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School of Liberal Arts and Social Sciences
Master's in Developmental Studies (MDS) Program

Assessing WASH Facilities across Informal Settlements in Dhaka

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DST698 | Research/Field Work for Master Thesis

Summer 2026

Declaration

I hereby declare that:

- The thesis submitted is my original work, which I completed as part of the degree requirements at Independent University, Bangladesh.
- The thesis does not include previously published or third party-authored content, unless it is properly cited and referenced in accordance with academic norms.
- The thesis does not include any material submitted or accepted for another degree or certificate at any university or institution.
- I have acknowledged all significant sources of assistance and guidance in the preparation of this work.

Student's full Name & Signature

_____

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Approval

The thesis titled **"Assessing WASH Facilities across Informal Settlements in Dhaka"** submitted by Ushmila Akhter Tamim (2532101) of final semester, 2024 year has been accepted as ..... in partial fulfillment of the requirement for the degree of MA in Social Science on .....

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Abstract

This thesis examines the availability, accessibility, affordability, acceptability, and awareness/adaptability (the 5As) of water and sanitation (WASH) facilities in two structurally distinct informal settlements in Dhaka, Bangladesh: Korail Settlement, a large, officially tolerated informal settlement, and Geneva Camp, a small, non-notified enclave housing a stateless, Urdu-speaking Bihari community. Using a qualitative research design comprising thirty in-depth interviews with household members and six key informant interviews with representatives of the Dhaka Water Supply and Sewerage Authority (DWASA), NGOs and community-based organizations, and settlement-level informal leaders, the study addresses three research objectives: assessing the status of water and sanitation access through the 5As framework, examining the governance and institutional structures shaping service delivery, and documenting the coping and survival strategies households employ in response to inadequate service. The findings show that WASH deprivation in both settlements is best understood not as a simple absence of infrastructure but as a condition of partial, intermittent, and institutionally mediated access, in which the coexistence of a nominal water source or toilet with severe deficits in reliability, cost, privacy, and safety is the norm rather than the exception. Rather than a true institutional void, service delivery is shaped by a hybrid governance system in which formal utilities, NGOs, community-based organizations, informal leaders, and households themselves jointly and unevenly bear responsibility for continuity and maintenance. Households respond through a layered sequence of coping strategies, from storage and rationing to informal purchase and self-repair, with women disproportionately absorbing the burden of collection, cleaning, and menstrual hygiene management. Korail and Geneva Camp differ sharply in the severity and institutional character of this deprivation, reflecting their distinct histories of informality. The study concludes with policy recommendations for tenure-neutral service eligibility, minimum service standards, pro-poor tariff structures, and permanently financed, accountable governance arrangements, and identifies avenues for future research extending this analysis to hygiene, gender, and childhood as dedicated lines of inquiry.

Keywords: WASH, informal settlements, Dhaka, 5As framework, institutional bricolage, Korail, Geneva Camp, water governance, coping strategies

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Chapter: I

Introduction

1.1 Background of the Study

Bangladesh's rate of urbanization is now among the fastest in South Asia, and Dhaka bears the brunt of it as the country's primate city and its dominant hub of political, economic, and administrative power. Rural-to-urban migration into Dhaka has accelerated over the last two decades, driven not by any single motivation but by a compounding mix of push and pull factors: recurrent riverbank erosion and flooding in the coastal and char lands, cyclones and salinity intrusion that undermine agricultural livelihoods, chronic underemployment in rural labor markets, and the concentration of Bangladesh's formal and informal economic opportunities in the capital (Chowdhury, 2026). Climate change functions as an accelerant rather than the sole cause of this movement: as extreme weather events increase in frequency and severity, rural households facing the erosion of arable land or the salinization of freshwater sources have progressively fewer viable livelihood strategies at home, and migration to Dhaka becomes less a matter of aspiration than of survival (Chowdhury, 2026). The scale of this influx has consistently outpaced the capacity, and often the political will, of city authorities to plan for it. Formal housing markets, utility networks, and municipal service infrastructure in Dhaka were neither designed nor subsequently expanded to absorb the volume of new residents arriving each year, and the resulting mismatch between population growth and planned urban capacity has manifested spatially in the proliferation of informal settlements across the city.

While the term “slum” remains in wide popular and even some policy use, contemporary scholarship has increasingly moved toward “informal settlement” as the more precise and less stigmatizing designation, reflecting a shift in emphasis from a moralized reading of poverty and disorder toward a structural understanding of exclusion from formal planning, land tenure, and service delivery systems (Roy, 2005). UN-Habitat's (2003) widely used operational definition characterizes such settlements by the presence of one or more specific deprivations, including inadequate access to safe water, inadequate access to sanitation, insecure tenure, poor structural quality of housing, and overcrowding, rather than by any single visual or economic marker of poverty. Roy (2005) pushes this further, arguing that

informality should not be understood as a fixed or externally imposed condition but as an actively produced mode of urbanization, in which the state itself, through its planning, zoning, and enforcement practices, determines which forms of land occupation and service use are sanctioned as legitimate and which are left unrecognized. This distinction matters directly for Dhaka, where informal settlements are far from a homogeneous category. Korail, one of the largest and most well-documented informal settlements in the city, occupies land formally belonging to Bangladesh Railway and the Bangladesh Water Development Board and has developed over decades into a dense, functioning neighbourhood that, despite its lack of legal tenure, benefits from a degree of de facto administrative tolerance (Ahmed, 2007; Rana & Piracha, 2018). Geneva Camp in Mohammadpur represents a starkly different form of informality: a small, spatially compact enclave housing a stateless, Urdu-speaking Bihari community that has resided there since the Bangladesh Liberation War of 1971, whose disputed citizenship status has left it almost entirely outside the reach of municipal service planning (Iqbal & Nazneen, 2014). Both settlements are informal, but the mechanisms producing and sustaining their informality, and consequently their prospects for future service delivery, diverge sharply.

Within both types of settlement, the absence of safe, secure, and equitably distributed water and sanitation services constitutes a persistent humanitarian and development crisis rather than an incidental by-product of poverty. Although the global WASH agenda formally encompasses water, sanitation, and hygiene as three interlinked pillars, this study narrows its empirical focus to the core dimensions of water and sanitation, treating hygiene-related behaviours primarily insofar as they intersect with the availability and acceptability of physical infrastructure. Access to clean water and adequate sanitation is recognized under international human rights law as fundamental to human dignity, health, and the realization of a wide range of other rights, and was formally affirmed as a distinct human right by the United Nations General Assembly in 2010 (WWAP, 2019). Bangladesh has made substantial documented progress toward the Millennium Development Goal targets for basic water and sanitation access, yet national-level statistics of this kind routinely obscure severe, geographically concentrated deprivation within the country's informal settlements (World Bank, 2018). In *Korail, Geneva Camp,* and comparable settlements across Dhaka, the everyday reality of WASH access is characterized by aging and damaged pipe networks prone to leakage and contamination, water sources vulnerable to fecal and chemical pollution, insufficient sanitation facilities that are frequently shared across dozens of households, and

surrounding environmental conditions, including poor drainage and solid waste accumulation, that compound public health risk (Cawood, 2018).

To move beyond a purely infrastructural accounting of these deficits, and to capture the lived, multidimensional experience of WASH deprivation, this study adopts the 5As Framework, comprising Availability, Accessibility, Affordability, Acceptability, and Awareness/Adaptability, as its central analytical lens. Rather than functioning as five independent checklist items, these dimensions are understood as interdependent and mutually reinforcing, such that a deficiency in any single dimension can undermine the practical value of adequacy in the others. Availability concerns the uninterrupted physical presence and functionality of water sources and latrines: a tap or tube well is not meaningfully available if it runs dry for extended periods, or if a latrine is available in name but is structurally unsafe or perpetually out of service. Accessibility extends beyond mere physical proximity to encompass the safety, convenience, and social feasibility of reaching a water point or sanitation facility, including the distance households must travel, the time burden this imposes (disproportionately on women and girls), and the physical or social risks associated with the route, particularly after dark. Affordability captures the fairness and sustainability of the cost structure households face, most acutely where the absence or unreliability of formal utility connections forces reliance on informal vendors, whose pricing can be dramatically inflated relative to municipal tariffs (Fagundes, Marques, & Malheiros, 2025). Acceptability concerns the degree to which available services align with prevailing social and cultural norms, particularly regarding privacy, safety, and gender-segregated facilities, an issue with particular salience for menstrual hygiene management and for women's and girls' willingness or ability to use shared or exposed facilities (Elledge et al., 2018). Awareness/Adaptability, finally, refers to the community's knowledge of safe water handling, sanitation, and hygiene practices, as well as the household- and community-level capacity to adapt to and sustain services over time, including informal maintenance arrangements where formal upkeep is absent. Taken together, these five dimensions offer a more complete diagnostic picture than infrastructure coverage statistics alone, one capable of explaining why nominally “improved” water or sanitation access, as recorded in conventional monitoring frameworks, so often fails to translate into genuinely safe, equitable, and dignified service in practice.

A central argument of this study is that the persistence of WASH deprivation across *Korail* and Geneva Camp cannot be adequately explained by infrastructural neglect alone; it is substantially produced and sustained by an institutional void. Formal municipal service

providers, principally the Dhaka Water Supply and Sewerage Authority (DWASA) and the relevant city corporations, face significant legal, administrative, and spatial constraints in extending regular service connections into settlements whose land occupation is not formally recognized, since utility connection processes typically presuppose documented tenure or an authorized address (Haque, 2019). Where the state's formal service apparatus is unable or unwilling to extend into these spaces, the resulting vacuum is rarely left empty; rather, it is filled by an alternative, informally governed order in which local water-point operators, informal cartels or "syndicates," and community-level power brokers, sometimes described locally as *mastaans*, come to exercise substantial de facto control over the allocation, pricing, and continuity of water and sanitation access (Mohsin, 2023). This informal governance system is not incidental to the settlements' WASH deficits but constitutive of them, shaping who gets water, at what price, on what schedule, and through what channels of negotiation or obligation.

Faced with this combination of infrastructural inadequacy and institutional exclusion, households in Korail and Geneva Camp are compelled to develop and sustain a range of coping strategies simply to meet their daily water and sanitation needs. These strategies span negotiating informally with local providers or neighbouring landlords, paying substantial premiums to private water vendors relative to formal utility rates, reducing overall household water consumption below levels required for adequate hygiene, walking extended distances or queuing for extended periods at shared or distant sources, and, in some cases, collecting water from nearby commercial or residential buildings outside the settlement (Venkataramanan et al., 2020). Emerging evidence from Dhaka further suggests that these coping burdens are not distributed evenly within the household: women frequently absorb a disproportionate share of the physical and time costs of water collection and often engage in an internal, gendered rationing of scarce water toward household members perceived as most vulnerable, at times at the expense of their own consumption, hygiene, or safety (Hossain et al., 2025; Sarkar, 2022). Understanding these coping strategies, not merely as evidence of hardship but as adaptive responses to a specific institutional and infrastructural context, is central to this research's third objective, and provides the empirical bridge between the household-level WASH outcomes captured by the 5As framework and the governance structures examined through this study's second objective. It is this combination — availability and accessibility, mediated by affordability and acceptability, further shaped by institutional voids and informal governance, and ultimately absorbed through household

coping strategies — that this study sets out to document and analyse across two structurally distinct informal settlements in Dhaka.

Framework Conceptual Flow

Phase / Dimension	Key Component & Operational Realities
Context	Informal settlements are defined by high population density and low-income levels, as exemplified by the Korail Settlement and Geneva Camp Enclave.
Interconnected 5A Dimensions	● Availability refers to the uninterrupted physical presence of water sources and latrines. ● Accessibility includes the safety of physical access, reasonable distance, and safe routes for collecting water and sanitation services. ● Affordability includes the fairness of pricing that does not have exorbitant syndicate charges. ● Acceptability includes being consistent with social customs and providing privacy and gender segregated facilities. ● Awareness and adaptability pertain to community knowledge of sanitation methods and the capacity for ongoing system maintenance.
Institutional Gaps	The lack of formal utilities means a reliance on cartels and syndicates to provide basic services.
Coping Strategies	Strategies for survival include informal water purchases, loans from other people, decreased consumption, and changes to hygiene behavior.

1.2 Problem Statement

While it is generally agreed that water and sanitation are basic human rights, the inhabitants of the slums in Dhaka still suffer from a lack of utilities. In crowded places like Korail and the isolated Geneva Camp area, there are continuous operational difficulties faced by the residents in collecting water and accessing sanitation facilities. Municipal systems are either overloaded, improperly maintained, or completely non-existent. The problem of the WASH

crisis in Dhaka is rooted much deeper than engineering issues and has more to do with urban governance.

Access to water and sanitation in Dhaka's informal settlements is shaped by insecure land tenure, institutional barriers, and unequal political influence. Historically, requirements concerning legal tenure have restricted residents' access to formal water connections. However, these restrictions should not be understood as an absolute prohibition: NGO-supported arrangements have demonstrated that communities without conventional land titles can obtain formal services (Ahmed & Terry, 2003). Where public provision remains inadequate, an "institutional void" emerges—a gap in accountable service delivery, regulation, and protection for residents. Ahmed and Terry's report documents these tenure barriers and alternative arrangements.

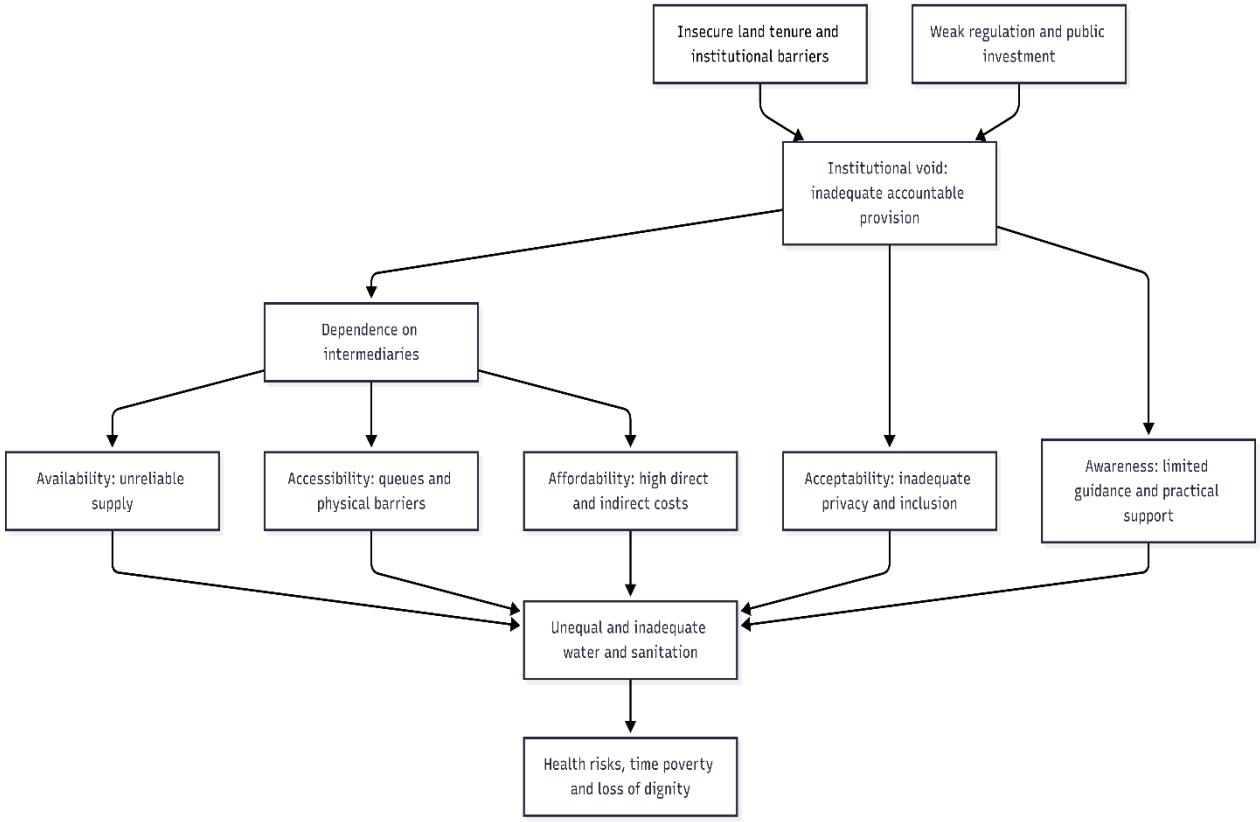
This gap creates opportunities for landlords, intermediaries, private vendors, and politically connected actors to control essential services. Such arrangements may provide water where formal systems fall short, but they can also weaken accountability over prices, maintenance, and quality. Haque et al. (2020) found that water and sanitation access in Dhaka's slums was generally high, yet services suffered from problems involving safety, reliability, and informal management. Consequently, having a connection does not necessarily mean receiving an adequate service. These conditions can be examined through five interconnected dimensions. (Haque et al. 2020)

- **Availability** concerns whether sufficient water and functioning sanitation facilities exist when residents need them. Intermittent supply, overcrowded water points, and inadequate maintenance can undermine everyday access. Households may therefore store water for extended periods or depend on alternative suppliers during interruptions.
- **Accessibility** concerns whether residents can physically reach and use services safely. Shared facilities, queues, narrow pathways, and inconvenient locations can make water collection burdensome. Women and children may lose time otherwise available for education, employment, or rest. Older people and persons with disabilities face additional difficulties when facilities lack accessible entrances and appropriate designs. Community-managed facilities can help address these practical barriers when users participate in planning and management (Hanchett et al., 2003). Hanchett et al. (2003)

- **Affordability** refers to whether service costs are manageable without sacrificing other necessities. Dependence on informal suppliers can expose poor households to higher charges than those accessing formal utility connections. Collection time and income lost while waiting also increase the effective cost of water. Accordingly, affordability should consider both direct payments and indirect burdens, rather than simply whether households pay their bills (Ahmed & Terry, 2003).
- **Acceptability** involves privacy, dignity, safety, and suitability for different users. Shared toilets may become unacceptable when they lack secure doors, lighting, cleanliness, reliable water, or menstrual hygiene provisions. Facilities must accommodate differences in gender, age, and physical ability. The World Health Organization (WHO, 2018) emphasizes that sanitation interventions should protect health and broader well-being. WHO (2018)
- **Awareness** includes knowledge of safe collection, storage, hygiene, and service entitlements. Inadequate guidance can contribute to unsafe practices, but contamination should not be attributed solely to residents' knowledge. Overcrowding, insufficient water, and unsuitable infrastructure also constrain behaviour. Hygiene education therefore needs practical support and community participation (Hanchett et al., 2003). Strengthening residents' capacity to adapt to interruptions must accompany accountable public provision, transparent pricing, inclusive facilities, and reliable maintenance.

The diagram below shows how insecure land tenure, institutional barriers, weak regulation, and insufficient public investment create an institutional void, where residents lack adequate and accountable water and sanitation services. This gap increases dependence on intermediaries, landlords, and private vendors, potentially undermining availability through unreliable supply, accessibility through queues and physical barriers, and affordability through high charges and collection costs. Inadequate public provision also affects acceptability, as facilities may lack privacy, safety, and inclusive designs, while limited awareness and practical support constrain safe water handling and hygiene practices. Together, these interconnected problems contribute to unequal services, increased health risks, time poverty, and loss of dignity. The arrows illustrate proposed relationships rather than statistically proven causal links.

Conceptual pathway linking institutional gaps to the five dimensions:



Structural Problem & Outcome Matrix

Dimension Category	**Identified Structural & Governance Root Causes**	**Daily Lived Impacts & Disruption**
Structural Factors	• Restrictions on land tenures..	•Irregular supply of water.
	• Fragmentation of administrative jurisdictions. • Influence of local water cartels. • Absence of municipal connections to water.	• Queuing for long hours physically results in fatigue. •Overcharging by informal vendors for units. • Poor and segregated sanitation facilities.

Coping Burden & Health Outcomes	● High costs to families using informal sources of water. ● Borrowing of water between households and water usage rationing. ● Prevalence of waterborne infections.	

