did not. Additionally, the team will try to sample one to three manual emptiers as well.

The timelines for the above activities are summarized (light blue) in Figure I I. The activities are detailed in subsequent sections.

**Figure I I: Timeline for FSM RQ2 data collection and analysis**



Acronyms: IDI: In-depth interview

For additional details on the data collection plan for this research question, please refer to Appendix 2.

## 7.4 ANALYSIS PLAN

### 7.4.1 COST OF SERVICE DELIVERY

**Question:** What is the cost of service delivery for emptiers?

URBAN WASH will estimate the cost of providing services for emptiers in Maputo and Beira by analyzing the following:

- P&L statements for private emptiers,
- P&L statements for disposal sites (treatment plants and transfer stations, the latter only for Beira), and
- Other costs incurred by implementers (i.e., WSUP, municipality, autonomous sanitation body) to implement the transitions.

The team will conduct the analysis for Maputo for the baseline year (between 2020–2022, when the emptiers were active in the market) and Beira for 2023 (post-transition) and the baseline year (2020–2022, which was pre-transition) (refer to Figure 10).

For the emptiers and disposal sites, the team will capture the revenues earned and costs incurred for providing FSM services and build P&L statements. For the implementers (i.e., WSUP, municipality, and the autonomous sanitation body), the team will capture the other costs incurred for implementing the transitions (e.g., cost of providing licenses and monitoring, provision of trucks and emptying equipment) and the sources of funding for these costs (e.g., grants for setting up treatment plants).

URBAN WASH will capture the notes from interview transcripts with the emptiers, disposal sites, and implementers conducted in-person every day (to ensure better recall from the interviews) into a standardized P&L template with line items for the different revenues, costs incurred, and sources of funding for these costs.

URBAN WASH will then build and analyze the total cost of service delivery for emptiers as follows:

- Derive the annual total costs by adding the costs from the P&L statements of emptiers, disposal sites (deriving the costs per emptier), and costs incurred by the implementers.
- Derive the amount of annual cost recovered through revenues from the P&L statements of emptiers and disposal sites.
- Derive the “revenue gap” by subtracting the second amount from the first amount and mapping who is currently funding it. The team will do this separately for emptiers and disposal sites.

The team may disaggregate the cost of service delivery by size of the emptier (i.e., number of households served) or proximity to disposal sites, if relevant.

For the Maputo emptiers, the team will also build a “post-failure” P&L statement of their current business line (i.e., solid waste management business) for 2023, which the team will compare to the FSM business line in the transition year to understand financial considerations for exiting the market.

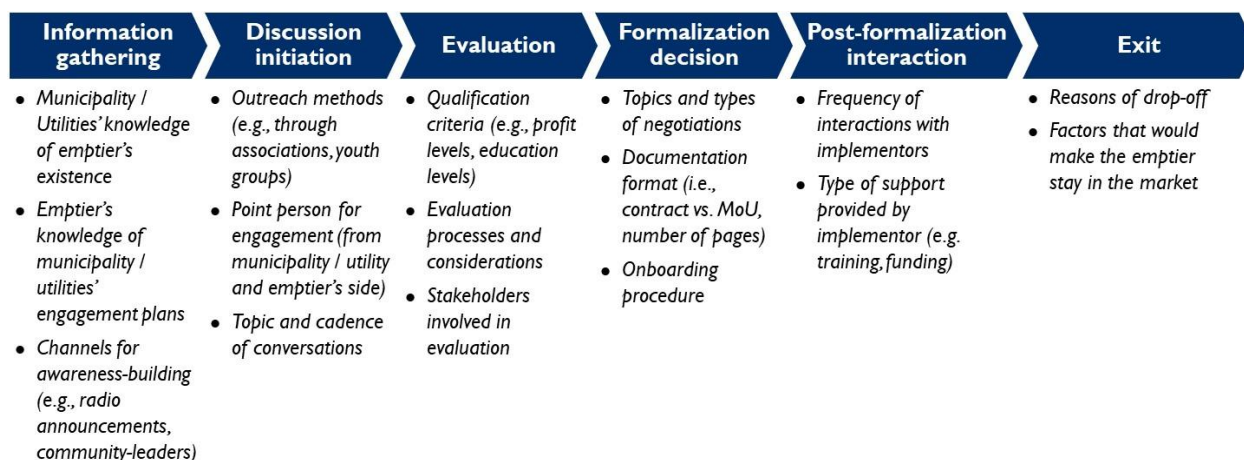
## 7.4.2 IDENTIFICATION AND ENGAGEMENT

**Question:** *What are the implementation processes and challenges for identifying and engaging private emptiers and reasons for private emptiers to drop-off? (player lever)*

URBAN WASH will compare the engagement journey for the ongoing transition in Beira with the failed transition in Maputo to understand the relative success for the Beira transition and the reasons for the drop-off of private emptiers for the Maputo transition.

URBAN WASH will first use deductive thematic analysis<sup>28</sup> to **produce an engagement journey map** for each of the two transitions. The engagement journey map will include the key stages involved and the key activities conducted by the implementers in each stage. The team will produce this map from the perspective of the implementers, formalized emptiers, and informal emptiers. Refer to Figure 12 for a hypothesized engagement journey map. For each transition, the team expects that the stages of the journey map will remain the same, but the details within each stage may vary.

**Figure 12: Stages of the identification and engagement process**



Acronyms: MoU: Memorandum of understanding

URBAN WASH will do this in two steps, using data from the transcripts from the IDIs with implementers (i.e., WSUP, municipalities, and autonomous sanitation bodies), formalized and informal emptiers, and documented data from implementers (e.g., logbook on the dates, number of emptiers, and topic/reasons for interaction).

- At the end of each day of data collection, the team will capture notes from the interviews and the logbooks onto the hypothesized engagement map (refer to Figure 12), capturing data that does not fit on this map, separately as “additional stages.”
- After all data collection is complete, the team will read through the notes to identify themes of activities mentioned across the interviews, especially for data under “additional stages” to generate a refined engagement journey map (collapsing or adding stages where required).

Then, the team will **evaluate the experience of the emptiers** by identifying themes of challenges/key decisions/motivations at each stage of the refined engagement journey map.

- For formal emptiers, the team will understand their key decisions, challenges, motivations to continue through each stage (e.g., potential to increase customer base, benefits of being legal), and reasons for drop-off (e.g., reasons for exiting the market, factors that would make the emptiers stay in the market) (for the Maputo emptiers).
- For informal emptiers, the team will understand their key decisions and motivations to continue as long as they did (if they interacted at all), and key challenges and reasons for dropping off

<sup>28</sup> URBAN WASH is using deductive thematic analysis because literature cites it as an appropriate method for qualitative analysis when having a hypothesized theme (Dovetail Editorial Team 2023). In this case, the team has already hypothesized themes for the steps in the journey and the challenges at each stage.

when they did (e.g., inability to produce documents, inability to meet eligibility criteria, unaware of engagements).

- For implementers, the team will understand the operational challenges mentioned for each of the stages (e.g., lack of skill, lack of time, not enough resources, reasons for drop-off).
- The team will specifically compare the experiences of the formalized emptiers in Beira who have stayed in the market with exited emptiers in Maputo.

URBAN WASH will also **evaluate the stages and processes** through quantitative metrics for the implementers, including:

- Costs involved for each stage (done as part of the cost of service analysis),
- Time taken to complete each stage, and
- Number of emptiers that pass through each stage.

To do this, the team will capture data from the interview transcripts with municipalities and autonomous sanitation bodies. At the end of each day of interviews, the team will capture data along the above three metrics from the notes onto each stage of the hypothesized journey. The team will then process the notes after all data collection to compare the metrics for different processes across different utilities.

### 7.4.3 COMPLIANCE TO LICENSING GUIDELINES

**Question:** *What are the challenges for emptiers to **comply with licensing guidelines**?*

First, URBAN WASH will **map the current guidelines** provided by the implementer (i.e., WSUP and the municipality in Maputo, SASB in Beira) to the emptiers that are part of the transition. The research team will gather this data by reviewing the contracts/agreements of the emptiers (where these are available) or by asking the points of contact at the municipality or autonomous sanitation body.

Then, the team will **measure the degree of compliance** by emptiers to these guidelines on a scale of 0–5 gathered from both emptiers and the implementers. URBAN WASH will conduct the analysis as follows:

- From the emptiers, the team will gather self-reported compliance from the IDIs. The team will capture notes at the end of each day of data collection from the transcript onto a template mapping their stated compliance against each guideline.
- From the implementers, the team will gather their perceived compliance for each emptier similarly from their IDIs as above. The team will supplement this with data from their logbooks.

URBAN WASH will also compare compliance data provided between emptiers (e.g., ongoing transition versus failed transition) to identify variations among them. For the failed Maputo transition, the stated degree of compliance will be limited as it will be based on recall data.

URBAN WASH will **identify and analyze key barriers** for emptiers to comply with the guidelines and implementers to enforce guidelines by:

- Estimating **costs of compliance**, and its impact on viability; and
- Conducting a **deductive thematic analysis of reasons** stated for not being able to implement them.

For emptiers, URBAN WASH will analyze the cost of compliance as part of the cost of service delivery analysis (detailed above) by quantifying the impact of compliance on their viability for the guidelines they are following and projecting the impact of compliance for the guidelines they do not follow. For implementers, the team will estimate the costs incurred by the implementer and the sources of these funds, as detailed above.

For the thematic analysis of barriers, the team will study the rating emptiers provide and the reasons they state on awareness of, ability to comply to (self-reported), willingness to comply with different guidelines, and variations between emptiers (e.g., ongoing transitions versus failed transitions). For the implementers, the team will understand the operational challenges they face in enforcing compliance.

The team will capture details (e.g., ratings, costs) from the interview transcripts at the end of each day onto a template against each guideline. After the data collection, the research team will analyze the barriers and costs by reading responses, identifying themes of challenges, and accounting for the costs in the P&L statements.

## 8.0 RESEARCH QUESTION 3 FOR FSM – IMPACT OF TRANSITIONS

### 8.1 OVERALL APPROACH

The aim of RQ3 for FSM is to understand the impact of transitions (ongoing and failed) on households, on private emptiers, and on the resilience of services. It is framed around four sub-research questions:

- What is the impact of transitions (ongoing and failed) on **access**<sup>29</sup> to formalized services in a settlement?
- What is the impact of transitions (ongoing and failed) on **affordability**<sup>30</sup> and **customer experience**<sup>31</sup> for households?
- What is the impact of transitions (ongoing and failed) on the **emptying and disposal practices**, and **occupational safety**<sup>32</sup> of emptiers?
- What is the impact of transitions (ongoing and failed) on the **resilience** of service delivery?<sup>33</sup>

Overall, there is a lack of data on the impact of transitions on access, households (especially from marginalized groups), emptiers' practices, and resilience in Mozambique and in the global sector.

Municipalities in Mozambique implement transitions with the aim of improving access to formalized services within unserved settlements. However, data on how many households are served by the formalized emptiers does not exist. Further, the reasons driving households' decisions to take up formalized or informal services post-transitions are unclear. Stakeholders and WSUP are also eager to learn if their interventions have provided any sustained impacts even after the emptiers they worked with have left the market.

There is limited data on affordability and customer experience from households. While evidence shows that households are unable to pay the full cost of sanitation services (Drabble et al. 2019), it is unclear what their ability to pay is. Literature acknowledges that while WSUP's intervention succeeded in establishing emptiers with the skills and equipment required to service households willing and able to pay, services may need to be subsidized to serve low-income households (Drabble and Parente 2018). Studying household affordability can help authorities set tariffs that are affordable for households and viable for emptiers, and understand the cost required to balance the two.

Literature highlights that unsafe emptying and disposal practices are highly prevalent in Mozambique (Muximpua et al. 2017), such as burying the sludge on the household land (Drabble and Parente 2018)

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<sup>29</sup> This study is defining access as the proportion of households within a settlement that receive formal emptying services and are able to access the type (manual, mechanical, etc.) of service they want.

<sup>30</sup> This study is defining affordability as the price paid by households for formal emptying services, relative to general market prices for emptying, and benchmarks such as households' willingness to pay and total annual expenditure.

<sup>31</sup> This study is defining customer experience as the customers' perception of the quality of service in terms of cleanliness, timeliness, payment options offered, and safety practices followed.

<sup>32</sup> This study is defining occupational safety as the prevention of work-related injuries and the promotion of the health of workers.

<sup>33</sup> This study adapted the definition from the USAID Market Systems Resilience Framework (USAID 2018) for this analysis. Resilience of service delivery refers to the ability of the FSM service delivery network, involving households, emptiers, and the utilities to adapt to and recover from shocks. This involves the ability to allocate resources, draw on system-level resources (such as utility and emptier networks, emptier and community networks, guidelines regarding safe emptying and disposal, etc.), and innovate in order to solve problems in the face of shocks and stresses.

or emptying sludge on the road. After WSUP's intervention, customer feedback showed that that the service was appreciated for its improved hygiene, and the truck operators noted that the stigma associated with manual emptiers did not extend to them (Muximpua et al. 2017). However, whether impacts on emptying and disposal practices and occupational safety were sustained is unclear. Literature discusses the development of several frameworks and recommendations for preventive measures (Gautam et al. 2021; Repon, Faruq, and Mantaz 2015), but the actual change in outcomes is currently not adequately documented.

Understanding the impact of transitions on the resilience of service delivery is important as it will help assess whether the FSM service delivery system can adapt to stresses. Across the world, climate change and urbanization are risks to the continuity of safe FSM practices (UNICEF and Global Water Partnership 2022; Semiyaga et al. 2015). For Mozambique, literature highlights that floods in Maputo can cause fecal sludge to flood the streets, break sanitation facilities (AFRIKAIA 2022), and affect consequent FSM service delivery. However, no data currently exists on the impact of transitions on the resilience of FSM services.

