Hybrid Waters: Informal Water Provision, Municipal Governance and Household Water Security in Nairobi's Informal Settlements

CLIMATE ASSESSMENT FOR THE SOUTHWEST (CLIMAS)
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Contents

Executive Summary

Four billion people worldwide face severe water scarcity at least one month of the year (Mekonnen &Hoekstra, 2016) and 3 in 10 people lack access to safe, readily available water at home (WHO, 2019). In the case of rapidly urbanizing developing countries, informal "slum" settlements usually have less access to improved sources of drinking water than others (WHO, 2019). Municipal water supply is inadequate or absent in these settlements, where a mixture of formal and informal networks of water provision persist, with new infrastructures continuously emerging (Bakker, 2003; Meehan, 2014, n.d.; Ranganathan, 2014; Swyngedouw, 2004).

My project investigated formal-informal institutional dimensions of water security in informal settlements in Nairobi. Using three informal settlements in Nairobi as empirical studies, where 97% of residents do not have municipal water supply, and a majority of them buy water from privately owned water points (Mukuru Analysis, 2017), the project examined: (1) Under what conditions do informal water providers emerge and how do their operations vary across settlements? (2) What is the relationship between informal water providers and formal (municipal) water institutions? (3) What is the role of these formal-informal water systems in shaping water security in different households? Taking a mixed-methods approach, the research addressed an urgent gap of assessing – informal water supply, formal municipal institutions, and household water security in relation to one another.

The project identified two main stakeholders – three municipal bodies responsible for supplying water and informal water providers as key to this project. Workshops with municipal officials, community members and informal water providers proved to be productive avenues for engagement. These meetings led to formulating questions tailored to the needs of municipal officials and community members. For instance, water quality came out to be a significant issue in informal settlements, therefore quality related questions were added to the household water security questionnaire with an emphasis on diseases prevalent in the settlements. In addition, interviews with informal providers led to address these questions on quality and reliability of water and how they saw these issues with their supply through their perspective.

The fieldwork supported by CLIMAS led to sharpening and modifying research questions, methodology and instruments towards writing dissertation research proposal and applying for external grants. Affiliations with University of Nairobi was obtained, and research permits were secured in order to get ready for dissertation fieldwork. In 2020, I will appear for comprehensive exams and prepare for the fieldwork. I will live in Nairobi for 7 months to conduct my dissertation fieldwork beginning from June 2020.

In future, I will present my preliminary findings to municipal officials, community members. In addition, I will communicate my findings to the academic community through conferences and three peer-reviewed journal articles. The CLIMAS fellowship, helped me in streamlining my research questions, aligning them to what is needed in the local communities and provided me with skills to communicate research findings with wider audiences.

1. Introduction

This report discusses the details and outcomes of my CLIMAS fellowship year, during which I conducted, wrote, and presented about use-inspired, mixed-methods research on informal water provision and water security in low-income settlements in Nairobi, Kenya.

Why this research:

Two-thirds of the world's population experiences water scarcity at least part of the year, and half a billion people face severe water scarcity all year round (Mekonnen & Hoekstra, 2016). It is widely recognized that water insecurity is a global health issue, and its effects are projected to become severe due to climate variabilities – prolonged dry periods, intense floods and increasing water salinity (WHO, 2019). In the case of rapidly urbanizing developing countries, informal "slum" settlements[1] often have limited access to improved sources of drinking water (WHO, 2019). In most cities, formal water utilities serve between 40% - 70% of the urban population while those areas where formal utilities do not reach are served instead by a large variety of small-scale providers (Alhers et al., 2014). In Africa, over half of the urban population (61.7%) lives in informal settlements (Habitat, 2013) and their continuing expansion makes it challenging for national and municipal governments to ensure access to safe, reliable and affordable water. Almost 50% of the urban population resorts to private small-scale providers such as street vendors, water resellers, kiosks and water tankers (Dardenne, 2006) with an increasing figure of 80% in urban centers in Nigeria, Kenya, Senegal and Sudan (Kariuki & Schwartz, 2005). African cities have grown into heterogeneous urban landscapes, composed of highly diverse formal-informal networks that supply water. However, little is known about the nature of operations of informal water providers, their interactions with formal governance and its impact on household water security. This one-year project was aimed at investigating formal-informal institutional dimensions of water security in informal settlements. The project stemmed from the understanding that, waterscapes in the cities of global south are often co-produced by multiple state and non-state actors (Alhers, Cleaver, Rusca, & Schwartz, 2014) and public policy must recognize these co-produced forms.

