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Stakeholders Lived Experiences of the Pit Emptying Services in George Compound in Lusaka, Zambia

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ABSTRACT

The main objective of the study is to explore the stakeholders' views about the implementation of sanitation programmes in George Compound of Lusaka, Zambia. The study was guided by a specific objective which sought to explore stakeholders lived experiences of Pit Emptying Services in Lusaka's Peri-Urban areas. The researcher adopted the social constructivist ontology, knowledge was co-constructed with participants through an interpretive phenomenological approach, and reflexive thematic analysis was used to analyse in-depth and key informant interviews with beneficiaries, local committees, regulatory bodies, and the Lusaka Water Supply and Sanitation Company. The sample was selected purposively and determined using data saturation, ensuring rich, contextual insights from relevant stakeholders. The study revealed that most of the pit emptiers faced operational challenges including lack of licenses, limited personal protective equipment, and inadequate adherence to safety standards and non-compliance with vaccination among employees were also identified. Novel findings include the identification of the gendered impact of sanitation challenges, the interactions between formal and informal service providers, and the role of mindset, education, and cultural practices in shaping compliance and service uptake. The researcher's application of systems theory highlighted the interdependence of institutions, service providers, and communities, demonstrating that weaknesses in any component can compromise the sanitation system. The systems lens also emphasized that sustainable outcomes require integration of infrastructure, regulation, household participation, and community engagement. The study has theoretical, methodological, policy, practice, and knowledge implications. Theoretically, it corroborates systems theory by illustrating the interrelated roles of stakeholders in sustainable sanitation. Methodologically, it demonstrates the value of interpretive phenomenology in capturing lived experiences and operational nuances. For policy, the study emphasizes integrated, multi-stakeholder interventions informed by practical experiences. Practically, it highlights the need for community sensitization and engagement to ensure sustainability of sanitation innovations. Knowledge-wise, the study provides contextual evidence specific to George Compound, documenting challenges, innovations, and operational insights that can inform similar peri-urban settings. In conclusion, addressing sanitation challenges in peri-urban Lusaka requires a holistic, systems-oriented approach that integrates infrastructure, regulation, education, cultural socialization, and community participation to ensure equitable, sustainable, and effective on-site sanitation services.

INTRODUCTION

This section presents the introduction, background of study, statement of the problem, purpose of study, study objectives, research questions, significance of the study, theoretical review, scope of study, operational definitions and ethical consideration. The study explored Sanitation Programme Implementation in George Compound in Lusaka and was guided objective which sought to explore stakeholders lived experiences of Pit Emptying Services in Lusaka's Peri-Urban areas. The study identified the following gaps: Weak sanitation laws, inadequate sanitation investments, limited emptying services, lack of basic sanitation, limited studies focusing on different population groups such as children and women, limited inclusion of people with disability and pollution due to construction of on-site sanitation (toilets).

Background of the Study

Globally, Water and sanitation services are critical to protecting public health. They are also recognized human rights under international law (UNGA, 2010). Ensuring effective delivery of these services is one of the most basic responsibilities of any government leading to social and economic benefits to the population of their countries. However, as the international monitoring data shows, the world has a long way to go to ensure everyone gets access to safe services (Howard, 2021). Despite governments' commitment to the United Nations Sustainable Development Goals (SDGs) and the African Union's Agenda 2063, most countries are not on track to meet their objective of ensuring the availability and sustainable management of water and sanitation for all. (United Nations, 2015).

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Globally, an estimated 3.4 billion people, or 45% of the population, used safely managed sanitation services in 2017. However, data availability is limited, and national estimates were only available for 96 countries, representing 54% of global population. Furthermore, while many countries had national data on treatment of wastewater from households connected to sewers, very few had data on treatment and disposal of waste from on-site facilities (UNICEF and WHO, 2019). This remains the single biggest data gap for global monitoring of the SDG sanitation target (Bain *et al.*, 2018). Other areas where there is missing or poor-quality data include sanitation system typologies, emptying practices in both urban and rural areas, and the ability to assess the magnitude of the fecal exposure risks associated with the appropriate management of such on-site systems. There are further data gaps around the influence of weather conditions on on-site sanitation management, which are altered further by climate change (World Health Organization, 2018), knowledge of these impacts is limited to small scale study areas (Frenoux & Tsitsikalis, 2015).

Regionally, Safe water and sanitation are essential to the health of all Africans as well as to the social and economic development of their countries, yet millions lack access to both (World Health Organization, 2023). The study is anchored on the agenda 2063 whose aspiration is that Africa shall have equitable and sustainable use and management of water resources for socio-economic development, regional cooperation and the environment (Agenda 2063, 2015). Moreover, access to proper sanitation is still elusive in many parts of Africa while significant improvement in global sanitation has been realized that the sanitation situation in Africa is still appalling with almost 20% of the population reported to still practice open defecation in Sub Saharan Africa. According to the 2023 Africa Sustainable Development Report, 411 million Africans still lack access to safe water, and almost three-fourths don't benefit from safely managed sanitation services (United Nations Development Programme, 2023).

Nationally, The National Water Supply and Sanitation Council (NWASCO) reports that one of the greatest challenges facing water and sanitation supply utilities in Zambia is poor infrastructure development and maintenance. Inadequate water and sanitation infrastructure is mainly due to low financial investments in the sector, with an annual allocation of less than 3% of the national budget. According to NWASCO, the investments have been skewed towards water supply as opposed to sanitation and this situation has been compounded by lack of a clear policy on sanitation issues. Subsequently, Zambia has developed a comprehensive policy to guide the development and management of sanitation and water sectors.

