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Article

Financial Factors and Service Delivery of Rural Water Supply Service: Traditional Mankhambira, Nkhata Bay, Malawi

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Abstract

This study explored financial factors influencing the effectiveness of rural water supply services in Malawi, focusing on the investment challenges in achieving Sustainable Development Goal 6 (SDG6) related to water and sanitation. Using a mixed-methods approach, it included qualitative interviews with 299 participants and quantitative analysis of investment data from government entities and institutions like the World Bank and the African Development Bank (AfDB). The findings revealed that inadequate financing, unequal resource distribution among District Councils, and an investment imbalance favouring water development over operational needs significantly contribute to the non-functionality of rural water systems. Additional challenges, such as low community demand and a lack of local financing, further hinder sustainable water management. The study emphasises the necessity for a well-balanced funding strategy and consistent financial support to enhance infrastructure sustainability. Recommendations include increasing community involvement in water management, creating tailored financial models that reflect local capacities, and improving government accountability in water service delivery. Overall, the research highlights the urgency for collaborative efforts among stakeholders to develop sustainable solutions for Malawi's water supply challenges and suggests integrating traditional water management practices with modern methods for greater efficiency.

Keywords: community contribution; functionality; local financing; service delivery; water supply services

1. Introduction

The financial factors and functionality of rural water supply services are critical issues impacting the achievement of universal access to water and sanitation, particularly in developing countries like Malawi. According to OECD (2018), while there is a strong economic rationale for investing in water-related projects, this has not translated into substantial financial commitments globally. The World Bank (2012) estimated that Malawi requires at least US$140 million annually to provide basic Water, Sanitation, and Hygiene (WASH) services for its population. However, UNICEF (2019) highlighted numerous financial obstacles that could impede Malawi's efforts to achieve Sustainable Development Goal 6 (SDG6) — universal access to water and sanitation.

One significant challenge is the inadequate distribution of WASH resources to District Councils, which hampers their ability to respond to local financial needs. Although there have been increases in budget allocations for WASH activities, these allocations continue to fall short of national and international targets. Furthermore, investments in the WASH sector tend to be heavily skewed towards water development due to reliance on donor funding, with insufficient recurrent financing for ongoing operations and maintenance. Regional population growth also exacerbates the situation; JICA (2021) reported a 35% population increase in Malawi from 2008 to 2018, resulting in heightened

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demand for water services. According to the WASH sector Joint Review Meeting Report (2019), several critical challenges impede the water supply sub-sector, including poor revenue collection by water boards, substantial unpaid bills by the government, increasing non-functionality of rural water supply services, and inadequate funding for rural infrastructure.

Despite significant investments from the Malawi Government and various development partners, the financial landscape remains concerning. The African Development Bank (AfDB), for instance, is managing a US$30.4 million project in Nkhata Bay, while the World Bank is executing a US$100 million water and sanitation project in Lilongwe. Other contributors include UNICEF, the European Investment Bank, USAID, and several NGOs. In its 2022/2023 national budget, the government allocated approximately US$185.4 million to the Ministry of Water and Sanitation, yet true progress hinges on the effectiveness of such funding. Research has shown that relying solely on community members for rural water management is insufficient. For example, studies in Ethiopia indicated that integrating traditional practices with modern water management methods is necessary, but these should be tailored to specific local conditions. Additionally, Cleaver and Toner (2017) noted that user fees intended for the Uchira Water Scheme were not collected, ultimately leading to its failure. In Ghana, community contributions to rural water upkeep proved ineffective, as reported by Gyau-Boakye (2011) and supported by other studies.

In Malawi, research by Holm et al. (2015) revealed that communities faced severe financial challenges, making them reluctant to invest in water services, especially as some operators-imposed fees. The technical capacity for managing underground water resources in these communities is lacking. Montgomery, Bartram, and Elimelech (2009) identified three primary barriers to the functionality of rural water supplies: ineffective community demand, inadequate local financing and cost recovery, and poor operational maintenance by the communities. The reliance on inaccurate data for monitoring water resource functionality further complicates these challenges. Ultimately, addressing the financial and operational barriers within Malawi's rural water supply services is vital for moving towards universal access, requiring a concerted effort from the government, development partners, and the communities themselves.

