

Household Coping Strategies for Unreliable Water Supplies in Kalingalinga Compound of Lusaka City

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Abstract: *The aim of this study was to investigate household coping strategies for unreliable water supplies in Kalingalinga compound in Lusaka city in Zambia and to propose sustainable coping strategies in the compound. Qualitative data was gathered through interviews and surveys in the area. It was found that the coping strategies included water storage in small quantities such as small containers, buckets and drums, water tanks, rainwater harvest in rainy season, reschedule activities, recycling water, purchasing water and treating of water through boiling and adding chlorine. Finally, it is recommended that the government in conjunction with other stakeholders need to develop a policy framework to coordinate water provisions in compounds such as Kalingalinga in order to enhance easy access to water utilization which will in turn promote sustainable coping strategies in the compound.*

Keywords: *Coping strategy, compound, water utilization, water supply, Zambia*

1. INTRODUCTION

Access to water supply that is sufficient, reliable and of good quality is a basic requirement for all human beings. Unreliable water supply is one of the key problems facing developing countries, threatening the health of millions of people around the world. Many people around the world lack adequate access to clean water. Even in countries where most residents are connected to water supply network, they experience frequent interruptions in water supply. For example, in the southern parts of Russia, water is available for only a few hours a day. In Romania, some water supply systems do not function for more than 12 hours a day. In Italy 30% of islanders also suffer interruptions in water supply (UIA, 2022). According to the 2006 report by the United Nations Development Programme, 700 million people (11% of the world's population) experience inadequate water supply mostly in the Middle East and Africa. Lack of access to adequate water puts stress on food production and the ability to feed the growing population. Additionally, inadequate water supply differs dramatically

from one place to another, and in some cases causing wide-reaching damage, including public health, economic development, and global trade. It can also drive mass migrations and spark conflict.

According to (Felter & Robinson, 2021), prolonged inadequate supply of water can have devastating effects on public health and economic development. In Zambia, many places lack access to safe drinking water; and adequate sanitation services. These deprivations can spur the transmission of diseases such as cholera, typhoid, polio, hepatitis A, and diarrhoea. Felter & Robinson (2021) further explains that inadequate water supply threatens a community's access to food. Food insecure communities can face both acute and chronic hunger, where children are more at risk of conditions stemming from malnutrition, such as stunting and wasting, and chronic illnesses due to poor diet, such as diabetes.

There are many threats to our water resources and sources in developing countries. Due to ever growing population, human demands often exceed sustainable water consumption levels, and the pollution generated harms aquatic systems and renders the contaminated water unsafe to use. Moreover, global warming increases the likelihood of extreme weather events, including drought and excessive heat, and is expected put additional stressors on water availability and distribution.

In Lusaka's Kalingalinga compound, people face a lot of challenges from poor waste management to lack of access to adequate water and sanitation. According to World Health Organization (2011) and Mubita (2021), access to safe and sustainable water, sanitation and hygiene reduces stunting, improves education quality and learning outcomes and is essential for a child's health and well-being. However, this is not the case for Kalingalinga compound as it faces challenges in accessing water. The compound receives water for just few hours in a day and with low pressure and while some days even pass without receiving water. Unreliable water supply coupled with poor water drainage systems and inadequate waste collection systems can lead to diseases like cholera and diarrhoea. According to Sinyange et al. (2018), Kalingalinga compound was among the places in Lusaka which has had high figures of households affected by cholera in 2017. Unreliable water supply in households is among the factors may affect the quality of life in school environments and households (Mubita and Namafe, 2016). Water scarcity limits access to safe water for consumption and may compromise basic hygiene in households, in school environments and in health-care facilities. When water is scarce, sewage systems can fail and the threat of contracting water borne diseases like cholera surges (Mubita and Namafe, 2016 and Mubita, 2021). More so, unreliable water supplies in households could affect school attendance by children in such homes, especially girls as they will be given tasks of fetching water. This also affects the quality of sanitary infrastructure in affected households (Mubita and Namafe, 2016). With such unreliable supply of water, residents have come up with strategies for coping with the situation. Such strategies were the reasons for conducting this study.