Water and sanitation infrastructure (WSS), which was primarily built to cater to a small sub-sector of developing city populations, is increasingly coming under excessive strain. In the rapidly growing cities of the developing

world, infrastructure expansion does not always keep pace with population demand, leading to waterborne diseases such as cholera (*Vibrio cholerae*) and typhoid (*Salmonella serotype Typhi*) (Gething *et al.*, 2023).

Moreover, about sanitation, the percentage of households with access to an improved sanitation facility at national level increased to 54.4 percent in 2018 from 35.5 percent in 2007. The improvement was attributed to consistent public sector investments in water and sanitation, coupled with support from cooperating and development partners. Despite the gains made in improving access to water and sanitation in urban areas, the increase in unplanned settlements were a major drawback on Government efforts to provide safe water and adequate sanitation. There is, therefore, need to improve town and country planning and implement decentralization that will entrench participatory planning with communities in various constituencies and wards, (GRZ, 2022). The practices indicate that NWASCO is regulating sanitation service provision only through sewerage systems and not onsite sanitation, while ZEMA licenses the exhauster trucks and the construction and operation of wastewater treatment plants. The Zambia Environmental Management Agency (ZEMA) regulates onsite sanitation for environmental protection purposes; however, the provision of onsite sanitation services is not regulated. Sanitation service provision tools such as service level guarantees and agreements between the regulator NWASCO and the commercial utilities (CUs), which were created to provide urban WSS services, do not include onsite sanitation and faecal sludge management. ZEMA has developed effluent standards, but faecal sludge standards are not in place. ZEMA does not regulate community emptying either. Unsafe emptying of pit latrines, especially in peri-urban areas, results in public health risk and potential environmental pollution. Existing building codes are outdated and require updating (NWASCO, 2018).

The Zambia Water and Sanitation Act No. 28 of 1997 establishes onsite and offsite sanitation as a service under the responsibility of Water and Sanitation Utilities and regulated by NWASCO. However, the Act did not provide sufficient clarity on the roles and responsibilities of all the relevant actors across the sanitation chain. Other issues that lacked comprehensive guidance and/or provision for regulation included: Standards on the types of onsite sanitation systems allowed within a given jurisdiction, Use of onsite sanitation systems and emptying frequency, offloading of faecal sludge at treatment sites and management of transfer stations and offloading bays, Treatment, re-use, and disposal of faecal sludge, Powers of authorized officers and penalties for incompliance (SNV, 2024).

MATERIALS AND METHODS

Research Paradigm

The study was anchored on social constructivist paradigm and viewed reality from a relativist ontology who believes in multiple realities. Scotland (2012), asserts that reality

is relative to how individuals experience it at any given time and place. According to Scotland, (2012), ontology is defined as a branch of philosophy concerned with the assumptions, we make to believe that something makes sense or is real, or the very nature or essence of the social phenomenon we are investigating. Further, Scotland (2012) collaborating with the above definition, the researcher studied reality by integrating multiple perspectives. Moreover, in terms of epistemology, the researcher adopted a subjective epistemological stance in which knowledge is generated through the researcher's personal experiences and interaction with participants (Kivunja & Kuyini, 2017). Using this epistemological stance, the researcher generated knowledge through co-construction and interpreting meaning from the participants' experiences.

Further, the researcher adopted a value bound axiological stance hence acknowledging that once positionality in terms of personal background, experience, values and beliefs influenced the study while prioritizing ethical considerations. Kivunja and Kuyini (2017) defines axiology as the ethical issues that need to be considered when planning a research proposal. Given the nature of the study approach adopted, the research was value bound, hence was part of what was being researched, and could not be separated (Saunders *et al.*, 2009). Therefore, positionality in this study, helped in integrating the researchers' beliefs and experiences in the co-construction of meaning during the study. Lastly, the researcher deployed a methodology stance which covered the research approaches, designs, methods and procedures used in an investigation that is well planned to find out something (Keeves, 1997). The inductive reasoning is a logical process in which multiple premises, believed true or found true most of the time, are combined to obtain a specific conclusion or to supply evidence for the truth of conclusion (Sauce & Matzel, 2017). The researcher applied inductive logic in data collection and data analysis by reasoning from the specific that were participants sampled to the general study area.

The Research Design

The interpretive phenomenological lens which sought to describe the essence of a phenomenon by exploring it from the perspective of those who experienced it was adopted in this study. Neubauer *et al.* (2019) note that the goal of phenomenology was to describe the meaning of this experience both in terms of what was experienced and how it was experienced. Given the philosophical underpinning of this study, the researcher was able to generate meanings, and the participants lived experiences.

Sampling, Location, Population and Procedure

Study Location

The study was conducted in George Compound one of the Peri Urban areas located West of Lusaka. The study area was selected premised on the Sanitation Programmes interventions which were implemented there by the

government of Zambia through the Lusaka Sanitation Program.