2. Materials and Methods

The study was conducted in Traditional Authority (TA) Mankhambira in Nkhata District in Malawi. Traditional Authority (TA) Mankhambira is located in Nkhata Bay District, Northern Malawi. The area was chosen due to persistent functionality problems with water sources despite prior development support from NGOs like World Vision. This chapter systematically details the study's locale, participant demographics, and mixed-method approach for data collection and analysis.

The research area, TA Mankhambira, is roughly 47 kilometers east of Mzuzu City. The district water office's findings indicated that even after the installation of boreholes and other water sources funded through international partnerships, many faced significant operational challenges. This highlighted the necessity for research to explore the underlying issues affecting water accessibility and functionality in the region. A map detailing TA Mankhambira is included for visual reference.

The participant demographics are outlined in a table, presenting a total of 299 individuals, drawn from varied groups through different methods of engagement. Quantitative data was gathered from 121 households, comprising 38 men and 83 women through household interviews. Additionally, focus group discussions (FGDs) were held with 104 individuals, evenly split by gender, to gather qualitative insights. Key informant interviews (KII) included 74 participants—30 men and 44 women—who held positions relevant to water management, such as the District Water Development Officer and local leaders. These informants were chosen for their expertise in managing rural water supply services and the operational challenges faced by the community.

A notable aspect of the study was the engagement of local technicians, the Area Water Mechanics (AWM), and Health Surveillance Assistants (HSA). AWMs were identified as critical support for training community water committees, while HSAs addressed health-related issues, including

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sanitation and water purification. However, the study revealed overlaps in their roles, which led to confusion and ineffective support for local communities seeking assistance.

The research was conducted in both Chichewa and Chitonga for community interviews and in English for key informants to ensure clarity and accuracy in gathering data. The methodological approach adopted was a mixed-method design, particularly a sequential mixed-method design. This strategy allowed for the collection of quantitative and qualitative data at separate times, leading to a more comprehensive understanding of the research problem. The initial phase involved collecting quantitative data from households using water points, followed by qualitative data gathering through interviews and discussions.

The survey method was employed to facilitate data collection through questionnaires and interviews. This approach not only allowed for a diverse range of data types to be gathered but also enhanced the study's robustness by incorporating various perspectives and insights into the water supply challenges faced by the communities in TA Mankhambira. This chapter fundamentally underscores the importance of a well-structured research design in addressing the complex issues surrounding water accessibility and management in rural settings.

3. Results

The functionality and sustainability of rural water supply services are crucial for improving the quality of life in underserved communities. However, the effectiveness of these services is often hampered by various financial factors that play a significant role in their overall performance. This section aimed to analyse the financial determinants that influenced the operation and maintenance of rural water supply systems. By investigating aspects such as the management of contributed funds, the prevalence of corruption, community involvement, and the role of government policies, this research sought to uncover the complex financial landscape shaping access to clean water.

The findings delved into the concerns raised by community members regarding fiscal mismanagement, highlighting the urgent necessity for accountability and transparency in financial practices. Additionally, the role of local engagement in enhancing financial oversight and fostering sustainable funding mechanisms was examined. Ultimately, this analysis was intended to provide insights that could inform policy stakeholders and community leaders in their efforts to optimise the functionality of rural water supply services, thereby ensuring equitable access to vital water resources for all.

The fourth objective of this research investigated the financial factors that influence rural water supply services. **Table 1** illustrates that financial factors emerged as a critical determinant of the functionality of rural water supply systems, with an overall factorial analysis score of 75%. This score was influenced by various loading factors assessed under this objective. However, the research identified that 88% of respondents expressed concerns regarding the mismanagement of contributed funds and corruption, which were recognised as significant governance challenges. Furthermore, 95% of participants reported instances of financial mismanagement and corruption, highlighting that these issues pose a major impediment to the sustainability of water services in the region.

Table 1. Financial Factors and Functionality of Rural Water Supply Services.