Residents need to cope with system weaknesses by making adaptations in the way they function on a day-to-day basis. This can include the purchase of water at increased costs, borrowing between households, decreasing their daily intake below physiological needs, and drawing water from poorly treated or polluted sources. Even though recent studies have highlighted the problems that are inherently present within slum environments in Bangladesh, one area that is missing from the literature is the influence of governance structures on the 5A concept of WASH. Such an assessment requires the use of a thorough analytical framework that combines large-scale data analysis with deep qualitative research. Without such an assessment, it is not possible for policymakers as well as development organizations to formulate appropriate interventions.

1.3 Research Questions and Objectives

In order to maintain scientific objectivity and not reach premature conclusions, research questions and objectives are stated neutrally. The research investigates the real-life aspects of the process of delivery of services, functioning of institutions, and the coping methods of citizens. In order to investigate the above-mentioned objectives, the study uses a mixed-method research design that entails both quantitative and qualitative research methodologies. Specifically, the research includes surveys for the collection of quantitative information about the delivery of services, and interviews and observations for deeper analysis of the process and coping mechanisms.

1.3.1 Research Objectives

1. RO1: To study the existing status and performance of water and sanitation services of Korail and Geneva Camps applying the 5As approach of the Interconnected Approach, which encompasses Availability, Accessibility, Affordability, Acceptability, and Awareness/Adaptability. The importance of the 5As approach cannot be underestimated in this case, since it allows for a detailed evaluation of different aspects that influence access to basic services. In addition to the availability and affordability of water and sanitation services and their physical existence, their acceptability and adaptability to certain community requirements will also be addressed through the use of the mentioned approach.

2. RO2: Study of the organizational and governance structures related to utilities provision, especially regarding some important elements of governance like policy framework, management, decision-making process, and different stakeholders' roles in providing water and sanitation services.

3. RO3: Study of the survival strategies which people use in order to fight water scarcity and sanitation problems. 'Survival strategies', for the purposes of this research, can be defined as the set of adaptive and resourceful behavior of individuals/households aimed at coping with and solving the problem of water and sanitation shortage.

1.3.2 Research Questions

1. RQ1: How are the components of the interrelated 5A Framework incorporated into the day-to-day access to water and sanitation facilities of the Korail settlement and Geneva Camp inhabitants?

2. RQ2: What kinds of governance structures, institutional processes, and informal institutions influence the supply and distribution of water and sanitation facilities in the mentioned locations?

3. RQ3: What kind of coping strategies do families employ in order to overcome any problems with the delivery of these facilities by formal utilities?

Operational Coding Framework:

Variable Code	**Indicator Metric**	**Focus Area & Operational Definition**
[WA_1]	Water Availability	Liters per capita available daily; frequency and reliability of supply.

[WA_2]	Water Accessibility	Spatial distance to point, queuing duration, and physical safety during collection.
[WA_3]	Water Affordability	Monthly monetary expenditure, vendor markups, and percentage of total income.
[SA_1]	Sanitation Availability	Person-to-latrine ratio, physical distance, and functional status of facilities.
[SA_2]	Sanitation Acceptability	Structural privacy, cleanliness, gender segregation, and dignity for vulnerable groups.
[CM_1]	Coping Mechanisms	Purchasing from vendors, inter-household borrowing, and consumption rationing.

1.4 Scope of the Study

This study makes important contributions to the body of knowledge as well as policy and intervention in urban planning, public health, and urban governance in the Global South.

- Theoretical and Conceptual Contribution: The use of the integrated 5A Framework on water and sanitation in urban informal areas adds more to theoretical and conceptual frameworks beyond infrastructure assessments. This study demonstrates how the social, economic, and organizational factors play a role in shaping the actual access to utilities.
- Empirical Contribution: The empirical comparison of an extensive informal area (Korail) and a dense informal area (Geneva Camp) contributes towards filling an important research gap regarding the internal diversity of informal urban areas in Dhaka.
- Policy Implications and Practical Relevance: The results have policy implications and practical relevance for municipal bodies such as DWASA, Dhaka North/ South City Corporations, international non-governmental organizations

(NGOs) like WaterAid and UNICEF, and urban planners. The research identifies gaps within the official service delivery lines and informal practices to present a basis for developing a distribution system that is inclusive, accountable, and recognized in law.1.6 Limitations of the Study

Though the current research adopts a multi-dimensional mixed-method approach to assess WASH service delivery in the context of low-income urban areas in Dhaka, there are some inherent limitations in terms of context, methodology, and sociocultural considerations that need to be highlighted. Contextual and Structural Heterogeneity (Korail versus Geneva Camp): This study will be based on two sites: the Korail informal settlement and the Geneva Camp enclave in Mohammadpur. While both are examples of high-density informal urban settlements, the two contexts differ widely on the grounds of history, structure, legality, and geography. Korail is an extensive informal settlement, officially recognized by the administration of Dhaka City Corporation, housing mainly Bengali internal migrants, which has various tenancy arrangements. Geneva Camp, on the other hand, is a small enclave, non-notified and highly dense, housing Urdu-speaking Biharis in Bangladesh, with certain sociocultural and legal complications.

- **Socio-Cultural Interactions and Language Barriers in Geneva Camp:** Qualitative fieldwork in Geneva Camp presents distinct socio-cultural and linguistic challenges. Many older residents, women primary researchers, and field researchers use Bengali. Language barrier instruments and loss or alteration used during real-time translation may result in the loss or alteration of nuanced meanings. Additionally, socio-historical marginalization may foster institutional distrust among residents, leading to guarded responses. In addition, marginalization socio-historically may lead to distrust institutionally among resident children: The analysis through gendered and power relations is highly sensitive socioculturally. The provision of sanitation in the overcrowded informal slums is related to problems like privacy, bodily autonomy, menstruation control, and exposure to sexual violence during the use of shared toilets. The difficulty that the female respondents have when it comes to talking about such sensitive hygiene matters, toilet hygiene, or dangers will emanate from cultural taboos, and thus make it difficult for the researcher to get such information. In addition to this, the information on the children is based on self-reporting of the mother, as opposed to that of the child.

- **Analytical Focus on Specific Utility Dimensions:** In order to keep an analytical focus and maintain the feasibility of the research in the specified academic time frame, the study limits its scope to Water and Sanitation utilities. While hygiene behavior, solid waste disposal, and storm drainage constitute important parts of the WASH matrix, they will be examined only in terms of their direct influence on water quality and functionality of latrines, but not as separate variables.

Therefore, the results of the empirical analysis can fail to reflect seasonal influences, such as acute water shortages, drying out of pipelines, and price increases in dry summer months; on the other hand, waterlogging, overflowing of drainage facilities, and flooding of latrines during the monsoon season.

Chapter: II

Literature Review

2.1 Introduction

This chapter provides a critical review of the literature relating to the issue of WASH service provision in informal urban settlements with a particular emphasis on conceptualization of informality, causes of growth of settlements, governance, affordability, health effects, gender issues and coping mechanisms that influence access to these services in highly crowded and poor communities, like those found in Dhaka, Bangladesh. The literature review is organized according to the eight research themes that emerged from the research problem outlined in Chapter 1: (i) conceptual and human rights framework of the 5As approach; (ii) conceptualization of informal settlements and urban informality approach; (iii) urbanization and migration due to climate change as the factors determining growth of informal settlements; (iv) evidence of WASH inequality in informal settlements in the world and specific countries; (v) institutional failure, informal governance and NGO intervention influencing access to WASH services in Dhaka slums; (vi) affordability as an independent variable; (vii) health and gender issues arising from inadequate WASH; and (viii) coping strategies adopted at the household level.

2.2 Human Right to Water and Sanitation and the Underlying Foundation for the 5As

The human right to water and sanitation is provided for under Article 11(1) of the International Covenant on Economic, Social, and Cultural Rights. In 2010, the General Assembly of the United Nations declared this human right as an indispensable component for the realization of all human rights (WWAP 2019). As described in General Comment No. 15 of the Committee on Economic, Social and Cultural Rights, this human right, which is outlined in the United Nations World Water Development Report 2019, "Leaving No One Behind," comprises five criteria (WWAP 2019). All five attributes mentioned above align closely with the 5As methodology used in this research, which makes them highly legitimate. The 5As technique helps transform international normative theory into something testable. As highlighted by WWAP (2019), all five variables discussed above are interconnected; for

instance, a facility might be readily available but not accessible because it is too expensive or socially unacceptable.

Also, according to WWAP (2019), international human rights laws require states to ensure non-discriminatory and universal access to water and sanitation, focusing especially on those most in need. Adhering to this commitment requires understanding the diversity within populations and cities. This rationale explains the use of settlement-based disaggregation of WASH conditions (Korail and Geneva Camp) in this paper, rather than aggregate averages at the city or national level. Using aggregations results in the statistical invisibility of slum inhabitants (WWAP, 2019).

2.3 Defining Informal Settlements: The Urban Informality Lens

The term "informal settlement" used in chapter one is consistent with the modern usage of the term and its separation from the term "slum," which is older. As per the operational definition of UN-Habitat (2003), slums are households that lack any one of the following five items: access to safe water, sanitation, security of tenure, permanent dwellings, and adequate space. This deprivation-based definition of slums focuses on living conditions rather than legal status. On the other hand, informality is defined within planning and tenure systems. Roy (2005) argues that informality must be understood as a state-sponsored urbanization process in which the state legitimates land occupation and service access, rather than as an informal area of poverty. The difference between the “informality of the poor” and “informality of the propertied classes” is identified by Roy (2005), who argues that informality is the result of the exclusion process which may be changed through policy decisions. This matters for this research because both Korail and Geneva Camp are defined as informal settlements according to Roy (2005), meaning they are not formally designated but have experienced different forms of deprivation and marginalization (UN Habitat, 2003). The lack of formality of Korail results from the unlawful takeover of the Bangladesh Railroad and public lands, while that of Geneva Camp arises out of statelessness.

2.4 Urbanization and Climate-Induced Migration as Drivers of Settlement Growth

The migration studies above clarify how the formation of informal settlements in Dhaka is justified in Chapter 1. As noted by Chowdhury (2026), rising temperatures, irregular rainfall,

and increased flood and cyclone incidents have affected the lives of many Bangladeshi people, forcing them to move to Dhaka. Moreover, climate migrants who move to Dhaka choose informal settlements due to poor housing, as well as due to the lack of access to safe drinking water, sanitation, and health services. Moreover, as explained by Chowdhury (2026), although displaced households can cope with these changes through informal employment, they lack institutional support, making them more vulnerable to climate impacts. Thus, from this study it becomes obvious that the mentioned studies provide additional evidence of the fact stated in Chapter 1, namely, that informal settlements in Dhaka are not only about the lack of proper housing but are the result of a larger problem of climate- and poverty-induced migration, which suggests that WASH deficiencies in such settlements should be viewed in connection with the very vulnerability of such settlements.

2.5 WASH Access and Inequality in Informal Settlements: Global and National Evidence

In practice, various studies show that aggregate indicators of WASH in an entire country or city often miss the reality in informal settlements. According to WWAP (2019), when indicators for access to water were adapted and the costs, minimum amount of water, and time spent on water collection – all of which were not accounted for in the first JMP indicators – were taken into account, water coverage in a small Ugandan town fell from 69% to 16% within one year. Additionally, the study states that Demographic and Health Surveys, the main source for estimating JMP indicators worldwide, fail to account for informal settlements even though they appear in census data.

This pattern is corroborated in Bangladesh by the World Bank's Bangladesh WASH Poverty Diagnostic, published as Promising Progress (World Bank, 2018). The diagnostic finds that although nearly 98% of the national population uses a technologically improved water source, only around 39% has access to an on-premise source free of E. coli or arsenic, and slums in the five largest cities have five times less access to improved sanitation than the wealthiest 60% of households nationally (World Bank, 2018). Household wealth accounts for about 70-75 percent of the differences in access to improved water and sanitation services, which shows how poverty and informality are intertwined and why improving infrastructure alone will not solve the issue (World Bank, 2018). Another study done by the World Bank, in regard to registered slums in Dhaka, showed that, although there were available water and sanitation facilities, there were problems relating to reliability of service, fecal sludge

management, and the informal middlemen, with about 2% of slum households practicing safe sanitation practices based on JMP standards (Arias-Granada, Haque, Joseph, & Yanez-Pagans, 2018).

2.6 The Institutional Vacuum and Informal Water Governance in Dhaka's Informal Areas

The notion of an institutional vacuum is common in the literature on Dhaka, since formal authorities like DWASA do not allow informal areas permanent access to water because such areas have no legal property rights (Haque, 2019). A different, less regulated system fills the vacuum. According to Haque (2019), political officials, intermediaries, and even DWASA employees who act outside the formal process arrange water allocation in Dhaka's slums, leading slum residents to spend roughly one-fourth of their monthly income on domestic water. Mohsin (2023) explains that local gangsters called mastaans act as de facto gatekeepers to access electricity and water in the community, with informal governance defined as client-based governance. Since this type of governance operates in the governance realm that the state has neglected, it legitimizes corruption and maintains inequality.

This institutional explanation is supported by Cawood's (2018) research in three low-income settlements in Dhaka, where many parties mediate access, including landlords, local leaders, unauthorized suppliers, informal committees, and NGOs. Necessity plays no part in determining the terms of access; rather, they depend on tenancy, gender, and political connections. Residents also continue to prefer investments in water over investments in sanitation. The long-term investment in structures is hindered by tenure and economic uncertainty. On the other hand, with a larger sample, Haque et al. (2020) find that, regardless of the legality of the water source, intermediaries run water services at various stages, such as provision, management, and fee collection. As discussed in Chapter 1, this institutional gap can justify our research. Our thesis will help fill the knowledge gap between a major settlement, which is known (Korail), and a minor settlement that is unknown (Geneva Camp), using either one or two settlements. One of the rare WASH assessments for Geneva Camp is by Iqbal and Nazneen (2014). The authors describe overcrowding and facility sharing, poor-quality water resources, and exclusion due to statelessness, which makes the camp a non-municipal territory.

2.7 Alternative Ways of Formal Service Provision: NGO-mediated and Community-based

Many studies on Dhaka examine alternative ways of overcoming the institutional gap through community-based and NGO-mediated approaches, beyond the two service-provision models discussed above. Ahmed (2007) cites an example of such an attempt known as DSK, which began operating in 1992 through the involvement of the NGO Dushtha Shasthya Kendra. In this scenario, DWASA formally provides water from the community source, while the NGO mediates the formation of a user committee. According to Ahmed (2007), these approaches led to the development of over 100 community-managed water sources which serve thousands of informal settlers. However, they still depend on donor funding, are prone to bribery by municipal workers, and will remain a temporary solution until formal tenure is secured. In a similar manner, Hanchett, Akhter, and Khan (2003) suggest that the community-based water and sanitation projects run by WaterAid Bangladesh urban project could increase access to the services in the slums, but they are sustainable only if they have ongoing external funding and the community organizations can manage them after the NGO departure.

Rana and Piracha (2018), focusing on the DSK model in Korail—one of the two settlements analyzed in this thesis—find that community participation in water governance provides residents with an important secondary benefit: engagement with formal organizations through a community-based organization (CBO) grants a degree of informal, de facto acknowledgment within the city, even in the absence of formal tenure. Nevertheless, numerous political and socioeconomic challenges hinder community-based efforts in Korail because these communities resist change, which helps them survive (Rana & Piracha, 2018). These studies show that community-based approaches and NGO support are a reliable, empirically grounded alternative to either fully state-managed water provision or entirely informal systems. Nevertheless, the political conditions in each area play a critical part in their success. This thesis is therefore well positioned to compare these dynamics between Korail, where such models have been implemented, and Geneva Camp, where, according to Iqbal and Nazneen (2014), no similar community-managed scheme has yet emerged.

2.8 Affordability as an Analytical Factor Unique in its Own Right

Whereas affordability was previously regarded as a secondary criterion, the emerging literature treats it as an analytical criterion distinct in nature, implying an analysis separate from the others. In terms of affordability, Fagundes et al. (2025) propose a multi-factor approach with six factors: coverage, affordability ratio, poverty situation in the community, affordability ratio for low-income customers, social tariff availability, and cost of a single connection. In turn, using an affordability ratio based on average incomes ignores the issue of low-income families altogether. Based on the affordability ratio, Fagundes et al. (2025) estimate water services in Brazil and find that the traditional affordability ratio classifies most water services as "affordable." In fact, more than 90% of poor families regard water services as unaffordable using the poverty-based denominator. The distinction between average and poverty-adjusted affordability ratio is particularly relevant for slum communities, because households do not represent the average used to calculate tariffs across the entire city.

The difference between the average and poverty-adjusted affordability ratio is consistent with findings from Dhaka. Haque (2019) shows that people living in slums pay considerably more per unit of water than formally connected households. WWAP (2019) supports this finding, stating that in the Global South, residents of informal communities pay 10 to 20 times more for water than the rest of the population. Fagundes et al. (2025) add that single connection fees, and not consumption tariffs, often serve as the main affordability obstacle. This is consistent with the informal high-cost connection systems described in Dhaka by Cawood (2018) and Haque et al. (2020).

2.9 Health and Human Development Effects of Inadequate WASH

The health literature explains the relationship between lack of WASH access and the human development problems described in Chapter 1. The cohort study by Dearden et al. (2017) in Ethiopia, India, Peru, and Vietnam shows that better sanitation access is more strongly related to lower rates of childhood stunting than access to better-quality water. The impact of sanitation access on reducing childhood stunting remains strong in both infancy and older ages. This study helps explain why the diagnostic report provided by the World Bank (2018), as analyzed in Section 2.5, describes Bangladesh's childhood stunting as occurring mainly among households without shared, improved sanitation, rather than among households that lack any access to water. Nevertheless, Dearden et al. (2017) suggest that further longitudinal

studies are needed before we make any clear conclusions about which variable, sanitation or water access, is more important. Therefore, this suggestion confirms that both variables need to be measured at once using the 5As framework. This supports the causal link presented in Chapter 1: poor WASH access in Korail and Geneva Camp is not only inconvenient but also a factor affecting children's health and development.

2.10 Gender Perspectives on Access to WASH Facilities

A growing body of scholarly research indicates that WASH inadequacy is not an issue that affects all members of households equally; women and girls, in particular, suffer significantly more because of inadequate MHM. The findings presented by Elledge et al. (2018) in their study of MHM and waste disposal issues in LMICs indicate that the use of communal, often poorly maintained facilities of sanitation that are prevalent in informal settlements hinders adequate privacy, water supply, and safety required for proper MHM. Improper MHM provision is linked with school and job absence, as well as higher risk of infections. In their study of flood victims in Bangladesh, Al-Mamun, Kalam, Karim, Alam, and Khan (2025) discover that poor MHM provision is associated with the lack of privacy during menstruation due to the absence of private sanitation facilities and access to clean water. The situation worsens during disasters and displacement, which are similar to conditions in informal settlements. This literature is direct evidence of the Acceptability perspective from the 5As framework in Chapter 1, where privacy and gender-based facilities are required.

2.11 Household Coping Mechanisms during Water and Sanitation Insecurity

There is now considerable literature on household behaviors in cases of insecurity related to the availability of water, sanitation, and hygiene (WASH). While analyzing coping mechanisms used by households and individuals, Venkataramanan et al. (2020) found particular mechanisms frequently used by households in developing nations. Such mechanisms include buying water from vendors, mutual borrowing between households, rationing use, stockpiling water, and creating unofficial connections. While these mechanisms can be adaptive, they may also carry risks, including economic strain and polluted water. The coping mechanisms that people use are anything but gender-neutral, as shown by Sarkar (2022). Women are responsible for acquiring water and negotiating with

informal sellers, and they may even need to change their hygiene habits to protect others in the family.

This is additionally reinforced by examples from Dhaka. Household water distribution follows a strategy of "buffering," as observed in Hossain et al. (2025) in their interview findings with women in households experiencing severe water insecurity in Dhaka. Buffering refers to the process where women distribute water among vulnerable individuals within the household. This demonstrates that, while coping strategies used by informal residents may involve externally oriented actions, including purchasing from vendors and negotiating with mastaans, they also include internal water-rationing actions within households, which have a pronounced gender aspect. This twofold nature of coping is clearly demonstrated by the study objective related to coping strategies (RO3) set forth in this dissertation.