The Study Population

The study population is defined as a set of cases, determined, limited, and accessible, that constituted the subjects for the selection of the sample, and must fulfill several characteristics and distinct criteria, (Arias-Gómez *et al.*, 2016). The study population comprised the beneficiaries of sanitation programmes, the Ward Development Committee, the water and Sanitation Committee, the Lusaka City Council (Public Health Department), Zambia Environmental Management Agency (Inspectorate), National Water Supply and Sanitation Council, and Lusaka Water Supply and Sanitation Company- (Peri-Urban Department). The Population was selected based on the participants experiences working on the sanitation programmes in the Peri-Urban areas.

The study Sample Size

The researcher adopted a qualitative research approach in which the sample size was determined based on the principle of data saturation. Suri (2011), notes that data saturation is associated with the situation when a further collection of data provides little in terms of 'further themes, insights, perspectives or information'. Therefore, the researcher determined sample size after conducting interviews with 29 Participants (10 Males and 15 women) and 4 key informants.

Sampling Procedure

The Purposive Sampling is intentional selection of informants based on their ability to elucidate a specific theme, concept, or phenomenon, (Robinson, 2014). Furthermore, the researcher employed criterion-based purposive sampling in this study. This type of sampling calls for the researcher to set a specific criterion which should be followed for participants to take part in the study. These participants were handpicked for such reasons because the criterion is set to enable the relevant data to be collected (Haruna, 2023). The researcher selected samples from the participants who have experienced and benefited from the sanitation Programmes that were implemented by the government for the past Ten years. The government stakeholders were selected based on their experience implementing sanitation programmes in the study areas. The selected study participants comprised, the beneficiaries of sanitation programmes, the Ward Development Committee, the water and Sanitation Committee, the Lusaka City Council (Public Health Department), Zambia Environmental Management Agency (Inspectorate), National Water Supply and Sanitation Council, and Lusaka Water Supply and Sanitation Company- (Peri-Urban Department).

Data Collection Instruments

The collection of primary raw data from the field

was based on the deployment of the Key Informant Interviews targeting government officials and Community Opinion Leaders and the In-Depth Interviews targeting the sanitation programmes beneficiaries.

Key Informant Interviews

The researcher deployed the key informants Interviews based on its quality to conduct intensive individual interviews with a small number of respondents to explore their perspectives on a particular idea, program, or situation. This choice of data-collecting tool is appropriate for open-ended questions for a qualitative study that the researcher intends to use. The Key Informant Interviews (KIIs) are a valuable qualitative research method aimed at collecting in depth insights and viewpoints from individuals who possess specialized expertise in a particular field. This method involves conducting one-on-one interviews with key informants to gain a comprehensive understanding of their knowledge, experiences, and perspectives, thus providing valuable qualitative data for research and analysis (Akhter, 2022). The researcher deployed this method targeting the government officials and community leaders based on their experience working in the sector or experiencing the sanitation programme interventions in the study area.

In-Depth Interviews

The researcher deployed in-depth Interviews in generating qualitative data. The in-depth interviews can be quite unpredictable and varied and are well suited to exploratory research and other research interested in meaning and experiences (Osborne & Grant-Smith, 2021). The Data collection instrument is suited for this study as it leans on gathering sanitation beneficiaries lived experiences in unrestricted manner as opposed to structures instruments which restrict participants responses.

Data Collection Procedures

The researcher deployed the self-administer interviews in the field to elicit for the participant's views and experiences. The interviews were conducted either English or translated into local language spoken by the participant. The study participants to be interviewed were selected using the criterion purposive sampling. The interviews duration lasted between 50 to 60 minutes. Data Collection devises such as audio-recording were used after obtaining consent from the study participants.

Data Analysis

The researcher analyzed raw data manually using a Reflexive Thematic Analytical Research Approach. According to (Kiger & Varpio, 2020) defines Thematic Analysis is an appropriate method of analysis for seeking to understand experiences, thoughts, or behaviours across a data set, themes are actively constructed patterns (or meanings) derived from a data set that answer a research question, as opposed to mere summaries or categorizations of codes. The study adopted Braun and

Clarke framework for conducting thematic analysis which involves a six-step process namely data familiarization, generating initial codes, themes identification, reviewing themes, defining and naming themes, and producing the report (Kiger & Varpio, 2020). The above themes helped in building patterns for interpreting the study findings in line with the study objectives and study purpose.

The Study Trustworthiness

The researcher achieved rigor by employing trustworthiness which according to Lincoln and Guba relied on four general criteria in their approach to trustworthiness. These are credibility, transferability, dependability, and confirmability (Ahmed, 2024). The researcher achieved credibility of the study findings by building trust and rapport with participants over time thus allowed the researcher to gain nuanced insights into their experiences, behaviours, and beliefs (Ahmed, 2024). Further, the step helped in capturing rich data that might not be immediately evident during brief interactions (Ahmed, 2024). Moreover, transferability was achieved by thoroughly describing the research context, participants, and methods allows readers to evaluate the similarities between their context and the study, enabling them to judge the applicability and relevance of findings to their own settings or situations (Ahmed, 2024). Further, the researcher achieved dependability by thoroughly documenting each step of the research process, which helped to ensure transparency and allowed others to replicate the study or assess the dependability of the findings by following the same procedures and understanding the rationale behind decisions made (Ahmed, 2024). Further, Eryilmaz (2022) notes that creating and preserving an audit trail, which consists of a comprehensive log documenting the decisions made throughout the research process, allows other researchers to reproduce the study, therefore guaranteeing the dependability of the results. The researcher achieved confirmability by employing member checking to ensure that the verification of their viewpoints and experiences was accurately represented, thereby strengthening the confirmability of the findings by providing participants with an opportunity to validate or correct the interpretations. Further, by keeping a journal helps researchers track their evolving thoughts, biases, and reflections during the research process. This reflective practice enhances transparency and provides insights into the researcher's subjectivity, contributing to the confirmability of the findings (Ahmed, 2024).