The overall approach for RQ3 is retrospective research in two settlements: one with an ongoing transition<sup>34</sup> involving private emptiers and one with a failed transition where formalized emptiers dropped out of the market. The research will involve understanding changes in access in a settlement, in affordability and customer experience for households, in occupational safety practices of the emptiers, and in resilience of the service delivery market. The retrospective research will involve developing a view of the market for different time periods (based on recall data) by studying:

- A failed transition in Maputo during:
  - The year before the transition (2018–2020), which will form the baseline for analysis;
  - One year of the intervention (2020–2022), which will provide the view of the market during the transition; and
  - 2023, which will provide the view of the market post-failure.
- An ongoing transition in Beira during:
  - The year before the transition, which will form the baseline for analysis; and
  - 2023, which will provide the current view of the market.

## 8.2 STUDY SITES

URBAN WASH will conduct the analysis for this research question for one settlement for the failed transition in Maputo and one settlement for the ongoing transition in Beira (refer to Table 12). The team selected these settlements for the reasons described in Section 7.2. For the failed transition settlement, the team will select a settlement that emptiers have recently exited to improve the quality of recall data.

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<sup>34</sup> For this study, “ongoing transition” refers to a transition that started in ~2020 and is currently active (i.e., the emptier is currently licensed and is currently providing emptying services).

**Table 12: Background of the two shortlisted settlements**

City	Settlement Details			Transition Details			Research Method
	Settlement	Settlement Population	Type	Status	No. of Formal Emptiers	Type	
Maputo	One settlement (TBD) <sup>35</sup>	~5,000	Low-income community in an urban area	Stopped in 2022	1 (which exited the market after 2022)	Failed transition from <b>unregulated to facilitated</b> , with truck operators	Retrospective
Beira	One settlement (TBD) <sup>33</sup>	~5,000	Peri-urban area	Started after 2020	1–2 (as of 2023)	Ongoing transitions from <b>unregulated to facilitated</b> , with truck operators	Retrospective

Acronyms: TBD: To be determined

### 8.3 DATA COLLECTION PLAN

For the research on access, and affordability and customer experience, URBAN WASH will collect data from households through the following methods:

- Household surveys, administered by a local research agency, with a total of 100–170 households, across two settlements, to generate data on access, and indicators to measure affordability and customer experience (refer to Appendix 2 for additional details of sampling).
  - For the failed Maputo transition, the team will administer the survey to a total of 50–90 households:
    - A total of 50–60 households will be randomly selected to generate pre-transition (2018–2020), during transition (2020–2022), and post-failure (2023) data.
    - URBAN WASH may purposefully sample an additional 0–30 samples (up to 10 samples for each period) if the penetration of emptying actions (i.e., emptying a pit or building a new toilet) is low in any period.
  - For the ongoing Beira transition, the team will administer the survey to a total of 50–80 households:
    - The team will randomly select 50–60 households to generate pre- and post-transition data.
    - The team may purposefully sample an additional 0–20 samples (up to 10 samples for each period) if the penetration of emptying actions or formal emptying is low in any period.
- FGDs, facilitated by a local research agency in FSG’s presence, with 20 households (8–10 per settlement) to help validate findings and understand reasons for households choosing the services that they did.

<sup>35</sup> The transition was implemented in multiple settlements across the city, out of which one will be studied.



**For the research on emptiers’ practices and occupational safety,** URBAN WASH will gather data through the following:

- In-person IDIs, conducted by the FSG team with translation support from a local research agency, with ~7 formal and informal emptiers (three to four per settlement) to capture changes in their stated practices and occupational safety for the below periods:
  - For Maputo: post-transition for formal emptiers (i.e., 2020–2022) and pre-transition (i.e., 2018–2020), during transition (i.e., 2020–2022), and post-failure (i.e., 2023–2024).
  - For Beira: Pre- and post-transition for both formal and informal emptiers.
- Household surveys (described above) and IDIs with implementers and disposal site operators (as described under RQ2) to triangulate the data on practices stated by formal emptiers.

**For the research on resilience,** URBAN WASH will gather data from the households, emptiers (formal and informal), community leaders, and implementers as part of the surveys and interviews the team is conducting with them under RQs 2 and 3 (refer to Table 13 in analysis plan for the data source for each indicator).

The timelines for these activities are provided in Figure 13 and detailed in subsequent sections.

**Figure 13: Timeline for RQ3 FSM data collection and analysis**



Acronyms: HH: Household; IDI: In-depth interview; FGD: Focus group discussion

For additional details on data collection, please refer to Appendix 2.

## 8.4 ANALYSIS PLAN

### 8.4.1 FOR ACCESS, AFFORDABILITY, AND CUSTOMER EXPERIENCE

#### *For Access to Formalized Services*

**Question:** What is the impact of transitions (ongoing and failed) on access to formalized services in a settlement?

URBAN WASH will **measure the change in access** understanding the split between formally served, informally served, self-served, and no-need households in a settlement for the failed Maputo transition and for the ongoing Beira transition (refer to Figure 14).<sup>36</sup>

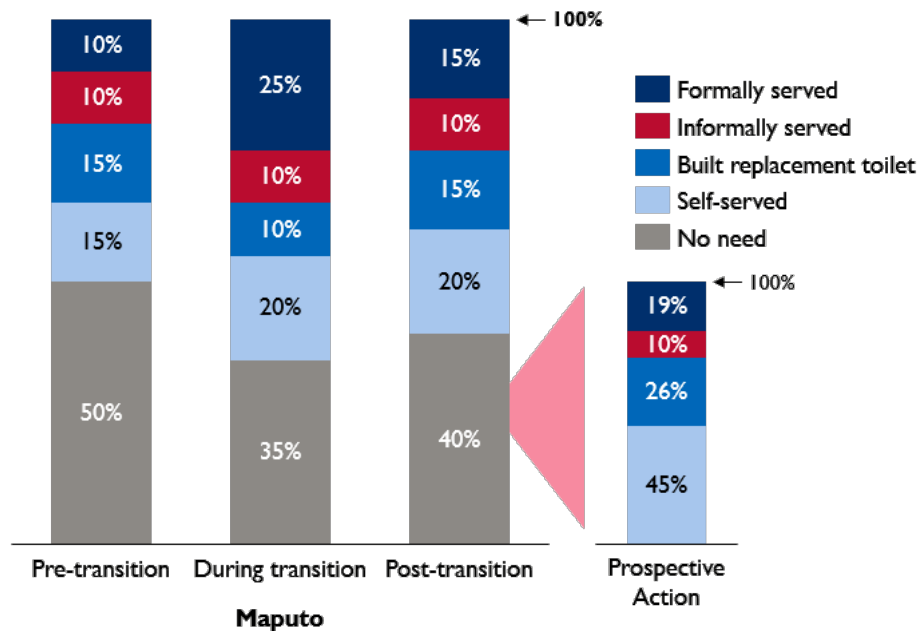
- Formally served: households served by SASB/municipality (i.e., implementers) or formalized emptiers to empty their pit.

<sup>36</sup> Note that there will not be any households that are present across all three transition periods for Maputo.

- Informally served: households that used an informal emptier to empty their pit.
- Self-served: those who empty the pits themselves or through a neighbor/family member.
- No-need households include those who have either:
  - Faced the need to empty a toilet, but built a new pit/toilet when the need arose; or
  - Have not faced the need yet (i.e., built a new toilet that has not required emptying), in which case the team will capture their future decision when the need arises.

The team will also aim to disaggregate the data for different segments (e.g., by wealth quintiles, for male-versus female-led households) to determine if access to formalized sources varies by segment.

**Figure 14: Illustrative service map for access for Maputo**



URBAN WASH will use the data gathered through household surveys for this analysis, using descriptive statistics in SPSS to identify frequencies of households for each category in Figure 14 in Maputo for pre-transition, during transition, and post-failure, and in Beira for pre-transition and post-transition.

URBAN WASH will also **understand the reasons for the shifts in access** to see if the transitions caused any increases or decreases in access to formalized services (e.g., after a transition, does the share of no-need and self-served change? Post-failure, do the previously formally served households use informal or formal services [if available]?). The team will also understand if households are able to access services from their preferred service provider while making their choice. The team will compare the reasons and preferred services stated by households who shifted to formalized emptiers with those who did not choose formalized emptiers during transition and post-failure for Maputo and post-transition for Beira.

The team will do this by collecting data from two sources:

- From household survey data, the team will generate descriptive statistics for coded responses on reasons for households' choices of services.

- From open-ended responses in the FGDs, for which the team will debrief daily after FGDs and capture reasons from the notes for each type of household.

Following data collection, the team will read through the captured notes to identify trends of reasons, key decisions, and motivations for households.

### ***For Affordability and Customer Experience***

**Question:** *What is the impact of transitions (ongoing and failed) on affordability and customer experience for households?*

URBAN WASH will **measure the change in affordability and customer experience** by conducting a point-in-time comparison of the two metrics for services availed from formalized emptiers with general market prices (from any source other than formalized emptiers) by settlement.

This study will assess the price paid by households for formalized emptying, relative to general market prices for emptying, and will benchmark costs against household willingness to pay and monthly expenditures. For **changes in price**, the team will compare prices paid for services across different time periods to understand if prices changed during transitions and post-failure.

- For the Maputo settlement, the team will compare the price paid for a typical volume of emptying of:
  - Formalized emptiers during transition (2020–2022) to informal emptiers pre-transition (2018–2020), and
  - Formal emptiers during transition (2020–2022) to informal emptiers post-failure (2023) or during transition (2020–2022).
- For the Beira settlement, the team will compare the price paid for a typical volume of emptying of a formalized emptier with the general market price paid for the same volume from informal emptiers pre-transition (2020–2022) and post-transition (2023).

URBAN WASH will perform this comparison using either averages or medians at the settlement level based on the distribution of the data and outliers. The team will also account for inflation in the Mozambican economy when comparing the data.

To better understand **willingness to pay** and **affordability**, URBAN WASH will also compare the price paid to a formalized emptier with:

- Willingness to pay for emptying a typical volume, and
- Households' stated total annual expenditure.<sup>37</sup>

Finally, the team will disaggregate the analysis for different segments (e.g., top two versus bottom three wealth quintiles,<sup>38</sup> male- versus female-led households) within settlements to understand variations in affordability for these segments.

<sup>37</sup> URBAN WASH is using expenditure as a proxy for income, since the research team's experience suggests that it is more likely to get accurate data on expenditure rather than on income.

<sup>38</sup> Wealth quintiles for the settlement created using households' responses as per the equity tool (Equity Tool 2021).

For **customer experience**, URBAN WASH will compare the services across different time periods to understand if customer experience changed during transitions and post-failure.

- For the Maputo settlement, the team will compare the customer experience of:
  - Formal emptiers during transition (2020–2022) with informal emptiers pre-transition (2018–2020), and
  - Formal emptiers during transition (2020–2022) with informal emptiers during transition (2020–2022) and post-failure (2023).
- For the Beira settlement, the team will compare the customer experience with formal emptiers post-transition (2023) with the experience with informal emptiers pre-transition (2020–2022).

URBAN WASH will compare the services along the following indicators:

- Number of booking platforms and number of emptiers available,
- Time taken from booking to reach and empty the pit,
- Whether the emptier followed safe practices (i.e., wearing personal protective equipment, cleaning the surrounding areas of the pit, and transporting sludge away in a secure container),
- Flexibility in payment modes and frequency offered,
- Emptiers' response to post-service complaints, and
- Overall customer satisfaction levels.

For the analysis of affordability and customer experience, the team will use the data gathered through the household surveys. URBAN WASH will conduct the analysis on the households' availing services from an emptier (formal or informal) or building a new toilet. The team will do this post-transition for Beira, and during transition and post-failure for Maputo. As noted above, the team will use SPSS to conduct the analysis through descriptive statistics.

#### 8.4.2 FOR EMPTIERS' PRACTICES AND OCCUPATIONAL SAFETY

**Question:** *What is the impact of transitions (ongoing and failed) on the emptying and disposal practices, and occupational safety of emptiers?*

The URBAN WASH team will **measure changes in emptying and disposal practices, and occupational safety** by comparing formal and informal emptiers' stated practices across different time periods to understand if the practices changed during transitions and post-failure:

- For the Maputo settlement, the team will compare the stated practices and occupational safety of:
  - Formal emptiers during transition (2020–2022) (based on recall data) with the practices of informal emptiers post-failure (2023), and
  - Informal emptiers during transition (2020–2022) (based on recall data) with their current practices post-failure (2023) to identify any changes to practices after the transition.
- For the Beira settlement:
  - For formal emptiers who were already providing emptying services pre-transition, the team will compare the stated practices and occupational safety for the same emptier for pre-transition (2020–2022) and post-transition (2023).

- For emptiers who newly entered the market (i.e., were not providing services pre-transition), the team will compare stated post-transition (2023) practices and occupational safety to those of informal emptiers in the city post-transition (2023).

For emptiers’ practices, URBAN WASH will compare the proportion of emptying services provided by formal and informal emptiers where they:

- Used personal protective equipment (e.g., gloves, boots, face masks),
- Entered the pit,
- Cleaned the area outside the pit,
- Ensured attendance to the pit at all times during emptying and closed the pit after service, and
- Disposed of the emptied sludge at the designated site.

URBAN WASH will also triangulate the information stated by emptiers with the following sources:

- With households and implementers based on their observation of these practices (except disposal), and
- Disposal site operators for data on disposal.