2.12 Gaps in the Literature and Positioning of the Present Study

Several gaps emerge from this review, spanning matters of scale, theory, method, and integration.

First, while global frameworks such as WWAP (2019) and national diagnostics such as World Bank (2018) establish that informal settlements are severely underserved, they operate at a level of aggregation — national, district, or citywide — that cannot capture the internal diversity of informality itself, a limitation Roy (2005) suggests is conceptual as much as statistical, since informality is itself unevenly produced across different settlements. A single national "slum" statistic, however carefully disaggregated by wealth quintile, cannot distinguish between a settlement like Korail, where decades of de facto tolerance have allowed some community-mediated infrastructure to emerge, and a settlement like Geneva Camp, where statelessness has foreclosed even that partial accommodation. This is a gap of scale: the unit of analysis in most existing WASH diagnostics is too coarse to register the settlement-level variation this thesis is designed to capture.

Second, the Dhaka-specific governance and community-provision literature (Haque, 2019; Mohsin, 2023; Cawood, 2018; Haque et al., 2020; Ahmed, 2007; Rana & Piracha, 2018; Hanchett et al., 2003) offers strong evidence of institutional voids, informal intermediation, and NGO-mediated alternatives, but these studies tend to examine either a single settlement or pooled samples of registered government slums, leaving under-explored how WASH governance and outcomes differ between a large, officially recognized settlement such as

Korail and a small, legally ambiguous, non-notified enclave such as Geneva Camp. This is compounded by a further, largely unaddressed comparative gap: because Geneva Camp's statelessness places it in a legal category distinct even from other non-notified Bangladeshi slums, none of the studies reviewed here place a settlement of its kind alongside a large, tolerated settlement within a single research design, meaning the comparative logic central to this thesis has no direct precedent in the existing Dhaka literature.

Third, although affordability frameworks such as Fagundes et al. (2025) offer methodologically robust tools for distinguishing average from poverty-adjusted affordability, they have not been applied within a single informal-settlement comparative case study that also incorporates governance and coping dimensions. Existing affordability work on Dhaka (Haque, 2019) is valuable but largely descriptive of price levels rather than structured around a replicable multi-indicator framework, meaning this thesis is among the first to operationalize a formal affordability framework specifically within Dhaka's informal-settlement context.

Fourth, the health and gender literature (Dearden et al., 2017; Elledge et al., 2018; Al-Mamun et al., 2025) documents the developmental and gendered consequences of inadequate WASH convincingly at a general or national scale, but rarely within the specific governance and affordability context of a named informal settlement. The consequence is a disconnect between the "why it matters" literature and the "how it happens" literature: studies that establish that inadequate sanitation predicts stunting, or that shared facilities compromise menstrual hygiene management, are rarely conducted in the same settlements, using the same households, as the studies that explain the institutional and pricing mechanisms producing that inadequate sanitation in the first place.

Fifth, the coping-strategy literature (Venkataramanan et al., 2020; Sarkar, 2022; Hossain et al., 2025) is rich in behavioral detail but is rarely integrated with an institutional analysis of the informal governance structures that generate the very insecurity households are coping with. Coping is generally theorized, where it is theorized at all, at the household or individual level, without reference to the mastaan-mediated, patron–client political economy documented by Mohsin (2023) and Haque (2019) that determines the terms on which coping strategies such as informal purchase or negotiation actually operate.

Sixth, this is in part a theoretical gap. Much of the governance literature uses the language of an "institutional void" descriptively, without situating it within a more formal apparatus such

as institutional bricolage (Cleaver, 2001), which theorizes how communities in weak-institution settings blend formal rules, informal norms, and social relationships into functioning governance arrangements. Similarly, the coping-strategy literature has yet to be organized through an explicit livelihoods lens (Chambers & Conway, 1992), which would let household-level findings be read as evidence about the broader asset base — social, financial, physical, and human capital — households draw upon, rather than as an unstructured list of behaviors.

Finally, the migration literature (Chowdhury, 2026) establishes why Dhaka's informal settlements continue to grow but has not been connected empirically to the WASH governance and coping literatures reviewed above, leaving open the question of whether more recently arrived, climate-displaced households experience systematically different WASH governance and coping conditions than longer-established residents of the same settlement — a question this thesis's household survey, by capturing tenancy history, is positioned to probe even if only descriptively.

Taken together, these gaps of scale, comparative design, affordability measurement, health–governance disconnection, coping–institution disconnection, and theoretical grounding — point toward the same underlying deficiency: the absence of a single, comparative, theoretically grounded, mixed-methods study that treats availability, accessibility, affordability, acceptability, governance, and coping as elements of one integrated system rather than separately studied phenomena.

This thesis addresses these gaps by applying an integrated 5As framework — grounded in the human-rights dimensions articulated by WWAP (2019) and the informality lens developed by Roy (2005) and UN-Habitat (2003) — to a comparative, mixed-methods study of two structurally distinct Dhaka settlements, combining household-level quantitative data on availability, accessibility, and affordability with qualitative evidence on governance structures, community-based alternatives, and coping strategies. By selecting Korail and Geneva Camp specifically for their contrasting institutional histories, the study directly closes the comparative-design gap identified above; by applying the Fagundes et al. (2025) multi-indicator framework to household-level data, it closes the affordability-measurement gap; and by reading its governance and coping findings against the institutional bricolage and sustainable livelihoods literatures, it offers a more theoretically grounded account of both than has previously been available for Dhaka's informal settlements. In doing so, it extends

the existing Dhaka-specific literature from single-site or governance-only accounts toward a comparative framework that connects institutional analysis, affordability measurement, health and gender consequences, and household coping behavior within a single analytical structure.

2.13. Theoretical Framework:

This study uses **Institutional Bricolage Theory** and the **Sustainable Livelihoods Framework (SLF)** as complementary theoretical perspectives for understanding water and sanitation service delivery in Korail and Geneva Camp. The selection of these frameworks reflects the multidimensional nature of the research problem. WASH insecurity in informal settlements is not merely the result of insufficient infrastructure; it is shaped by institutional arrangements, power relations, household resources, and the strategies residents develop to manage unreliable services. The study's 5As framework—Availability, Accessibility, Affordability, Acceptability, and Awareness/Adaptability—provides the analytical structure through which WASH service performance is assessed, while Institutional Bricolage and the Sustainable Livelihoods Framework explain the institutional and household processes that produce these outcomes. This distinction is important because the 5As identify what forms of WASH deprivation exist, whereas the theoretical frameworks assist in explaining why these conditions arise and how residents respond to them. The research itself examines these three connected dimensions through RO1 on the 5As, RO2 on governance and institutional structures, and RO3 on household survival and coping strategies.

2.13.1. Institutional Bricolage Theory

The first theoretical perspective applied in this study is **Institutional Bricolage**, developed by Frances Cleaver (2001). Institutional bricolage challenges the assumption that institutions operate exclusively through formally designed rules and organizations. Instead, Cleaver argues that people construct workable institutional arrangements by combining formal rules, informal norms, existing social relationships, cultural practices, and available organizations. Consequently, institutions encountered in everyday life frequently represent mixtures of formal and informal arrangements rather than clearly separated systems.

This framework is highly relevant to WASH governance in Korail and Geneva Camp. Water and sanitation services in the two settlements are not provided through a straightforward relationship between government utility and household. The thesis identifies multiple actors,

including DWASA, city corporations, NGOs such as DSK and BRAC, community-based organizations, local leaders, landlords, informal intermediaries, sanitation workers, and residents themselves. Households may receive water through infrastructure originating from a formal public institution while local committees manage distribution, residents contribute money for repairs, NGOs establish alternative sources, and landlords or local actors influence last-mile access. The empirical findings therefore describe a **hybrid governance environment** rather than either purely formal or purely informal provision.

Institutional Bricolage provides a stronger theoretical interpretation of what the thesis initially describes as an "institutional void." An institutional void does not necessarily mean that institutions are completely absent. The field findings instead indicate that numerous institutions exist, but their responsibilities overlap, remain unclear, or operate through locally constructed arrangements. Residents may repair damaged pipelines themselves, contribute money for drain cleaning, manage shared toilets, negotiate access through local actors, or depend on NGO-supported infrastructure after formal systems prove inadequate. Institutional Bricolage helps explain how these practices emerge because communities combine the institutional resources available to them to keep essential services functioning.

The framework is therefore directly relevant to **RO2**, which examines organizational structures, decision-making, management, and stakeholder roles in WASH provision. It also contributes to **RO1**, because institutional arrangements influence all five dimensions of WASH access. For example, decisions concerning distribution influence Availability; the location and control of communal facilities affect Accessibility; informal intermediation can influence Affordability; maintenance arrangements shape Acceptability; and community organizations or NGO activities can influence Awareness and Adaptability. Institutional Bricolage also connects to **RO3**, because household self-repair, collective maintenance, negotiation with local actors, and community contributions are not simply individual coping behaviours; they are forms of everyday institutional practice.

The comparative design further strengthens the relevance of this theory. Korail has experienced significant NGO/CBO-mediated formalization of water access, whereas Geneva Camp reflects a different history of administrative exclusion, extreme density, community-managed services, and household adaptation. The theory allows the research to examine how different historical, legal, political, and social conditions produce different combinations of formal and informal institutions instead of assuming that all informal settlements operate in

the same way. This is particularly appropriate because the thesis treats Korail and Geneva Camp as two structurally distinct cases.

2.13.2 Sustainable Livelihoods Framework

The second theoretical perspective is the Sustainable Livelihoods Framework, originating from Chambers and Conway (1992). A livelihood consists not only of income but also of people's capabilities, assets, resources, and activities used to secure the necessities of life. A livelihood is considered more sustainable when people can cope with and recover from stresses and shocks while maintaining or strengthening their capabilities and assets.

Although the framework was initially developed largely in relation to rural livelihoods, its underlying concepts are highly applicable to urban informal settlements. In this study, unreliable water supply, sanitation breakdowns, flooding, waterlogging, increasing expenditure, overcrowding, and uncertain institutional support can be understood as recurrent stresses and shocks affecting household security. Residents respond by mobilizing the resources available to them.

The SLF is especially useful for analysing these responses through different forms of household assets. Financial resources determine whether households can purchase emergency water, pay maintenance costs, install tanks, arrange private connections, or construct household toilets. Physical assets include storage containers, housing space, water connections, toilets, and tanks. Social resources include relationships with relatives, neighbours, community groups, landlords, and local leaders through which households may borrow water, access another toilet, negotiate services, or organize collective repairs. Human capabilities and knowledge include experience in storing water, distinguishing between sources, organizing household consumption, maintaining facilities, and responding to shortages. Access to groundwater and other environmental water sources may also function as an important resource within the wider livelihood system.

This framework directly supports **RO3**, because the research identifies storage, rationing, source switching, borrowing, purchasing, changing household schedules, self-repair, private sanitation construction, and reduced water-intensive hygiene as major coping strategies. These practices can therefore be analysed not as an unstructured list of behaviours but as strategies shaped by the assets and capabilities available to different households.

The framework also helps explain inequality within the 5As. Two households exposed to the same interruption may experience very different levels of WASH insecurity. A relatively better-off household with a storage tank, larger dwelling, private toilet, and financial resources may absorb the interruption more easily. A poorer household may have to queue, carry water, borrow from neighbours, postpone washing, or use shared sanitation. Thus, the SLF explains why infrastructure failure produces unequal consequences according to income, housing conditions, gender, social networks, and household assets.

Importantly, the framework prevents coping from being automatically interpreted as successful resilience. A household may successfully obtain water by remaining awake until midnight, carrying containers over long distances, sacrificing income, purchasing expensive water, or reducing hygiene. Such practices demonstrate adaptive capacity, but they also reveal that the costs of inadequate service have been transferred from institutions to households. This distinction is particularly important to the thesis because its findings show that adaptation does not necessarily mean that WASH insecurity has disappeared.

2.13.3. Integration of the Two Theoretical Frameworks

The strength of combining Institutional Bricolage and the Sustainable Livelihoods Framework lies in their different but complementary levels of explanation. Institutional Bricolage operates primarily at the governance and institutional level, explaining how formal agencies, NGOs, CBOs, informal actors, social relationships, and households collectively construct the actual WASH system. The Sustainable Livelihoods Framework operates primarily at the household level, explaining how residents mobilize unequal combinations of financial, physical, social, and human resources to cope with the service conditions produced by that system.

The theoretical logic of the study can therefore be expressed as:

Urban informality and institutional context → institutional bricolage in WASH governance → outcomes across the interconnected 5As → household asset constraints and opportunities → coping and adaptation strategies → unequal livelihood burdens and WASH security.

Together, the frameworks provide theoretical coverage for all three research objectives. Institutional Bricolage explains the governance processes behind WASH service delivery, the

5As measure how these arrangements translate into everyday service conditions, and the Sustainable Livelihoods Framework explains how households respond to those conditions. The combined framework therefore allows the thesis to move beyond simply documenting inadequate infrastructure toward explaining the relationship between institutions, service performance, inequality, and household adaptation in Dhaka's informal settlements.

Chapter: III

Methodology

This chapter details the research design and methods employed for the assessment of the availability, accessibility, affordability, acceptability, and awareness/adaptability (5As) of water and sanitation facilities in two distinctly different informal settlements in Dhaka, Bangladesh, namely Korail Settlement and Geneva Camp, as well as the placement of household conditions in the context of the governance and institutions that affect them. The use of a qualitative design consisting of IDIs and KIIs ensured the interpretation of the 5As statistical pattern in light of the institutional and experience-based data necessary for addressing the three ROs of this study (RO1: water and sanitation situation assessment in terms of 5As; RO2: governance and institutional structure; RO3: coping and survival strategies). This chapter follows the sequence of research approach and design, study area, research timeline, population and sampling, research instruments, reliability and validity, data collection procedure, data analysis, and ethical considerations.

3.1 Research Approach and Design

The study employs a qualitative approach, whereby data is collected thoroughly, analysed independently, and then combined at the point of interpretation to interpret patterns of access to WASH facilities through institutional and experiential findings (Creswell & Plano Clark, 2018). The study is grounded in the pragmatist paradigm according to which IDIs and KIIs are more appropriate to discover the institutional mechanisms, governance arrangements, and coping behaviors (Tashakkori & Teddlie, 2010).

The contrast in the size of the two settlements, their legal status, and history of settlement makes the study also a comparative case study where Korail and Geneva Camp are considered two separate bounded cases distinguished by their institutional characteristics rather than one aggregated sample (Yin, 2018). Such research design makes it possible not only to examine the extent of WASH deprivation in each settlement but to determine whether there is any systematic difference in deprivation levels, governance arrangements, and coping strategies between a large official settlement and a small non-notified one.

3.2 Study Area

Data collection was carried out in two informal settlements in Dhaka, Bangladesh, through purposive sampling, where the chosen settlements are different types of settlement informality within the same city. The first of these was Korail Settlement, which is situated between Banani and Gulshan, with ownership rights resting formally with Bangladesh Railway and Bangladesh Water Development Board. It is among the biggest informal settlements in Dhaka, inhabited primarily by rural-to-urban migrant communities who speak Bengali and are beneficiaries of the tolerant de facto administrative arrangement that have allowed for limited connections to water through community mediation (Ahmed, 2007; Rana & Piracha, 2018). The second of the two selected sites is Geneva Camp, which is a small non-notified settlement hosting a stateless, Urdu-speaking, Bihari community, who have been living there since 1971. Unlike Korail, the Geneva Camp is not legally recognized in addition to having citizenship problems. As a result, municipal service planning has left it out completely, rendering its provision of water and sanitation dependent only on a single communal source with severely crowded latrines (Iqbal & Nazneen, 2014). Two settlements were purposely chosen to allow for the comparison described in Section 3.1 below to hold constant the overall city-wide institutional setting (same water utility, city corporations and national policy context) while varying greatly in terms of settlement size, population composition and, most important to this research, level of legal recognition.

3.3 Population and Sampling

Qualitative Sample: IDIs, KII, Participant Observation

A maximum variation sampling method was employed to obtain a qualitative sample of experiences from different households and institutions. In total, 30 interviews were carried out with different members of households (roughly 15 per settlement), who varied in terms of gender, tenancy status, and distance from formal/informal sources of water. The number of interviews done is in line with qualitative recommendations, which stipulate that 12-24 in-depth interviews are adequate enough to achieve thematic saturation when purposively sampled and information-rich, addressing a well-bounded area of study (Guest, Bunce, & Johnson, 2006; Malterud, Siersma, & Guassora, 2016). A total of six (06) key informant interviews were conducted with members of DWASA, NGO/CBO members involved in water provisioning including those who worked on the DSK model in Korail (Rana &

Piracha, 2018), and other informal leaders/committee members in the settlements, to get an institution/ informal governance view needed for RO2. Alongside of the collected data from the field and interviews, I have also used secondary resources to validate and confirm my findings.

3.4 Research Timeline

Fieldwork was organized into three sequential phases to allow instrument piloting, in-depth qualitative fieldwork, and a final validation stage during which preliminary findings were checked against key informants and community members. Table 3.1 summarizes the timeline.

Phase	**Field Activities**	**Major Outputs**
Phase 1: Preparatory & Instrument Piloting	Courtesy visits to Korail and Geneva Camp community leaders/CBOs; mapping of water points and sanitation blocks	Established community access and trust; finalized sampling frame.
Phase 2: Qualitative Fieldwork (IDIs & KIIs)	In-depth interviews with household members in both settlements; key informant interviews with DWASA officials, academics, NGO/CBO staff, and settlement-level informal leaders.	Institutional and lived-experience narratives for RO2 and RO3.
Phase 3: Data Validation	Preliminary findings shared informally with select participants and key informants for feedback (member checking).	Triangulated, validated findings ready for analysis and write-up.

Table 3.1: Research Timeline

The qualitative fieldwork within the same overall field period allowed emerging patterns — for example, unexpected differences in reported water expenditure between the two settlements — to inform the probing questions used in the subsequent IDIs and KIIs, and the validation phase provided an opportunity to feed preliminary interpretations back to the community, consistent with member-checking practice in qualitative research (Lincoln & Guba, 1985). The research budget for transport, enumerator and research-assistant compensation, printing, and incidental field costs was self-funded by the researcher; no external donor, institutional grant, or third-party funding was involved at any stage of data

collection or analysis, ensuring full independence in the design, conduct, and interpretation of the study.

3.5 Research Instruments

In-Depth Interview (IDI) Guide

The IDI guide used semi-structured, open-ended prompts organized around household members' lived experience of accessing water and sanitation: their history of negotiating access with landlords, local committees, or informal providers; perceived changes in access and cost over time; specific coping episodes (e.g., the most recent occasion of water shortage or facility breakdown); and household decision-making around water use and hygiene, with particular attention to gendered differences in labor and negotiation.

Key Informant Interview (KII) Guide

The KIIs guide was tailored to each category of informant. DWASA and city corporation officials were asked about formal service-extension policy toward informal settlements, the legal and administrative barriers to connecting Korail and Geneva Camp, and awareness of informal intermediation. NGO/CBO representatives were asked about the design, coverage, and sustainability of community-managed schemes. Settlement-level informal leaders and committee members were asked about the mechanisms through which water access is currently allocated, priced, and maintained within the settlement.

3.6 Reliability and Validity

With regard to the qualitative methodology, the credibility, transferability, dependability, and confirmability criteria proposed by Lincoln & Guba (1985) will be used to prove methodological rigor. **Credibility** was strengthened through methodological triangulation across IDIs, KII, and direct observation of water points and sanitation facilities during fieldwork; a claim was treated as established only where it was corroborated across at least two independent sources. **Dependability** was supported through verbatim transcription, a shared codebook applied consistently across both settlements, and documented field decisions. **Confirmability** was pursued through reflexive field memos in which the researcher's positionality — including outsider status relative to the stateless Bihari community of Geneva Camp — was made explicit, consistent with feminist-geography guidance on reflexivity in fieldwork with marginalized communities (England, 1994).

Transferability was supported through thick description of each settlement's history, legal status, and governance arrangements, with clear boundary conditions stated so that readers can judge the applicability of findings to other Dhaka informal settlements with comparable characteristics.