RESULTS AND DISCUSSION

This section presents the study findings and the participants verbatims which were coded and anonymised by initials of the study area i.e. George Compound (GC) for beneficiaries and KII for the Key informants. The collected raw data from the field employed the open-ended interview guides in which the interview scripts were analysed thematically in line with the study objectives and the research questions. The presentation of the study

findings sought to answer the question on, stakeholders lived experiences of Pit Emptying Services in Lusaka's Peri-Urban areas.

Pit Emptying Services in Lusaka's Peri-Urban areas The Lived Experiences of Pit Emptying Services

One of the challenges faced in the Pit emptying services are resources as well as limited communication and awareness to most of the people in the Peri-Urban areas. The key informants revealed that:

“The Pit emptier's face challenges of resources, deployment of staff and issues to do with information education communication materials. When it comes to awareness raising this has been limited. The Peri-Urban areas are growing but the resources are not growing and so is awareness raising.” (Source KII LWSC).

Emptying Delays Challenges

Some of the community beneficiaries narrated that they faced challenges of delayed emptying of the toilets by the service providers when the toilet fills up and inconsistent emptying charges are a challenge for the community beneficiaries. One of the community beneficiaries narrated that:

“Those who come to empty the toilets usually delay coming and they have different charges for emptying the toilet when it is full.” Participant (GC 19).

Bury Pit latrines

The study revealed that most people in the Peri-Urban areas do not have plans to have their Pit emptied and they tend to bury the toilets once they fill up. This practice tends to pollute the underground water given that people use underground water from the shallow wells hence this creates public health challenges.

“There is no plan for Pit emptying by most of the people in the Peri-Urban areas since they have not fully embraced the idea of Pit emptying. People do not have enough water and when their toilets fill up, they tend to bury them, and this affects underground water quality given that people use shallow wells hence this creates sanitation situation.” (Source KII- LCC).

Exposure to Faecal and Lack of Vaccinations

The study revealed that most of the people in the Peri Urban areas face the challenges of faecal exposure and lack of vaccinations. One of the key informants expressed that:

“The other challenge faced by the pit emptier's is exposure to faecal and lack of vaccination due to financial challenges.” (Source KII NWASCO).

The study revealed that most of the people in the Peri Urban areas face the challenges of faecal exposure and lack of vaccinations. One of the key informants expressed that:

“The other challenge faced is exposure to faecal and lack of vaccination due to financial challenges.” (Source KIINWASCO).

Training and Certification of Pit Emptier's

The study revealed that most pit emptier's who are licensed are trained and certified however, we have another category of the service providers who are not trained and licensed, and these operate without personal protective clothing, come drunk and usually during awkward hours. They tend to flout the law by dumping waste in the drains, sewer system or in the open environment. One of the extractions from the key informants disclosed that:

“Those Pit Emptier's who are trained are certified and these follow the standard operating procedures. But the challenges come with those who are not trained and licensed. The untrained people do not adhere the personal protective clothing and get vaccinated. Most of the time they tend to litter and fail to disinfect the surroundings. Because they usually operate at nighttime, they usually do not follow guidelines since they come drunk and usually dump waste on the sewerage system or the open environment or nearby water bodies.” (Source KII NWASCO).

Solid Waste and Texture

Additionally, the community beneficiaries faced quick filling up of the toilets because they are also used as solid waste dumping pits. They also face the challenge of lighting affecting their visibility at night and this is attributed to loadshedding. One of the community members submitted that:

“The other challenge is that the toilets fill up fast because people are dumping solid waste in the latrines. There's also poor lighting at night which makes us not see clearly. We also face water challenges due to lack of water in some areas due to load-shedding.” Participant (GC 6).

The study finds out that most pit latrines are also used for dumping solid waste which affects the texture and increases cost for separation of sludge from solid waste. An extraction from one of the key informants avers that: “There is also challenge of solid waste disposal in the pit latrines which also affects the texture of the sludge as well as cost of separation.”

Willingness to pay for Pit Emptying Services

The study revealed that people are not willing to pay for Pit emptying services and there are poor roads network in most peri-urban areas making it in accessible by trucks transporting faecal matter. Further people also face financial challenges. One of the Key informants revealed that:

“Not so many people want to pay for Pit emptying services and there are no roads making it difficult for the Peri-Urban areas to be accessed. Moreover, most of the toilets are not built to standards hence most people resort to using the informal Pit emptier.” (Source KII- LCC).

Employees Vaccination and Pit Emptying

The employees providing pit emptying services are required to be vaccinated in line with the provision of the company's standard operating procedures. The key informant disclosed that:

“There are enforcement gaps in the pit emptying of the on-site sanitation. Some of the service providers do not adhere to the standard operating procedures which requires that vaccinate its employees before emptying the faecal from the on-site sanitation facilities. The employees are supposed to be vaccinated with Cholera, Polio and Hepatise B vaccines.” (Source KII LWSC 2).