Research Focus and Questions:

The aim of this one-year project supported by the CLIMAS fellowship was to conduct a pilot study to test the methodology, research instruments and make stakeholder connections that will be useful for my dissertation fieldwork.

The project examined **how informal water supply arrangements arise, what is their relationship with formal (municipal) water institutions, and how these systems shape household water security.** It used three informal settlements in Nairobi as empirical studies, where 97% of residents do not have municipal water supply, and a majority of them buy water from privately-owned water points (Mukuru Analysis, 2017). The privately-owned water points, recognized as 'water cartels' by residents, blur the distinctions between formal and informal, as they are run by covert sanction from municipal water supply institutions. While these formal-informal arrangements play a crucial role in supplying water to informal settlements, water is

[1] Slums are the most deprived and excluded form of informal settlements characterized by large agglomerations of dilapidated housing located in hazardous urban land, lack formal supply of basic infrastructure and services such as water, sanitation, electricity, green areas, and are constantly exposed to eviction, disease and violence (Habitat, 2015).

expensive, unreliable and of poor quality. In order to understand these institutional dimensions and how they shape water security, the project piloted three research questions:

RQ1) Under what conditions do informal water providers emerge and how do their operations vary across the three settlements?

RQ2) What is the relationship between informal water providers and formal (municipal) water institutions?

RQ3) What is the role of these formal-informal water systems in shaping water security in different households?

While dynamics of informality and water insecurity are well-understood separately, this research addressed an urgent gap of assessing – informal water supply, formal municipal institutions, and household water security in relation to one another.

2. Research Design - Summer Fieldwork

The CLIMAS fellowship support my pilot project that was built on a preliminary scoping research conducted in summer 2018 in various informal settlements in Nairobi, which led to site-selection, formulation of research questions and instrument design. Mukuru kwa Njenga, kwa Rueben and Viwandani settlements were chosen as research sites because of their colonial history, land tenure challenges, and the unique water chamber model that was implemented by NCWSC. The chambers installed by NCWSC in 2004, were later taken over by informal water providers by implicit sanctions from NCWSC employees (Crow & Odaba, 2009). Thus, the settlements make unique empirical studies to understand the interaction between NCWSC and informal water providers. In addition, the three settlements are located in the neglected industrial area of Nairobi and have not been part of scholarly studies as opposed to Kibera, Mathare and other informal settlements in Nairobi. A diverse built environment and differences in household density between the settlements make them an ideal location for cross comparison and examine water security at household and community level (Mukuru Analysis, 2017).