Integration of the qualitative strands followed a triangulation practice, in which convergence, complementarity, and divergence between strands are all treated as analytically informative rather than as a simple confirmation exercise (Bryman, 2006). Table 3.2 summarizes how each of the study's three research objectives was triangulated across data sources.

Research Objective	**IDIs**	**KIIs**
RO1: 5As status (Availability, Accessibility, Affordability, Acceptability, Awareness/Adaptability)	Lived-experience narratives explaining patterns	Institutional context for service gaps
RO2: Governance and institutional structures	Household accounts of negotiating access	Primary evidence from DWASA, city corporation, NGO/CBO, and informal leaders
RO3: Household coping and survival strategies	Primary detailed coping narratives and episodes	Awareness of informal coping practices from provider perspective

Table 3.2: Triangulation Matrix

3.7 Data Collection and Procedure

Desk Research

Secondary data collection involved reviewing relevant literature, government and World Bank diagnostics, and NGO reports on WASH conditions in Dhaka's informal settlements, as presented in Chapter 2. The findings from this secondary analysis helped form the interviews, as well as providing the overall background context into which the primary data is analyzed.

In-Depth Interviews and Key Informant Interviews

The IDIs were carried out either at the respondent's home or at a location that was close by but guaranteed confidentiality. The KIIs were also conducted either at the office of the informant or at any other location chosen by the informant.

Participant Observation

Observations on the conditions of water points, latrine blocks, and drainage systems at both locations were conducted to support triangulation of the data collected from respondents, as discussed in Section 3.6.

3.8 Data Analysis

Qualitative data collected from IDIs and KIIs were verbatim transcribed and thematically analyzed as per the approach suggested by Braun & Clarke (2006), which comprised of six phases: familiarization, initial coding, searching for themes, theme review, definition & naming of themes and writing up the final narrative analysis. Code book developed initially using a deductive approach based on the 5As framework, and governance & coping themes generated from Chapter 2 were further developed through an inductive approach based on emerging data (e.g. variation in the mechanism of informal water pricing at the level of each settlement). Coding was done uniformly in both settlements for ensuring comparability of findings, and negative/disconfirmatory cases were kept in mind and analyzed.

Combining the qualitative findings related to governance mechanisms (RO2) and coping strategies (RO3) is to develop an integrated explanation for explaining the WASH conditions of Korail & Geneva Camp.

3.9 Ethical Considerations

The research was done according to the set ethics for conducting studies on human subjects (World Medical Association, 2013). The study subjects were first made aware of the aim of the study, the procedures involved, and the absolute right of the participants to refuse to participate at any point of the study without suffering from any repercussions before the research commenced.

The confidentiality of the information provided was protected by using pseudonyms and ensuring that no identifiers remained in the transcripts, records, and in the thesis, and the data

collected were secured and accessible only to the researchers. In Geneva Camp, special attention was paid in designing questions because of the stateless nature of the settlement: all questions related to informal payment, informal leaders, and dealings with the municipality were posed in a way such that there would be no threat of any retribution on the part of the participants, and nothing linking any particular informal intermediary or committee members was written down in the research.

Chapter: IV

Findings

The findings indicate that water and sanitation deprivation in Korail and Geneva Camp is best understood not as a simple absence of infrastructure but as a condition of partial, intermittent, unequal and institutionally mediated access. Across the attached participant accounts, households frequently reported having a pipeline, tap, groundwater point, toilet or shared sanitation facility while simultaneously describing long interruptions, poor water quality, crowding, lack of privacy, maintenance failures, additional expenditure and the need to secure alternative sources. This distinction is fundamental to the 5As framework used in this study. A household may therefore be classified as having a water source or toilet while still experiencing serious failures in Availability, Accessibility, Affordability, Acceptability and Awareness/Adaptability.

The broader Bangladesh data demonstrate why the distinction between nominal access and meaningful access matters. The latest WHO/UNICEF Joint Monitoring Programme dataset covers household WASH trends through 2024 and explicitly distinguishes basic access from safely managed services. The Bangladesh country workbook indicates that approximately 98.8% of the urban population had at least basic drinking-water service in 2024, yet only about 54.3% met the safely managed drinking-water standard, which incorporates improved source type together with accessibility on premises, availability when needed and freedom from relevant contamination. Approximately 87.8% of the urban population had water accessible on premises and about 93.8% had water reported as available when needed, illustrating how progressive service criteria narrow the proportion considered fully served. (WHO & UNICEF, 2025).

The same pattern is visible for sanitation. The 2024 JMP Bangladesh estimates indicate approximately 91.9% urban use of improved sanitation technology, but only around 67.6% had at least basic sanitation, meaning an improved facility that was not shared with other households. About 24.3% of the urban population used improved but shared sanitation, which JMP classifies as a limited service, while the estimate for safely managed sanitation was only about **30.7%**. These figures are not estimates for Korail or Geneva Camp, but they provide an essential benchmark: even urban averages conceal a substantial gap between the existence of

improved facilities and the stronger standards of exclusive, safely managed service. (WHO & UNICEF, 2025).

Dhaka-specific research points to an even sharper distinction within informal settlements. A World Bank household study covering small, medium and large government-defined slums in Dhaka found that water access was nearly universal in source terms, but interruptions and temporary inaccessibility remained common. Sanitation was overwhelmingly shared; the mean was approximately 16 households per sanitation facility, and only around 2% of surveyed slum households satisfied the study's full interpretation of safely managed sanitation once fecal-sludge handling was incorporated. The same study found extensive involvement of middlemen in the installation, management and payment stages of WASH service delivery. (Arias-Granada et al., 2018).

The two study areas nevertheless represent different forms of informality. Korail has developed a relatively extensive hybrid water system in which community-based organizations and NGOs have helped residents obtain legally recognized DWASA connections. An Asian Development Bank-supported initiative reported approximately 1,000 connections in Korail and more than 50,000 beneficiaries, while earlier reporting on the initial formalization process described shared connections serving groups of households. (ADB, 2019; Rana & Piracha, 2018). Yet the existence of those connections has not completely eliminated intermittent service, unequal connection ownership or informal resale.

Table 1: Actors Contributing to Water and Sanitation Service Provision in Informal Settlements:

Actor / Institution	Main Role in WASH Provision	Type of Contribution	Limitations / Issues Identified
Dhaka WASA (DWASA)	Formal urban water supply, pipeline infrastructure and institutional water services	Formal / Government	Formal service extension to informal settlements can be constrained by administrative, tenure and infrastructural issues

City Corporations	Public sanitation, drainage, community toilets, cleaning and local infrastructure support	Formal / Government	Maintenance and coverage are uneven; residents may not clearly know which institution is responsible
DSK and other NGOs	Community water connections, sanitation facilities, awareness activities and support to community management	NGO / Development actor	Coverage is not universal and some projects depend on external support
BRAC	Drinking-water points/tube wells, previous water-quality and hygiene-related support	NGO / Development actor	Some respondents reported that monitoring or activities stopped after projects ended
CBOs / Community Committees	Collection of fees, minor repairs, management of shared facilities and coordination between residents	Community-based	Effectiveness depends on participation, leadership and ability to collect resources
Landlords / House Owners	Installation or maintenance of household connections, toilets and sometimes decisions concerning WASH infrastructure	Private / Household-level	Investment may depend on financial incentives and tenancy arrangements

Local leaders / Matabbars / Chairmen	Mediation, local decision-making and sometimes coordination of service access	Informal governance	Responsibilities are often unclear and residents report varying levels of responsiveness
Informal vendors / Middlemen / Syndicates	Alternative water supply and intermediation when formal services are inadequate	Informal / Market actor	Can increase costs and create unequal access
Residents / Households	Storage, cleaning, repairs, fee contributions, water collection and management of shared sanitation	Community / Household	Transfers substantial service-management burden from institutions to households

The table above demonstrates that water and sanitation provision in the study settlements does not operate through a single institutional provider. Instead, service delivery reflects a **multi-actor governance system** involving formal government agencies, NGOs, community organizations, landlords, informal leaders and residents themselves. Although DWASA and the city corporations represent the formal institutional structure, qualitative accounts indicate that NGOs such as DSK and BRAC have played important roles in filling service gaps through community water lines, groundwater sources, sanitation facilities and awareness activities. At the same time, households frequently undertake responsibilities such as storing water, cleaning shared toilets, paying for repairs and maintaining facilities. This indicates that the practical functioning of WASH services depends substantially on **institutional substitution and household-level management**, rather than exclusively on formal public provision. This finding is consistent with the thesis's discussion of an institutional void and NGO- or community-mediated service provision.

Geneva Camp exhibits a different profile. A 2024 peer-reviewed survey of 313 Geneva Camp respondents found that only 4.8% described themselves as very happy and 16.0% as happy with the water-supply system. Only 29.7% were satisfied and 4.8% very satisfied with safe

drinking water. Regarding sanitation, only 31.3% reported having private toilet facilities, meaning 68.7% did not. More than half of respondents, 52.7%, reported that 16–20 people used the same toilet; 80.3% were unhappy with toilet smell and 73.6% reported problems associated with multiple people using the same toilet. (Sifullah, Sohel, Jamil, & Hasan, 2024). These figures provide a strong quantitative validation of the sanitation crowding and service dissatisfaction described in the qualitative narratives.

The comparison therefore begins with a common finding but distinct institutional expressions. Korail's central problem is not simply exclusion from the network but unstable and socially differentiated access within a partially formalized system; Geneva Camp's problem is compounded by extreme density, heavy sharing, spatial confinement and fragmented responsibility for facilities.

5A dimension	**Korail: dominant empirical pattern**	**Geneva Camp: dominant empirical pattern**	**Interpretation**
Availability	Formal/community-mediated connections exist, but interruptions, uneven coverage and supplementary sources remain important.	Water infrastructure exists but supply satisfaction is low; timed/intermittent supply and dependence on supplementary groundwater/community sources appear repeatedly.	Infrastructure presence does not equal uninterrupted service.
Accessibility	Shared points, tenancy status, queues, lane conditions and control over connections differentiate access.	Geographic distances can be short, but extreme crowding, queues, limited household space and heavily shared facilities create functional	Social and temporal distance can matter as much as physical distance.

		inaccessibility.	
Affordability	Formal DWASA supply is inexpensive at utility tariff, but intermediation and private resale can multiply costs; connection ownership matters.	Direct per-litre evidence is limited, but households bear maintenance costs, collection time and private adaptation costs.	Affordability includes both tariffs and the cost of compensating for unreliable service.
Acceptability	Shared/community sanitation presents cleanliness, privacy, gender and maintenance challenges despite gradual upgrading.	Particularly severe: 68.7% in a 2024 survey lacked private toilets; sharing and toilet smell were major sources of dissatisfaction.	Sanitation access without privacy and dignity constitutes only partial service.
Awareness/Adaptability	Residents display strong practical knowledge of storage, source switching and maintenance, but structural shortages constrain hygienic practice.	Considerable household adaptation exists, including source differentiation and self-maintenance; awareness does not eliminate infrastructure constraints.	The principal gap is often capability to act on knowledge, rather than complete absence of knowledge.

Sources: attached field narratives; Arias-Granada et al. (2018); Rana and Piracha (2018); Sifullah et al. (2024); WHO and UNICEF (2025).

The quoted field extracts below should be interpreted accordingly. Where an attached participant made the statement directly, it is treated as participant testimony. Where a quotation is explicitly labelled an illustrative composite vignette, it is an analytical synthesis of several recurring accounts rather than a claim that one respondent spoke those exact words

4.1 Existing Status and Performance of WASH Services under the Five As

This section addresses the first research question and objective by examining how Availability, Accessibility, Affordability, Acceptability, and Awareness/Adaptability shape the residents' day-to-day access to water and sanitation in Korail and Geneva Camp as interconnected dimensions rather than separate infrastructure indicators. The clearest empirical finding is that none of the five dimensions can adequately describe WASH access by itself. Problems in one dimension systematically generated pressure in others: interrupted water availability increased storage and purchasing; difficult accessibility increased time costs; poor affordability encouraged rationing; sanitation crowding reduced acceptability; and insufficient water limited households' ability to translate hygiene awareness into practice. This interconnectedness is strongly visible in the attached participant narratives.

4.1.1 Availability: physical infrastructure existed, but continuity was the primary weakness-

A recurrent finding across the interview material was the coexistence of a physical connection with unreliable delivery. One long-term resident described a transition from comparatively regular supply to a pattern in which water might arrive only every two or three days:

> "Two years ago, we used to get water more regularly. Now sometimes we get water after two days, and sometimes after three days. We cannot depend on getting it every day."

The importance of this statement lies in the difference between connection availability and water availability. Under a binary infrastructure indicator, such a household could be recorded as connected to a piped supply. Under the 5As, however, the same household performs poorly on Availability because supply cannot be depended upon when required.

This finding closely parallels the larger Dhaka slum survey in which nominal water access was high but interruptions were sufficiently common to undermine reliability. (Arias-Granada et al., 2018).

Other participants described interruptions lasting the entire daytime period, water returning near midnight, or having to remain alert until the early hours of the morning. One female participant reported that household water could disappear around 9:00 or 10:00 a.m. and return only around midnight or 1:00 a.m., with occasional delays until 3:00 or 4:00 a.m. Another participant reported full-day interruptions, while another described far more severe episodes in which water reportedly failed for 10–15 consecutive days. These durations differ considerably, demonstrating that service reliability is heterogeneous even within informal-settlement environments.

This heterogeneity is itself a finding. A single settlement-level designation such as "served" or "unserved" conceals differences between households that receive water almost continuously, households that receive it at predictable hours, and households that experience multi-day failure. The attached accounts include residents who described present service conditions as quite good alongside residents experiencing serious interruptions. This indicates intra-settlement inequality rather than uniform deprivation.

Korail provides an important illustration of this partial transition. The settlement historically relied heavily on informal water vendors, but organized community action and NGO mediation enabled legal DWASA connections to expand. ADB reported roughly 1,000 connections benefiting more than 50,000 people through a community-based management arrangement. Yet ethnographic work conducted after formalization found that formal supply did not fully displace informal supply, partly because formal service could remain intermittent and

Box 4.1: Having physical infrastructure did not guarantee continuous service

One long-term resident had a piped water connection, yet water sometimes arrived only after two or three days. The household responded by storing water whenever supply returned and rationing it mainly for drinking and cooking. When stored water ran out, they occasionally had to purchase additional water. The respondent also explained that lack of water made toilet use and cleaning more difficult. This case shows that having physical infrastructure did not guarantee continuous service; households remained dependent on storage, rationing and other coping strategies.

because ownership and control of connections were socially differentiated. (Khan, 2023). Thus, Korail demonstrates an evolution from network exclusion to incomplete service inclusion.

For Geneva Camp, the external evidence is more explicitly negative. In the 2024 survey of 313 respondents, only 20.8% fell into the combined categories of happy or very happy with the overall water supply, and only 34.5% were satisfied or very satisfied with safe drinking water. (Sifullah et al., 2024). These satisfaction indicators are not direct volumetric measures, but their magnitude supports the qualitative finding that the physical presence of infrastructure has not translated into a consistently satisfactory service. Sanitation availability displayed a similar distinction between facilities and functional facilities. Several attached respondents possessed household toilets, while others relied on a toilet shared among approximately ten rooms, community facilities, or public toilets. One woman reported a facility used by more than 20 people; another depended primarily on public toilets that occasionally became blocked for several days. This aligns with the World Bank's wider Dhaka evidence showing an average of 16 households per sanitation facility in surveyed slums. (Arias-Granada et al., 2018).

Geneva Camp again shows an especially severe quantitative pattern: Sifullah et al. (2024) found that 68.7% of respondents lacked a private toilet, and 52.7% reported sharing the same toilet with 16–20 people. Availability, therefore, should not be represented simply by a toilet count. At peak periods, a toilet theoretically available to 20 people may be temporarily unavailable to 19 of them.

Water and sanitation availability were also mutually dependent. Participants repeatedly noted that toilets became harder to clean, flush or use when water was scarce. One respondent summarized this dependence directly:

> “The toilet is permanent, and we use it regularly. But it also needs cleaning and maintenance. If there is no water, then using and cleaning the toilet becomes more difficult.”

4.1.2. Accessibility: proximity was often offset by queues, safety, congestion, time and mobility conditions-

The evidence indicates that measuring accessibility only through metres from a water point would significantly underestimate household burden. Several participants described water sources only two, five or ten minutes away yet also described waiting, congestion, carrying heavy containers, flooded or muddy pathways and competition at the point itself. A physically close source can therefore be functionally distant.

One respondent described a groundwater source approximately ten minutes away where afternoon crowding generated arguments and pushing. Her explanation separated Availability from Accessibility particularly clearly: water might be present at the source throughout the day, but obtaining one's turn became the difficulty. Another participant noted that a five-minute trip became substantially more difficult during rain and waterlogging because containers still had to be carried through deteriorated pathways.

> “The tap is close enough that I can see the lane leading to it, but distance is not the real problem. When everyone comes at the same time, I wait with the container, watch my turn, carry it back through the wet lane, and then return again because one trip is not enough.”

This distinction is especially important in Geneva Camp because extreme density compresses physical distances without necessarily improving access. The 2024 Geneva Camp findings show that most respondents lacked private sanitation, while more than half of respondents shared a toilet among 16–20 users. (Sifullah et al., 2024). Thus, a toilet may be only metres from the dwelling while remaining unavailable at the moment of need because another user is inside.

The attached accounts suggest three different forms of accessibility burden. First is temporal accessibility: households must collect water when it arrives rather than when they need it. Second is physical accessibility: narrow lanes, rain, standing water and carrying containers make movement difficult. Third is social accessibility: queues, unwanted comments, gendered exposure, conflict and dependence on the permission or cooperation of landlords, operators or other users determine whether a service can actually be used.

Korail's history of communal water points illustrates similar social accessibility. When formal connections were first expanded, reports indicated that one connection could serve roughly

30 families, meaning legal provision remained a shared rather than individual household service. Subsequent research found that access varied according to whether a resident was a house owner or tenant and according to the type of connection available. (Khan, 2023). Therefore, the network may reach the settlement while household-level accessibility remains socially differentiated.

Gender intensified the accessibility burden. The attached interviews repeatedly place women in roles involving water collection, household water management, sanitation cleaning and decisions over children's hygiene. One male participant stated that his mother and sister-in-law normally collected the household's drinking water. A female participant described personally cleaning a shared bathroom because other users did not do so consistently and because she was concerned for her child. The effect is that a WASH access failure translates into unpaid labour that is unevenly distributed within households.

Rainfall further modified accessibility. The participant narratives describe waterlogging and dirty surrounding water during heavy rain, creating the paradox of abundant environmental water alongside reduced access to usable water. Such conditions do not necessarily destroy the source itself, but they make the route less safe, increase contamination concerns and make public sanitation more difficult to reach or maintain.

Box 4.2: A Household water also sometimes returned only around midnight

A female respondent collected drinking water from a groundwater source around ten minutes from her home. Although the source was physically close and generally had water, access became difficult when many residents arrived at the same time. She described waiting, arguments and occasional pushing while people competed for their turn. Household water also sometimes returned only around midnight or later, forcing her to remain awake to collect it. Her experience shows that accessibility depended not only on distance, but also on queues, timing, congestion and the effort required to collect water.

4.1.3. Affordability: the burden was generated not only by tariff levels but by the price of unreliability-

The affordability findings reveal an important contradiction. Formal municipal water is comparatively inexpensive at the point of utility billing, yet poor households may incur

considerably greater total costs because they purchase smaller quantities, depend on intermediaries, pay landlords or operators, finance repairs, contribute to shared maintenance, purchase storage containers, or switch to commercial drinking water when regular supply fails.

DWASA's tariff schedule was revised from July 2024, with residential water priced at BDT 16.70 per 1,000 litres, up from BDT 15.18. The official DWASA site records the July 2024 tariff revision, while contemporaneous reporting specifies the residential rate. (DWASA, 2024). At face value this equals only BDT 0.0167 per litre. The problem in informal settlements, therefore, is not adequately explained by the municipal tariff itself.