Mind Set Change and Capacity

The study revealed that people are not willing to pay for Pit emptying services and there are poor roads network in most peri-urban areas making it in accessible by trucks transporting faecal matter. Further people also face financial challenges.

“Not so many people want to pay for Pit emptying services because most of them were used with sewerage systems and mechanical emptying service. Moreover, there are no roads making it difficult for the Peri-Urban areas to be accessed. Moreover, most of the toilets are not built to standards hence most people resort to using the informal Pit emptier.” (Source KII- LCC).

Discussion of Findings

Emptying Delays Challenges

The study revealed that most of the households in the Peri-Urban areas faced challenges of delayed pit emptying by the service providers when the toilet fills up. Moreover, people experience inconsistent emptying charges are a challenge for the community beneficiaries. Similarly reviewed literature in A study conducted by Kakar *et al.* (2023) revealed that, most residents in Dar’s unplanned settlements use unhygienic methods to empty their latrines and do not empty pits as often or as thoroughly as they should, partly to save money or because they cannot afford better and partly because hygienic services are unavailable to them. Further literature review observed that Globally, China and Ethiopia have the most Unemptiable pits, while Sub Saharan Africa exhibits the highest regional prevalence of this service type. In terms of facility density, Ethiopia, Nigeria, and the Democratic Republic of Congo have high prevalence of Unemptiable latrines and subsequent need for facility rebuilds or upgrades (Greene *et al.*, 2021).

Bury Pit Latrines

The study revealed that most the households in Peri-Urban areas do not plan for pit emptying; instead, once their pit latrines fill up, they are commonly buried and new ones constructed. This practice poses significant environmental and public health risks, particularly groundwater contamination, given that most residents rely on shallow wells as their primary source of water. The potential infiltration of faecal matter into groundwater supplies increases the risk of diarrheal diseases and other waterborne infections. Comparable findings are highlighted by Greene *et al.* (2021), who noted that in Urban settings, pit latrines generally require periodic emptying due to limited space that restricts the rebuilding of new facilities. Furthermore, Strauss *et al.* (2000) and Thye *et al.* (2011) reiterate that pit latrines

remain the predominant sanitation system among urban poor populations in many developing regions, particularly in informal and high-density settlements. In such environments, once latrines fill up, options for replacement are severely limited by space, making pit emptying the only feasible solution. As such, the safe and systematic management of full pits becomes crucial to sustaining sanitation access and protecting public health. The current study therefore reinforces the argument that in Peri-Urban areas, where population density is high and reliance on shallow groundwater is common, failure to plan for pit emptying has direct implications for environmental health and disease prevention. This highlights the need for increased awareness, community engagement, and supportive regulatory mechanisms to promote the construction of emptiable toilet systems and the adoption of safe sludge management practices.

Exposure to Faecal and Lack of Vaccinations

The study revealed that most residents in Peri-Urban areas are exposed to faecal contamination, and this challenge is exacerbated by the low uptake of vaccinations that protect against sanitation-related diseases. This aligns with Cairncross and Feachem (2019), who emphasize that the breakdown of faecal containment systems directly contributes to the transmission of enteric diseases, particularly in densely populated settlements where sanitation infrastructure is weak. The absence of routine vaccinations further intensifies vulnerability, as vaccines serve as a protective barrier in environments where sanitation conditions are compromised. Without this protection, disease outbreaks spread more rapidly and are harder to control. Similarly, Nhamo *et al.* (2021) note that Peri-Urban populations often face structural barriers such as poverty, overcrowding, and inadequate public health outreach, which limit access to preventive health interventions, including vaccinations. In these contexts, sanitation-related diseases remain prevalent, not due to lack of medical knowledge, but due to systemic failures in service provision, infrastructure support, and community-level health education.

Trained and Certification of Pit Emptier’s

The study revealed that while several licensed Pit Emptiers are trained and certified to perform faecal sludge management in a safe and regulated manner, there exists another category of informal service providers who are neither trained nor licensed. These informal operators often conduct pit emptying activities without personal protective equipment, sometimes under the influence of alcohol, and usually during late hours to avoid detection by authorities. Their practices frequently result in illegal dumping of faecal sludge into drains, sewer lines, or open spaces, which poses significant environmental and public health threats. This finding is consistent with the observations of Peal *et al.* (2014), who note that in many low-income urban areas, informal pit emptying services dominate due to affordability and accessibility, despite

the high risks associated with their methods. Informal operators often fill a gap created by the inability of formal service providers to meet demand, particularly in densely populated Peri-Urban settlements where households lack the resources to pay for regulated services. However, the lack of training and protective equipment greatly increases the risk of occupational exposure to pathogens for the emptiers, as well as environmental contamination for the surrounding community.

Similarly, Satterthwaite *et al.* (2021) emphasize that the sanitation sector in many developing countries is characterized by dual systems: regulated formal service providers and informal, unregulated actors. While the informal sector compensates for gaps in service delivery, the absence of oversight can result in risky disposal practices, contributing to outbreaks of sanitation-related diseases. The operation of untrained emptiers during “awkward hours” suggests deliberate avoidance of regulatory enforcement, reinforcing the problem of weak governance and oversight in the sanitation sector.