This study investigated how households in Kalingalinga compound are coping with unreliable water supply. World Health Organisation (2011), explained that the effects of inadequate water supply such as cholera can affect the activities of people and hence having an impact on their social and economic spheres. Kalingalinga compound is already faced with lack of improper sanitation conditions and poor waste disposal (Sinyange et al., 2018). Therefore, the compound is likely to continue being a hotspot of water borne diseases, if the situation is not attended to, as it will threaten people's livelihoods and their health. How households are coping with unreliable water supply still remains unstudied. It is for this reason that a study was conducted so as to find out how households in Kalingalinga compound are coping with unreliable water supply.

2. AIM

The aim of this study was to find out how households in Kalingalinga compound were coping with unreliable supplies of water.

2.1. Objectives

This study was informed by the following objectives:

- i. To establish the effects of unreliable water supply in Kalingalinga compound
- ii. To investigate coping strategies adopted by households in the Kalingalinga compound.

- iii. To suggest sustainable coping strategies for unreliable water supply in Kalingalinga compound

3. SIGNIFICANCE OF STUDY

The results of this study could go a long way in providing recommendations to the community on the good strategies concerning scarce water considering that the communities/compounds around Lusaka city have difficulties in accessing reliable water supply. An understanding of strategies in coping with unreliable water supply could help communities in strategizing on the usage of already water scarce problem. Such studies that boarder on the lives of people are vital bearing in mind that water is a need and not a want. The government and other stake holders around different communities would definitely need such information as to find a way on how best they could help out.

3.1. Description of the study Area

Kalingalinga compound (Figure 1) is one of Lusaka's largest townships, which was legalised on April 1, 1986 under the 1972 Government Policy towards upgrading of squatter settlements. After legalisation, the Lusaka City Council (LCC) tried to establish a systematic grid layout of houses and roads in most parts of the area. The compound borders the townships of Mtendere and Kabulonga. Many of its occupants are people who were discouraged from settling in Lusaka and moved as squatters to outlying regions of the city Kalingalinga compound population is approximately 25,000 to 30,000 (CSO, 2022). This big population in an unplanned settlement has brought about challenges in accessing resources like water.

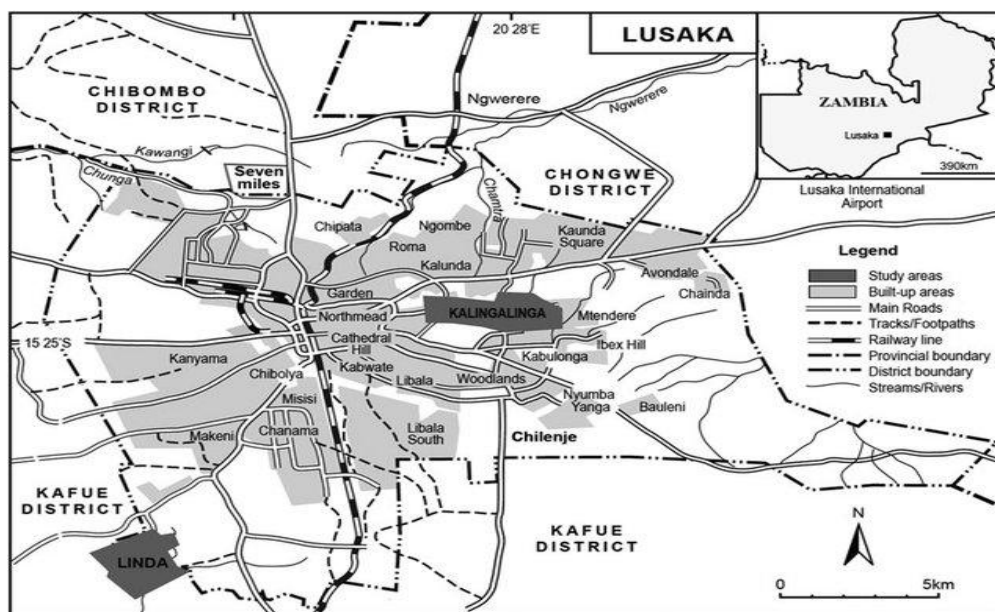


Figure1. The location of Kalingalinga Compound in Lusaka Zambia

Source: Adapted from Wendy Phillips (2013), Cartographic Unit, University of Wits, Johannesburg

3.2. Methodology

According to Saunders et al. (2009), a population is the full set of cases from which a representative sample is taken for detailed study. The targeted population for this study were the water user households, water sector staff from Lusaka Water and Sewerage Company and academia.