Korail evidence illustrates the markup created when access is mediated. Khan's ethnographic account reports that, at the time covered by the study, formal connection holders paid approximately BDT 15.93 per 1,000 litres whereas informal arrangements could charge approximately BDT 170–250 for the same nominal volume; small quantities obtained through private jar delivery could be far more expensive. (Khan, 2023). The precise figures are time-specific and should not be interpreted as a 2026 price schedule, but the within-study comparison demonstrates the structural point: informal intermediation can make a formally cheap commodity expensive for households with the weakest connection rights.

This is consistent with earlier Korail evidence describing vendor-mediated access and substantial premiums over municipal water. It is also consistent with the wider Dhaka slum literature, which finds that middlemen remain involved in multiple stages of WASH provision. (Arias-Granada et al., 2018).

The attached narratives provide the household mechanism behind these price differences. A participant with a monthly income estimated at BDT 15,000–20,000 explained that purchasing additional water occurred only when stored water was exhausted:

> “If I have to spend money on water, then that money has to come from the same household income that I use for food and other needs.”

Another participant reported approximately BDT 2,000 per month in water-related expenditure, although the attached account does not provide enough information to determine whether that payment represented utility billing, an intermediary payment, purchased drinking water or a bundle of charges. It should therefore be treated as a household-reported expenditure rather than generalized to either settlement.

Sanitation generated smaller but repeated expenditures. One participant reported contributions of around BDT 20–50 from households when drain cleaning was required and estimated her own sanitation/drain-cleaning expenditure at roughly BDT 200–300 in some months. Another reported contribution is around BDT 50–60 for public-toilet maintenance. These figures appear modest in absolute terms, but several interviewees reported monthly incomes close to BDT 6,000. For such households, apparently minor maintenance charges are layered onto rent, food, cooking fuel, transport, healthcare and other essential costs.

An equally significant affordability finding is that time and labour function as hidden payments. Households reporting no water bill were not necessarily receiving water at zero cost. They paid through waiting, carrying, late-night collection, storage, self-repair and forgone time. This explains why conventional affordability measures based only on the water bill systematically understate the burden.

A further inequality emerged around the ability to purchase private adaptation. One participant explicitly contrasted households that could afford stronger multi-storey housing, tanks and private facilities with households in small single-storey dwellings that lacked storage and suffered more during shortages. Thus, economic status shaped not only the ability to buy water but the ability to shield oneself from service failure.

4.1.4. Acceptability: sanitation was the weakest dimension for privacy, dignity and gender responsiveness-

The qualitative evidence is especially strong on the difference between having a toilet and having an acceptable toilet. The dominant acceptability concerns were cleanliness, privacy, gender separation, doors and locks, lighting, menstrual-hygiene suitability, queueing and the number of people sharing the facility. A female participant described one toilet shared across approximately ten rooms and more than 20 users:

> “The toilet is not only for our family. Around ten rooms depend on one toilet, so more than twenty people may use the same place. The hardest times are usually morning and night because everyone needs it then.”

She also explained that she cleaned the facility herself because she had a child and did not trust other users to maintain it consistently. The finding therefore concerns more than facility condition. A collective toilet without a dependable maintenance arrangement transfers cleanliness responsibility onto particular users, often women.

The Geneva Camp statistics independently validate this pattern. Only 31.3% of respondents in the 2024 survey had a private toilet, only 13.7% were satisfied with using the same toilet as multiple other people, 73.6% reported problems associated with multiple users, and 80.3% were unhappy with toilet smell. (Sifullah et al., 2024). These indicators demonstrate that sanitation sharing is not merely a technical arrangement; it directly affects users' evaluation of service quality.

Menstrual hygiene reveals the gendered character of acceptability particularly strongly. One attached female participant explained that she preferred changing menstrual materials inside her room rather than in the shared sanitation facility and described public toilets as especially stressful because men and women were not adequately separated.

Box 4.3: A Functioning Toilet, but Not an Acceptable One

A female participant described sharing one toilet with around ten rooms and more than 20 users. Although the facility was physically available, overcrowding, poor cleanliness and limited privacy reduced its acceptability. Morning and evening were particularly difficult because many residents needed the toilet at the same time. She often cleaned the facility herself because she had a child and could not depend on other users to maintain it. The problem became more serious during menstruation. She explained:

"During menstruation, using the bathroom becomes much harder. I do not feel comfortable there. There are many people using the same toilet, and there is not always enough privacy."

She therefore preferred changing menstrual materials inside her room rather than using the shared facility. Her experience demonstrates that sanitation availability does not automatically ensure dignity, privacy or gender-responsive access**.** Shared facilities may remain technically functional while being socially unacceptable for particular users, especially women.

Source: In-depth interview, female participant.

The importance of this account is that a toilet may be operational but still fail the Acceptability criterion for women. Physical availability does not neutralize embarrassment, fear of observation, harassment, inadequate disposal arrangements or the need to move through public space at night. Indoor toilets presented a different acceptability trade-off in Geneva Camp and other densely occupied housing. Several attached male participants described household toilets as important improvements because women no longer needed to use public facilities. At the same time, they noted that constructing a toilet inside an already small dwelling reduced usable living space. One camp resident explained:

> "Before we had a toilet inside the house, the women in our family had to use the public toilet. That was difficult for them. Because of that, we decided that even though our house is small, we would make a toilet inside."

This is a particularly important Geneva Camp finding because it demonstrates how spatial density converts a sanitation improvement into a housing trade-off. Privacy is improved by sacrificing scarce domestic floor space. The result is not a simple transition from "bad sanitation" to "good sanitation"; it is an adaptive reallocation of household space to obtain dignity.

Korail has also experienced sanitation upgrading, including NGO-supported community latrines, but historical and contemporary studies continue to identify sharing, maintenance and privacy as concerns. One Bangladesh sanitation assessment reported community latrines in Korail shared by roughly 25–30 families in the facilities examined.

Acceptability was consequently more socially differentiated than availability. A healthy adult man using a nearby toilet during daytime may evaluate the same facility differently from a menstruating woman, an elderly user, a disabled resident or a child. The findings therefore support the study's decision to treat acceptability as an independent analytical dimension rather than assuming that functional infrastructure is automatically socially acceptable.

4.1.5. Awareness and Adaptability: residents possessed considerable practical knowledge, but infrastructure constrained their ability to act on it-

The attached field accounts do not support a simplistic interpretation that WASH problems primarily result from residents lacking awareness. Participants generally understood that water should be stored, that foul-smelling or visibly dirty water might be unsafe, that toilets require cleaning, that hands should be washed, and that safer drinking sources should be prioritized when available.

The more important finding is an awareness–capability gap. Households sometimes knew the desirable behaviour but did not have enough water, fuel, soap, money, space or reliable infrastructure to practice it consistently. One participant articulated this clearly:

> "We know water is needed for cleaning and washing, but when there is very little water, we first think about drinking and cooking. If the supply is regular,

everything is easier. When there is a shortage, every use of water has to be considered."

This is a strong finding because it changes how inadequate hygiene behaviour should be interpreted. Reducing handwashing or toilet-cleaning water during shortage may not indicate ignorance. It may represent a rational allocation of a scarce resource toward drinking and cooking.

Another participant reported drinking supplied water directly without routinely treating it and stated that she had received little formal instruction on household water treatment. Others assessed water safety through smell, colour, visible iron or long familiarity. Such sensory assessment is understandable under uncertainty but cannot reliably identify microbial contamination.

The Geneva Camp survey shows a similar distinction. Sifullah et al. (2024) found that 96.8% of respondents reported cleaning their hands before eating, despite widespread dissatisfaction with the WASH environment and extensive sharing of toilets. High reported awareness or practice on one hygiene behaviour therefore coexists with serious infrastructural deficits.

The latest JMP benchmark reinforces the same point at the urban-national level. Approximately 80.0% of Bangladesh's urban population had a basic handwashing facility with both water and soap in the 2024 estimate, meaning infrastructure for routine hygiene still did not reach everyone even where knowledge may exist. (WHO & UNICEF, 2025).

Adaptability, in contrast, was extremely high. Residents developed routines for storing water, differentiating drinking and washing sources, adjusting bathing and laundry to supply schedules, using a relative's toilet when their own failed, pooling repair contributions, constructing indoor toilets, repairing lines and relying on community sources. The empirical concern is therefore not an absence of adaptation but the amount of household labour necessary to compensate for an unreliable system.

4.2. Organizational and Governance Structures and the Institutional Void

The second research question and objective raised concern regarding the formal and informal governance structures, institutional processes, and stakeholder relationships shaping water and sanitation provision and distribution. The findings suggest that the term **institutional void** is useful only if it is interpreted carefully. Neither Korail nor Geneva Camp is literally

without institutions. On the contrary, both contain numerous institutional actors. The problem is that responsibility is fragmented, mediated and unevenly accountable.

The observed governance arrangement is better described as a hybrid institutional environment in which public utilities, city institutions, NGOs, CBOs, local leaders, landlords, informal operators and households jointly produce the service that residents ultimately receive. This hybrid arrangement helps explain why infrastructure can exist without clearly assigned accountability for continuity, repairs, drainage, toilet cleanliness, billing or quality.

Korail represents the clearest example of partial formalization. Historically, informal vendors and local power structures supplied water where conventional household connections were unavailable. Community mobilization, Dushtha Shasthya Kendra and other NGO/CBO arrangements subsequently helped establish legal DWASA connections. Reports from the formalization period describe CBOs organizing connections, collecting payments and maintaining communal facilities, while ADB later documented approximately 1,000 connections and more than 50,000 beneficiaries. (Rana & Piracha, 2018; ADB, 2019).

The governance achievement is significant: formal public water entered a settlement from which conventional household utility arrangements had historically been constrained. However, formalization did not eliminate informal power. Subsequent ethnographic evidence shows continued participation by house owners, local leaders and informal suppliers and reports that formal and informal connections coexist. (Khan, 2023). This produces what can be called informalization within formalization: the bulk source may be legally supplied by DWASA, but last-mile allocation, timing, payment and dispute resolution remain partly governed through local relationships.

The wider Dhaka evidence strongly validates this interpretation. Arias-Granada et al. (2018) found that middlemen operated at multiple stages of water and sanitation delivery, including installation, management and payment collection. Thus, Korail should not be represented as a simple opposition between “DWASA” and an “illegal market.” The actual system is a chain of formal and informal actors.

Geneva Camp displays a different hybrid structure. The attached accounts refer to City Corporation-linked lines, BRAC-supported groundwater sources, community contributions, sanitation workers, local chairmen or matabbars and household-managed facilities. Several respondents could describe who they contacted in a practical crisis but could not clearly

identify which institution had final responsibility for the overall system. The governance problem therefore includes institutional legibility: households know the immediate intermediary more clearly than the accountable authority. One camp participant described a water line believed to be 20–30 years old and stated that residents frequently dealt with leaks or damage themselves:

> "When the line leaks or becomes damaged, we often have to deal with it ourselves. We repair it and continue using it because otherwise we will not have water."

This is not merely a coping strategy; it is also governance evidence. When users repair network infrastructure because no clearly responsive maintenance authority acts quickly enough, operational responsibility has effectively shifted downward from utility institution to community. The following flowchart synthesizes the institutional relationships revealed by the findings. It is an analytical representation rather than an official organizational chart.

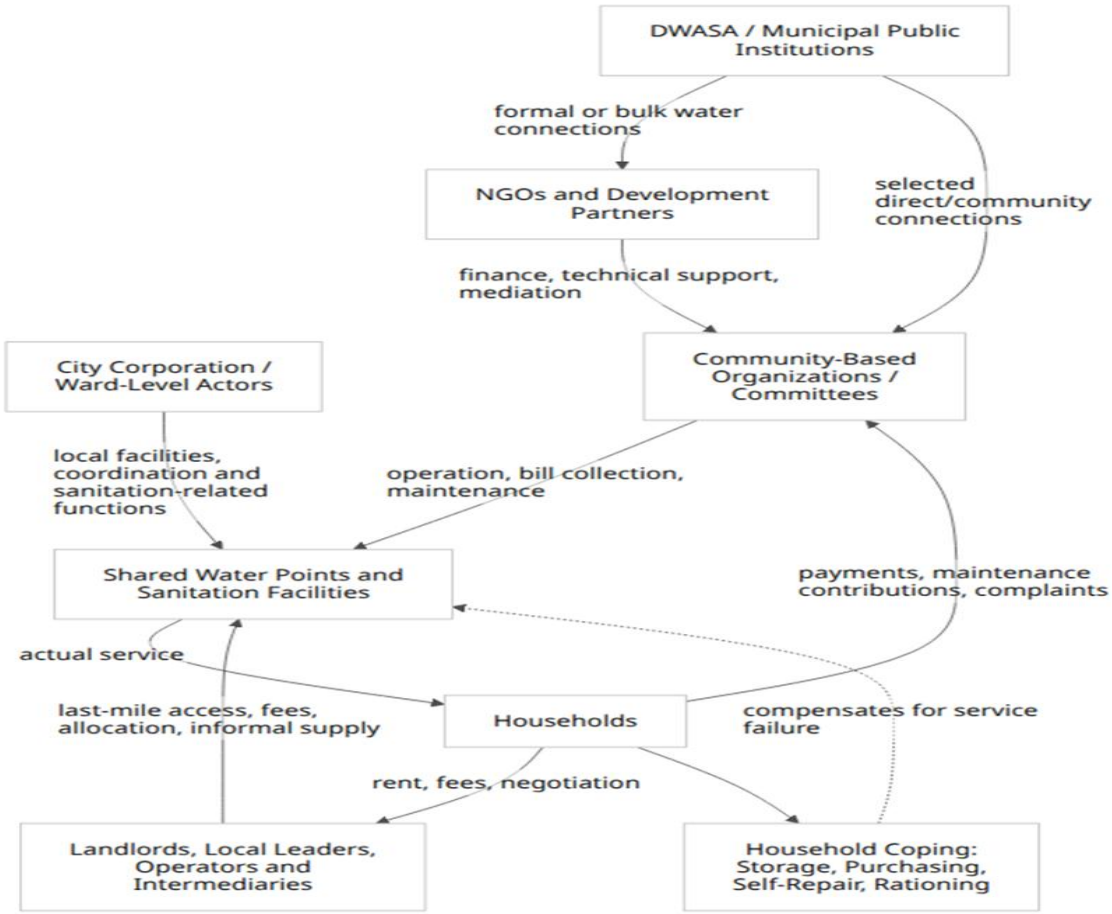


Figure: Hybrid institutional structure identified in the two settlements.

The pathways differ between Korail and Geneva Camp, but the common finding is that households rarely receive an entirely direct utility-to-household service. Evidence is synthesized from attached field accounts, Dhaka slum research and Korail community-water studies. The governance actor comparison can be summarized as follows.

Actor	Korail	Geneva Camp	Finding on institutional role
DWASA	Important formal/bulk water provider; legal connections expanded through community/NGO arrangements.	Formal water authority within wider Dhaka, although household narratives more often describe local/community lines than direct individual DWASA relationships.	Public authority is strongest at network level, weaker at household interface.
City Corporation / local public actors	Relevant to local urban services and coordination; residents also interact with ward/local actors.	More visible in some participant descriptions of lines, supervisors and public facilities.	Institutional responsibility is experienced locally but not always clearly understood by users.
NGOs/development partners	Historically central to formalizing access; DSK/CBO model particularly important.	BRAC and other externally supported groundwater or WASH initiatives appear in participant narratives.	NGOs bridge gaps but can create project-dependent service islands.

CBOs/community committees	Major role in bill collection, operation and interface with DWASA in community-water models.	Community maintenance and collective contributions appear, although institutional structure is less consistently identified by respondents.	Communities function as service administrators, not merely beneficiaries.
Landlords/local leaders/intermediaries	Important in connection ownership, resale and informal allocation.	Local leaders/matabbars/chairmen mentioned, but respondents' knowledge of responsibilities varies.	Last-mile governance can depend on local power and social position.
Households	Store, purchase, negotiate, contribute, maintain and sometimes self-provide sanitation.	Store and collect water, maintain or construct toilets, repair facilities and contribute to communal upkeep.	Households absorb operational risks that would normally be borne by service institutions.

Sources: attached field narratives; Arias-Granada et al. (2018); Khan (2023); Rana and Piracha (2018); ADB project evidence

A major finding is therefore that governance failure does not manifest primarily as complete government withdrawal. It manifests as uncertain boundaries of responsibility. Formal agencies provide or authorize part of the infrastructure; NGOs broker access; CBOs collect bills or operate water points; informal actors manage last-mile distribution; users fund repairs; and households absorb the consequences when one part of this chain fails.

Table 2: Cross-Sectional Assessment of Water and Sanitation through the 5As Framework

5A Dimension	Water: Main Issues Identified	Sanitation: Main Issues Identified	Major Contributing Factors
Availability	Intermittent supply; water unavailable for hours or days; variation between areas; dependence on alternative groundwater sources	Toilets physically available but sometimes blocked, damaged or insufficient for number of users	Old infrastructure, limited service capacity, high population density, unreliable supply
Accessibility	Queuing, collecting water from external sources, carrying containers, waterlogging and difficulty reaching sources	Shared/public toilets, waiting time, distance, overcrowding and difficult access during rainfall	Dense settlement pattern, narrow pathways, number of users, seasonal waterlogging
Affordability	Monthly water expenditure, occasional purchase of alternative water, household contributions and maintenance costs	Cleaning, drain clearance, repair and maintenance contributions	Low/irregular income, informal service costs, shared maintenance responsibilities

Acceptability	Concerns about smell, dirt, iron, contamination and perceived safety	Lack of privacy, cleanliness problems, mixed-gender use, menstrual-hygiene difficulties and overcrowding	Poor maintenance, facility design, gender needs, water quality and social conditions
Awareness / Adaptability	Water storage, source switching, boiling in some households, reliance on sensory judgment of quality	Household cleaning, use of alternative toilets, community contributions and adjustment during breakdowns	Previous NGO awareness activities, household experience, service unreliability and coping capacity

The cross-sectional assessment indicates that the five dimensions of WASH access are **strongly interconnected rather than independent problems**. Physical availability of infrastructure does not necessarily guarantee effective access. Several participants reported having piped water connections while simultaneously experiencing interruptions lasting from several hours to multiple days. Similarly, the existence of sanitation facilities does not guarantee acceptable sanitation where toilets are overcrowded, dirty, blocked or lack adequate privacy.

Accessibility also changes according to environmental and social conditions. A water point located only a short distance from a household may still impose a substantial burden when residents must queue, carry heavy containers or cross waterlogged pathways. Affordability extends beyond formal water bills to include alternative water purchases, cleaning contributions, repair expenses and other household costs. Acceptability is particularly influenced by water quality perceptions, sanitation cleanliness, privacy and gender-specific needs. Finally, the Awareness/Adaptability dimension illustrates that residents actively compensate for service failures through storage, source switching, rationing, cleaning and alternative sanitation arrangements. The findings therefore support the central proposition of the thesis that the 5As should be examined as an **interconnected system of access**, rather than as isolated indicators. Sanitation reveals the institutional gap most clearly. At the city

scale, the World Bank reported in 2020 that approximately 3.5 million people in Dhaka's low-income communities were exposed to poor sanitation conditions and pollution, while the city's conventional sewer infrastructure remained inadequate for the scale of demand. The Dhaka slum household study similarly found that the major sanitation deficit becomes visible once fecal-sludge containment, emptying and treatment are examined rather than simply the existence of a latrine. (Arias-Granada et al., 2018).

Box 4.4: Hybrid Governance and Fragmented Accountability in WASH Service Delivery

The findings show that WASH governance in Korail and Geneva Camp is not characterized by a complete absence of institutions, but by fragmented responsibility among multiple actors**.** Public agencies, NGOs, CBOs, local leaders, landlords, informal operators and residents collectively shape the services households receive. In Korail, NGO- and CBO-mediated formalization has expanded access to DWASA water, yet local actors continue to influence last-mile distribution, payment and dispute resolution. Geneva Camp similarly combines City Corporation-linked supply, NGO-supported sources, community management and household self-provision.