Solid Waste and Texture

The study revealed that many households in Peri-Urban areas use pit latrines not only for human waste disposal but also as dumping sites for solid waste. This practice alters the texture and composition of faecal sludge, making it more difficult and costly to empty and treat. The presence of non-biodegradable materials such as plastics, rags, glass, and metal objects clogs emptying equipment and increases the labour required for manual removal. These challenges contribute to reduced efficiency of faecal sludge management and pose significant occupational hazards for pit emptiers. These findings are consistent with existing literature. For example, Tomoi *et al.* (2025) observed that inappropriate household waste management practices significantly hinder safe pit emptying processes. Their study noted that households frequently dispose of solid waste such as “needles, bottles, and broken glass” into pits, accelerating pit fill-up, creating safety risks for emptiers, and obstructing pump-based emptying methods. This underscores that safe faecal sludge management is strongly influenced by household behaviour and awareness. The practice of using pit latrines as waste disposal sites is often linked to the absence of affordable and accessible solid waste collection services in informal settlements (Simiyu *et al.*, 2017). Where such services are lacking, households adopt the latrine as a convenient alternative. However, as highlighted by Satterthwaite and Mitlin (2020), this coping mechanism undermines sanitation infrastructure and increases the cost and complexity of faecal sludge treatment. The current study therefore reinforces the importance of community sensitization on proper solid waste disposal and highlights the need for integrated sanitation and waste management strategies. Strengthening household awareness, improving waste collection services, and enforcing by-laws against disposing solid waste in latrines would reduce pit fill rates, protect emptiers’ safety, and enhance the sustainability of

faecal sludge management systems.

Willingness to Pay for Emptying Services

The study revealed that willingness to pay for pit emptying services remains low among community beneficiaries in the study area. Despite the introduction of formal faecal sludge management services, many households continue to perceive pit emptying as costly and unaffordable, especially in contexts where incomes are unstable and livelihoods are informal. This unwillingness is further compounded by financial constraints that make it difficult for households to plan for sanitation expenditures, particularly when sanitation is not prioritised relative to other immediate socio-economic needs such as food, school fees, and household utilities. In addition, the poor road network in most peri-urban areas presents a structural barrier, limiting accessibility for desludging trucks. As a result, residents face service delays or resort to informal pit emptying practices, including manual scooping or illegal dumping, which undermine public health and environmental protection efforts.

From a systems theory perspective, the issue of willingness to pay is not solely an economic limitation but reflects the interconnectedness of physical infrastructure, household capacity, service delivery models, and institutional coordination. The sanitation system extends beyond the household level to include road access planning (Lusaka City Council), regulation and monitoring (NWASCO and ZEMA), service provision (LWSC), and community governance structures such as Water and Sanitation Committees and Ward Development Committees. When any of these components are weak or misaligned, the entire sanitation chain is disrupted. For example, lack of road access prevents service provision, which in turn reinforces scepticism about the value of paying for sanitation services, thereby weakening compliance and willingness to invest in proper facility maintenance.

This finding also introduces a novel dimension to the discussion on urban sanitation. While existing literature often attributes low willingness to pay to lack of awareness or behaviour-related barriers, this study demonstrates that willingness to pay is shaped by a complex interaction of socio-economic pressures, infrastructural limitations, and perceptions of service reliability.

The study further revealed that employees involved in pit emptying services are required to undergo vaccination in accordance with the company’s standard operating procedures. This requirement reflects an important occupational health safeguard, recognizing the inherent risks associated with contact with faecal sludge, including exposure to waterborne and communicable diseases. The emphasis on vaccination aligns with global best practices in faecal sludge management, which advocate for comprehensive health protection measures for sanitation workers.

From a systems theory perspective, this finding illustrates how sanitation service delivery is not only dependent on infrastructure and community compliance, but also on the

capacity and well-being of frontline workers. The system operates through interconnected components-technical standards, operational procedures, worker safety measures, and regulatory oversight. Ensuring that sanitation workers are vaccinated strengthens the resilience of the sanitation system by maintaining workforce availability and reducing health-related service disruptions. However, the finding also revealed that the effectiveness of occupational safety depends on the coordination between the utility company, the City Council Public Health Department, and national health institutions responsible for vaccination supplies and monitoring. Therefore, this safety measure functions effectively only when institutional linkages are strong. This study adds a new dimension to the discourse on sanitation service delivery, shifting attention to the often overlooked labour and occupational health component.

Access due to Unplanned Settlement

The study disclosed that many Peri-Urban areas are characterized by unplanned housing structures and narrow, irregular pathways, which make it difficult for service providers to access households when pit latrines fill up and require emptying. Poor spatial planning and high-density settlement patterns restrict the movement of vacuum trucks and other desludging equipment. As a result, households in these areas often depend on manual pit emptying or resort to unsafe practices such as abandoning filled pits or illegally discharging sludge into the environment. This situation limits the effectiveness of faecal sludge management services and increases the risk of environmental contamination and public health hazards. This finding is consistent with literature which highlights that many informal and Peri-Urban settlements develop without adherence to urban planning regulations. According to Jenkins *et al.* (2015), the lack of road access and structured plot layouts in informal settlements makes mechanical emptying either costly or physically impossible. Similarly, Simiyu *et al.* (2017) observed that sanitation access challenges are often compounded by the spatial arrangement of homes, where houses are built closely together, leaving no space for service vehicles to operate.