For occupational safety, the team will measure the change in the number of accidents/injuries faced on the job in the last six months and the proportion of emptying services provided where they come into contact with feces. These indicators were developed based on the key concerns highlighted for emptiers in literature (Gautam et al. 2021; World Bank, ILO, WaterAid, and WHO 2019).

For both practices and occupational safety, the team will capture notes from interview transcripts with formal and informal emptiers every day (to ensure better recall from the interviews) into a template per emptier that captures data along each indicator. Post-data collection, the team will analyze the data to see if any emptiers have stated a difference in their practices and occupational safety post-transition.

For emptiers who have stated a difference, URBAN WASH will also conduct a deductive thematic analysis to **understand whether the changes are due to transitions** based on the reasons stated by emptiers for changes. The team will specifically look for mentions of licensing, equipment provided, training by utilities, and other activities under the transition while capturing data from the handwritten notes. For this analysis, the team will use the data captured through IDIs with formalized emptiers in the following manner:

- Capture data from interview transcripts every day post-interviews on a template that checks whether specific factors were mentioned,
- Capture any additional reasons stated in the interview verbatim into the template, and
- Identify themes across all data collected.

Finally, the team will **understand the impact of changes in practices on the emptiers’ cost of service delivery**. URBAN WASH will isolate the costs stated by emptiers for implementing the above-mentioned practices and remove them from the cost of service delivery to determine the impact of implementing these practices on their viability. The team will use the financial data gathered and analyzed under RQ2 for this analysis.

### 8.4.3 FOR RESILIENCE

**Question:** *What is the impact of transitions (ongoing and failed) on the resilience of service delivery?*

The broad approach consists of measuring the change in resilience as per Section 6.4.3. The indicators have been adapted for the FSM sector (refer to Table 13).

**Table 13: Market characteristics and indicative scoring of indicators**

Characteristic	Indicator	Rationale for Indicator	Indicative Scoring	Data Source
Competition with rule of law	Number of emptiers (quantitative)	More emptiers indicate continuity of services during shocks	<ul style="list-style-type: none"> <li>4: Several emptiers available, with a few formalized emptiers.</li> <li>1: Only one emptier available in a settlement.</li> </ul>	<ul style="list-style-type: none"> <li>IDIs with formalized emptiers (<i>Appendix 11_RQ2+3 Formal Emptier Instrument – Maputo, Appendix 12_RQ2+3 Formal Emptier Instrument – Beira</i>)</li> <li>Household surveys (<i>Appendix 15_RQ3 HH Instrument – FSM (Maputo), Appendix 16_RQ3 HH Instrument – FSM (Beira)</i>)</li> </ul>
	Emptiers' degree of involvement in deciding guidelines (qualitative)	Emptiers having a say in guidelines improves the chances of them following guidelines, ensuring better services even during shocks	<ul style="list-style-type: none"> <li>4: Active involvement of emptier with some contract rules defined by them.</li> <li>1: Emptier having no discussions on the contract.</li> </ul>	IDIs with: <ul style="list-style-type: none"> <li>Formalized emptiers (<i>Appendix 11_RQ2+3 Formal Emptier Instrument – Maputo, Appendix 12_RQ2+3 Formal Emptier Instrument – Beira</i>)</li> <li>Informal emptiers (<i>Appendix 9_RQ2+3 Informal Emptier Instrument – Maputo, Appendix 10_RQ2+3 Informal Emptier Instrument – Beira</i>)</li> <li>Municipalities / Utilities (<i>Appendix 8_RQ2+3 Implementers Instrument – FSM</i>)</li> </ul>
	Existence of guidelines and degree of compliance (qualitative)	Existence of guidelines and high compliance indicate better services	<ul style="list-style-type: none"> <li>4: Existence of, and emptiers stating a high degree of compliance with most rules.</li> <li>1: Non-existence of guidelines or emptiers stating low compliance with most rules.</li> </ul>	IDIs with: <ul style="list-style-type: none"> <li>Formal emptiers (<i>Appendix 11_RQ2+3 Formal Emptier Instrument – Maputo, Appendix 12_RQ2+3 Formal Emptier Instrument – Beira</i>)</li> <li>Informal Emptiers (<i>Appendix 9_RQ2+3 Informal Emptier Instrument – Maputo, Appendix 10_RQ2+3 Informal Emptier Instrument – Beira</i>)</li> <li>Municipalities / Utilities (<i>Appendix 8_RQ2+3 Implementers Instrument – FSM</i>)</li> </ul> Utility logbooks on emptiers' compliance
Connectivity and cooperation	Degree of activity within emptier network (qualitative)	A network between emptiers helps with planning coordinated responses to shocks	<ul style="list-style-type: none"> <li>4: An organized network of emptiers (formal and informal), with activities/ information sharing every quarter.</li> <li>1: No interaction between emptiers.</li> </ul>	IDIs with: <ul style="list-style-type: none"> <li>Formalized emptiers (<i>Appendix 11_RQ2+3 Formal Emptier Instrument – Maputo, Appendix 12_RQ2+3 Formal Emptier Instrument – Beira</i>)</li> <li>Informal emptiers (<i>Appendix 9_RQ2+3 Informal Emptier Instrument – Maputo, Appendix 10_RQ2+3 Informal Emptier Instrument – Beira</i>)</li> </ul>
	Interactions between emptiers, community association,	Interactions between different stakeholders also help with coordinated	<ul style="list-style-type: none"> <li>4: Interactions at least once a quarter between the emptiers, community</li> </ul>	IDIs with: <ul style="list-style-type: none"> <li>Formalized emptiers (<i>Appendix 11_RQ2+3 Formal Emptier Instrument – Maputo, Appendix 12_RQ2+3 Formal Emptier Instrument – Beira</i>)</li> </ul>

Characteristic	Indicator	Rationale for Indicator	Indicative Scoring	Data Source
	and municipality/ autonomous sanitation body (qualitative)	response to shocks	association, and municipality/ autonomous sanitation body. <ul style="list-style-type: none"> <li>1: No interactions.</li> </ul>	<ul style="list-style-type: none"> <li>Community leaders (<i>Appendix 17_RQ3 Community Leader Instrument— FSM</i>)</li> <li>Municipalities / Utilities (<i>Appendix 8_RQ2+3 Implementers Instrument – FSM</i>)</li> </ul>
Diversity in business models	Viability of emptiers (financial data)	Having emptying as a profitable business improves likelihood of them continuing service provision during shocks	<ul style="list-style-type: none"> <li>4: All formalized emptiers being profitable and emptying as a significant source of income.</li> <li>1: All formalized emptiers being unprofitable.</li> </ul>	IDs with: <ul style="list-style-type: none"> <li>Formal emptiers (<i>Appendix 11_RQ2+3 Formal Emptier Instrument – Maputo, Appendix 12_RQ2+3 Formal Emptier Instrument – Beira</i>)</li> <li>Informal emptiers (<i>Appendix 9_RQ2+3 Informal Emptier Instrument – Maputo, Appendix 10_RQ2+3 Informal Emptier Instrument – Beira</i>)</li> </ul>
	Diversity of emptiers for a settlement (qualitative)	Having access to different kinds of emptiers (e.g., sewered, manual emptiers, vacuum trucks) improves the likelihood of improved services in shocks	<ul style="list-style-type: none"> <li>4: Access to multiple emptiers, including at least one from outside the community</li> <li>1: Access to one (or less) emptier operating only in the local community</li> </ul>	IDs with: <ul style="list-style-type: none"> <li>Formalized emptiers (<i>Appendix 11_RQ2+3 Formal Emptier Instrument – Maputo, Appendix 12_RQ2+3 Formal Emptier Instrument – Beira</i>)</li> <li>Informal emptiers (<i>Appendix 9_RQ2+3 Informal Emptier Instrument – Maputo, Appendix 10_RQ2+3 Informal Emptier Instrument – Beira</i>)</li> <li>Households (<i>Appendix 6_RQ3 HH Instrument – Water</i>)</li> </ul>
	Disposal points for emptying (qualitative)	Having easy access to disposal sites improves likelihood of safe practices during shocks	<ul style="list-style-type: none"> <li>4: Easily accessible disposal point, as stated by emptier.</li> <li>1: No disposal points.</li> </ul>	IDs with: <ul style="list-style-type: none"> <li>Formal emptiers (<i>Appendix 11_RQ2+3 Formal Emptier Instrument – Maputo, Appendix 12_RQ2+3 Formal Emptier Instrument – Beira</i>)</li> <li>Informal emptiers (<i>Appendix 9_RQ2+3 Informal Emptier Instrument – Maputo, Appendix 10_RQ2+3 Informal Emptier Instrument – Beira</i>)</li> </ul> Secondary data
	Access to emptying equipment and repair services (qualitative)	Access to emptying equipment and repair services improves the likelihood of sourcing required items during shocks	<ul style="list-style-type: none"> <li>4: High access, as stated by emptier.</li> <li>1: Negligible access, as stated by emptier.</li> </ul>	IDs with: <ul style="list-style-type: none"> <li>Formal emptiers (<i>Appendix 11_RQ2+3 Formal Emptier Instrument – Maputo, Appendix 12_RQ2+3 Formal Emptier Instrument – Beira</i>)</li> <li>Informal emptiers (<i>Appendix 9_RQ2+3 Informal Emptier Instrument – Maputo, Appendix 10_RQ2+3 Informal Emptier Instrument – Beira</i>)</li> </ul>

Acronyms: *IDI: In-depth interview; SLP: Small, local provider*

## 9.0 DATA MANAGEMENT PLAN

### 9.1 ETHICAL CLEARANCE AND HUMAN SUBJECTS PROTECTION

DNAAS will provide URBAN WASH's local research agency with a written document approving all data collection activities they conduct.

In addition to this, URBAN WASH will collect verbal informed consent from all study participants. The team will not communicate any personally identifiable information to local stakeholders and will only present summary statistics and statements while communicating findings. The team will remove all personal identifiers (names and global positioning system [GPS] coordinates) before uploading data to USAID's Development Data Library.

Further, the team will securely upload all collected data onto password-protected computers and share within the team using only password-protected company mail servers. For data collected by the research agency, URBAN WASH will ensure sharing only via password-protected company mail servers, and detail in the contract with them that all data collected for the purposes of this research will need to be deleted post-termination of the contract.

### 9.2 DATA QUALITY ASSURANCE

URBAN WASH will ensure data quality differently across the two broad types of data collection activities planned:

- Household surveys conducted by the research agency, and
- IDIs conducted by FSG.

#### Household surveys

- Preparation:
  - Hire a well-reputed market research agency based on the agency's prior experience in the sector or country,
  - Embed non-falsifiable questions (e.g., GPS coordinates of interview) within the surveys, and
  - Create translated versions of the data collection tools in local languages (languages will be based on inputs from the local research agency given their knowledge of the context).
- Training of the agency (remotely by FSG):<sup>39</sup>
  - Explain the research instruments along with the purpose of each section,
  - Conduct simulated surveys for different kinds of research methods for settlements, and
  - Run pilots of surveys and refine the survey question (including updating the wording in translated versions) based on learnings from the field.
- Data collection:
  - Review incoming quantitative data daily (or every alternate day, depending on frequency of agency sharing data) and follow up with data collection teams on inconsistencies; and

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<sup>39</sup> FSG has successfully conducted remote training of research agencies for data collection in multiple countries as part of the WASHPaLS project.



- Check for outliers and consistency of quantitative data through interview times, GPS locations, etc.

### **In-depth interviews**

- Preparation:
  - Conduct simulated interviews within the team and refine instruments,
  - Conduct simulated interviews with the translator to explain the purpose of each question/section,
  - Refine framing of questions/probes after initial interviews, and
  - Conduct the first few interviews in the presence of two team members to debrief and refine interview instruments before team members split up for data collection.
- Data collection:
  - Transcribe interview notes daily into a template on computers to ensure better recall to identify and fill in gaps through subsequent interviews,
  - Conduct consistency checks of financial data through specific questions at the end of the interview (e.g., revenue and cost increase/decrease since year X), and
  - Compare interview notes to audio transcripts (where collected based on informed consent and observed comfort of the respondent) and translator's notes.

## 10.0 STAKEHOLDER ENGAGEMENT PLAN

### 10.1 ENGAGEMENT WITH WORKING GROUPS AND RESEARCH PARTNERS

URBAN WASH has created two Technical Working Groups for the two sectors (water and FSM) to provide input into this implementation research. Table 14 and Table 15 list the organizations that are part of the groups. The objective of creating these groups is to:

- Integrate the perspectives of diverse stakeholders that play a key role in decision-making in the water sector to ensure the relevance of the research, and
- Build ongoing buy-in from local stakeholders who can help ensure uptake of the findings from the research.

The members of the two groups were identified during the scoping trip conducted in August 2023 through recommendations from the local USAID mission, AURA, and DNAAS.

**Table 14: Technical Working Group members – Water**

Category	Organization
National government ministries/agencies	AURA
	DNAAS
	AIAS
	FIPAG
	Ministry of Health
	Ministry of Education (Department of Construction)
Utilities	AdRMM
International development organizations	Transform Water, Sanitation, and Hygiene
	USAID
	Water Aid
Civil society	PROCONSUMERS
	Community leader
SLP representatives	AFORAMO

**Table 15: Technical Working Group members – FSM**

Category	Organization
National government ministries/agencies	AURA
	DNAAS
	AIAS
	Ministry of Health
	Ministry of Education (Department of Construction)
Municipalities	Matola Municipality
International development organizations	Small Town Sanitation ( <i>USAID project</i> )
	USAID
	Water Aid
	WSUP
Civil society	PROCONSUMERS
	Community leader

Category	Organization
SLP representatives	Clean FOSSA
	MAJU

URBAN WASH convened the sectoral groups for co-design workshops in November 2023. Their inputs on the research design were incorporated while finalizing the analytical and research approaches for each of the three research questions.