This fragmented arrangement often shifts operational responsibility to residents. One participant explained that when an old water line leaks, "we often have to deal with it ourselves. We repair it and continue using it because otherwise we will not have water." Such experiences show that infrastructure may formally exist while responsibility for maintenance, continuity and service quality remains unclear. The central governance problem is therefore not an *institutional absence*, but a hybrid system with weakly defined and unevenly accountable responsibilities**.**

This helps explain why individual residents report repeatedly cleaning drains or toilets without being able to resolve the larger sanitation problem. A household can clean a toilet pan, a group of users can pay to unblock a drain, and an NGO can construct a community latrine, but none of those interventions alone guarantees a complete safely managed sanitation chain. The institutional void is therefore vertical as well as horizontal. Horizontally, responsibilities are spread across organizations. Vertically, there is a gap between trunk infrastructure and the household. The absence of reliable last-mile systems creates space for intermediaries and self-provision.

Korail demonstrates that NGOs and CBOs can reduce this void. However, community management also introduces questions of representation. Khan's work indicates that connection access and CBO participation can be influenced by house ownership and local political relationships. (Khan, 2023). This means community management should not automatically be treated as synonymous with equal community control. Tenants, women and

poorer residents may have less influence over infrastructure decisions despite being heavily dependent on the service.

Geneva Camp's sanitation data similarly show that infrastructure burden is associated with dwelling conditions. Sifullah et al. (2024) found that occupation, income and number of rooms were significantly associated with sanitation satisfaction. This reinforces the attached qualitative observation that households with more resources or space can internalize sanitation by constructing a toilet, while households occupying a single small room remain more dependent on communal arrangements.

Another governance finding concerns project discontinuity. One participant remembered BRAC personnel previously providing advice or checking water but reported that such activities had ceased after the project ended. The practical implication within the findings is that awareness, monitoring and maintenance may depend on temporary intervention cycles rather than permanent institutional routines.

A related issue is information. Several participants could not confidently state who was responsible for WASH management. This lack of clarity weakens accountability because residents cannot easily distinguish which body is responsible for water pressure, pipe repair, toilet construction, drain blockage, water testing, tariff collection or public-facility management.

WASH insecurity in the two settlements is produced by a hybrid governance system in which formal infrastructure and informal institutions coexist, but responsibility for the quality and continuity of the final service is dispersed. Korail has achieved greater institutionalized linkage to formal water through NGO/CBO mediation, whereas Geneva Camp exhibits stronger evidence of sanitation crowding, spatial confinement and fragmented household/community provision. In both cases, households carry responsibilities that exceed the role of conventional utility consumers.

4.3. Household Survival and Coping Strategies

The third research question and objective are all about coping and adaptation strategies households use in response to water and sanitation insecurity, including failures or limitations across formal, informal, NGO-supported, community-managed, and household-level service arrangements. The findings show that coping is not a single behaviour but a layered sequence of adaptation. Households generally move through increasingly costly strategies: anticipation,

storage, rationing, source switching, borrowing or sharing, purchasing, self-repair, altered hygiene and, when necessary, use of facilities outside the household.

The most widespread strategy was water storage. Because residents could not reliably predict continuous supply, they collected water whenever it became available and stored enough to bridge subsequent interruptions. One participant explained:

> "When water comes, we collect as much as we can and keep it in containers. We use that water for cooking and drinking. We have to think about how long it will last."

Storage transformed the household into a small-scale water-management system. The household had to estimate future supply, prioritize containers, protect stored water and allocate it over time. The strategy increased resilience to brief interruption but also transferred responsibility for continuity from the supplier to the household.

The second closely related strategy was rationing. When stored supplies were limited, drinking and cooking were prioritized over washing, bathing, cleaning and sometimes sanitation. This hierarchy is rational from the household's immediate perspective, but it demonstrates how a water-supply failure propagates into sanitation and hygiene.

> "The first containers are for drinking and cooking. If the line still does not return, washing waits, cleaning waits, and we use as little as possible in the toilet. The shortage changes the order of everything in the house."

The third strategy was source diversification. Many households did not rely on a single source for all purposes. Groundwater, BRAC-supported points or separate drinking-water lines were preferred for consumption, while piped or DSK water could be used for bathing, washing, toilets and cleaning. This is significant because it shows that households themselves perform a kind of informal water-quality classification.

One participant used an outside groundwater source because household water sometimes smelled or appeared dirty. Another family used BRAC-provided groundwater specifically for drinking and municipal or community-line water for other domestic activities. This strategy reveals an important limitation of conventional "main drinking-water source" indicators. A household may maintain two or three sources because no single source satisfies all five As

simultaneously. One source may be available but not acceptable for drinking; another may be safe but inconvenient to collect; a commercial source may be convenient but unaffordable.

The fourth strategy was temporal adaptation. Residents reorganized daily life around the water schedule. Household work might be performed early in the morning before supply stopped or after water returned late at night. One camp participant described water disappearing during the day and returning around 11:00 p.m.:

> "We cannot always do these things when we want. We have to organize them around the time when water comes."

This adaptation has an opportunity cost that conventional monetary WASH indicators do not capture. Waiting for water at midnight can reduce sleep; collecting water during working hours can reduce income; queueing can displace childcare, education or domestic work.

A fifth strategy was purchasing water when other strategies failed. Participant 01 described first relying on previously stored water and only purchasing when the stored supply was exhausted. This indicates a coping ladder: purchasing is often a last resort rather than a preferred service. Korail's formal–informal water economy provides external validation. Even after legal connections became available, private

Box 4.5. Coping with WASH Service Failure: From Storage to Sacrifice

The interviews show that households respond to WASH service failure through a **layered coping process**. Water is first stored whenever supply becomes available and then rationed, with drinking and cooking prioritized over washing, cleaning and sanitation. When stored water is exhausted, households switch to alternative sources, borrow from neighbours or relatives, or purchase water if they can afford it. Some residents also repair damaged water lines, contribute money for drain and toilet maintenance, or use sanitation facilities in other households. Coping capacity, however, is unequal. Better-off households are more able to install storage tanks, private toilets or additional connections, while poorer households depend more heavily on shared sources, carrying water and social networks. Women often absorb additional unpaid work through water collection, toilet cleaning and household water management. These practices demonstrate that **adaptation does not mean the WASH problem has been solved**. As one participant explained, *"We have learned how to adjust, but that does not mean the problems are gone."* Coping therefore protects households from immediate service failure while transferring time, cost, labour and risk from service providers to residents.

Typical pathway:

Service interruption → storage → rationing → source switching/sharing → purchasing → self-repair → reduced hygiene or alternative sanitation

and informal water transactions continued because households valued continuity, flexibility and negotiability, while households without secure access to formal connections remained dependent on intermediaries. (Khan, 2023).

A sixth strategy involved social networks and borrowing/sharing. The conceptual framework anticipated inter-household water borrowing, and the attached narratives contain repeated reliance on neighboring homes, other lanes, relatives and other household bathrooms during service failure. One woman explained that when her shared toilet became unusable she sometimes used another household's facility or went to her mother's residence. Social capital therefore operated as emergency WASH infrastructure. The same mechanism is evident at community level. Households pooled small contributions to unblock drains, clean toilets or repair common facilities. These arrangements improve short-term functionality but also show that residents must collectively finance services beyond their normal household expenditure. A seventh strategy was self-repair and community maintenance. This was especially visible in the camp narratives. Residents described repairing old water lines, cleaning sanitation facilities and paying local workers to remove blockages.

> "When the line leaks or becomes damaged, we often have to deal with it ourselves. We repair it and continue using it because otherwise we will not have water."

The household or community thus acts simultaneously as consumer, maintenance contractor and emergency service provider. An eighth strategy was private sanitation construction. Families that could mobilize sufficient money and space constructed toilets inside their homes to avoid the privacy and safety problems of public facilities. In the camp narratives, this strategy was explicitly justified by women's discomfort with external toilets. Yet this adaptation was unequally available. Better-off households could obtain tanks, stronger housing, additional connections or private toilets, while households with less income or floor space could not. One respondent explicitly noted that families occupying more substantial multi-storey structures suffered less from WASH shortages than families in smaller one-storey dwellings.

The 2024 Geneva Camp data substantiate this stratification: sanitation satisfaction was associated with monthly income and number of rooms, while only 31.3% of respondents had a private toilet. (Sifullah et al., 2024). Coping capacity is therefore socially differentiated. The poorest are not simply exposed to more service failure; they have fewer means to insulate themselves from it.

A ninth strategy was risk acceptance. When no better source was available, households sometimes continued to use water they considered smelly, dirty or otherwise questionable. Some participants boiled water when possible, while others drank familiar groundwater or piped water without treatment because fuel, equipment or alternative supply was unavailable. One participant described the dilemma:

> "Sometimes the supply water has a smell. We notice it, but we still need water for cooking, bathing, washing, and other work. If there is no other option, we have to use what we have."

This represents constrained choice, not necessarily risk ignorance. Households can perceive a quality problem while lacking the material option to avoid exposure. Reported health experiences reinforce why this matters, although the interviews cannot establish clinical causality between an individual water source and illness. Participants reported itching, stomach illness and, in one case, diarrhea serious enough to require a short hospitalization, which the participant personally associated with contaminated water. Such accounts should be interpreted as perceptions and experiences rather than epidemiological proof. Nevertheless, they influence source preference and household risk assessment.

A tenth coping strategy was behavioural compression of hygiene, meaning residents adapted their hygiene practices downward during shortage. The clearest example was prioritizing drinking and cooking over cleaning. This indicates that coping can generate secondary deprivation: solving the immediate problem of having enough drinking water creates a hygiene deficit.

Gender was a cross-cutting feature of nearly every coping strategy. Women were disproportionately represented in the narratives of collecting water, cleaning shared toilets, managing children's exposure, menstrual hygiene and navigating public sanitation. Even where men collected water, women commonly managed its domestic allocation. The account of the woman cleaning a communal toilet because she had a child is particularly revealing:

> "Other people do not always clean it, but I cannot leave it dirty because I have a child."

Her behaviour converts a collective sanitation-management failure into unpaid individual labour. This is a form of household buffering: one person absorbs additional work to protect other household members. The final and perhaps most important coping finding concerns

normalization. Long-term residents repeatedly presented waiting, storing, carrying and switching sources as ordinary parts of urban life rather than exceptional emergencies. One participant summarized this normalization:

> "Our life has become adjusted to the water situation. When water comes, we collect it. Then we use it carefully and wait for the next supply. If it does not come, we buy water."

Most Importantly, not every household passes through every stage. Income, housing quality, family structure, gender, proximity to water points, access to storage and social relationships alter the pathway. The findings therefore show that coping and adaptation are shaped by unequal household resources that are prevalent and by the specific service conditions prevailing in each settlement. It cannot be concluded as an uniform response to formal utility failure.

Coping should consequently be understood as having both protective and burden-producing effects. Storage protects households from interruptions but can introduce contamination risk if containers are poorly handled. Private toilets improve dignity but consume scarce room space and require household financing. Purchasing water improves immediate availability but worsens affordability. Public groundwater may improve drinking-water confidence but increases collection time. Social borrowing prevents complete deprivation but creates dependence on relationships. Household repair restores service but shifts maintenance responsibility away from formal institutions.

Table 3. Formal Urban WASH Provision versus WASH Conditions in Informal Settlements

Dimension	Formally Serviced Urban Residents	Residents of Informal Settlements	Resulting Inequality
Institutional recognition	Generally incorporated into municipal utility planning	Often partially recognized or excluded because of tenure, legal or administrative	Unequal institutional access

		conditions	
Water connection	Direct formal household/building connection more common	Shared, NGO-mediated, informal or community connections more common	Greater dependency on intermediaries
Water reliability	Greater expectation of routine household supply	Interruptions, restricted hours and source switching are common	Higher everyday insecurity
Water cost	Formal tariff structures	Additional vendor charges, maintenance contributions or alternative water purchases may occur	Poor households may bear disproportionate costs
Water collection	Usually available within household/building	Residents may walk, queue and carry water from communal points	Additional time and physical burden
Sanitation	Household/private sanitation more common	Shared toilets, public toilets or toilets serving several households are common	Crowding and privacy problems

Maintenance responsibility	Primarily institutional or property-management based	Residents frequently clean, repair and contribute money themselves	Service burden transferred to households
Gender and privacy	Greater likelihood of private sanitation	Shared facilities may create privacy, safety and menstrual-hygiene difficulties	Disproportionate burden on women and girls
Capacity to cope	Storage tanks, private facilities and alternative services more achievable	Coping capacity strongly constrained by income, housing space and tenure	Poorer households face greater vulnerability
Overall service security	Infrastructure and institutional access generally reinforce each other	Infrastructure may exist while reliability, quality and affordability remain inadequate	Nominal access does not equal secure access

Table 3 highlights that WASH inequality between formally serviced urban areas and informal settlements concerns much more than the physical presence of infrastructure. Formally serviced households are generally incorporated within established municipal service systems, whereas residents of informal settlements frequently depend on a combination of formal connections, NGO-supported facilities, shared infrastructure and household coping arrangements. Consequently, residents may possess a water connection or toilet while still experiencing unreliable supply, collection burdens, additional expenditure, maintenance responsibilities and privacy limitations.

The comparison also indicates that poorer households bear a disproportionate share of the work required to compensate for inadequate services. Primary narratives in the study describe storing water, waiting for late-night supply, travelling to alternative sources, paying for

cleaning and repairs, using alternative toilets and adapting household space to accommodate private sanitation. The inequality is therefore not simply an **infrastructure gap**, but a **service-security and governance gap**: households in informal settlements must expend greater time, labour and adaptive effort to make basic water and sanitation infrastructure functional in everyday life. This interpretation corresponds with the thesis literature showing that aggregate urban access figures can obscure substantial within-city inequalities.

Chapter: V

Discussions

5.1 Introduction

This study sought to understand water and sanitation insecurity in Korail and Geneva Camp beyond the conventional question of whether infrastructure is physically present. The qualitative evidence from the 21 household case narratives demonstrates that WASH insecurity is more appropriately understood as a condition of partial, intermittent, negotiated and unequally manageable access. Across the cases, households frequently possessed a pipeline, community water point, groundwater source, household toilet or public sanitation facility, yet continued to experience interruptions, poor perceived water quality, congestion, maintenance problems, privacy concerns and additional expenditure. The findings therefore support the central proposition of the 5As framework that meaningful WASH access depends simultaneously on Availability, Accessibility, Affordability, Acceptability and Awareness/Adaptability.

The discussion further shows that these service outcomes cannot be separated from the institutional environment in which they occur or from the resources households possess to compensate for service failures. Institutional Bricolage Theory (Cleaver, 2001) provides an explanation of the hybrid arrangements through which WASH services actually function, while the Sustainable Livelihoods Framework (Chambers & Conway, 1992) explains why households experiencing similar service failures possess very different capacities to respond. Together, these perspectives reveal a wider process in which institutional uncertainty produces service insecurity, while households mobilize their own labour, money, physical assets, knowledge and social relationships to prevent that insecurity from becoming complete deprivation.

5.2 From Infrastructure Access to Service Security

One of the most significant findings is the distinction between having infrastructure and having a secure service**.** This distinction was repeatedly visible across the participant cases. Participant 01 had a piped connection but reported that water could arrive only after two or

three days. Participant 02 had access to supplied water but depended on a common tap and experienced periods when the line stopped for one or two days. Participant 04 described water disappearing during the morning and sometimes returning only at midnight, 1:00 a.m., or even later. Participant 05 similarly organized household activities around morning supply and water returning near 11:00 p.m. At the more extreme end, Participants 11 and 13 described interruptions lasting ten to fifteen days despite the existence of a DSK-supported water line.

These accounts problematize binary classifications of households as either “served” or “unserved.” The issue is not simply connection status but whether water is available when required. Participant 01 expressed this clearly: “We cannot depend on getting it every day.” Most described some improvement compared with childhood, yet continued to rely on storage, supplementary groundwater and adjustments to daily routines. The later case narratives therefore show an important historical transition: infrastructure has expanded, but service security has not necessarily developed at the same pace.

The 5As also proved empirically interconnected. When Availability declined, Accessibility deteriorated because households had to travel to alternative sources. Participant 03 described collecting water from a source approximately five minutes away, while Participants 04 and 15 described a roughly ten-minute journey that became substantially more difficult during crowding or rainfall. Participant 07 travelled to another part of the settlement when regular supply failed. Thus, distance alone did not determine accessibility. Queuing, carrying containers, waterlogging, timing and social interaction at shared points created what may be understood as functional distance**.**

Affordability was similarly connected to unreliability. Participant 01 purchased water only after stored supplies were exhausted, explaining that the money had to come from the same income used for food and other necessities. Participants 02, 04 and 15 described household contributions for drain cleaning, toilet maintenance or repairs. Participants 10 and 11 reported relatively high water-related expenditure, although the precise composition of these payments was not sufficiently clear to generalize. These cases support Fagundes et al.'s (2025) argument that affordability cannot be understood solely through formal tariffs. In this study, households also paid a price of unreliability through containers, maintenance payments, physical labour, waiting, lost sleep and time spent collecting water.

5.3 Institutional Bricolage and the Everyday Governance of WASH

The governance findings provide strong empirical support for Cleaver's (2001) concept of **institutional bricolage**. Neither Korail nor Geneva Camp can be described accurately as spaces where institutions are simply absent. Instead, residents encounter combinations of formal utilities, city institutions, NGOs, CBOs, landlords, local leaders, sanitation workers, community members and informal arrangements. These actors collectively produce the service experienced at household level.

Korail's community- and NGO-mediated connections are particularly illustrative. DSK-supported arrangements demonstrate how a formal utility service can be combined with community management and local mediation. Participants 09, 10, 11 and 13 referred to DSK-related water arrangements, yet their experiences also show that the existence of such institutional mediation does not automatically create continuous or equally distributed service. Participant 11, for example, described water reaching some sections while failing to reach others. This supports previous research by Ahmed (2007) and Rana and Piracha (2018), which shows that NGO/CBO intervention can improve institutional access while remaining embedded within wider local political and socioeconomic relationships.

The camp-related narratives reveal a different form of bricolage. Participant 05 described a City Corporation-linked line, BRAC-supported drinking water and an aging pipeline that residents sometimes repaired themselves. Participant 12 similarly combined municipal supply, household storage and private sanitation. Participant 04 recalled earlier BRAC involvement in water monitoring but stated that such monitoring disappeared after the project ended. These cases demonstrate how residents assemble services from whatever institutional resources remain available.

Theoretically, this modifies the idea of an “institutional void.” The central problem is not simply that no institution exists. Rather, responsibility is fragmented and difficult to locate. When a pipeline leaks, residents may repair it. When a toilet becomes dirty, users collect money or clean it themselves. When an NGO project ends, households continue using the infrastructure without equivalent institutional monitoring. When formal water is unavailable, alternative sources fill the gap. Institutional bricolage therefore sustains everyday service, but it may also blur accountability. The same flexibility that enables residents to keep water and sanitation functioning can allow public institutions to transfer operational burdens downward.

This interpretation is reinforced by the comments on local leadership found in the later case narratives. Participants 16–21 generally recognized gradual infrastructural improvement but several expressed dissatisfaction with weak follow-up and limited responsiveness. One respondent recalled that leaders promised improvements before elections but were less visible afterwards. Such accounts suggest that residents are incorporated into governance unevenly: they interact with local actors when immediate problems arise but do not necessarily experience a transparent institutional chain through which responsibility can be enforced.

5.4 Sustainable Livelihoods and Unequal Capacity to Cope

The Sustainable Livelihoods Framework provides a particularly useful interpretation of household coping. The interviews show that households respond to service failure by mobilizing combinations of financial, physical, social and human resources. Coping is therefore not merely a list of emergency behaviours; it reflects the asset base available to each household.

Physical assets were especially important. Participants 08, 16, 17, 18, 19, 20 and 21 described storing water in tanks or containers to survive interruptions. Participant 08 explicitly distinguished households living in stronger multi-storey buildings from those occupying small single-storey rooms, arguing that better-resourced households could install tanks and private facilities and therefore experienced less disruption. Participants 05, 07, 12 and several later cases also described private toilets as an important improvement. These facilities reduced dependence on public sanitation, but their construction required both money and scarce household space.