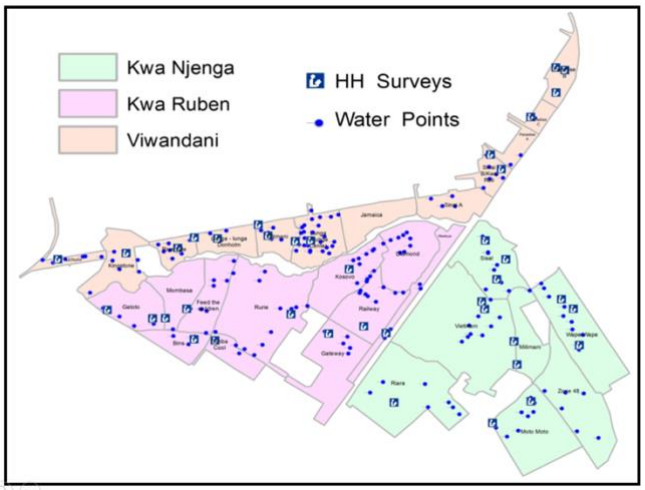

Figure 1: Mapped water-points and HH surveys conducted

In summer 2019, pilot research was executed with a small sample of population from Mukuru settlements (n=60) to test the research instruments and methodology. Water security surveys were administered to 47 households (HH), and 13 in-depth interviews with informal water providers spread across 30 villages. More than 200 informal water points were mapped to understand the spread of informal water providers and their practices. Nairobi's water governance consists of three main institutions – Nairobi City County (NCC), Nairobi City Water and Sewerage Company (NCWSC) and Athi Water Services Board (AWSB). The role of each institution in Nairobi's water supply system was understood through literature search, analyzing policy documents such as acts and laws in Kenya. Development plans for Mukuru were collected from NCC office and analyzed. Five Semi-structured interviews with NCWSC, NCC and AWSB officials, who are in-charge of informal settlements division were interviewed using a purposive sampling method. The pilot study guided

towards editing and adding questions to the HH water security survey, add follow-up qualitative interview component after the surveys, edit interview and FGD questions for informal water providers, and change some mapping strategies. This crucial work will be a supplement to conduct an in-depth dissertation fieldwork with sharpened questions, new instruments and an expansion of the study sample. In addition, fieldwork also led to making strong connections with stakeholders and local community members towards fulfilling two agendas – making research findings communicable and engaging stakeholders to make the research use-inspired and applicable to public policy design.

3. Stakeholder Engagement and Use-inspired Research:

The fieldwork conducted in Mukuru, led to forming connections with 2 major stakeholders in the project – Municipal water governance officials and Informal water providers.

(1) The role of 3 institutions NCC, NCWSC and AWSB is crucial in the management of water in Nairobi. Along with interviews with administrative officials at NCC, NCWSC and AWSB officials, I attended water community workshops that were led by NCC officials with Mukuru community mobilizers to discuss water needs and health impacts of poor water quality. These meetings led to form my questions about water security around quality of water, making the research use-inspired. In addition, this led to more in-depth conversations with the county officials about making the research findings useful to lead interventions in the community. The project was well-received by the community as well as administrative officials. After the completion of my dissertation research, I will present my findings at various Nairobi county meetings, also translating reports in Swahili making it more accessible to Mukuru community members.

(2) Another important stakeholder identified were individual informal water providers and community-based youth groups involved in water supply. Informal water providers fill gaps that the government cannot fill and have illicit connections with county officials. Therefore, in-depth interviews led to deeper conversations with water providers and see gaps between municipal officials' perspectives on water supply versus those of informal water providers. Informal water providers are community youths that have started water business and therefore, joint meetings with municipal officials, community mobilisers and water providers will be led during the dissertation fieldwork towards discussing quality, affordability and accessibility.

Overall, identifying stakeholders and engaging with them was a time-consuming process. Especially, my fieldwork that was targeted to be for 2 months often seemed inadequate to build stronger ties with local actors. In addition, I learnt that it was a complex process of understanding different perspectives and agendas but not lose sight of my research objectives. Stakeholder engagement is mired with power relations and positionality within the social and material contexts and therefore this led me to reflect on my positionality. Engagement with municipal officials and water providers led to expand my questions on water quality and understand how both formal and informal institutions interact, making my questions use-inspired. I also learnt the best methods to make my findings communicable, and the ways in which it would be most useful with the framework in which municipal officials could operate. This exercise that I envision to continue during my dissertation fieldwork is now embedded within my methodology that I will use to

conduct the fieldwork. Stakeholder engagement is pivotal to understanding the formal informal institutional dynamics of water supply, thus making this exercise a useful tool to conduct research.