Unstructured interview for this study involved 40 households through multi-stage random sampling. This was followed by 10 in-depth expert interviews conducted with selected stakeholders from Lusaka Water and Sewerage Company and academia to share and express their insights and opinion on household coping strategies to unreliable water supplies. The 10 experts were purposively chosen because “purposive sampling helps in ensuring that the persons selected met the criteria for selection before being allowed into the study” (Sinclair, Jullien, & Garner, 2016). Field observation involved watching stakeholder activities and processes, and documenting processes and results. The Field observations had the added benefit of enabling the researchers to identify activities that may have

been missed during interviews. In this study, primary data was collected unstructured interview schedules from households. Secondly, primary data was also collected through in-depth expert-interviews conducted with selected stakeholders from water sector staff from national and academia. These were purposively chosen. More so, field observations were also carried out in the study area. Field observation involved watching stakeholder activities and processes, and documenting processes and results. The study also collected data from published and unpublished reports that had some relevant information on household coping strategies to unreliable water supplies and the factors influencing the choice of strategies in the basin. Secondary data was also gathered from textbooks, internet sources and journals. In this study, the household adopted coping strategies to unreliable water supplies were analyzed using descriptive statistics and thematic evaluation of collected data.

3.3. Review of Related Literature

Many developing countries continue to have unreliable water supplies (World Health Organisation, 2012). Many developing countries face severe challenges with the unreliable water supplies, especially in unplanned settlements. These supplies are often characterized by intermittence, low pressure and poor water quality (Majuru, 2015). To this effect, households have adopted some coping strategies to alleviate the water shortages. The term “coping strategies” is used in a wide variety of contexts, and may mean something different situations. For example, in social science literature, Davies (1993) uses the term to describe strategies employed in response to crises. In this paper, we adopt the term “coping strategies” to describe households’ responses to unreliable water supplies. Some common coping strategies for unreliable water supplies in most developing countries include drilling wells, storing water, and collecting water from alternative sources (Majuru et al. 2016).

According to Majuru et. al (2016), the choice of coping strategies is influenced by income, level of education, land tenure and extent of unreliability. This highlights how low-income households bear a disproportionate coping burden, as they often engage in coping strategies such as collecting water from alternative sources, which is labour and time-intensive, and yields smaller quantities of water. Such alternative sources may be of lower water quality, and pose health risks. In the absence of dramatic improvements in the reliability of water supplies, a point of critical avenue of enquiry should be what coping strategies are effective and can be readily adopted by low income households.

According to literature, households in many developing countries often employ multiple coping strategies, categorizing the range of coping strategies assessed is a useful approach. Subsequent to the early studies by Kudat et al. (1993), the four studies that have categorized the range of coping strategies assessed have done so on the basis of: actual actions taken by households, e.g., storing, pumping, collecting, purchasing or treating water (Zera, 2000 and Pattanayak et.al, 2005), outcomes ensuing from the various actions, e.g., adaptation, exiting from the formal water service or costs related to the various strategies, e.g., collection time, financial water costs, capital costs, diarrhoea treatment costs, and water treatment costs (Cook, Kimuyu., Whittington, 2016).

Majuru et.al (2016) categorized the coping strategies identified from the literature by the assumed outcome intended by these household actions as follows: enhancing/supplementing quantity of water available; accommodating unreliable supplies; improving water quality; and enhancing water pressure. Even so, there seems to be some overlaps among these categories depending on context of application and use.

4. RESULTS

The results of this study were collected from the field in Kalingalinga compound by interviewing ten households on how they cope with unreliable water supply. Other sources included the review of literature from books and articles on the internet. The findings of this study addressed the objectives that were set

4.1. Effects of Unreliable Water Supply in Kalingalinga Compound

Water is a primary ingredient of a good and quality life. This is because it is in it were life evolves. However, Zambia and other developing countries have been facing water problems from time immemorial. Shanty compounds are the worst affected areas. In this study that was carried out, Kalingalinga was the focus area. Unreliable water supplies have affected Kalingalinga in so many ways. According to the response from different households, unreliable water supply has affected the resident’s daily activities and livelihood. Due to poor water storage and unreliable water supply,

residents of Kalingalinga were forced to store water in drums and barrels. Keeping water in such containers made it easier for mosquitoes to breed which render people of Kalingalinga vulnerable to diseases like malaria and waterborne diseases in case of water contamination.