FINANCIAL FACTORS				
Loading Factors	**Percentage contribution**	**Suppressed factors**	**Average percentage**	**Overall**
Mismanagement of contributed funds	95%	Mismanagement of contributed funds and corruption cases	88%	
Corruption cases	95%			

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Action is taken against those involved in malpractice	74%			**75%**
Roles of the community in ensuring accountability of the funds	83%	Roles of the community members in accountability of the funds	78%	
Prudent fund usage	82%			
Audit takes place	69%			
Fundraising activities	57%	Community fundraising activities	65%	
Pre-funding collections	50%			
Expected to contribute something before construction	87%			
Knowledge of government policies, guidelines and conditions	64%	Governance policies and guidelines for water provision	69%	
Roles of Central Government in the provision of water for all	73%			

On a positive note, 78% of community members expressed their willingness to participate in fund accountability efforts, supported by 83% recognising the community's role in ensuring financial accountability, demonstrating that local engagement could enhance transparency. Additionally, 65% of respondents indicated that they engage in community fundraising activities, with 57% highlighting various fundraising efforts and 50% supporting pre-funding collections, emphasising the importance of local financial contributions in sustaining water services. A significant 69% of respondents acknowledged the critical role that governance policies and financial guidelines play in effective water management, underscoring the importance of structured frameworks for financial oversight. Furthermore, 64% of those surveyed were aware of specific government policies, guidelines, and conditions that govern water resource management, indicating an overall understanding of the regulatory landscape. An even higher percentage, 73%, recognised the central government's pivotal role in ensuring the provision of water resources for all citizens, highlighting the necessity of coordinated efforts for water accessibility. These findings indicate that while financial contributions to water supply initiatives remain relatively consistent, pervasive issues such as

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corruption and mismanagement continue to hinder progress toward achieving sustainable water supply solutions. This underscores the urgent need for enhanced accountability and transparency within governance frameworks to address these barriers effectively.

The study further highlighted critical issues related to financial mismanagement and a lack of accountability within community water management structures. Community members expressed significant concerns about how funds allocated for the operation and maintenance of water points were being utilised. This concern was especially strong among individuals involved in local leadership, leading to the recommendation that water committees conduct regular audits. Such audits are deemed essential to improve transparency, accountability, and operational efficiency in the use of financial resources.

One participant emphasised the community's urgent need for financial support to maintain and ensure the reliability of critical water infrastructure, such as pumps, wells, and pipes. He stressed the importance of obtaining spare parts necessary for the effective functioning of these systems and argued that securing these resources would not only enhance the water supply but also significantly improve community well-being by ensuring consistent access to safe water. This view aligns with the broader discussion about the vital role of reliable water services in promoting community health and development.

The analysis also highlighted the crucial role of non-governmental organisations (NGOs) and development partners in financing water initiatives, particularly for borehole drilling and shallow well construction. However, the withdrawal of support from major organisations like World Vision and CPAR has raised serious concerns among community members who have historically relied on these entities for infrastructural development. The reduction in support poses significant risks to both the immediate availability of water sources and the long-term sustainability of water security initiatives in the region. A member of Nowa Village articulated that increased support from NGOs and government partners is essential for maintaining and improving community water services.

Furthermore, the community demonstrates a strong awareness of governmental policies and regulations governing water resource management. This understanding promotes active participation in local stewardship, as reflected in the community’s substantial contributions to water point construction, including both financial inputs and the provision of essential building materials. Such collective involvement not only signifies a strong sense of ownership but also fosters a culture of accountability and collaboration necessary for the effective management of water resources. The Borehole Committee is charged with the financial management of community contributions. In incidents of misappropriation, community leaders often demand restitution from those responsible, thereby reinforcing the community's commitment to the prudent management of financial resources critical to the sustainability of water supply services.

4. Discussion

The financial factors emerged as the second most prioritised and crucial element in influencing the functionality of rural water supply services in TA Mankhambira, Nkhata Bay District. The overall results indicated that these financial aspects accounted for 75% of the variables affecting the functionality and sustainability of rural water supply services. This factor was particularly significant due to the ongoing reliance on government support and assistance from development partners, including non-governmental organisations (NGOs), even amidst innovative approaches designed to empower local communities in managing their water resources. Despite these advancements, the reliance on external funding sources remained pronounced.

One of the most substantial challenges faced in this context was the high cost associated with the implementation of essential infrastructure projects, such as gravity-fed pipeline systems and the drilling of boreholes in rural areas. According to findings from the research, the estimated expenditures for drilling a borehole in Malawi ranged from US$5,000 to US$8,000, a financial burden that many rural communities struggle to meet. The implications of these costs highlight the urgent

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need for more sustainable financing models and community-driven initiatives that could alleviate some of these financial barriers, ultimately enhancing access to reliable water supply services.