4. Outcomes and Outputs

The results from the pilot study revealed that HHs were water insecure only in terms of affordability and the quality of water. The spread of informal water providers in the settlements has improved access and reliability of water supply. After stratifying the sample for income and number of family members, descriptive statistics confirmed that 91% of the sampled HHs spent more than 1/4th of their income on buying water. Since NCWSC is publicly owned and at the same time autonomous, for-profit company, interviews with NCWSC employees revealed that it picked only profitable areas for water supply, leaving out less profitable areas such as informal settlements (Wamuchiru, 2017). These findings guided towards editing and adding questions to the HH water security survey, add follow-up qualitative interview component after the surveys, edit interview and FGD questions for informal water providers, and change some mapping strategies. It also led to finalizing the sampling method for household water security surveys. Starting at the village[2] level, 20 out of 30 villages spread across Kwa Njenga, Kwa Rueben and Viwandani settlements are sampled to be included in the study. Building on the pilot study, two inclusion criteria are identified and form the basis of village level sampling (1) NCWSC Chamber Model; (2) Household Density (See Figure 2). Weak implementation of the chamber model refers to villages that have less than 2 chambers installed. When this setting occurs in villages with high or low density of HHs, this leads to high, moderate or low water security indicators (access, price, reliability and quality). Strong implementation of chamber model refers to villages that have 2 or more chambers installed. HH density refers to the ratio of population of HHs to the square feet area of the village. Water security (outcome variable) is heavily influenced by both the inclusion criteria, and this will lead to a strong comparative analysis among different villages. After sampling 20 villages according to the matrix, a water security questionnaire will be administered to a minimum 30 randomly recruited HHs (central limit theorem) in each 20 selected villages (n=750; see table 1). Sample size calculations are done according to the number of households in each village, considering a confidence interval of 95%. To equally distribute sampled HHs in all areas, every 5-10 HHs (depending on village area size) will be skipped at each road transect.

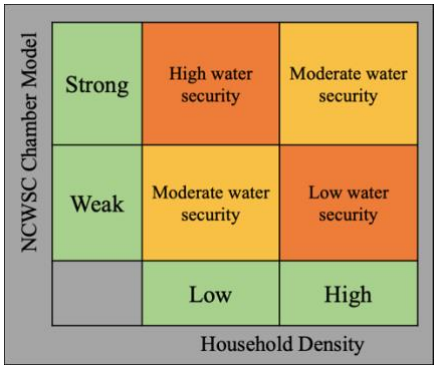

Figure 2: Village level sampling matrix

Settlement	Village	Population of HH	Sample Size
Viwandani	Paradise A	1191	32
Kwa Rueben	Mombasa	2106	63
Kwa Njenga	Milimani	2504	75
‘’	‘’	‘’	‘’
‘’	‘’	‘’	‘’
3 settlements	**20 villages**	**67,034**	**747 (Round-off 750)**

Apart from developing methodology for the dissertation fieldwork, the pilot research provided with deeper understanding of the context and the data to write grant proposals for Social Science Research Council (SSRC), National Science Foundation – Doctoral Dissertation Research Improvement (NSF DDRI), and Society of Women Geographers to fund my dissertation

[2] The three settlements in Mukuru are divided among 30 villages (see figure 1). ‘Village’ is a term locally and officially used while identifying areas in the settlements.

fieldwork. Apart from that, I also got the research affiliation with the Centre for Urban Research and Innovations (CURI), University of Nairobi (UoN). Given the complexity of the built environment within informal settlements, spatial data is often fragmented. With the help of professors at UoN, I will map water points and kiosks, households and water chambers which will contribute to a data repository on infrastructures in informal settlements in Nairobi. These data will be built on harmonized data protocols developed in collaboration with UoN to disseminate best-practice protocols to the research communities in Nairobi and around the world.

5. Next Steps

I am appearing for my comprehensive exams in February 2020. After I am all but dissertation (ABD), I will finalize my research instruments, apply for Visa and start getting ready to leave for the field. I will live in Nairobi for 7 months to conduct my dissertation research starting in June 2020.

6. Acknowledgements

I am grateful to everyone at CLIMAS for their support on this project and to the continued inspiring conversations on stakeholder engagement and use-inspired research that we have had. This project would not have happened without insights from my advisor Dr. Tom Evans, folks in the research group – Zack Guido, Corrie Hannah, Julia Davies, Andrew Zimmer that gave several inputs on developing methodologies and writing grant proposals after the fieldwork. I am also thankful to GPSC and SBSRI pre-dissertation grant that made my travel possible. And, last but not the least, I am indebted to the people of Mukuru for letting me work with them, my field assistant David Mwangi without whom the project is impossible to be implemented and all the stakeholders who were welcoming towards my ideas and supported the collaborations all through the project.

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