Financial capital determined whether households could purchase water, finance repairs or create private alternatives. Social capital was equally important. Participant 02 used another household's toilet or travelled to her mother's house when her usual facility failed. Participant 04 used toilets in other lanes when the nearest public toilet was blocked. Community members in several narratives pooled small amounts of money for cleaning, drain clearance or repair. Social relationships therefore operated as a kind of informal WASH safety net**.**

Human capital appeared through accumulated practical knowledge. Participant 09 knew that water had to be stored in the morning because the DSK supply would disappear later. Participants 04, 05, 08 and 12 differentiated between drinking and general-use sources.

Across Participants 16–21, groundwater was repeatedly preferred for drinking while piped water was used for washing, bathing and cleaning. This knowledge enabled households to manage uncertainty, although judgments about water safety were frequently based on smell, appearance, visible iron or long-term familiarity rather than laboratory evidence.

The SLF nevertheless cautions against interpreting such coping automatically as resilience. Participant 01's statement that residents had "learned how to adjust" but that the problems had not disappeared captures this tension. Storage may indicate competence, but it also indicates unreliable supply. Travelling to another source demonstrates adaptability, but also imposes time and physical costs. Constructing a household toilet improves dignity but consumes financial resources and domestic space. Community self-repair demonstrates collective capacity, but simultaneously signals that maintenance responsibility has shifted toward residents. The evidence therefore suggests burdened resilience**:** households remain functional partly because they absorb costs that a reliable service system would otherwise carry.

5.5 Gender, Dignity and the Unequal Distribution of WASH Labour

The qualitative cases also demonstrate that WASH insecurity is socially differentiated within households. Participant 02's experience is particularly important. More than twenty people could use the shared toilet available to her, and she frequently cleaned it because she was concerned about her child. During menstruation she preferred changing materials inside her room because the shared facility lacked adequate privacy. She also described unwanted comments while moving through the area. Her case shows that sanitation acceptability depends not only on infrastructure but on bodily privacy, gender, caregiving responsibilities and the social environment around the facility.

Participant 06 provides another important example. His household reported relatively good WASH conditions, yet his mother and sister-in-law still collected most of the drinking water. Thus, even where physical access was comparatively good, everyday water labour remained gendered. Participant 05 explained that his family constructed an indoor toilet largely because women had found public sanitation uncomfortable. Participant 07 similarly remembered earlier arguments and unpleasant comments around shared toilets.

These experiences align with Sarkar (2022), Elledge et al. (2018) and Hossain et al. (2025), but the present research adds an important institutional interpretation: women frequently

become the individuals who close the gap between infrastructure provision and household usability. Cleaning, storing, allocating water, protecting children, managing menstruation and modifying household routines are not peripheral activities; they are part of the hidden labour through which inadequate systems remain usable.

5.6 Comparative Interpretation and Theoretical Contribution

The comparison between Korail and Geneva Camp suggests that there is no single condition of "slum WASH." Korail reflects a process of partial formalization, where NGO/CBO mediation has brought sections of the settlement closer to formal water provision but has not eliminated intermittent supply, social differentiation or last-mile governance problems. Geneva Camp reflects greater spatial compression, heavily shared sanitation, old infrastructure and household/community self-provision. Both cases therefore experience insecurity, but the mechanisms producing it differ.

Equally important is the variation within the case narratives themselves. Participant 06 described relatively satisfactory conditions, while Participants 11 and 13 represented the extreme end of water insecurity. Participants 09 and 12 had private sanitation and differentiated water sources, whereas Participants 02, 04 and 15 depended much more heavily on shared or public facilities. Participants 16–21 repeatedly emphasized improvement over time while simultaneously identifying continuing shortages, water-quality concerns, seasonal difficulties and unequal household capacity. Such variation is analytically valuable because it shows that informality does not generate uniform deprivation. Instead, household assets, location, gender, housing space, institutional connections and social relationships mediate exposure to WASH insecurity.

The combined theoretical contribution of the study can therefore be summarized as follows: Institutional bricolage explains how an incomplete formal service system is made operational through multiple formal and informal actors, while the Sustainable Livelihoods Framework explains how households make that incomplete system livable through unequal combinations of assets and coping strategies. The 5As connect these two levels by showing where the effects become visible in everyday service experience.

The central conclusion of this discussion is therefore not that residents lack WASH infrastructure altogether, nor that households are simply passive victims of institutional

failure. Rather, WASH provision in the two settlements functions through continuous interaction between incomplete infrastructure, hybrid institutions and household adaptation. Residents demonstrate considerable competence and resourcefulness, but this competence should not be mistaken for secure service provision. Their ability to store, carry, share, repair, purchase, ration and reorganize daily life is simultaneously evidence of resilience and evidence of the institutional and infrastructural deficiencies to which that resilience is responding.

Chapter: VI

Research Recommendations

The recommended policy package is to: establish tenure-neutral eligibility for basic WASH services; guarantee measurable minimum water-service standards; introduce progressive, pro-poor water financing; shift sanitation policy from toilet construction to the complete sanitation service chain; make gender, menstrual-health, safety, and disability standards mandatory; replace temporary projects with permanently financed utility programs; and institute transparent, settlement-level accountability.

Establish a tenure-neutral right to municipal WASH service. The first reform should explicitly separate eligibility for basic services from recognition of land ownership. Informal tenure should neither grant property rights through a utility connection nor disqualify a resident from safe water and sanitation. This directly addresses the exclusion documented in the findings: DWASA's difficulty extending permanent connections into settlements lacking recognized tenure (Section 4.2, Table 1), and Geneva Camp's near-total exclusion from municipal service planning as a consequence of its unresolved statelessness dispute (Section 4.2). Korail's own experience shows what partial recognition can achieve, and its limits: ADB-supported mediation produced roughly 1,000 legal DWASA connections benefiting more than 50,000 residents (Section 4.1.1), yet informal resale and unequal connection ownership persisted even after formalization (Section 5.3), underscoring that legal recognition alone, without the safeguards proposed below, is not sufficient.

Implementation: LGD and DWASA should issue a Low-Income Settlement Service Protocol allowing household, compound, or community connections using verified residency/service IDs rather than land titles. Each connection agreement should state explicitly that utility service creates no ownership claim. Korail and Geneva Camp should be mapped block-by-block, with unauthorized but technically safe connections progressively converted into metered legal connections. **Actors:** LGD, DWASA, DNCC/DSCC ward administrations, settlement representatives. **Timeline:** rule within six months; pilot legalization within 12 months; settlement-wide coverage within 24–36 months. **Indicators:** percentage of households with legal service; number of informal connections converted; connection-processing time; and zero denials based solely on absence of land title.

Guarantee measurable minimum water-service performance, not merely infrastructure coverage: A connection should count as successful only when it delivers sufficiently reliable and safe water. Participant narratives demonstrate why: households with pipelines still report prolonged outages, night-time collection, offensive smells, rationing and emergency collection from secondary sources: Participant 01 reported going two to three days at a stretch without water, Participants 04 and 05 described supply disappearing during the day and returning only near midnight or later, and Participants 11 and 13 experienced outages lasting ten to fifteen consecutive days despite having a DSK-supported connection (Section 4.1.1; Section 5.2).

Implementation: establish settlement-level service standards for daily continuity, pressure, maximum outage duration, collection/queue time and microbial quality; rehabilitate old and leaking pipes; install backflow controls; conduct pre-monsoon leak and contamination inspections; provide strategically located storage/emergency water points during planned and unplanned outages; and publish monthly E. coli, residual-disinfectant and relevant chemical-quality results. Infrastructure investments should use DMA/SCADA monitoring where technically feasible rather than expanding unmanaged pipe networks. **Actors:** DWASA should lead, with independent laboratory/academic verification. **Timeline:** baseline assessment in six months, critical repairs within 12–18 months and progressive 24-hour reliability over three to five years. **Indicators:** median supply hours/day; outage frequency and duration; water-quality compliance; non-revenue water; pressure; percentage of households collecting water on premises; and average queue/collection time.

Introduce a pro-poor lifeline entitlement and progressive tariff structure. Affordability should be measured from the perspective of the poorest users, not average Dhaka households. The findings support this directly: one participant reported approximately BDT 2,000 in monthly water-related expenditure despite unreliable supply (Section 4.1.3), and Korail's informal water economy illustrates the scale of the affordability penalty, with formally connected households paying roughly BDT 15.93 per 1,000 litres at the time of Khan's (2023) study while informal arrangements charged approximately BDT 170–250 for the same nominal volume (Section 4.1.3; Section 5.2).

Implementation: DWASA should introduce a subsidized or zero-priced basic drinking-water entitlement for qualifying low-income users, subsidize connection and meter costs, and recover part of the subsidy through higher marginal charges for discretionary high-volume

consumption and appropriate non-residential categories. Emergency/community dispensing points should never charge low-income residents a higher effective per-litre price than comparable formal consumers. An annual affordability audit should measure the combined burden of tariffs, vendor purchases, connection fees and coping costs. Digital/prepaid systems can improve accountability but should not become mechanisms for immediate exclusion when households temporarily lack cash. **Actors:** LGD, DWASA and the Ministry of Finance, with independent tariff review. **Timeline:** affordability study within nine months; pilot tariff within 12–18 months; evaluation after two years. **Indicators:** effective BDT/m³ paid by low-income versus other households; WASH expenditure as a share of household income; vendor-price premium; connection-fee burden; arrears; and frequency of service interruption for inability to pay.

Move from "toilet provision" to Citywide Inclusive Sanitation and a complete fecal-waste service chain. Building toilets without safe containment, emptying, transport and treatment merely relocates contamination. The findings identify this "containment-only" problem directly: the Dhaka-wide slum survey found an average of sixteen households sharing each sanitation facility, with only about 2% of surveyed households meeting the full safely managed sanitation standard once fecal-sludge handling was taken into account (Section 4.2; Arias-Granada et al., 2018), while Geneva Camp's 2024 survey found that 68.7% of respondents lacked a private toilet and 52.7% shared a toilet with sixteen to twenty other people (Section 4.1.4; Sifullah et al., 2024).

Implementation: conduct a GIS inventory of every shared toilet, household containment system and discharge point in Korail and Geneva Camp; upgrade unsafe pits/septic arrangements; introduce scheduled rather than emergency-only desludging; license and monitor vacuum/FSM operators; digitally record collection, transport and treatment; eliminate direct drainage/water-body discharge; and link settlement services to authorized treatment infrastructure. Communal facilities should have defined maximum user loads, water supply, paid caretakers and repair standards. **Actors:** DWASA with DNCC/DSCC, LGD, Department of Environment and regulated private FSM operators. **Timeline:** mapping within six months; pilot scheduled desludging within one year; universal safe-chain coverage in three to five years. **Indicators:** percentage of fecal waste safely contained, emptied, transported and treated; illegal-discharge incidents; desludging response time; toilet functionality; and treatment records.

Make gender, menstrual-health, safety and disability requirements non-negotiable service standards. The primary evidence demonstrates that "access" cannot be defined by walking distance alone. One woman describes mixed-sex public toilets, inadequate privacy, menstrual-hygiene difficulties and repeated unwanted comments while travelling to sanitation facilities; other households report constructing indoor toilets despite severe space constraints specifically to protect women's privacy (Section 4.1.4). Participant 02's account is central here: she cleaned a shared toilet used by more than twenty people because she did not trust other users to maintain it, preferred to change menstrual materials inside her room rather than in the shared facility, and described unwanted comments while moving through the settlement — together illustrating that sanitation insecurity is experienced as a safety and dignity problem as much as an infrastructural one (Section 4.1.4; Section 5.5). Recent Dhaka research also finds that women in severely water-insecure households frequently buffer scarcity by prioritizing other family members, illustrating the hidden gendered cost of inadequate supply (Hossain et al., 2025).

Implementation: require sex-separated shared toilets where feasible, internally locking doors, reliable lighting, screened and safe approaches, water and soap, menstrual washing/changing space, disposal systems, child-friendly design and accessible cubicles. Women and adolescent girls should conduct periodic safety audits, and anonymous complaint channels should cover harassment and facility failure. Cleaning should be paid work rather than an unrecognized burden disproportionately transferred to female users. **Actors:** DNCC/DSCC with DWASA, LGD, agencies responsible for women and children, NGOs and representative women's groups. **Timeline:** standards within six months; high-risk retrofits within 18 months. **Indicators:** share of facilities meeting the standard; female-reported safety after dark; MHM availability; toilet queue time; accessibility compliance; and complaint-resolution time.

Convert time-bound WASH projects into permanently financed service programs. This is arguably the most important governance reform. The KII describes a recurring cycle in which NGOs install services, project finance ends, responsibility becomes unclear, trained personnel move, and infrastructure deteriorates—sometimes returning communities "back to zero" once external funding ends (Table 1, BRAC row). Participant 04 recalled that BRAC previously provided advice and water monitoring in Geneva Camp, but that these activities ceased once the project concluded, after which residents were left to repair the aging water line themselves (Section 4.2; Section 5.3).

Implementation: no WASH capital project in an informal settlement should be approved without a named long-term asset owner, five-year O&M plan, lifecycle-cost estimate, ring-fenced maintenance allocation, service-level agreement, asset register, spare-parts plan and institutional—not merely individual—training package. CBOs should participate in oversight and local management where appropriate, but should not substitute for the utility's public-service obligation or depend indefinitely on unpaid labor. **Actors:** LGD and DWASA, with city corporations and development partners contractually bound to handover requirements. **Timeline:** apply immediately to new projects; audit all existing assets within 12 months. **Indicators:** percentage of assets with funded O&M; functional uptime; mean repair time; recurrent expenditure per asset; frequency of repeat failures; and percentage of trained positions retaining institutional coverage after staff transfers.

Create settlement-level public accountability and anti-capture mechanisms. The qualitative evidence repeatedly shows this uncertainty directly: several respondents could name the immediate person they turned to during a crisis but could not identify which institution held final responsibility for the system (Section 4.2), and Participants 16–21 described local leaders as more visible around election periods than in following through on service commitments afterward (Section 4.2; Section 5.3). This makes community participation necessary but insufficient: participation must be combined with auditable utility accountability.

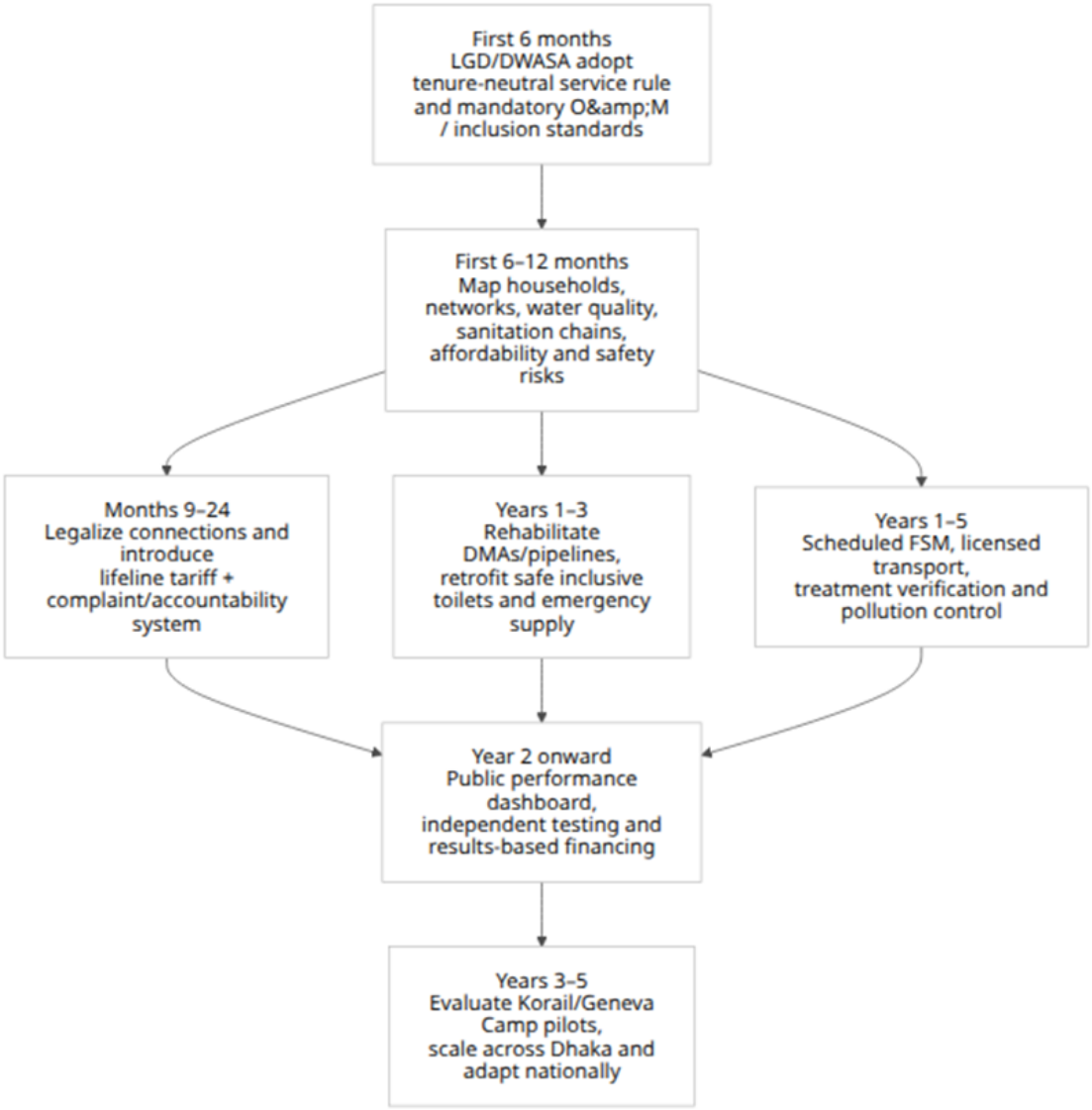
Implementation: establish a geocoded settlement WASH registry and public dashboard showing connection coverage, outages, water-quality results, tariffs, complaints, toilet functionality and FSM performance. Residents should be able to submit complaints through SMS/phone, ward desks and low-literacy channels, receive ticket numbers and track resolution. Quarterly social audits should include women, renters, minority communities, persons with disabilities and geographically different blocks, using rotating rather than permanently gatekept representation. Informal vendors that remain necessary during transition should be licensed, prices disclosed and unauthorized markups sanctioned. **Actors:** LGD and DWASA, with DNCC/DSCC, regulators, universities and civil-society monitors. **Timeline:** system design within nine months; pilot dashboard within one year. **Indicators:** complaint closure rate within service standards; unauthorized-payment reports; publication rate of water-quality tests; service disparities by settlement/block; and annual resident-trust scores.

Because the thesis provides no government budget envelope, the cost/complexity classifications below are **relative implementation judgments**, not monetary estimates. The strongest approach is a coordinated package rather than selection of one option in isolation, because the findings show the 5As to be mutually dependent in practice: interrupted availability increased storage and purchasing, difficult accessibility increased time costs, poor affordability encouraged rationing, sanitation crowding reduced acceptability, and water scarcity limited households' ability to translate hygiene awareness into practice (Section 4.1).