The other notable effect of unreliable water supply was the interruption of daily schedule due to fetching of water which mainly affected women and children. The respondents noted that even school going children were interrupted and, in some instances, they failed to attend school because they would be busy fetching water and some would complain of fatigue due to fetching water from far places and carrying big containers of water.

In an instance where water was available in the neighborhood, people of Kalingalinga paid for them to access water. This greatly affected those who could not afford paying for each container of water they fetched. This later on forced some to recycle water. For instance, water that was used to clean dishes would be used to clean the house and some would bath using the same water. Others would skip bathing just to serve water. This all had greatly affected the livelihood of Kalingalinga community.

Despite its contribution towards water-related illness and the significant coping burden it imposes on households, water supply reliability remains a difficult attribute to measure and poses a variety of effects on the livelihood of the people especially those living in informal settlements and low-income areas of Lusaka such as Kalingalinga compound. According to the Ministry of Energy and Water Development (2010), water distribution systems are typically designed with the intention that they operate continuously under positive pressure. However, this is not the case for Kalingalinga compound where water systems operated intermittently with low pressure. In some cases, water is supplied less than 7 days a week for between 4 and 6 hours or more on supply days and sometimes water is supplied daily but for durations ranging from 1-2 hours only. According to the residents of Kalingalinga compound, water only runs for about 4-5 hours a day and sometimes they did not get any water for a whole day. Because of this, people were forced to rely on sources such as surface water, unprotected and possibly contaminated wells, or vendors selling water of unverifiable provenance and quality. As a result, residents of Kalingalinga were in danger of health-related problems such as cholera, typhoid and diarrhea. This is correlation with Mubita (2021) who noted that inadequacies in welfare facilities, water supply inclusive, affect health adversely both directly and indirectly.

According to Mubita (2016) in an article titled, 'Barriers to effective safety and health management at Sefula secondary school in western Zambia' noted that inadequate water supply also affected quality of sanitary infrastructure. Poor sanitation and health mean far-reaching and ill-fated effects for those who are required to use unsanitary toilet facilities and drink, bathe, cook with and use contaminated water (Mubita, 2016).

According to a research by DTF (2006), piped water supplies are usually contaminated due to fluctuating pressure in distribution systems, poor storage and handling practices during supply may be forced to revert to unsafe water resulting in diarrheal illness. However, the impacts of unreliable household water supplies are not limited to health, livelihoods are also affected. In terms of school attendance, girls are the most vulnerable category. The lack of water in schools makes it impossible for them to take care of themselves during their menstruation, so they often end up dropping out of school entirely in the long run (Mubita, 2021).

For many households in Kalingalinga compound, water sources were far from their homes, and it typically falls to women and girls to spend much of their time and energy fetching water, a task which often gets them out of school and work. Also, unreliable water supply amongst the people of Kalingalinga compound had often led to conflicts with other neighboring residents which cause confusion amongst the people. There are several drawbacks to having an unreliable/intermittent water source. It causes problems for users, especially the ones who lack the means to store large quantities of water at home.

4.2. Coping Strategies Adopted by Households in Kalingalinga Compound

The study reviewed how households in Kalingalinga compound often coped with unreliable water supply. To cope with the situation, households used different strategies and not just one. A total of copying strategies 7 were identified in this study. Some of the unreliable water supply coping

strategies adopted by households in Kalingalinga compound to enhance water quantity were; storing of water in drums, buckets and containers, putting up water tanks and rainwater harvesting. The table 1 shows the different strategies adopted by different households in coping with water scarcity and unreliable supplies in Kalingalinga compound.

Table 1. Household coping strategies for unreliable water supply in Kalingalinga compound.

S/N	Coping strategy	Number of households using the strategy (%)
1.	Water storage in small quantities such as small containers, buckets and drums	60
2.	Water tanks	20
3.	Rainwater harvest in rainy season	10
4.	Reschedule activities	70
5.	Recycle water	50
6.	Purchase water	40
7.	Treat water (boil/chlorinate)	80

Source: Field data, 2023

The table above shows the number of coping strategies (each percentage out of 100%) adopted by local residents in Kalingalinga compound. Due to the unreliable water supply, some residents in Kalingalinga compound were forced to store water in drums, buckets and small containers. About 60% of the respondents used buckets and containers as one of the coping strategies while only 20% managed to install water tanks by setting up electric pumps connected to overhead storage tanks.