Moreover, the World Bank (2020) emphasizes that physical accessibility is a key determinant of sanitation service delivery under the Citywide Inclusive Sanitation (CWIS) framework. Where access is restricted, even well-designed policies and adequate service provision systems become ineffective. This reinforces the need for integrated urban planning and sanitation programming, where settlement layout, road networks, and drainage systems are considered alongside sanitation infrastructure development.

Risk of Urinary Tract Infections and Shame of Use

The study revealed that sanitation challenges in Peri-Urban areas disproportionately affected women, particularly regarding access to water for personal hygiene. Many female participants reported increased vulnerability

to urinary tract infections (UTIs) due to the scarcity of water needed for regular cleansing when using the toilet. The situation was worsened by the high number of users per toilet, which not only compromised cleanliness but also increased waiting time and discomfort. For menstruating women and girls, these challenges became especially pronounced, as the lack of adequate water and privacy heightened the risk of menstrual blood staining the facilities, leading to embarrassment, shame, and social stigma.

This finding is well supported by existing scholarship. Sommer *et al.* (2015) argue that inadequate sanitation infrastructure disproportionately affects women because cultural expectations around cleanliness and modesty place greater pressure on them to maintain hygiene. When sanitation facilities lack privacy, water, or cleanliness, women may delay urination or avoid toilet use, which increases the likelihood of UTIs and other reproductive health complications. Similarly, Caruso *et al.* (2017) highlight that menstrual hygiene management is a critical yet often neglected aspect of sanitation planning, and when not adequately addressed, it can undermine women's dignity, restrict mobility, and negatively impact physical and psychosocial well-being. Additionally, Satterthwaite and Mitlin (2020) observe that shared sanitation facilities, particularly those that are overcrowded and poorly maintained, create environments in which women feel unsafe, ashamed, or exposed. This reinforces the gendered dimensions of sanitation access-where inadequate facilities translate not only into health risks, but also into emotional stress and reduced sense of dignity.

Limited Data on On-site Sanitation

The study revealed that there is limited availability of empirical data on on-site sanitation systems, particularly in Peri-Urban settlements. This gap in knowledge affects planning, monitoring, and the development of effective faecal sludge management strategies. Without reliable data on the number, type, condition, and usage of on-site sanitation facilities, it becomes difficult for service providers and regulatory authorities to estimate sludge generation rates, plan treatment capacity, or develop appropriate service delivery models. As a result, decision-makers often rely on assumptions or fragmented information, which can lead to inefficiencies in sanitation programming. This finding aligns with observations made by Kvarnström *et al.* (2018), who note that on-site sanitation-though used by most households in many low-income urban areas-has historically been overlooked in formal sanitation planning. Urban sanitation policies have tended to focus on sewered systems, even though such systems are unattainable for many informal and low-income communities due to high infrastructure and operation costs. Similarly, Peal *et al.* (2014) highlight that the lack of standardized faecal sludge data contributes to weak service delivery chains, particularly regarding emptying, transportation, and

treatment. The Citywide Inclusive Sanitation (CWIS) framework further emphasizes that achieving equitable sanitation outcomes requires data-driven planning that incorporates both sewered and non-sewered systems (World Bank, 2020). Without reliable data on on-site systems, authorities may underinvest in faecal sludge management infrastructure and underappreciate the scale of need in Peri-Urban areas. This increases the risk of environmental contamination and disease transmission. The current study therefore underscores the importance of strengthening data collection systems related to on-site sanitation, including household surveys, spatial mapping, and routine monitoring of sludge management practices. Improved data availability would support evidence-based decision-making, enhance planning accuracy, and promote sustainable and inclusive sanitation service provision.

Environmental Challenges

The study revealed that both male- and female-headed households in Peri-Urban areas experienced substantial challenges related to toilet emptying due to overcrowded settlement patterns and poorly developed road networks. The absence of planned access routes made it difficult for vacuum tankers and other sanitation service providers to reach households requiring pit emptying. Consequently, when toilets filled up, residents often resorted to digging new pits within the same yard. Over time, repeated digging led to widespread ground disturbance, increasing the likelihood of environmental contamination particularly of shallow groundwater, which many households rely on for drinking and domestic use. This finding aligns with Simiyu *et al.* (2017), who highlight that physical layout constraints in informal settlements limit access for mechanical desludging equipment, often forcing residents to use manual pit-emptying methods or abandon full latrines altogether. Jenkins *et al.* (2015) similarly argue that unplanned housing arrangements create practical barriers to safe faecal sludge management, resulting in unsafe disposal practices and heightened public health risks. Furthermore, Strauss and Montangero (2004) explain that repeated excavation of pit latrines in densely populated areas contributes to soil saturation with faecal matter, increasing the risk of pathogen migration into groundwater sources. This is particularly dangerous in contexts like Peri-Urban Zambia, where many residents depend on shallow wells. The environmental degradation described in the study therefore reflects not only infrastructural limitations but also systemic sanitation risks that can perpetuate disease transmission. The findings seem to reinforce an integrated planning interventions that is need to address both sanitation infrastructure and settlement layout.