The research rigorously examined several elements associated with financial factors. Some of the elements considered under financial factors included pre-funding activities. Settling of disputes, corruption, among others. The results showed that 83% of the community members were engaged in the pre-funding activities, while 74% were involved in the fundraising activities. The research noted that the chiefs were also involved in mobilising funds and settling disputes whenever they arose among the committees. The chiefs were also responsible for instilling discipline of some malpractices or cases of corruption like misappropriation of funds designated for essential maintenance of water points. The research also assessed the different methods used by the community to mobilise funds for the operations and maintenance of the water points, including whether they were required to contribute financially before the installation of these essential resources.

Furthermore, it examined the processes for auditing the community-raised funds dedicated to operation and maintenance, identifying who was responsible for conducting these audits. An aspect of this inquiry focused on investment trends within the water sector, particularly concerning rural water supply services in Nkhata Bay District, evaluating whether such investments were justified given the multitude of competing financial needs in the area. The research findings uncovered some compelling insights into the perceptions and experiences of community members regarding financial management within community water management committees. An overwhelming 95% of the participants expressed a strong belief that financial misappropriation had occurred at various times, highlighting a deep-seated concern over the management of resources that were crucial to their livelihoods. This challenge was further underscored by the fact that over 86% of participants stressed the important role of the community in enforcing accountability among committee members responsible for overseeing these vital resources. Results showed that 69% of the water committees revealed that they regularly conducted audits to monitor the funds allocated for the maintenance of boreholes and other rural water supply services.

Typically, the executive members of the Water Point committee took the lead in these audits by ensuring transparency in the handling of finances. In situations where rumours of financial mismanagement emerged—particularly related to funds contributed by development partners—local leaders occasionally intervened to carry independent financial audits, reflecting the community's proactive approach to governance. Moreover, the study highlighted a significant burden placed on community members, with 87% indicating they were often required to provide financial contributions and essential materials, such as sand and bricks, before any water points could be established. When assessing community satisfaction with government and partner interventions aimed at ensuring the sustainability and accessibility of water resources, 73% of participants deemed these efforts acceptable. Yet, dissatisfaction loomed large, with 88% expressing discontent regarding the expenditures made by the water committees from the funds contributed by the community.

A significant majority, more than 78%, believed that members of the water point committee were to be held accountable for the funds contributed by community members towards the functionality of rural water supply services. These results align with findings from the Water and Sanitation Programme (WSP 2015), which highlighted the importance of clarifying the responsibilities of governments and development partners in water and sanitation services. The data further illustrate that the responsibility for developing rural water resources extends beyond community efforts alone. A comparative study conducted in Malawi by Holm, Singini, and Gwayi (2016) revealed similar challenges, as certain service providers began to impose charges for water services, leading to a reluctance among communities to invest in the expansion of water supply services due to financial constraints.

A financial analysis noted that if Malawi was to achieve SDG6, it needed to overcome various financial obstacles for all Malawians to have universal access to water and sanitation services (UNICEF, 2019). The government of Malawi estimated that the nation needed to invest at least US$140 million (MK105 billion) per year to provide basic WASH services to all populations (World

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Bank, 2012). However, one of the challenges was that District Councils, who have been considerate of the different budgetary demands, were receiving fewer funds for WASH activities. Save for an increase in funding, WASH programme funds remain insufficient for national and international objectives. Furthermore, it was noted that little money was set aside for continuous operations and maintenance and that many WASH investments supported water development projects, the majority of which were funded by donors. In a similar vein, the Uchira Water Scheme in Tanzania failed because user fees, which were supposed to be raised for operations and maintenance, were not raised (Cleaver and Toner, 2006). Gyau-Boakye (2009), on the other hand, indicated that Ghana has not been successful in asking communities to pay for the delivery of water for rural water supplies (Adank and Tuffuor, 2013). These results were also consistent with the study by the OECD (2018), which noted that while there was a compelling economic case for water-related expenditures, there has never been sufficient data to justify significant international investment. It is expected that future investment needs will exceed existing financial sources.