Going forward, an engagement manager from Mozambique will lead the formal and informal interactions with the working groups' stakeholders, with support and guidance from the research teams. Based on inputs from the engagement manager, URBAN WASH will develop dissemination materials in English and Portuguese in formats most suited to generate interest and uptake from local stakeholders.

URBAN WASH will formally engage the members (through the engagement manager) quarterly during the research through in-person meetings in Mozambique. The team has spread out each engagement over multiple months to provide flexibility in scheduling meetings with the members (refer to Table 16).

The members will also have access to a WhatsApp group for informal engagement, shorter updates, and updates on changes in local context or policy affecting research design or queries, which the engagement manager will answer. URBAN WASH will also supplement this with shorter messages/e-mails for those who may not be allowed to communicate regarding work over WhatsApp.

Additionally, the engagement manager will help prepare URBAN WASH's research partners for the research. These partners will also include stakeholders that are only part of the sample for RQ1, and as such, are not part of the working groups. The first such engagement is scheduled for February 2024.

**Table 16: Engagement with working group members and research partners**

Quarterly Meeting Date	Key Content to Present	Key Inputs Required
<b>Research partners</b>		
Engagement 1 – February 2024 for municipalities and utilities that are a part of RQ1 (refer to Section 4.2)	Updates on the research plan and preparing them for RQ1 data collection activities	Respondents to sample and availability for RQ1 interviews and workshop
<b>Working group members</b>		
Engagement 1 – March/April 2024	Updates on the kickstart of research and broad research timelines	Recommendations on subsequent phases of data collection
Engagement 2 – June/July 2024	Early findings on implementation and impact of transitions	Interpret early findings and suggest additional questions for interviews during the final phase of data collection for RQs 2 and 3
Engagement 4 – November/December 2024	Early synthesis of the research	Generate recommendations on operationalizing transitions for municipalities/utilities and ensuring buy-in from local stakeholders

## 10.2 ENGAGEMENT WITH NON-WORKING GROUP STAKEHOLDERS

The engagement manager will also use appropriate channels for enhancing buy-in of findings from local stakeholders who are not part of the working groups. This will include attending and presenting the

research at various local events. Below is an indicative list of events or conferences that URBAN WASH might consider:

- National WASH conferences/events, such as:
  - Annual Joint Performance Assessment Meeting of the Water Sector, organized by DNAAS.
  - AQUASHARE & EXPO PLAMA Conference, organized by AQUASHARE.
  - 16th Symposium on Hydraulics and Water Resources in Portuguese-speaking countries (16th SILUSBA) and the 11th Congress on Planning and Management of Coastal Zones in Portuguese-speaking Countries (XICPGZC), expected to be held on November 17–22, 2024, in Maputo, co-organized by AQUASHARE.
  - National Water and Urban Sanitation Strategy
- Provincial-level committee/local government authority quarterly meetings, such as:
  - Provincial seminar on the sustainability of water supply services.
- Annual events with political, utility, or municipality leadership, as and when they occur.

The dates of the meetings may change marginally according to the final plan for the conferences/meetings (mentioned above). All events happening in the same region and same period will ideally ensure that both can be attended during a single trip. In addition to the above, URBAN WASH will consider disseminating the final findings through local partners who can present them on local communication platforms (including community radio channels) in the local language to increase the scope of informal/community members learning of research findings.

## 11.0 ACTIVITY MANAGEMENT PLAN

Redacted from the document.

**Table 17: Summary of team roles and responsibilities**

Team Member	Role	Responsibilities
Redacted		
from		
the		
document		

## 12.0 MONITORING AND EVALUATION

The research will employ monitoring, evaluation, and learning reporting as required by URBAN WASH. Quarterly and annual reporting will include progress on this research. URBAN WASH can use the activity's custom indicators (refer to Table 18) to measure the results of the research and dissemination.

**Table 18: URBAN WASH performance indicators**

No.	Performance Indicator [and Type]	Disaggregation
C.1	Number of partners and stakeholders applying URBAN WASH-generated learning [Custom, Outcome]	Type of partners/stakeholders; Learning topic area; Geographic area
C.2	Number of institutional tools (reports, policies, laws, agreements, action plans, regulations, strategies, or investment agreements) influenced by URBAN WASH [Custom, Outcome]	Type of Guidance; Topic area; Type of institution; Stage (proposed/draft, adopted/final); Influence level (strong, medium, weak); Geographic area
C.3	Number of technical publications/communications materials developed to share information and learning [Custom, Output]	Type of products; Topic area; Type of institution; Geographic area
C.4	Number of individuals exposed to WASH and WRM approaches/tools through attendance at URBAN WASH presentations/events, communication materials and knowledge products [Custom; Output]	Sex (Male/Female/Undisclosed); Age (15–29, 30+); Type of exposure (events, knowledge, and communication products); Topic area; Affiliated institution; Geographic area
1.1	Number of partnerships established and supported by URBAN WASH [Custom; Output]	Type of partnering institution(s); Level (global, national); Status of partnership (established, supported)
1.2	Level of partners' satisfaction with the URBAN WASH's engagement [Custom; Output]	Type of partners; Level (global, national); Topic area; Geographic area
2.1	Number of country- or local-level workshops/events for research co-design and presentation of findings [Custom; Output]	Level of project role (organized, co-organized, presented); Topic area; Geographic area
2.2	Number of local partners actively participating in design and implementation of URBAN WASH research activities [Custom, Output]	Level of project role (organized, co-organized, presented); Topic area; Geographic area

# 13.0 DELIVERABLES, TIMELINE, AND BUDGET

## 13.1 DELIVERABLES

This research will lead to two categories of deliverables:

- **Cross-country reports:** Two cross-country reports that will integrate the analysis from Mozambique with the implementation research in other countries. The two reports will focus on:
  - The choice of transitions (RQ1), and
  - The implementation and impact of transitions (RQs 2 and 3).<sup>40</sup>
- **Country-specific briefs:**
  - Research brief on the choice of transitions (RQ1),
  - Research brief on the implementation and impact of transitions in the water sector (RQs 2 and 3), and
  - Research brief on the implementation and impact of transitions in the FSM sector (RQs 2 and 3).

Table 19 summarizes the audiences and objectives of these deliverables.

**Table 19: Deliverables**

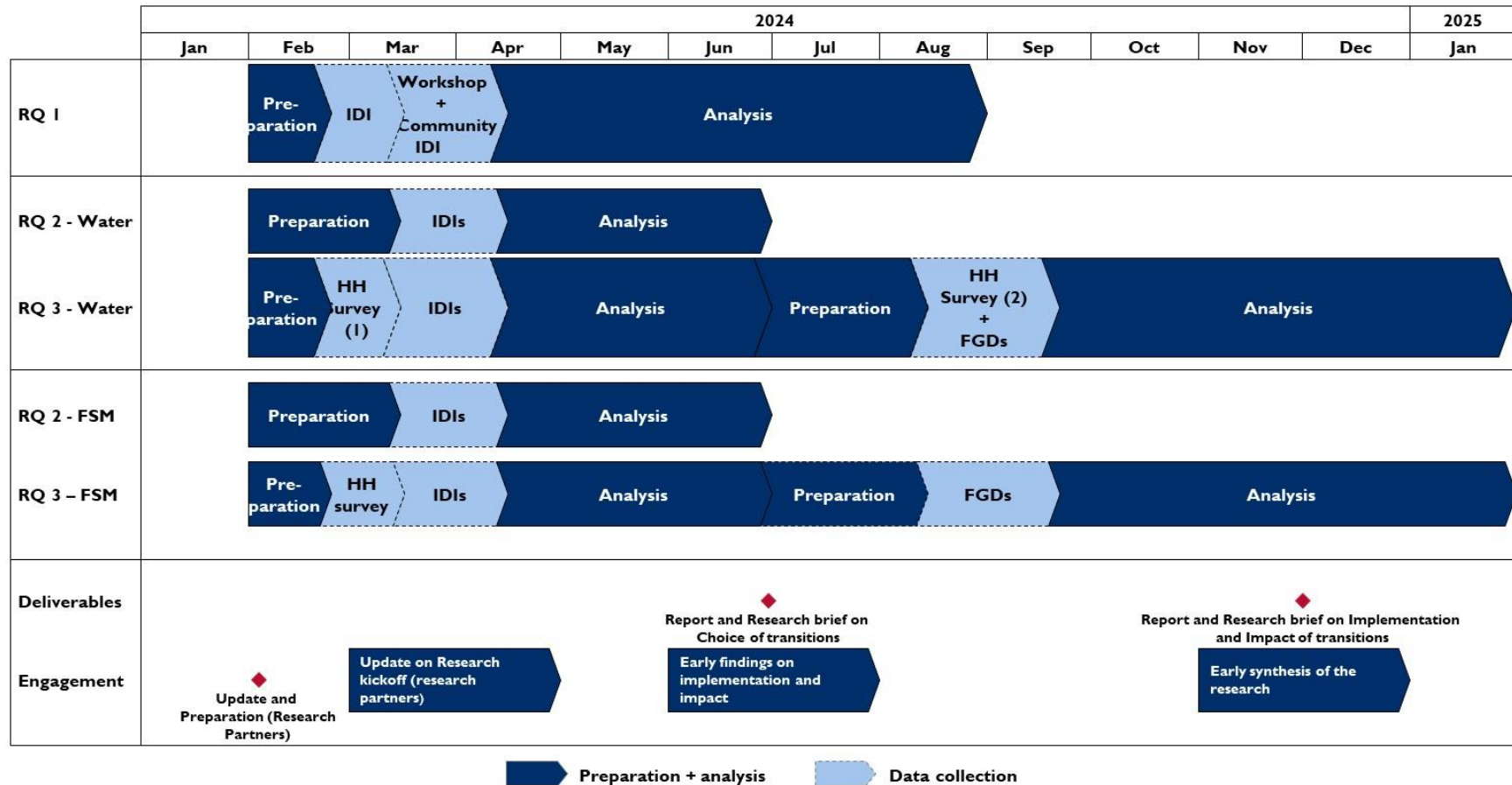
Deliverables	Audience	Objective
<b>Cross-country reports</b>		
Report on choice of transitions	National-level stakeholders in low-and-middle-income countries (LMICs), including regulators, ministries, and funders	Provide guidance to plan for transitions at a macro level and nudge and support city-level stakeholders
Report on implementation and impact of transitions	Utilities, city-level stakeholders in LMICs, such as water and FSM departments in city governments	Provide guidance for implementing transitions at a micro level, with the knowledge of the impact
<b>Country-specific briefs</b>		
Research brief on choice of transitions	National-level stakeholders in Mozambique, including regulators, ministries, and funders	Provide drivers and barriers to implementing transitions, specific to Mozambique
Research brief on implementation and impact of transitions in the water sector	National-level stakeholders (e.g., DNAAS, AURA, FIPAG), utilities, and municipalities in Mozambique	Provide guidance on implementation and impact of transitions, specific to Mozambique
Research brief on implementation and impact of transitions in the FSM sector	National-level stakeholders (e.g., DNAAS, AURA), utilities (e.g., SASB), and municipalities in Mozambique	Provide guidance on implementation and impact of transitions, specific to Mozambique

<sup>40</sup> URBAN WASH will decide in 2024 if the reports are required to be sector-specific (for water and FSM) or not.

## 13.2 TIMELINE

The timelines of the research, deliverables, travel, and stakeholder engagement are summarized in Figure 15. Each research question will involve data collection in phases, followed by synthesis and findings summarized in reports.

Figure 15: Timeline for research



Acronyms: IDI: In-depth interview; HH: Household; FGD: Focus group discussion

Note: The timeline does not include engagements with non-working group members and research partners/sample. The former will depend on when conferences and events are scheduled. The latter will be developed as the need arises. Where this involves travel outside Maputo, URBAN WASH will coordinate events and working group meetings for efficiency and maximizing the value of each trip.



### **13.3 BUDGET**

Redacted from the document.

# APPENDIX I: FRAMEWORK FOR TRANSITIONS

Urban Resilience by Building and Applying New Evidence in Water, Sanitation, and Hygiene’s (URBAN WASH’s) desk research developed a framework for utilities to implement market transitions with small, local providers (SLPs).

## MARKET ARCHETYPES AND TRANSITIONS

Different parts of a city may consist of different micro-markets with market archetypes (unregulated, facilitated, managed, served) based on the functions (enabling, offering, service) managed by city authorities/service providers in these areas (see Figure 16).

**Figure 16: Market archetypes**



**Unregulated** markets represent markets served by SLPs in the absence of city-led arrangements and in which they do not manage any functions or have oversight over SLPs.

**Facilitated** markets are characterized by city influencing the service delivery of SLPs (e.g., through the issuance of licenses or the creation of treatment facilities) by managing a range of enabling functions, typically following the introduction of regulatory frameworks for SLPs. Enabling functions can include:

- **Licensing** or similar mechanisms that provide SLPs the “right to operate” under specified standards and guidelines (often defined under regulatory frameworks);
- **Dependency** or points of interaction of the service with the external environment, like sourcing of water or disposal; and
- **Financing** for enterprises to invest in their business or for customers to pay for services.

**Managed** markets are characterized by cities managing SLPs’ offering and enabling functions (e.g., delegated management models). The offering functions define SLPs’ core product and marketing functions and include:

- **Pricing** of different types of service delivery for different customer segments;
- **Customer acquisition** through selection of micro-markets for SLPs to serve, and sales and marketing efforts;
- **After-sales engagement** with the customer beyond the delivery of the service; and
- **Technology** employed for delivering services to the customer.