Recommendation	**Expected impact**	**Cost/complexity**	**Timeline**	**Lead agency**
Tenure-neutral service eligibility	**Very high:** removes a structural exclusion mechanism and legalizes service delivery	Medium; mainly regulatory plus connections	6–36 months	LGD / DWASA
Minimum water-service standards and DMA upgrades	**Very high:** improves reliability, quality and accessibility simultaneously	High; significant network investment	1–5 years	DWASA
Progressive tariff and low-income lifeline	**High:** reduces poverty penalty and reliance on costly vendors	Medium; requires metering, targeting and tariff reform	9–24 months	DWASA / LGD
Full sanitation/FSM service chain	**Very high:** reduces fecal pollution and converts toilet access into safely managed	High; institutional and capital intensive	1–5 years	DWASA with DNCC/DSCC

Recommendation	Expected impact	Cost/complexity	Timeline	Lead agency
	sanitation			
Gender-, MHM-, safety- and disability-inclusive standards	**High:** major dignity, safety and equitable-access gains	Low–medium for retrofits; medium for rebuilding	6–18 months	DNCC/DSCC
Permanent O&M financing and program management	**Very high:** protects all infrastructure investments from post-project failure	Medium; recurrent fiscal commitment required	Immediate–2 years	LGD / DWASA
Public accountability and anti-capture system	**High:** improves responsiveness, transparency and enforceability	Medium; organizational/data reform	9–24 months	LGD / DWASA

Tenure-neutral eligibility, accountability and O&M reform should begin before large capital expansion, otherwise new infrastructure risks reproducing the institutional failures documented in the KII. Water-network upgrading and sanitation-chain investments should then proceed simultaneously, with affordability and gender safeguards embedded from design rather than added after construction. The implementation pathway below converts the thesis's 5As from an analytical framework into a service-delivery cycle. Performance monitoring should remain continuous rather than ending after construction, consistent with the KII's central argument that WASH is a permanent public service.



The first monitoring baseline should use the thesis's own 5As—availability, accessibility, affordability, acceptability and awareness/adaptability—but add explicit water-quality, gender-safety and complete-sanitation-chain indicators. Importantly, indicators should be disaggregated by settlement, block, gender, disability, tenancy and income rather than reported only as a Dhaka-wide average; national-level averages can conceal precisely the inequalities this research is designed to reveal. The formal definition of safely managed water should remain aligned with WHO/UNICEF JMP criteria on premises, available when needed and free from contamination while locally appropriate quantity benchmarks can be separately monitored as operational service targets (WHO & UNICEF, 2025).

Chapter: VII

Limitations of the Study

7.1 Introduction

This chapter reflects critically on the boundaries of what the present study was able to establish, and on the methodological, scope-related and analytical choices that shaped its findings. No single study of water and sanitation insecurity in informal settlements can capture every dimension of the problem, and the constraints discussed below should be read alongside the findings presented in Chapters IV and V rather than as a separate commentary on them. Four limitations are discussed in turn: the exclusion of the hygiene component of WASH from the study's scope; the methodological scope of the qualitative fieldwork, including the number of key informant interviews conducted and the decision not to administer a household survey; the non-equivalence of Korail and Geneva Camp as comparative cases; and the limited extent to which women and children were treated as distinct analytical categories in their own right.

7.2 Exclusion of the Hygiene Component of WASH

The most significant boundary placed on this study was analytical rather than purely methodological: although the global WASH agenda formally comprises Water, Sanitation and Hygiene as three interdependent pillars, the present research examined only the Water and Sanitation components in depth. This decision was made explicitly at the proposal stage, as noted in Section 1.6, and was driven principally by the time constraints of a single-researcher, self-funded academic study conducted within a fixed thesis timeline. Hygiene practices — handwashing behavior, menstrual hygiene management beyond its intersection with sanitation acceptability, household water treatment, and hygiene-promotion programming — were touched upon only incidentally, where they surfaced naturally within participants' accounts of Acceptability and Awareness/Adaptability (see, for example, Sections 4.1.4 and 4.1.5), rather than being investigated as a dedicated line of inquiry with its own interview questions, indicators or key informants.

This omission is a genuine limitation rather than a minor scoping choice, because the literature reviewed in Chapter 2 (Dearden et al., 2017; Elledge et al., 2018) treats hygiene

behavior as a critical mediating variable between water and sanitation access and the health outcomes — diarrheal disease, stunting, menstrual health — that ultimately motivate this field of research. By excluding hygiene as an independent analytical dimension, this study can describe the infrastructural and institutional conditions under which hygiene becomes difficult to practice, as several participants' own accounts illustrate (Section 4.1.5), but it cannot offer a systematic account of actual hygiene behavior, its determinants, or its health consequences within Korail and Geneva Camp. Future research with a longer fieldwork timeline should treat Hygiene as a full third pillar, with its own dedicated interview guide, observational protocol and, ideally, indicators comparable to those used for Water and Sanitation in this study.

7.3 Methodological Scope: Sample Size, Key Informant Coverage and the Absence of a Household Survey

A second limitation concerns the scale and composition of the primary data collection. As detailed in Chapter 3, the study relied on thirty in-depth interviews with household members (approximately fifteen per settlement) and six key informant interviews with representatives of DWASA, NGOs/CBOs and settlement-level informal leaders. While this sample size is broadly consistent with established guidance on thematic saturation in purposively sampled qualitative research (Guest et al., 2006; Malterud et al., 2016), it remains modest relative to the scale and internal diversity of both settlements. In retrospect, a larger number of household interviews would likely have captured a wider range of lived experience, particularly given the substantial intra-settlement variation documented in Chapters 4 and 5 — for example, between Participant 06's comparatively favorable circumstances and Participants 11 and 13's extreme water insecurity.

The number of key informant interviews is a more specific concern. Six KIIs, spread across DWASA, NGO/CBO representatives and informal community leaders, provided valuable institutional perspective, but this number is not sufficient to represent the full range of actors identified in the study's own governance findings (Table 1, Section 4.2), which include City Corporation officials, landlords and multiple categories of informal intermediary. A larger and more evenly distributed set of key informant interviews — including, in particular, additional interviews with City Corporation officials and with a wider range of informal

water-point operators and local leaders — would have strengthened the institutional-void and institutional-bricolage analysis presented in Sections 4.2 and 5.3.

Finally, and most significantly, this study did not include a structured household survey. Although the qualitative approach adopted (Chapter 3) was well suited to the study's emphasis on lived experience, institutional negotiation and coping narratives, it means that the findings in Chapter 4 — including the settlement-level comparisons summarized in the 5As tables — are illustrative and pattern-based rather than statistically representative of either Korail or Geneva Camp as a whole. A structured survey administered to a larger, systematically sampled group of households in each settlement would have allowed the study to state with greater confidence how widely the patterns identified in the interview data — for example, the prevalence of multi-day outages, or the proportion of households relying on informal water purchase — are shared across the wider settlement population, rather than being confined to the experiences of the households who were interviewed.

7.4 Non-Equivalence of the Two Study Settlements: Informal Settlement versus Stateless Enclave

A third limitation concerns the comparability of the two study settlements themselves. Korail and Geneva Camp were deliberately selected, as explained in Chapter 3, because they represent contrasting forms of informality within the same city; that contrast is analytically productive, but it also means the two settlements are not equivalent cases in the way a more conventional comparative design might require. Korail is, in the terms used throughout this thesis, an informal settlement or slum: a large, unauthorized but largely tolerated urban settlement populated primarily by internal rural-to-urban migrants who, whatever their informal tenure status, remain citizens of Bangladesh with an unambiguous claim to national services and legal protections, even where that claim is imperfectly honored in practice. Geneva Camp, by contrast, is better described as a stateless enclave or refugee-like camp: its Urdu-speaking Bihari residents have lived there since 1971 in a condition of unresolved and contested citizenship, a legal status categorically different from, and more precarious than, informal tenure on unauthorized land.

This distinction matters for the interpretation of the study's comparative findings. Some of the differences documented between the two settlements in Chapters 4 and 5 — for instance, Geneva Camp's markedly lower service-satisfaction figures (Sifullah et al., 2024) and its

almost complete absence of the NGO/CBO-mediated formalization pathway observed in Korail (Sections 4.2 and 5.3) — may be attributable not only to settlement size, density or institutional history, as this thesis has generally framed them, but also, in part, to the distinct and more severe legal exclusion that stems from statelessness itself, an exclusion mechanism that a slum such as Korail does not share. The study's comparative design should therefore be read as a comparison between two different registers of informality — tenure informality on one hand and statelessness on the other — rather than as a controlled comparison of otherwise similar settlements that differ only in size or density. Future research seeking to isolate settlement size and density as explanatory factors would need to compare Korail against another large, tenure-informal slum, and Geneva Camp against another stateless or refugee-like enclave, rather than comparing across these two distinct categories directly.

7.5 Limited Analytical Focus on Women and Children

A fourth limitation concerns the study's treatment of gender and childhood as analytical categories. Gendered patterns emerged as a strong and recurring theme throughout the findings — most notably in Participant 02's account of sanitation cleaning, menstrual privacy and unwanted comments (Sections 4.1.4 and 5.5), and in Participant 06's household, where water collection remained the responsibility of female relatives despite otherwise favorable conditions (Section 5.5) — and the discussion in Chapter 5 draws explicitly on the gendered-buffering literature (Sarkar, 2022; Hossain et al., 2025) to interpret these accounts. However, gender was not built into the study's sampling strategy or research instruments as a dedicated analytical axis from the outset: the study did not deliberately stratify its household sample by gender of respondent, nor did it employ a research design — such as separate male and female focus groups, or interview guides specifically structured around gendered time-use and labor — capable of systematically documenting the differential burden of WASH insecurity on women and girls across the full sample, rather than in the smaller number of cases where it emerged prominently in individual narratives.

Children were treated even more marginally. No child was interviewed directly, and information about children's experience of water and sanitation insecurity — exposure to unsafe water, use of unsuitable sanitation facilities, disruption of routines during illness or water collection — was obtained only indirectly, through the reports of adult household members, most often mothers. This mode of data collection is appropriate given the ethical complexity of interviewing children directly on sensitive WASH-related topics within the

scope and timeline of this study, and it is consistent with the ethical safeguards described in Section 3.9, but it means the study's findings regarding children are secondhand and cannot be taken as equivalent to children's own testimony. Future research with a broader scope, more time, and appropriate ethical clearance and safeguarding protocols should consider incorporating gender-stratified sampling, women-only research spaces facilitated by female researchers, and age-appropriate, ethically safeguarded methods for eliciting children's own perspectives on WASH insecurity, in order to move gender and childhood from an emergent theme within this study to a deliberately designed axis of analysis in their own right.

7.6 Concluding Remarks

Taken together, these four limitations do not undermine the central findings of this thesis, which remain grounded in rich, triangulated qualitative evidence from thirty household interviews and six key informant interviews across two carefully selected settlements. They do, however, define the boundaries within which those findings should be interpreted: as an in-depth, qualitative account of water and sanitation — rather than the full WASH agenda in two informal but not equivalent settlements, based on a modest though methodologically defensible sample, and attentive to but not systematically structured around gender and childhood. Addressing these limitations — extending the analysis to hygiene, expanding the sample and adding a survey component, disaggregating the comparative design by type of informality, and building gender and childhood into the research design from the outset represents a clear and achievable agenda for future research building on the present study.

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Annex

This annex reproduces, in full, the primary field instruments and the ethical clearance documentation used in the conduct of this research: (A) the In-Depth Interview (IDI) Guide administered to household respondents in Korail Settlement and Geneva Camp; (B) the Key Informant Interview (KII) Guide administered to institutional and community-level informants; and (C) the Ethical Consideration Form submitted for this study.

Annex A: In-Depth Interview (IDI) Guide

Leaving No Settlement Behind: WASH Facilities in Dhaka's Informal Settlements

Household respondents — Korail Settlement & Geneva Camp

Purpose

This guide is used for semi-structured in-depth interviews (IDIs) with household members in Korail and Geneva Camp. It complements the structured household survey by exploring the lived experience, reasoning, and meaning behind water and sanitation practices — the "why" and "how" behind the survey's "what." Questions are open-ended; use the italicised probes only if the respondent does not raise the topic spontaneously. Expected duration: 30–45 minutes.

Interview Details

Interviewer name/code	_____	**Date**	____ / ____ / _____
Settlement	☐ Korail ☐ Geneva Camp (Urban Camp)	**IDI ID**	_____
Respondent (name/code)	_____	**Age / Sex**	_____ / _____
Start time	_____	**End time**	_____

Consent obtained (verbal/written): ☐ Yes ☐ No Audio recorded: ☐ Yes ☐ No

A. Opening & Context

Q1. Can you tell me a little about your household and how long you and your family have lived in this settlement?

› *What first brought you to live here?*

› *How has the settlement changed since you arrived, particularly around water and toilets?*

B. Water – Access & Availability (lived experience)

Q2. Walk me through what a typical day looks like for getting water for your household — from waking up to the end of the day.

› *Who in the household is responsible, and why that person?*

› What happens on a day when something goes wrong — the tap is dry, the line is long, or the source is far?

Q3. Tell me about a time recently when your household did not have enough water. What happened, and what did you do?

› How did that affect daily life — cooking, bathing, work, school, health?

› How do you and your neighbors decide who gets water first when supply is limited?

C. Water – Quality, Safety & Affordability

Q4. How do you decide whether the water you collect is safe to drink or use? Can you describe how you make that judgment?

› Have you or anyone in the household ever gotten sick from water — what did you think caused it?

› Do you treat water at home? Why or why not?

Q5. Can you describe what water costs your household — in money, time, or favors — and how that affects other decisions your family makes?

› Has your household ever gone without something else (food, medicine, savings) because of water costs?

› Have you ever had to borrow money or ask for credit because of water?

D. Sanitation – Access, Safety & Dignity

Q6. Describe the toilet your household uses — who built it, who maintains it, and what it's like to use, especially at night.

› Is it shared? How does sharing work in practice — any conflicts or arrangements with other households?

› What changes at night, during heavy rain, or during flooding?

Q7. Have you or anyone in your household ever felt unsafe, uncomfortable, or unable to use the toilet when needed? Can you describe what happened?

› (If female respondent) How do women and girls in your household manage privacy, safety, and menstrual hygiene needs around the toilet and water points?

› What would make you feel safer or more comfortable?

E. Governance, Institutions & Power

Q8. Who actually controls or manages the water and toilet facilities you use — and how does that work in practice?

› Have you had any dealings with DWASA, the city corporation, an NGO, a committee, or a local leader/mastaan/landlord regarding water or sanitation?

› If something breaks or there's a dispute, who do you go to, and what usually happens?

Q9. Have you or your community ever tried to improve water or sanitation conditions here — through complaints, organizing, or negotiation? What happened?

› What has helped, and what has made it difficult?

F. Coping, Change & Aspirations

Q10. Looking back over the past few years, what has changed — for better or worse — in how your household manages water and sanitation?

› What coping strategies have you had to develop that you didn't need before?

Q11. If you could change one thing about water or sanitation in this settlement, what would it be, and why that one thing?

Closing

Is there anything about water, sanitation, or life in this settlement that we haven't discussed but that you think is important for me to understand?

Thank the respondent, confirm confidentiality, and ask if they have any questions for you.

Interviewer's field notes / non-verbal observations:

Annex B: Key Informant Interview (KII) Guide

1. How are water, sanitation, and hygiene services currently organized and provided in Korail and Geneva Camp settlements?

Probe: Which government agencies, NGOs, CBOs, community leaders, landlords, or informal actors are involved?

2. How are responsibilities for WASH service provision divided among Dhaka WASA, City Corporation, NGOs, CBOs, and informal service providers?

Probe: Are there overlaps, coordination problems, or unclear responsibilities?

3. What are the major governance and institutional challenges affecting WASH service delivery in these informal settlements?

Probe: Regulation, accountability, legal status of settlements, infrastructure limitations, political influence, or coordination gaps.

4. Are some residents or groups more disadvantaged than others in accessing WASH services? If so, why?

Probe: Gender, income, location within the settlement, disability, age, tenancy status, migration status, or social/political connections.

5. From your experience, how adequate and reliable is the availability of water and sanitation services in these communities?

Probe: Water shortages, supply hours, seasonal disruptions, flooding, broken toilets, or insufficient facilities.

6. What factors make it difficult for residents to physically access water sources and sanitation facilities?

Probe: Distance, overcrowding, queues, nighttime access, flooding, disability, safety, and location of facilities.

7. How affordable are existing water and sanitation services for low-income households?

Probe: Official fees, informal payments, vendor prices, maintenance costs, toilet-use charges, and whether poorer households pay disproportionately more.

8. How would you assess the quality, safety, privacy, and social acceptability of existing water and sanitation facilities?

Probe: Water contamination, maintenance, toilet cleanliness, privacy, lighting, locks, gender-sensitive facilities, and menstrual hygiene needs.

9. What role do informal water vendors, local leaders, landlords, syndicates, or water-point managers play in determining residents' access to WASH services?

Probe: Do they improve access, increase costs, control distribution, or create opportunities for discrimination or exploitation?

10. How would you assess residents' awareness and practices regarding safe water handling, sanitation, handwashing, and menstrual hygiene management?

Probe: What are the main knowledge or behavioral gaps, and what causes them?

11. What health, social, and economic consequences have you observed because of inadequate WASH services in these communities?

Probe: Diarrhea or waterborne disease, medical expenses, lost workdays, school absence, women's safety, dignity, and household financial burden.

12. What changes in policy, governance, infrastructure, community participation, or awareness programs would most improve sustainable and equitable WASH services in Korail and Geneva Camp?

Probe: Better institutional coordination, regulation of informal providers, subsidies, community monitoring, BCC programs, gender-sensitive facilities, or formal recognition of settlements.

Annex C: Ethical Consideration Form

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Date: 25 June 2026

Subject: Ethical Considerations for Thesis Research

This study, titled **"Assessing WASH Facilities across Informal Settlements in Dhaka,"** examines the availability, accessibility, affordability, acceptability, and awareness/adaptability (the 5As) of water and sanitation (WASH) facilities in two structurally distinct informal settlements in Dhaka, Bangladesh: Korail Settlement, a large, officially tolerated informal settlement, and Geneva Camp, a small, non-notified enclave housing a stateless, Urdu-speaking Bihari community. The research seeks to assess the status of water and sanitation access through the 5As framework, examine the governance and institutional structures shaping service delivery, and document the coping and survival strategies households employ in response to inadequate service.

The study will explore the perspectives and lived experience of household members residing in Korail and Geneva Camp, as well as key informants with institutional or governance-related knowledge of WASH service delivery in these settlements, including representatives of the Dhaka Water Supply and Sewerage Authority (DWASA), the relevant city corporations, NGOs and community-based organizations active in water provision, and settlement-level informal leaders and committee members. Household participants will be selected through purposive, maximum-variation sampling to capture a range of experiences by gender, tenancy status, and proximity to formal versus informal water sources. Key informants will be selected purposively based on their institutional role or knowledge of WASH governance in the study settlements. The study will use qualitative research methods, comprising in-depth interviews (IDIs) with household members and key informant interviews (KIIs) with institutional and community stakeholders. Prior to participation, verbal informed consent will be obtained from all respondents to ensure that they understand the purpose of the research, the nature of their participation, and their rights as research participants,

including the unconditional right to decline or withdraw from the study at any stage without any negative consequence.

Participant confidentiality will be protected through the use of pseudonyms and the removal of identifying details from transcripts, records, and the thesis; no personally identifiable information will be disclosed in the thesis, publications, or presentations without prior permission from participants. All collected information will be stored securely and accessed only by the researcher and research supervisor. The collected data will be used solely for academic purposes.

The study is considered to involve minimal risk; however, particular sensitivity is required given the subject matter. Some participants may experience discomfort discussing informal payments, negotiations with informal water vendors or local leaders, or engagement (or lack thereof) with municipal authorities. Questions on these topics will be framed to minimize any risk of retaliation or exposure to participants, and no information that could identify specific informal intermediaries or committee members by name will be recorded in a form linkable to individuals. Particular care will be taken in Geneva Camp given the settlement's stateless and legally precarious status and the heightened vulnerability of its residents. Participants will have the option to skip any question they do not wish to answer and may discontinue their participation at any time without any consequence.

The findings of this study are expected to contribute to a better understanding of WASH access, governance, and household coping strategies in Dhaka's informal settlements, and to inform policy recommendations for more equitable, tenure-neutral, and accountable water and sanitation service delivery.

Ethical approval will be obtained from the Department of Social Sciences and Humanities at Independent University, Bangladesh (IUB). All data collection and research activities will be conducted following established ethical principles, including voluntary participation, informed consent, confidentiality, and responsible data management. All engagements will be conducted with cultural and linguistic sensitivity, including the use of Urdu-speaking research assistance in Geneva Camp, to minimize harm and uphold participants' dignity throughout the research process.

I am committed to maintaining ethical standards throughout this research process. Participants are encouraged to contact the researcher if they have any questions or require further clarification regarding the study.

Thank you.