The government of Malawi and other development partners have made significant investments in this field. For instance, the World Bank, through the International Development Agency (IDA), implemented a water and sanitation project in Lilongwe worth US$100 million; the African Development Bank (AfDB) implemented a US$30.4 million project in Nkhata Bay Town; the European Investment Bank implemented a US$27 million project in Lilongwe; and the Exim Bank of India provided US$112 million in support to the Blantyre Water Board. UNICEF, the European Union, Water for People, Water Aid, United Purpose, World Vision, WESNET, USAID, FAO, and Engineers with Boarders were a few other organisations that were active partners in this field. In the meantime, the government of Malawi gave the Ministry of Water MK151.5 billion (US$185.4 million) in the 2022–2023 national budget.

The study has shown that financial factors emerged as the most significant factor, accounting for a substantial 75% of the overall functionality of rural water supply services in this district. This statistic underscores the critical importance of adequate financial support from both the government and various development partners; with such backing, the community is likely to struggle to manage these essential water supply services. The infrastructure required for water supply entails significant financial investment, which is particularly challenging in rural areas. To meet the targets lined in Sustainable Development Goal 6 (SDG 6), Malawi must make a concerted effort to bolster rural water supply initiatives. Attention and resources should not be disproportionately allocated to urban and peri-urban areas.

Evidence suggests that rural areas were more susceptible to waterborne diseases due to inadequate hygiene practices and infrastructure compared to towns where sanitation is considerably better. Therefore, it is essential to channel substantial investments into the improvement of water supply services in rural communities. As the familiar adage states, "*water is life,*" highlighting the fundamental role that access to clean water plays in the well-being of individuals and communities. Thus, prioritising investment in rural water supply services should become a cornerstone of the Malawi government's development agenda, recognising that the health and prosperity of rural populations are intrinsically linked to reliable access to safe water.

5. Conclusions

The functionality of rural water supply services in Malawi is significantly influenced by financial factors. One of the key conclusions from the study is the importance of addressing the financial barriers faced by rural communities. Inadequate funding and high maintenance costs create substantial challenges for ensuring consistent access to clean water. To enhance the sustainability and effectiveness of these services, it is crucial to implement strategies that prioritise financial inclusion. This includes establishing effective community contribution mechanisms that encourage financial participation and investment from residents. Strong financial management practices are essential for maintaining the services and maximising available resources.

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Additionally, external funding sources, such as grants and subsidies, play a vital role in supporting rural water supply initiatives. Therefore, developing partnerships with governmental and non-governmental organisations can provide the necessary financial support to overcome the existing limitations. Overall, addressing financial factors is pivotal for improving the functionality of rural water supply services. By focusing on financial sustainability and exploring various funding avenues, communities can ensure long-term access to clean and reliable water sources.

6. Patents

This section is not mandatory but may be added if there are patents resulting from the work reported in this manuscript.

Supplementary Materials: The following supporting information can be downloaded at the website of this paper posted on Preprints.org.

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Author Contributions: Lamech Chimphero, a dedicated researcher with expertise in methodology, was responsible for designing the research study comprehensively and collecting data meticulously from various sources. Associate Professor Mavuto Tembo, an experienced statistician, conducted a detailed data analysis and provided invaluable insights that contributed to a thorough interpretation of the results, ensuring the findings were both robust and meaningful. Dr. Richard Gadama, a seasoned scholar of academic writing, took charge of reviewing and editing the manuscript, focusing on enhancing clarity, coherence, and ensuring that the work met the highest standards of academic rigour and integrity before publication.

Ethical Clearance Statement: I hereby confirm that ethical clearance for the conduct of this research was obtained from the National Commission for Science and Technology (NCST) in Malawi. The research protocol was reviewed and approved in accordance with the ethical guidelines and standards for research involving human participants. The clearance was granted under the approval reference number **NCST/RTT/2/6** dated **1st November 2023.** All necessary procedures to ensure the protection of participants' rights, confidentiality, and well-being were strictly adhered to throughout the study, as outlined in the approved research protocol.

Abbreviations

The following abbreviations are used in this manuscript:

AWM Area Water Mechanics
HSA. Health Savellance Assistants
MSG Malawi School of Government
MZUNI Mzuzu University
NCST National Commission for Science and Technology
NGO Non-governmental Organisation
SDG Sustainable Development Goals
TA Traditional Authority
WASH Water Sanitation and Hygiene

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