**Served** markets receive city-led provision directly, through piped or decentralized systems for water services.<sup>41</sup> Utilities manage all the functions, including last-mile service delivery.

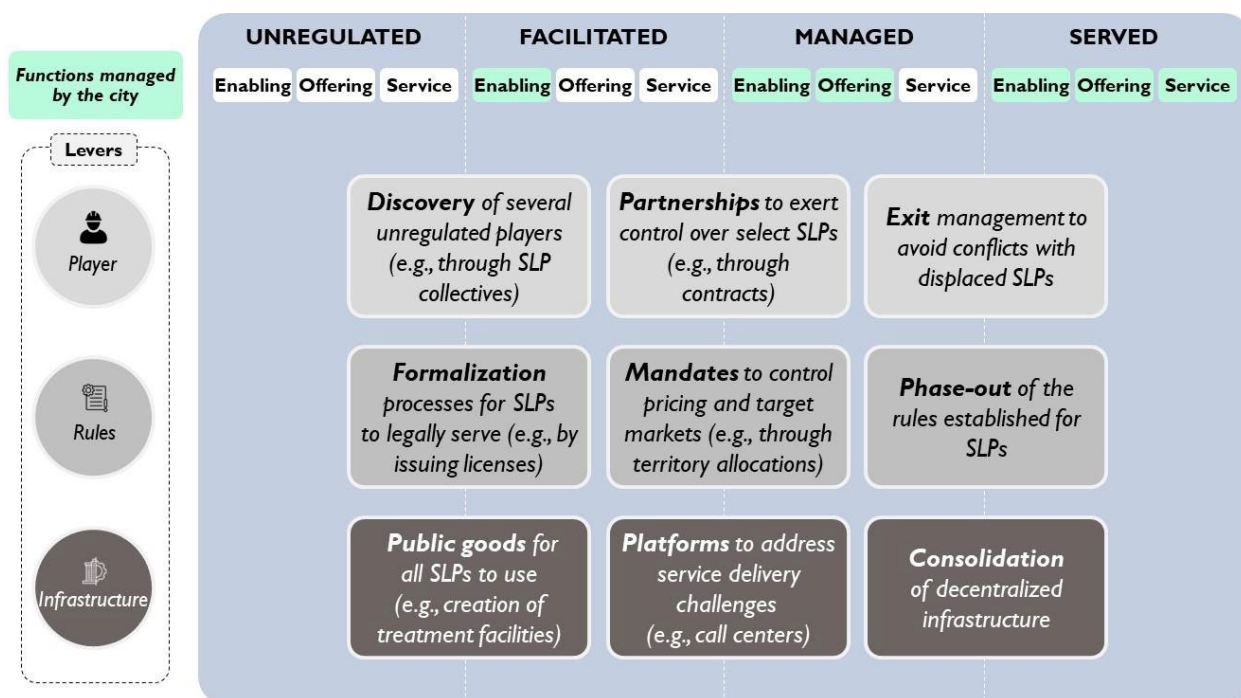
A city’s objective of engaging SLPs and implementing market transitions may not only be limited to expanding services. For example, cities may want to monitor the activities of water vendors/emptiers to reduce unsafe sourcing of water.

## LEVERS

Cities can expand or improve services and meet their mandate of providing citywide coverage by transitioning micro-markets across the four archetypes. Transitioning across these archetypes requires actions. These actions can be classified into three **types of levers**: (1) managing the engagement with **players**, (2) establishing **rules** for the engagement, and/or (3) creating **infrastructure** that supports SLPs to deliver services.

The purpose of these levers varies by transition (refer to the **Market Transitions Framework** in Figure 17).

**Figure 17: URBAN WASH Market Transitions Framework**



<sup>41</sup> Decentralized systems entail utilities providing water through non-piped means such as kiosks, communal standpipes, utility-owned tanker trucks, etc.

# APPENDIX 2: DATA COLLECTION PLAN

## DATA COLLECTION PLAN FOR RESEARCH QUESTION I

### FOR MUNICIPALITY AND UTILITY CHOICES

The **in-depth interviews (IDIs)** will capture data on the choices made by the municipalities and utilities and the conditions and influencers impacting each choice (as detailed in the analysis plan in Section 4.4). Given the emergent nature of the research, URBAN WASH may conduct one more targeted interview per municipality and utility (with the respondent profile depending on who is best placed to answer the targeted question).

URBAN WASH will conduct the interview in a semi-structured format,<sup>42</sup> with open-ended questions for identifying conditions and influencers. The team will add targeted probes as they emerge in each interview. Please refer to Appendix 3 for examples of different conditions. The detailed instrument is provided as a supplemental document (titled Appendix I\_RQI Decision Maker Instrument), and the broad areas of inquiry are included below:

- Background of the respondent, including role and experience within the municipality and utility;
- The vision of the municipality and utility, including overall aims, goals for drinking water and sanitation service delivery, and the role they see in the future for SLPs;
- Conditions impacting their choice of **“why”** to implement transitions, **“which”** transition to implement, and **“where”** to implement it (*the latter two will only be asked to those municipalities and utilities that make these choices*); and
- Influencers that enabled (e.g., provided funding), inhibited (e.g., lobbied against transition), or were neutral (e.g., need to be informed) choices of transitions mentioned above.

The **two in-person workshops** aim to validate the conditions from the data gathered through interviews. URBAN WASH will conduct these workshops with a sample of the initial decision-makers and influencers, additional decision-makers and influencers identified during the IDIs, community stakeholders, and SLP representatives based on those identified as most relevant to validate the conditions. The team will conduct the workshops using specific facilitation techniques in breakout groups based on the type of data URBAN WASH wants to generate:

- Validation of existing conditions and any additional conditions beyond those identified through the IDIs using the “sticky wall” method, which is cited as helpful when participants are required to reflect on an output and generate new ideas (Turner 2019);
- Ranking each condition to the choice using a pairwise comparison matrix for each choice, cited as a helpful method when participants are expected to rank a long list of options by breaking it into binary choices (Kyne 2023); and
- An initial list of the support required by municipalities and utilities to implement transitions through an open discussion/brainstorming activity within the groups.

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<sup>42</sup> Refers to interviews where a few questions are predefined, but the interviewer has the flexibility to probe or ask follow-up questions based on responses (Mueller and Segal 2015).

## FOR INFLUENCERS' IMPACT ON CHOICE

The **IDIs with influencers** will capture data on how they enable (e.g., provide funding), inhibit (e.g., lobby against the transition), or are neutral (e.g., need to be informed) to the decision-making of municipalities and utilities (as detailed in the analysis plan in Section 4.4). Given the emergent nature of the research, URBAN WASH may conduct one more targeted interview per influencer after that (with the respondent profile depending on who is best placed to answer the targeted question).

The team will conduct the interview in a self-structured format, with open-ended questions for identifying how the influencers impacted the decision-maker's choices. The team will add targeted probes as they emerge in each interview. The detailed instrument is provided as a supplemental document (titled Appendix 2\_RQI Influencers Instrument), and the broad areas of inquiry are included below:

- Background of the respondent, including role and experience within their organization;
- Objective of the organization in the water/fecal sludge management (FSM) sector; and
- If the influencer impacts the choices of decision-makers: How they impact the choices of “**why**” to implement transitions, “**which**” transition to implement, and “**where**” to implement it.

The **two in-person workshops** aim to validate the influencers, the kind of influence (inhibiting, enabling, or neutral) on choices, and the degree of influence gathered through the IDIs. URBAN WASH will conduct these workshops with a sample of the initial decision-makers and influencers, additional decision-makers and influencers identified during the IDIs, community stakeholders, and SLP representatives based on those identified as most relevant to validate the influencers, kind of influence, and degree of influence. The team will conduct these workshops using specific facilitation techniques in breakout groups based on the type of data URBAN WASH wants to generate:

- Validation of existing influencers, any additional influencers beyond those identified through the IDIs, and the kinds of influence using the “sticky wall” method, which is cited as helpful when participants are required to reflect on an output and generate new ideas (Turner 2019);
- Ranking each influencer using a pairwise comparison matrix for each choice, cited as a helpful method when participants are expected to rank a long list of options by breaking it into binary choices (Kyne 2023); and
- Scoring the degree of influence of enabling and inhibiting choices to determine which are the most important (e.g., by providing 20 points and asking groups to distribute it across conditions).

URBAN WASH may conduct **one-on-one IDIs with a sample of one to three additional decision-makers and influencers per city identified during the IDIs** to capture data on who influences the decision-makers and how (as detailed in the analysis plan in Section 4.4). The team will conduct the targeted IDIs in a semi-structured format, and they will develop the exact detailed questions and instruments based on the types of influence identified in the IDIs with decision-makers and influencers. The broad areas of inquiry may include the following questions for each choice:

- Background of the respondent, including role and experience within their organization;
- Objective of the organization in the water/FSM sector; and
- If the influencer impacts the choices of decision-makers: How they impact the choices of “**why**” to implement transitions, “**which**” transition to implement, and “**where**” to implement it.

URBAN WASH may also conduct **one-on-one IDIs with one to two stakeholders from the initial list of decision-makers and influencers**. The sample will include decision-makers who are

strongly influenced by an influencer and influencers who strongly impact the choice (as detailed in the analysis plan in Section 4.4). The team will conduct the targeted IDIs in a semi-structured format in the same manner as initial IDIs with decision-makers and influencers (above).

### FOR COMMUNITY PERSPECTIVES

The **two in-person workshops** (same as the workshops described above) will aim to capture any disagreements with the municipalities, utilities, and influencers on the conditions and influencers impacting each choice. The community stakeholders for each workshop will include:

- One community representative per city (total of four per workshop) from among civil society organizations, households, community associations, or regional nongovernmental organizations (NGOs); and
- One SLP per city (total of four per workshop).

During the workshops, URBAN WASH will gather data on the perspectives (agreements and disagreements with the municipality, utility, and influencers) voiced by the community stakeholders over each condition and influencer for each choice. The team will do this by seating the community stakeholders in the breakout groups with the municipality and utility stakeholders and representatives of influencer organizations. Facilitators from FSG or the research team seated within these groups will then silently capture any agreements, disagreements, or conflicts during the activities by taking note of the following for each condition and influencer:

- The type of stakeholder (i.e., community representative, SLP) that agreed to the municipality and utility's view on the conditions and influencers,
- The type of stakeholder that did not agree to the municipality and utility's view on the conditions and influencers, and
- Reasons stated for disagreements.

The **one-on-one IDIs with the community stakeholders** will aim to gather disagreements on each condition and influencer identified in the IDIs in the absence of power differentials imposed by the presence of government stakeholders. The sample will include all the community stakeholders invited to the workshop (i.e., civil society organizations, households, community association representatives, regional NGO representatives, and SLPs). The team will conduct these one-on-one IDIs in a semi-structured format, and they will develop the exact detailed questions and instruments based on the conditions and influencers identified in the IDIs with municipalities, utilities, and influencers. The broad areas of inquiry may include the following questions for each choice:

- Whether they agree with the municipalities and utilities' assigned rating of importance for the conditions, with reasons;
- Whether they agree with the municipalities, utilities, and influencers' view on who are the influencers and the kinds of influence (inhibiting, enabling, or neutral) they exert, with reasons;
- Whether there are additional conditions that the municipality and utility have not stated;
- Whether there are additional influencers and kinds of influencers that have not been stated;
- Specific probes to understand how political and social conditions and influencers at the community level impact choices (since these stakeholders are best placed to answer that and municipalities and utilities may not voice these aspects); and
- Their perception of why the municipalities, utilities, and influencers may not have listed the additional conditions and influencers.

## DATA COLLECTION PLAN FOR RESEARCH QUESTION 2 FOR WATER

### FORMAL PWPS

The in-person IDIs with licensed and bulk water private water providers (PWPs) will aim to develop their profit and loss (P&L) statements and understand their experience of formalization and challenges of compliance to guidelines.

URBAN WASH will conduct these interviews with a mix of semi-structured and structured sections.

- The semi-structured questions will gather data on their experience of formalization and their challenges to compliance, including their stated levels of compliance with guidelines.
- The structured questions will gather financial data to develop their P&L statements. The team will ask the vendors for data on each line item of the P&L statement and break the questioning into units (for example, ask for price per service and number of services in a week, rather than revenue). This is similar to the approach followed for the Water, Sanitation, and Hygiene Partnerships and Learning for Sustainability (WASHPaLS) enterprise viability study (United States Agency for International Development [USAID] 2021; USAID 2022).

The detailed instrument is provided as a supplemental document (titled Appendix 5\_RQ2+3 Formal PWP Instrument), and the broad areas of inquiry (across sub-research questions) are provided below. Please note that the sequencing of the questions in the instrument will be different from below since the instrument combines questions for research questions (RQs) 2 and 3 (detailed in Section 6) for formal PWPs.

- Background of the PWP's journey and work, and reasons for formalizing;
- Their experience of the engagement process;
- Their stated degree of compliance and challenges for compliance (including costs); and
- Financial data, including revenue and costs and operating expenses, for last year and the year preceding transition.

### INFORMAL PWPS

The in-person IDIs with informal PWPs (including those who were previously licensed) will gather data to understand their experiences of engaging with the formalization process (if at all), and reasons for dropping off.