Mind Set Change and Capacity

Similarly, the study revealed that on-site sanitation remains a relatively new concept among many residents, as communities have historically associated improved

sanitation with a conventional sewerage system. This long-standing preference for waterborne sewerage has shaped user expectations and attitudes, thereby affecting the acceptance and maintenance of on-site sanitation facilities. Many households still perceive sewerage systems as the “proper” or “modern” solution, while on-site systems are viewed as temporary, inferior, or a sign of underdevelopment. As a result, the transition to on-site sanitation requires not only infrastructural interventions but also deliberate mindset change and capacity-building among users. These findings align with Acheampong *et al.* (2022), who observed that sanitation behaviours are deeply embedded in social norms, historical practices, and cultural perceptions of cleanliness and status. When communities have long been exposed to waterborne sewerage-either directly or through public messaging-shifting to on-site systems can be misunderstood as a downgrade rather than an adaptation to geographic and economic realities. Furthermore, the lack of adequate community sensitization and training contributes to the improper use and management of on-site systems. Evans *et al.* (2018) argue that without building household capacity in maintenance, safe emptying practices, and hygiene behaviour, sanitation technologies may fail to achieve their intended health and environmental outcomes, even when well-designed. There is need to strengthen the role of local sanitation champions, D-WASH committees, to help improve the on-site sanitation services.

CONCLUSION

This study was guided by four key objectives: to understand the regulators’ role in enforcing Sanitation Laws in Lusaka’s Peri-Urban areas; to explore stakeholders lived experiences of Pit Emptying Services in Lusaka’s Peri-Urban areas; to explore the beneficiary’s views about sanitation challenges in Lusaka’s Peri-Urban areas and to construct sanitation measures to the perceived challenges identified by the stakeholders in Lusaka.. In view of these objectives, the study revealed several critical insights, and these were: Regulatory enforcement plays a pivotal role in ensuring compliance with sanitation laws. While the existence of legal frameworks and licensing mechanisms provides a foundation, challenges such as limited funding, weak institutional capacity, and sporadic inspections limit their effectiveness. Strengthening regulatory oversight, structured inspections, and multi-stakeholder joint operations emerged as essential strategies to improve compliance and public health outcomes. Secondly, the lived experiences of beneficiaries highlighted a range of sanitation challenges in peri-urban areas. These included poor housing planning, limited access due to unplanned settlements, shallow or poorly constructed pit latrines, exposure to faecal matter, and gendered burdens, particularly on women. Cultural practices, low awareness of sanitation laws, and inadequate education further exacerbated these challenges. The study also found that operational constraints such as limited access roads, load-shedding, and insufficient water supply hinder

effective service delivery. Thirdly, the study identified measures to address sanitation challenges, including the introduction of lined pit latrines, Faecal Sludge Treatment Plants, scheduled desludging, digital customer service platforms, and subsidies for households and service providers. Emphasis on education, cultural socialization, gender inclusion, and the adoption of a human rights approach were highlighted as critical strategies to promote behavioural change, awareness, and equitable participation.

The researcher applied the systems theory lens, the study underscores that sanitation is not a standalone service but a complex system involving interdependent actors, including regulators, utility companies, service providers, and community stakeholders. Coordinated efforts across these actors are essential for sustainable sanitation outcomes. Each component of the system—regulatory enforcement, infrastructure, household participation, and community engagement—interacts to determine the effectiveness and sustainability of on-site sanitation services. Weakness in any part of the system can compromise the entire sanitation service delivery chain, highlighting the need for a holistic, integrated approach. The novelty as it helped to highlight context specific findings depicting the peri-urban sanitation in George compound in Lusaka. Moreover, previous studies have examined sanitation challenges in developing countries broadly, this study provides empirical evidence on the specific operational, cultural, and infrastructural factors affecting pit emptying services and compliance in Lusaka's peri-urban areas.

Study Limitations

This study limitations were the length process of obtaining research clearance and consent was delayed due to institutional bureaucracy and slow feedback from certain offices. This had the potential to affect the data collection schedule. However, this challenge was mitigated through persistent follow-ups and timely reminders, which eventually facilitated the approval process. Furthermore, during data collection, some key informants demonstrated divided attention as they simultaneously addressed work responsibilities while participating in the interviews. This occasionally interrupted the flow of the discussion. To manage this, the researcher provided careful recaps of previous points whenever attention shifted, ensuring continuity and accurate representation of participants' perspectives. The study also employed a qualitative research design focused on exploring participants lived experiences. While this approach enabled in-depth insight and rich contextual understanding, it limits the extent to which the findings can be generalized to all peri-urban communities. Nonetheless, the depth of the findings offers valuable contribution to knowledge and provides grounded evidence relevant to similar settings. Lastly, the study was constrained by cost and time, which restricted the researcher's ability to include a larger sample or expand the geographical scope of the research. Despite these

limitations, methodological rigor was maintained, and the study achieved sufficient depth and saturation to support credible and meaningful conclusions. The findings of this study have several implications for sanitation service delivery, enforcement, and community participation in peri-urban Lusaka.

Study Recommendations

The following recommendations were made based on the study findings from the participants. The study recommends as follows:

The Government

i. The Government should strengthen fiscal partnerships with international financial institutions like the African Development Bank, UNICEF, GIZ and the World Bank to increase investment in Faecal Sludge Treatment facilities in Lusaka. This responds to the current shortage of functioning treatment capacity identified in the study.

ii. The Government, through the Ministry of Education, should mainstream sanitation laws and hygiene behaviour change education into school civic and life skills curricula, to build early awareness and strengthen long-term compliance culture.

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