When provided with water from the water suppliers, the respondents said they stored water in drums, buckets and in small containers. This is tandem with Odwori (2021) who noted that one of the household coping strategies for unreliable water supplies in Nzoia River Basin, Kenya is water storage through storage tanks, roof tanks, drums, pots, buckets, bottles. However, the storing water in such smaller containers is very tedious and time consuming as noted by residents of Kalingalinga compound. Because of this water scarcity, residents were forced to stay up late, or wake up very early to fill storage containers while the supply was still available. This took up a lot of their time as they usually spent one hour to three hours collecting water from these alternative sources, depending on the distance to the alternative source, number of trips made and time spent queuing. As Smiley (2016) stated, where the supply does not follow a set schedule, the supply is unpredictable and the feasibility of such storage is limited. Households also purchased water from kiosks, or paid for water from neighbors when the interruptions of water supply took more than two days, as the water which would have been stored would already have been used up. Hence, residents who did not have water tanks end up buying water from kiosks. This strategy was used by 40% of the respondents. Purchasing of water as a coping strategy for water scarcity is also reported by Pattanayak et. al. (2005) who noted that households in Kathmandu, Nepal, purchased water from vendors or kiosks, neighbours who had private wells, or paid for container or tanker deliveries to cope with unreliable water supplies.

Reducing water use, and recycling water were also part of the strategies to cope with unreliable water supply which was adopted by residents in Kalingalinga compound. 50% of the respondents recycled water while 70% of the respondents said they rescheduled their activities which required a lot of water. Activities, which required a lot of water, such as laundry were rescheduled to days when water was available. Households recycled water by reusing laundry or bath water for flushing toilets, mopping floors, watering vegetable or gardens. Water recycling was also a strategy used by people of Nzoia river basin in Kenya in order to cope with unreliable water supplies (Odwori, 2021).

Some respondents (10%) said that they harvested rain water, and stored it in small vessels such as buckets and drums. According to respondents interviewed, rainwater harvesting was only done during rainy seasons. Rainwater harvesting was done by placing buckets or drums beneath the edge of the roof as it rained when there was an interruption in water supply. This water was mostly used for washing, bathing and flushing toilets. This finding is in correlation with Odwori (2021) study on ‘household coping strategies for unreliable water supplies in Nzoia river basin, Kenya’ where it was noted that residents of Nzoia river basin harvested rain water in order to cope with unreliable water supplies in their region.

In addition, the unreliable water supply in Kalingalinga compound had caused the residents to also come up with coping strategies in terms of the quality of water used for consumption. 80% of the respondents said they that they treated water for consumption by boiling, adding chlorine or purchasing of bottled and sachet water.

4.3. Sustainable Coping Strategies

Sustainable water management simply entails the ability to meet the water needs of present generation without compromising the ability of future generation to do the same. One of the sustainable coping strategies that can be used is by reclaiming water or water reuse as it is known. This can act as a sustainable source for water supply and can alleviate stress on the primary water resources such as surface and ground water. Depending on the above given application, reclaimed water might need to pass through some form of treatment in order to provide the desired quality.

Reducing leakage and introducing demand management measures at each household level will mean reduction of wasting water. If the demand is managed, unnecessary water usage it will mean less waste of water hence increasing the availability of water at each household for all the basic use such as water for drinking and also for domestic usage such as cooking and washing.

Achieving sustainable coping strategies requires a multi-disciplinary and holistic approach in which technical, environmental, economic, landscape, societal and cultural issues are addressed. On the government part, for water utilities this can mean effective planning for water and waste ways systems to manage infrastructure and ensure the sustainability of the communities they serve.

5. CONCLUSION

The most obvious finding which emerged from this report is that unreliable water supplies impose significant coping burdens on households. In particular, the poorest sections of society suffer most from the impacts of unreliable water supplies and rely on coping strategies that are labor and time intensive. Consequently, the poorest sections of society may be missing out on the health and other benefits of access to safe water supplies even when they are reported as being served by improved supplies. As such, efforts aimed at mitigating unreliability of water supplies should target poorest sections of society who lack access to reliable water supply. The results of this study support a key alteration from concentrating on coverage of water supplies to improvement of the quality of service and in particular, water supply reliability. Such a shift is very important to the attainment of SDG target 6.1, if indeed the goal is to ensure universal and equitable access to safe and affordable drinking water for all.