URBAN WASH will conduct the IDIs in a semi-structured format, with open-ended questions and targeted probes (developed during the interview) to gather data on their formalization experience (if any). The detailed instrument is provided as a supplemental document (titled Appendix 4\_RQ2+3 Informal PWP Instrument), and the broad areas of inquiry (across sub-research questions) are provided below:

- PWPs' background, journey, and work;
- For PWPs who never engaged in the formalization process: Whether they know of the possibility to formalize and reasons for not having done so;
- For PWPs who started the formalization engagement but dropped off: Motivations to continue as long as they did, experience at each stage, and reasons for dropping off when they did;
- For PWPs who formalized but did not renew their license: Their experience of being licensed and reasons for not renewing;
- Their stated degree of compliance and challenges for compliance (including costs);

- Financial data, including revenue and costs and operating expenses, for last year and the year preceding or during transition (where applicable); and
- For all PWWPs:
  - Their perspectives on what has changed for them and in the market since the transitions, with probes on whether level of interaction within PWWPs networks has changed; and
  - Questions to determine if marginalization played a role in them not formalizing/remaining formalized.

## MUNICIPALITIES/ADRMM

The in-person IDIs with municipalities/*Aguas da Região Metropolitana de Maputo* (AdRMM) will gather data to understand their experience of implementing transitions. The profile for data collection will include:

- The Director of Public Works at municipalities, the Director, Commercial Manager, and Monitoring Department Head at AdRMM (for the transition they are implementing); and
- Low-income area, revenue, technical, or marketing department heads.

URBAN WASH will conduct these interviews with a mix of semi-structured and structured sections to gather data on the processes for implementing transitions.

The detailed instrument is provided as a supplemental document (titled Appendix 3\_RQ2+3 Implementers Instrument – Water), and the broad areas of inquiry (across sub-research questions) are provided below.

- Background and experience of the respondent within the organization; and
- Processes, costs, and choices made along the engagement journey for each transition.

## DATA COLLECTION PLAN FOR RESEARCH QUESTION 3 FOR WATER

### FOR ACCESS, AFFORDABILITY, AND PERCEIVED QUALITY

The research team will conduct **the household survey** with a representative<sup>43</sup> set of households in each settlement where the respondent is the household member who purchases water or the decision-maker for matters related to water purchase, and the team will ask if they are best placed to provide information regarding volumes and pricing of water purchased. The sample for the household surveys will vary by period of data collection, by sub-research question (refer to Table 20).

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<sup>43</sup> The research agency will employ the random walk methodology to ensure a representative sample. This will involve defining a starting point (e.g., west edge of the settlement) and using a predefined set of rules for the random walk to sample further households (e.g., every fifth household from the starting point).



**Table 20: Sampling plan for household interviews**

Municipality	Settlement	Method	Sub-RQ	Household Surveys		Focus Group Discussions (FGDs)
				Feb/Mar 2024	Aug/Sept 2024	Aug/Sept 2024
Maputo municipality	To be identified	R	Access	50–60	NA	8–10
			Affordability and perceived quality	10–50	NA	
Matola municipality	To be identified	R+P	Access	50–60	~30	8–10
			Affordability and perceived quality	10–50	10–30	
<b>Total distinct households</b>				<b>~120</b>	<b>~30</b>	<b>16–20</b>

Acronyms: R: Retrospective; P: Prospective; RQ: Research question; FGD: Focus group discussion; NA: Not applicable

In the first round of household surveys (for both settlements), URBAN WASH will conduct the following:

- For the analysis on access: Randomly sample 50–60 households<sup>44</sup> in each settlement.
- For the analysis on affordability and perceived quality: Sample a subset of these that have used services from a licensed PWP post-transition. The exact sample will depend on the penetration of the licensed PWP in the settlement.<sup>45</sup>

In the second round of household surveys (for one settlement only), URBAN WASH will conduct the following:

- For the analysis on access: Sample a representative set of 30 households, from the sample of 50–60 in the first round (e.g., based on the proportion of female- versus male-headed households, source of water).
- For the analysis for affordability and perceived quality: Sample a subset of these that have used services from licensed PWPs post-transition (sample to be determined based on penetration).

The survey will consist of a structured quantitative survey, with the research agency asking questions verbatim, in a predefined sequence. It will involve close-ended, coded questions, and a few open-ended questions for which the response will be captured verbatim. The questions will focus on understanding households' different suppliers of water, and the prices and perceived quality of these suppliers, pre-transition (i.e., the baseline market) and post-transition. The detailed instrument is provided as a supplemental document (titled Appendix 6\_RQ3 HH Instrument – Water), and the broad areas of inquiry (across sub-research questions) are given below.

- Qualification questions to ensure the sampled respondent was the primary purchaser of water or decision-maker for water purchase, pre- and post-transition;
- Household details, including details of the respondent, asset-related questions to establish wealth quintiles, and income- and expenditure-related questions;

<sup>44</sup> The sample of 50–60 households per settlement gives a 95 percent confidence interval with a five to six percent margin of error at the settlement level, assuming five members per household and the settlement population to be ~5,000.

<sup>45</sup> If penetration of licensed PWPs is low in the random sample, URBAN WASH will purposively sample a minimum of 10 per settlement. If penetration of licensed PWPs is moderate to high in the random sample, the team will sample as per the proportion in the random sample.

- Post-transition consumption, involving questions to establish the different sources and PWP, and volume of water consumed (including proportion used for drinking), price paid to, and time taken to receive water from each PWP;
- Pre-transition consumption with similar questions as for post-transition;
- Willingness to pay for drinking water from a licensed PWP; and
- Perceived drinking water quality from licensed PWP, and all other PWP that households sourced water from pre- and post-transition.

**For the FGDs**, the team will gather data from 8–10 households in one FGD per settlement (i.e., ~16–20 households across two settlements in total) (refer to Table 20), including those who sourced drinking water from a licensed PWP post-transition and those who either did not source from a licensed PWP or significantly reduced sourcing from licensed PWP post-transition. The team will also ensure that each group consists of at least three to four women-led households to ensure capturing any gender-related considerations involved in water purchase. The team will determine the specific areas of inquiry for the FGDs with households after analyzing the survey data.

### FOR VENDORS' WATER HANDLING PRACTICES

**For the IDIs with licensed PWP**, URBAN WASH will gather stated data on the changes in their water handling practices during sourcing, treatment, and distribution. The team will speak to all the licensed PWP as part of RQ2.

The team will conduct the interview in a semi-structured format, including specific questions to capture data on the practices of the PWP, pre- and post-transition, and open-ended questions (with targeted probes developed emergently) to understand reasons for changes, if any. It will also focus on understanding whether they have changed any practices that affect affordability and the quality of water provided to households, whether they have seen a change in the number of customers availing their services, or reductions in volumes purchased by customers, and reasons for these changes (if any). The detailed instrument is provided as a supplemental document (titled Appendix 5\_RQ2+3 Formal PWP Instrument), and the broad areas of inquiry are provided below.<sup>46</sup>

- Changes in water handling practices as recommended for water safety by *Autoridade Reguladora de Água* (Water Regulatory Authority), including whether recommended practices for each stage are implemented; frequency of implementation; and processes, costs, and challenges to implementing practices;
- Changes to affordability or quality of water for customers, and reasons for the same; and
- Proportion of and reasons for customers significantly reducing their consumption from the PWP, if any.

**For the IDIs with informal PWP**, URBAN WASH will gather data on their current water handling practices during sourcing, treatment, and distribution. The team will conduct this interview with the informal PWP sampled as part of RQ2, across the two municipalities. The informal PWP will be purposively sampled to reflect the same types (i.e., piped water supplier, borehole operators) as the licensed PWP, since the transitions the team is studying target a specific type of PWP. The aim is to compare the practices of licensed versus informal PWP under each transition.

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<sup>46</sup> Note that the sequencing of the questions in the instrument will be different from the areas of inquiry listed in this section since the instrument combines questions for RQs 2 and 3 (detailed in Section 6.0) for water PWP.

The detailed instrument is provided as a supplemental document (titled Appendix 4\_RQ2+3 Informal PWP Instrument), and the broad areas of inquiry (across sub-research questions) will include the current practices implemented for water safety.

## FOR RESILIENCE

URBAN WASH will gather all data for resilience from PWPs and community leaders in the two settlements mentioned in Table 20 as part of RQs 2 and 3, and the team will not develop a separate tool for PWP interviews.

URBAN WASH will conduct a targeted semi-structured interview to gather data from community leaders to understand the degree, frequency, and reasons for their interaction with municipalities and the PWPs. The instrument is provided as a supplemental document (titled Appendix 7\_RQ3 Community Leader Instrument – Water).

The indicators for which the team will gather data and its source (i.e., the interviews) are provided in Table 13.

## DATA COLLECTION PLAN FOR RESEARCH QUESTION 2 FOR FSM

### FORMALIZED EMPTIER

**The IDIs** will gather data from formal emptiers to develop their P&L statements, understand their formalization journey, and their compliance with guidelines. URBAN WASH will aim to capture diversity in the size (i.e., number of households served) of formalized emptiers to check for economies of scale for the cost of service delivery. The team will gather the data from the following for the research:

- For Maputo: ~Five dropped-off (previously licensed) emptiers who were most recently active in FSM services to improve the quality of data recall; and
- For Beira: ~Five licensed emptiers.

The team will conduct these interviews with a mix of semi-structured and structured sections.

- The semi-structured questions will gather data on their perspectives of the processes followed for engagement and compliance with guidelines within the transition. While some of the engagement activities (e.g., applying for a license) may have happened three to five years ago, the research team's experience is for important business decisions, such as engaging with the municipality, and recall will be high.
- The structured questions will gather financial data to develop their P&L statements for 2023 and the baseline year of each intervention. URBAN WASH will ask the emptiers for data on each line item of the P&L statement and break the questioning into units (for example, ask for price per service and number of services in a week, rather than revenue). This is similar to the approach followed for the WASHPaLS enterprise viability study (USAID 2021; USAID 2022), since this approach is likely to provide more accurate data. For the failed Water and Sanitation for the Urban Poor (WSUP) transition, the 2023 P&L of emptiers will apply to their solid waste management business. The team will not gather pre-transition P&L data for the failed WSUP transition, as the emptiers were previously not providing FSM services.

The detailed instrument is provided as a supplemental document (titled Appendix 11\_RQ2+3 Formal Emptier Instrument – Maputo and Appendix 12\_RQ2+3 Formal Emptier Instrument – Beira), and the broad areas of inquiry (across sub-research questions) are provided below. Please note that the

sequencing of the questions in the instrument will be different from below since the instrument combines questions for RQs 2 and 3 (detailed in Section 8.0) for emptiers.

- Background of the emptier’s journey and work;
- Value proposition of the transition for the emptier, including their overall motivations to engage with the utility, and the types of customers that they serve under the transition;
- Emptier’s experience of the formalization process, reasons for drop-offs (if applicable), and their ability, willingness, and degree of compliance to guidelines;
- Financial data, including revenue, costs, and operating expenses for 2023 and the baseline year of each transition, including costs that are subsidized by the government, the municipality, or international development agencies; and
- For the dropped-off emptiers:
  - Reasons for drop-off after the intervention ended across three considerations:
    - Financial or operational considerations (player lever),
    - Regulatory considerations (rules lever), and
    - Technology and disposal considerations (infrastructure lever).
  - Factors or motivations that would have encouraged the emptier to remain in the market; and
  - Questions to determine if marginalization played a role in dropping off.

## INFORMAL EMPTIERS

**The IDIs** with informal emptiers will gather data to understand informal emptiers’ experiences of interacting with the implementer (if at all), reasons for dropping off from the formalization process, and their current emptying and disposal practices. URBAN WASH will conduct this interview with ~10 informal emptiers in total, across the two cities based on when the implementer (i.e., WSUP, municipalities, autonomous sanitation bodies), emptier representatives, or community leaders can connect the team with them. The team will attempt to include emptiers that were active in both 2023 and the baseline year for each transition, with a mix of emptiers that have tried to formalize but dropped off and emptiers that have never tried to formalize. URBAN WASH will also attempt to include a mix of manual and mechanized emptiers in the sample.

The research team will conduct the IDIs in a semi-structured format, with open-ended questions and targeted probes (developed during the interview) to gather data on their engagement experience (if any) with the implementer. The detailed instrument is provided as a supplemental document (titled Appendix 9\_RQ2+3 Informal Emptier Instrument – Maputo and Appendix 10\_RQ2+3 Informal Emptier Instrument – Beira), and the broad areas of inquiry (across sub-research questions) are provided below:

- Emptiers’ background, journey, and work;
- For emptiers who never interacted with the implementer: Whether they know of the engagement and reasons for not interacting at all, with targeted probes to understand if marginalization played a role;
- For emptiers who were found but dropped off: Motivations to continue as long as they did, experience engaging with utilities at each stage, and reasons for dropping off when they did;
- Financial data, including revenue, costs, and operating expenses for 2023 and the baseline year of each transition; and

- For all emptiers:
  - Their perspectives on what has changed for them and in the market since the transition, with probes on whether the level of interaction within emptier networks has changed;
  - Questions to determine if marginalization played a role in them not engaging with implementer; and
  - Current emptying and disposal practices, and occupational safety.

## IMPLEMENTERS

**The IDIs** will gather data on the cost of service delivery, processes for identifying, engaging, and enforcing compliance with emptiers. Additionally for the failed transition, the IDIs will gather data on reasons for failure. The profile for data collection will include the Sanitation Lead who led the intervention from WSUP, one technical inspector/commercial director from the municipality, and one FSM/peri-urban area head/sanitation engineer from the autonomous sanitation body staff. The team will conduct these interviews in a semi-structured format.

The detailed instrument is provided as a supplemental document (titled Appendix 8\_RQ2+3 Implementers Instrument – FSM), and the broad areas of inquiry are provided below.

- Background and experience of the respondent within the implanting organization and within FSM;
- Value proposition of the transitions they have implemented (for 2023 and the baseline year), including their perceived value of the transition for emptiers and customers;
- Costs incurred or funded by the implementer and the financial data of emptiers (where available), including revenue, costs, and operating expenses for 2023 and the baseline year of each transition;
- Number of emptiers at passing through each stage of the engagement journey, and costs and time for each stage;
- Processes for engaging the emptiers, and monitoring and enforcing compliance with guidelines for the baseline year for Maputo and 2023 for Beira; and
- For the failed transition:
  - Perspective on the reasons for drop-off of emptiers after the intervention ended across three considerations:
    - Financial or operational considerations (player lever),
    - Regulatory considerations (rules lever), and
    - Technology and disposal considerations (infrastructure lever).
  - Perspective on the factors or motivations that would have encouraged the emptiers to remain in the market.

URBAN WASH will also supplement these interviews with any monitoring logs for emptier compliance data, financial data collected from the emptiers, etc.

## DISPOSAL SITE OPERATOR

**The IDIs** will gather data to build the disposal site operator’s (i.e., the fecal sludge treatment plant [FSTP] and the transfer station) P&L statements for 2023 and the baseline years of each transition. URBAN WASH will gather this data from the operational FSTP in Maputo, the transfer station, and

dormant FSTP in Beira. The profile for the data collection will be a department head of the FSTP for the Maputo municipality, and department heads for the transfer station and disposal site for the Beira municipality. URBAN WASH will notify them of the type of data the team requires so that they can be prepared ahead of the interview.

For the **FSTP IDIs**, URBAN WASH will conduct interviews in a semi-structured format. The team will first broadly understand the operational processes at the FSTP and then gather financial data on their revenues by breaking up the questions into units (e.g., unit of the disposal fees, number of emptyings per month). For costs, the team will gather data by each stage and the different components of the FSTP. Literature details using this approach for a cost analysis of FSTPs in other contexts (National Institute of Urban Affairs 2019; Tanoh et al. 2021; Dodane et al. 2012).

The detailed instrument is provided as a supplemental document (titled Appendix I3\_RQ2 FSTP Instrument), and the broad areas of inquiry are provided below.

- Respondent's background and role at the FSTP.
- FSTP information, including year of establishment, cities served, etc., and technology profile, including stages and technology used for treatment, treatment capacity, and utilization levels.
- Financial data, including revenues and costs (up-front capital costs and operating expenses) for 2023 and the baseline year of each transition, including costs that are subsidized by the government or international development agencies.
- Overall challenges for ensuring utilization and cost-optimization.
- URBAN WASH will supplement this with any financial records that the operator can provide.

For the **transfer station IDI**, the team will conduct interviews in a semi-structured format. The team will first broadly understand the operational processes at the transfer station and then gather financial data on their revenues by breaking up the questions into units (e.g., number of households served, area of service, number of disposals at the FSTP per month). For costs, the team will gather data by each stage and the different components of the transfer station.

The detailed instrument is provided as a supplemental document (titled Appendix I4\_RQ2 Transfer Station Instrument), and the broad areas of inquiry are provided below.

- Respondent's background and role at the transfer station.
- Transfer station's information, including year of establishment, cities/areas served, etc., and technology profile, including stages and technology used for storage, treatment, and utilization levels.
- Financial data, including revenues and costs (up-front capital costs and operating expenses) for 2023 and the baseline year of the Beira transition, including costs that are subsidized by the government, the municipality, or international development agencies.
- Overall challenges for ensuring utilization and cost-optimization.
- URBAN WASH will supplement this with any financial records that the operator can provide.

## **DATA COLLECTION PLAN FOR RESEARCH QUESTION 3 FOR FSM**

### **FOR ACCESS, AFFORDABILITY, AND PERCEIVED QUALITY**

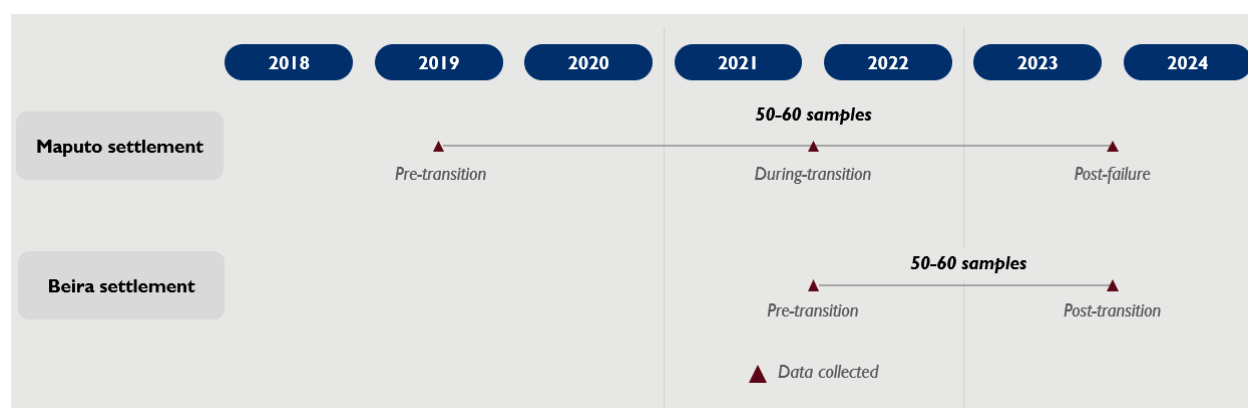
**The household survey** will vary based on the transition of the settlement with a total sample of 100–170 households across settlements. The team will conduct this survey with 50–60 randomly sampled

households and 0–30 purposeful samples for the failed Maputo transition and 50–60 randomly sampled households and 0–20 purposeful samples for the ongoing Beira transition.

- The sample will only include households who:
  - Use individual on-site sanitation systems or shared (with other households) systems, for which they are the key decision-maker; and
  - Have taken at least one emptying action (e.g., emptied a toilet or built a replacement toilet) in one time-period (i.e., pre-transition, during transition, and post-failure for Maputo and pre- and post-transition for Beira).
- The sample will exclude households that:
  - Practice open defecation since they do not face the decision of emptying, which URBAN WASH wants to study for this analysis, and their population in Maputo city is negligible, with <1 percent of residents practicing open defecation (Peal et al. 2015), and low in Beira city, with 54 percent of households having access to improved sanitation facilities (Victor et al. 2022) (implying a negligible impact on settlement-level analysis);
  - Have no emptying actions (i.e., no-need) across all time periods; and
  - Have built a toilet for the first time post-transition in Beira and post-failure in Maputo, as there is no pre-transition decision to compare this to.

For the **study on access**, URBAN WASH will randomly sample 50–60 households in one settlement in each Maputo and Beira (refer to Figure 18). The sample of 50–60 households per settlement gives a 95 percent confidence interval with a five to six percent margin of error at the settlement level, assuming five members per household and the settlement population to be ~5,000. URBAN WASH may purposefully sample an additional 0–10 households in any time period where the number of emptying actions or formal emptying is low (i.e., 0–30 households in Maputo and 0–20 households in Beira).

**Figure 18: Sampling plan for RQ3 FSM**



For the **study on affordability and customer experience**, URBAN WASH will sample 10–50 households that have used formalized services in the during transition period in Maputo and the post-transition period in Beira (from the ~50 sampled for access), depending on the penetration of the formalized emptier during the transition. If penetration of formalized emptiers is low in the original purposive sample, the team will purposively sample a minimum of 10 households in the settlement that have used formalized services in the during-transition period for Maputo and the post-transition period

for Beira. If penetration in this sample of formalized emptiers is moderate to high in the original purposive sample, the team will sample as per the proportion in the original purposive sample.

The survey will consist of a structured quantitative survey involving close-ended, coded questions, and a few open-ended questions for which the response will be captured verbatim. The questions will focus on understanding the market for emptying services pre-transition, during transition, and post-failure for the Maputo transition and pre-transition and post-transition for the Beira transition.

The detailed instrument for the **Maputo settlement** is provided as supplemental documents (titled Appendix 15\_RQ3 HH Instrument – FSM (Maputo), and the broad areas of inquiry (across sub-research questions) are given below:

- Qualification questions to ensure sampled households have on-site sanitation facilities and that the respondent was the primary decision-maker for emptying or building their toilets (based on their course of action taken) for the relevant time periods (i.e., pre-transition, during transition, and post-failure);
- Household details, including details of the respondent, asset-related questions to establish wealth quintiles, and income- and expenditure-related questions;
- Post-failure experience:
  - If availed emptying service: Service provider used (i.e., manual versus mechanical, informal versus formal), reasons for the choice and whether it was their preferred choice, price paid, and customer service experience; and
  - If self-emptied or built a new toilet: Reason for choosing to self-empty/build a new toilet, costs incurred, and overall experience.
- During-transition experience: Same areas of inquiry as above;
- Pre-transition experience: Same areas of inquiry as above;
- Future course of action (*if the respondent has not had a post-failure action (i.e., last emptying action was during transition)*): Their planned choice (emptying with formal/informal provider, self-emptying, or building new toilet/pit) with reasons; and
- Current willingness to pay for a typical volume of sludge emptied using their ideal service.

The detailed instrument for the **Beira settlement** is provided as supplemental documents (titled Appendix 16\_RQ3 HH Instrument – FSM (Beira), and the broad areas of inquiry (across sub-research questions) are given below:

- Qualification questions to ensure sampled households have on-site sanitation facilities and that the respondent was the primary decision-maker for emptying or building their toilets (based on their course of action taken) for the relevant time periods (i.e., pre-transition and post-transition);
- Household details, including details of the respondent, asset-related questions to establish wealth quintiles, and income- and expenditure-related questions;
- Post-transition experience:
  - If availed emptying service: Service provider used (i.e., manual versus mechanical, informal versus formal), reasons for choice and whether it was their preferred choice, price paid, and customer service experience; and
  - If self-emptied or built a new toilet: Reason for choosing to self-empty/build a new toilet, costs incurred, and overall experience.



- Pre-transition experience: Same areas of inquiry as above;
- Future course of action (*if the respondent has not had a post-transition activity*): Their planned choice (emptying with formal/informal provider, self-emptying, or building new toilet/pit) with reasons; and
- Current willingness to pay for a typical volume of sludge emptied using their ideal service.

**For the FGDs**, URBAN WASH will gather data to understand the key reasons for households choosing their preferred services post-transition for Beira and during transition and post-failure for Maputo. The team will gather the data from 8–10 households in one FGD per settlement (i.e., 16–20 households across two FGDs in total), with an equal split of those who chose to empty with a formalized emptier and those who did not, post-transition. For the failed Maputo transition, the team will also include at least one household that continues to avail formal services post-failure, if available. The areas of inquiry for the FGDs with households will be determined after analyzing the data from the surveys.

### FOR EMPTIER'S PRACTICES AND OCCUPATIONAL SAFETY

For the IDIs with formal and informal private emptiers, the team will gather stated data on the changes in their practices and occupational safety. In addition to the emptiers interviewed as part of RQ2, the team will speak to a sample of the emptiers that have provided emptying services to the surveyed households (out of all the emptiers in the settlement) so that the team can triangulate the data with the surveys.

The team will conduct the interview in a semi-structured format, including specific, verbatim questions to capture data on the practices of the emptiers and occupational safety, and open-ended questions (with targeted probes developed emergently) to understand reasons for changes, if any.

- For the failed Maputo transition, the team will capture data of the formal emptiers for the during-transition period, as pre-transition and post-failure, they were not providing FSM services. The team will capture data of the informal emptiers for all three periods.
- For the ongoing Beira transition, the team will capture data pre-transition and post-transition.

The detailed instrument is provided as a supplemental document for formal emptiers (Appendix 11\_RQ2+3 Formal Emptier Instrument – Maputo and Appendix 12\_RQ2+3 Formal Emptier Instrument – Beira) and informal emptiers (Appendix 9\_RQ2+3 Informal Emptier Instrument – Maputo and Appendix 10\_RQ2+3 Informal Emptier Instrument – Beira), and the broad areas of inquiry are provided below:<sup>47</sup>

- FSM service profile in their settlements of service, including the number and type of service providers, their interactions, and any changes since the transition inception;
- Occupational safety, including proportion of jobs resulting in an injury/accident, and the proportion of jobs when they come into direct contact with feces; and
- Change in emptying and disposal practices, and other practices, such as booking methods, payment terms offered, etc., and reasons for changes, if any, since the transition.

URBAN WASH will also capture data from the implementers and disposal sites on the practices of the emptiers and occupational safety followed by the emptiers as part of RQ2.

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<sup>47</sup> Note that the sequencing of the questions in the instrument will be different from below since the instrument combines questions for RQs 2 and 3 (detailed in Section 7.0 and Section 8.0) for emptiers.

## FOR RESILIENCE

URBAN WASH will gather all data for resilience through the interviews and surveys already mentioned for RQs 2 and 3 and additionally from community leaders. There will be no separate tool developed for emptiers, implementers, disposal sites, and households. The team will develop a tool for community leaders. The indicators for which the team will gather data, and its source (i.e., the surveys/interviews) are provided in Table 13.

## APPENDIX 3: CONDITIONS FOR RESEARCH QUESTION I

The research will aim to analyze three categories of conditions that influence choices for implementing transitions:

- **Political and legal factors**, including rules, relationships, events or political capital and incentives;
- **Economic and technical factors**, including financial resources, knowledge capacity, or infrastructure and technologies; and
- **Social and environmental factors**, including informal norms, public health and climate considerations, and social circumstances.

These categories of factors could play out at four different administrative levels, i.e., the country, county, municipality/utility, or settlement level.