6. RECOMMENDATIONS

It is evident from this study that water insecurity is still a challenge to human development in spite of coping strategies adopted by the residents of the study area. Improvement in water provision and in the right quality will therefore dependent on a number of factors ranging from policy matters, capacity building to advocacy and public health education. In this regard, the following recommendations have been made;

6.1. Policy Framework

In regard to policy gaps in the rural water provision, the government in conjunction with other stakeholders may need to develop a policy framework to coordinate water provision in rural urban setting. Enhancing easy access to water utilization and management facilities is important. Such facilities include storage facilities, treatment materials and water harvesting technologies. In order to ensure smooth operation of the proposed policy guideline a legal framework may also be necessary. This will reduce cases of water pollution from point source since domestic water is determined by the quality status of rivers and lakes; there is dire need to formulate a legal framework to regulate activities along the rivers and lake. However, such a proposal should be taken with certain caution so as not to interfere with the community's' socio-cultural systems of values and beliefs. Energy saving technologies could be used to avert the possible negative socio-economic and environmental externalities.

6.2. Capacity Building

Given the high level of water scarcity in the study area a lot need to be done to effectively implement the existing or proposed policy and legislation. This includes capacity building and necessary investment in water and sanitation service delivery. Based on the potential presented by the local initiatives in domestic water management, technological transfer and skill impartation is necessary in order to enhance proper coping water management strategies. Training of the local community on integrated water use is not only a necessary remedy against poor leadership but also means of empowering the local community in ownership of the development process. Cash transfer arrangements towards establishment of sanitation related facilities and water treatment plants are also necessary. Public utility development is the foremost step in enhancing water security. For instance, protection of water points can reduce point source water pollution.

6.3. Community Based Water Resource Management (CBWRM)

Water resource management is about balancing between water supply and demand in local communities. According to Oxfarm (2020) CBWRM is a valuable way to ensure community water supplies remain sustainable, because it places emphasis on assessing and monitoring available water resources by communities themselves. The aim of CBWRM is to identify and understand how water scarcity affects water availability, access and demand at household level, so that communities' and households' adaptive capacities can be strengthened through planning and direct involvement. Therefore, local communities in Kalingalinga in this context can be empowered with adaptive capacities through planning, education and direct involvement. This Community Based Approach to Natural Resources Management was also recommended by Milupi, Mweemba and Mubita (2023) and Milupi *et. al.* (2021) because it gives ownership to local communities and local solutions are implemented.

6.4. Environmental Education

In regard to advocacy and public health education, change of attitude and perception can be a remedy. However, for an effective change of mind and behavior efforts to have accurate knowledge about the community is necessary. Understanding of social axioms of a society is needed for development process. It plays a major role in enabling policy makers develop programs that can easily be adopted by the consumers of the development process (Mubita, 2021). In this view, therefore, there should be a concerted effort by the government and other partners to carry out an environmental education campaign to sensitize the community on the relationship between water, hygiene and human health. A public health education program may achieve this by working with the local community particularly women to train them on practices related to water, good hygiene and human health using multi-media approaches (Mubita *et. al.* 2022).

Secondly, a latrine awareness campaign may be useful in promoting sanitation standards. This will also require the training of trainers in order to impart the sense of latrines in homes. With financial support to the local leaders, a model latrine may be established in a central place to serve as an example to the community. This may be useful in transforming peoples' perception and attitude towards new cultural practices such as ownership of latrines. To achieve this, linkages between the various sectors such as water, public health and development planning is necessary. Though these recommendations are diverse in terms of approach and content, an ideal program for a domestic water security and sanitation may require a holistic approach so as to capture and harmonize different interests and needs of the society. This is based on the fact that the respondents appreciated the connection between water treatment and reduction in water-borne diseases, the rate of infection from bilharzia, cholera, typhoid, diarrhea and dysentery continues to rise.

6.5. Research Engagement

Stakeholders, especially those in water management and distribution should be involved in water resources and distribution research. This could help discover latest and modern approaches to water management in unplanned settlements like Kalingalinga in this context. Research engagement is also needed to better understand the cultural dimensions impacting water management practices and how they affect human behavior in different societies. Engagement in research was also proposed by Lako and Mubita (2021) as a means by which systems could be up to date with modern trends and management practices in teaching and learning.

Other sustainable mitigation measures to unreliable water supplies in Kalingalinga compound include the following:

- (a) Appropriately price water
- (b) Look to community-based governance and partnerships
- (c) Develop and enact better policies and regulations
- (d) Improve distribution infrastructure

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