**For water**, Table 21, Table 22, and Table 23 provide examples of these conditions mapped to the four administrative levels (where applicable).

**For FSM**, Table 24, Table 25, and Table 26 provide examples of these conditions mapped to the four administrative levels (where applicable).

**Table 21: Examples of political and legal conditions for water at different administrative levels**

Administrative Level	Rules	Relationships	Events	Political Capital and Incentives
<b>Country</b>	<ul style="list-style-type: none"> <li>National acts or laws detailing roles and responsibilities for water service provision</li> <li>National guidelines defined for PWP's participation and formalization</li> </ul>	<ul style="list-style-type: none"> <li>Between national-level ministries for water service provision</li> <li>Between national-level ministries and county governments</li> <li>Between national agencies and municipalities/utilities</li> </ul>	<ul style="list-style-type: none"> <li>Leadership changes through national elections or cabinet reshuffles leading to change in policies</li> <li>Enforcement of new guidelines or acts</li> <li>Commitment to sustainable development goals (SDGs)</li> </ul>	<p>Ability of national-level ministries and agencies to incentivize:</p> <ul style="list-style-type: none"> <li>County governments to adopt guidelines for water service provision</li> <li>County governments/municipalities/utilities to formalize PWPs</li> </ul>
<b>County</b>	<ul style="list-style-type: none"> <li>Guidelines assigning jurisdiction and coverage targets for service delivery</li> </ul>	<ul style="list-style-type: none"> <li>Within county-level water department</li> <li>Between county-level water department and municipalities/utilities</li> <li>Between county-level water department and PWP's</li> </ul>	<ul style="list-style-type: none"> <li>Leadership changes through county government elections, which may lead to changes in capacities and willingness to formalize PWP's</li> </ul>	<ul style="list-style-type: none"> <li>Ability of county governments to incentivize municipalities/utilities to formalize PWPs, and private water vendors to undergo formalization</li> </ul>
<b>Municipality/Utility</b>	<ul style="list-style-type: none"> <li>Presence of guidelines for formalization of PWP's</li> </ul>	<ul style="list-style-type: none"> <li>Within municipality/utility administration</li> <li>Between municipality/utility administration and PWP's</li> </ul>	<ul style="list-style-type: none"> <li>Leadership change of municipality/utility due to privatization or change in government structures</li> </ul>	<p>Ability of municipality/utility to:</p> <ul style="list-style-type: none"> <li>Incentivize PWP's to undergo formalization by ensuring their viability</li> <li>Identify and incentivize staff to stop engaging one-on-one with PWP's</li> </ul>
<b>Settlement</b>	<ul style="list-style-type: none"> <li>Legality and the property rights of settlements</li> <li>Settlement-level guidelines that define roles of community leaders, households, and PWP for water service provision</li> </ul>	<ul style="list-style-type: none"> <li>Between households and municipality/utility</li> <li>Between households and private water vendors</li> <li>Between community leaders and political leaders</li> </ul>	<ul style="list-style-type: none"> <li>Community-leadership changes through informal nominations or elections</li> <li>Advocacy for improvements in water service provision</li> </ul>	<p>Ability of settlement leaders to incentivize:</p> <ul style="list-style-type: none"> <li>County government/municipality/utility to choose their settlements</li> <li>Communities to adopt formalized water delivery sources</li> </ul>

Acronyms: PWP: Private water provider

**Table 22: Examples of economic and technical conditions for water at current administrative levels**

Administrative Level	Financial Resources	Knowledge Capacity	Infrastructure and Technologies
<b>Country</b>	Economic and technical factors are likely to play out at the city, municipality/utility, and settlement level where the transitions are actually operationalized		
<b>County</b>	<ul style="list-style-type: none"> <li>County government's budget allocated toward water provision as a percentage of total budget</li> <li>Capital available to discover, engage, and monitor PWWs</li> </ul>	<ul style="list-style-type: none"> <li>Skills of staff to set guidelines for formalization of PWWs</li> <li>Staff available to interact and provide support to utilities for transition</li> <li>Staff available to discover, engage, and monitor PWWs (e.g., number of public health officers)</li> </ul>	<ul style="list-style-type: none"> <li>Availability and types of water sources</li> <li>Prevalent non-revenue water (NRW) rates</li> </ul>
<b>Municipality/Utility</b>	<ul style="list-style-type: none"> <li>Capital available to make investments to extend service delivery</li> <li>Capital available to discover, engage, and monitor PWWs</li> </ul>	<ul style="list-style-type: none"> <li>Number of employees available to discover, engage, and monitor PWWs</li> <li>Skills of staff to engage with PWWs, define guidelines for them, and monitor their performance</li> </ul>	<ul style="list-style-type: none"> <li>Availability of water treatment technologies</li> <li>Availability of piped networks in municipality's/utility's areas of supply and their safeguarding mechanisms</li> <li>Prevalent NRW rates</li> </ul>
<b>Settlement</b>	<ul style="list-style-type: none"> <li>Average monthly household income</li> <li>Community's payment default rates</li> </ul>	<ul style="list-style-type: none"> <li>Number of PWWs serving the settlements</li> <li>Skills of PWWs to operate viably (e.g., commercial viability, organizational structure strength, affordability of service)</li> </ul>	<ul style="list-style-type: none"> <li>Quality of road and pipe networks within settlement</li> <li>Types of water vending prevalent in the community</li> </ul>

Acronyms: PWP: Private water provider

**Table 23: Examples of social and environmental conditions for water at different administrative levels**

Administrative Level	Informal Norms	Public Health and Climate Considerations	Social Circumstances
Country	Social and environmental factors typically play out in local interactions within the city, and within and between settlements		
County			
Municipality/ Utility	<ul style="list-style-type: none"> <li>• Preference for specific groups of PWWs (e.g., based on social class)</li> <li>• Perception of PWWs (e.g., based on past experiences)</li> </ul>	<ul style="list-style-type: none"> <li>• Inclination toward environment protection (e.g., drought mitigation policy)</li> <li>• Prevalence of diseases at the city level</li> </ul>	<ul style="list-style-type: none"> <li>• Population levels and density of city</li> <li>• Inclination toward community causes (e.g., gender inclusion, community empowerment)</li> </ul>
Settlement	<ul style="list-style-type: none"> <li>• Preference for specific types of PWWs (e.g., borehole operators versus tanker truck operator)</li> </ul>	<ul style="list-style-type: none"> <li>• Awareness of health effects of untreated water</li> <li>• Need for climate mitigation in water provision</li> <li>• Prevalence of diseases within settlement</li> </ul>	<ul style="list-style-type: none"> <li>• Population density and demography within settlement</li> <li>• Social characteristics (e.g., language spoken, religion) of households</li> </ul>

Acronyms: PWP: Private water provider

**Table 24: Examples of political and legal conditions for FSM at different administrative levels**

Administrative Level	Rules	Relationships	Events	Political Capital and Incentives
<b>Country</b>	<ul style="list-style-type: none"> <li>National acts or laws detailing roles and responsibilities for sanitation service provision</li> <li>National guidelines defined for private sector participation (e.g., permitting guidelines for emptiers)</li> </ul>	<ul style="list-style-type: none"> <li>Between national sanitation ministries and agencies</li> <li>Between national and sub-national-level ministries and agencies</li> </ul>	<ul style="list-style-type: none"> <li>Leadership changes through national elections or cabinet reshuffles</li> <li>National health campaigns</li> <li>Commitment to SDGs</li> </ul>	<ul style="list-style-type: none"> <li>Ability of national government to incentivize municipalities/utilities to engage with private emptiers</li> </ul>
<b>Municipality/ Utility</b>	<ul style="list-style-type: none"> <li>Guidelines assigning jurisdiction and coverage targets for service delivery</li> </ul>	<ul style="list-style-type: none"> <li>Between municipality/ utility administration</li> <li>Between private emptiers and municipality/utility administration</li> </ul>	<ul style="list-style-type: none"> <li>Leadership change of municipality/utility due to privatization or change in government structures</li> </ul>	<p>Ability of municipalities/utilities to incentivize:</p> <ul style="list-style-type: none"> <li>Private emptiers to engage</li> <li>Settlement leaders to promote uptake of formalized emptying</li> </ul>
<b>City</b>	<ul style="list-style-type: none"> <li>City-level guidelines defined for private sector participation (e.g., approvals required for engagement)</li> <li>City-level governance structures detailing roles for service provision</li> </ul>	<ul style="list-style-type: none"> <li>Between city council FSM departments</li> <li>Between city council FSM departments and municipalities/utilities</li> </ul>	<ul style="list-style-type: none"> <li>Leadership changes through local government elections or cabinet reshuffles</li> <li>City-level campaigns to reduce illicit dumping</li> </ul>	<ul style="list-style-type: none"> <li>Ability of city authorities to incentivize utilities to choose settlements/private emptiers within their cities</li> </ul>
<b>Settlement</b>	<ul style="list-style-type: none"> <li>Legality and the property rights of settlements</li> <li>Settlement-level guidelines that define roles of community leaders, households, and private emptiers for service provision</li> </ul>	<ul style="list-style-type: none"> <li>Between households and private emptiers</li> <li>Between community and political leaders</li> </ul>	<ul style="list-style-type: none"> <li>Community-leadership changes through informal nominations or elections (e.g., ward development committees)</li> <li>Advocacy for improvements in sanitation services</li> </ul>	<p>Ability of settlement leaders to incentivize:</p> <ul style="list-style-type: none"> <li>Utilities to choose their settlements for engagement with private emptiers</li> <li>Households to uptake formalized emptying</li> </ul>

Acronyms: FSM: Fecal sludge management

**Table 25: Examples of economic and technical conditions for FSM at different administrative levels**

Administrative Level	Financial Resources	Knowledge Capacity	Infrastructure and Technologies
<b>Country</b>	Economic and technical factors are likely to play out at the city, municipality/utility, and settlement level where the transitions are actually operationalized		
<b>Municipality/ Utility</b>	<ul style="list-style-type: none"> <li>• Capital available to make investments to extend service delivery</li> </ul>	<ul style="list-style-type: none"> <li>• Number of employees dedicated to engaging with private emptiers</li> <li>• Skills of staff to execute engagement with private emptiers, define their rules, and build infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>• Availability of FSTPs</li> <li>• Availability of emptying technologies</li> </ul>
<b>City</b>	<ul style="list-style-type: none"> <li>• City authority's budget allocated toward sanitation as a percentage of total budget</li> </ul>	<ul style="list-style-type: none"> <li>• Staff available to interact and provide support to utilities for transition</li> <li>• Skills of staff to set guidelines for private sector participation</li> </ul>	<ul style="list-style-type: none"> <li>• Availability of land to set up FSTPs or disposal sites</li> <li>• Availability of road networks to transport fecal sludge from settlements to disposal sites</li> </ul>
<b>Settlement</b>	<ul style="list-style-type: none"> <li>• Average monthly household income</li> </ul>	<ul style="list-style-type: none"> <li>• Number of private emptiers serving the settlements</li> <li>• Skills of private emptiers to engage in safe (e.g., with the use of protective equipment) emptying</li> </ul>	<ul style="list-style-type: none"> <li>• Availability of emptiable containment technologies</li> <li>• Quality of road networks within the settlement</li> <li>• Geography of settlement (terrain, past incidents of water logging)</li> </ul>



**Table 26: Examples of social and environmental conditions for FSM at different administrative levels**

Administrative level	Informal norms	Public health and climate considerations	Social circumstances
<b>Country</b>	Social and environmental factors typically play out in local interactions within the city, and within and between settlements		
<b>Municipality/Utility</b>			
<b>City</b>	<ul style="list-style-type: none"> <li>• Preference for specific groups of emptiers (e.g., based on social class)</li> <li>• Perception of private sector participation</li> <li>• Perception of importance of FSM business line of utility (as compared to water)</li> </ul>	<ul style="list-style-type: none"> <li>• Prevalence of diseases at the city level</li> <li>• Prevalence of unsafe emptying at the city level</li> <li>• Frequency of emptying in city</li> </ul>	<ul style="list-style-type: none"> <li>• Population levels and density of city</li> </ul>
<b>Settlement</b>	<ul style="list-style-type: none"> <li>• Preference for specific types of services (e.g., manual versus mechanical)</li> <li>• Stigmatization of emptying business</li> </ul>	<ul style="list-style-type: none"> <li>• Awareness of health effects of unsafe disposal</li> <li>• Need for climate mitigation in sanitation</li> <li>• Prevalence of diseases within settlement</li> </ul>	<ul style="list-style-type: none"> <li>• Population density within settlement</li> <li>• Social characteristics (e.g., language spoken, religion) of households</li> </ul>

Acronyms: FSM: Fecal sludge management

## APPENDIX 4: TRAVEL TIMELINES FOR DATA COLLECTION

Table 27 details the timelines and expected duration of travel for field data collection by the FSG and Iris Group teams.

**Table 27: Travel for data collection**

Trips	Number of Travelers	Purpose	Expected Duration
March/ April 2024	3	<ul style="list-style-type: none"> <li>• Conduct two workshops for RQ1 (refer to Section 4.3)</li> <li>• Conduct first round of data collection for RQ2 for water (refer to Section 5.3) and for FSM (ref to Section 7.3)</li> <li>• Conduct first round of data collection for RQ3 for water (refer to Section 6.3) and FSM (refer to Section 8.3)</li> </ul>	15 days
August/ September 2024	2	<ul style="list-style-type: none"> <li>• Conduct second round of data collection for RQ3 for water (refer to Section 6.3)</li> <li>• Conduct validation for RQ3 for water (refer to Section 6.3) and FSM (refer to Section 8.3)</li> </ul>	5–7 days

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