



Exploring Borewell Sustainability in Northern Malawi Villages

Identifying Key Gaps and Opportunities for
Improved Water Access

This project was developed for the OpenWashData Hackathon. The dataset used, *boreholefuncmwi*, provides insights into borehole management in Northern Malawi. The data was analyzed and visualized using Excel and R to uncover gaps and opportunities in borehole management across the villages of Karonga District in Northern Malawi.

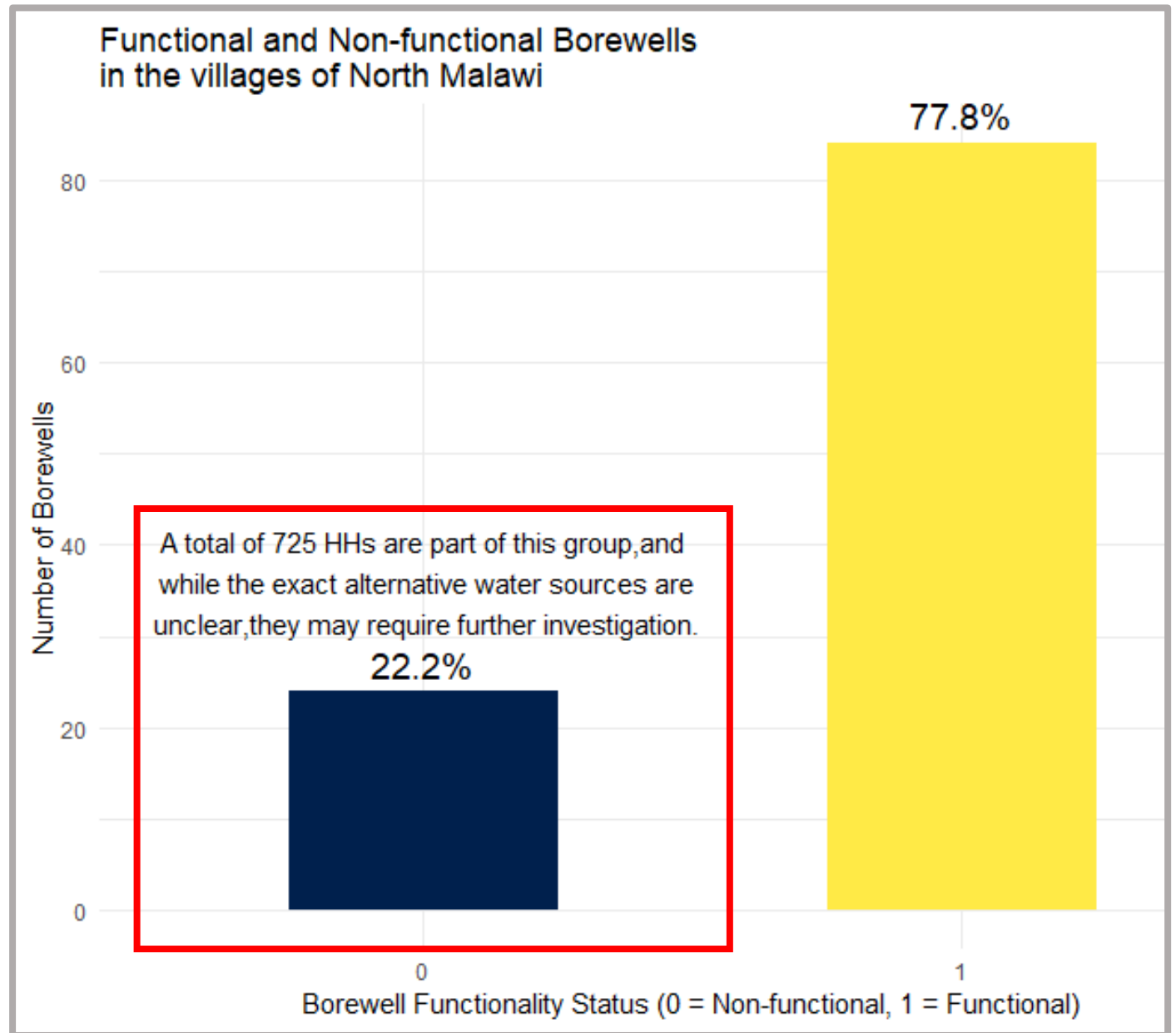
Date made available by - Yesaya M, Preisig J, Kayira H, Zhong M (2024).
"boreholefuncmwi: Analysis of boreholes' functionality in Northern Malawi."
[doi:10.5281/zenodo.12635354](https://doi.org/10.5281/zenodo.12635354)

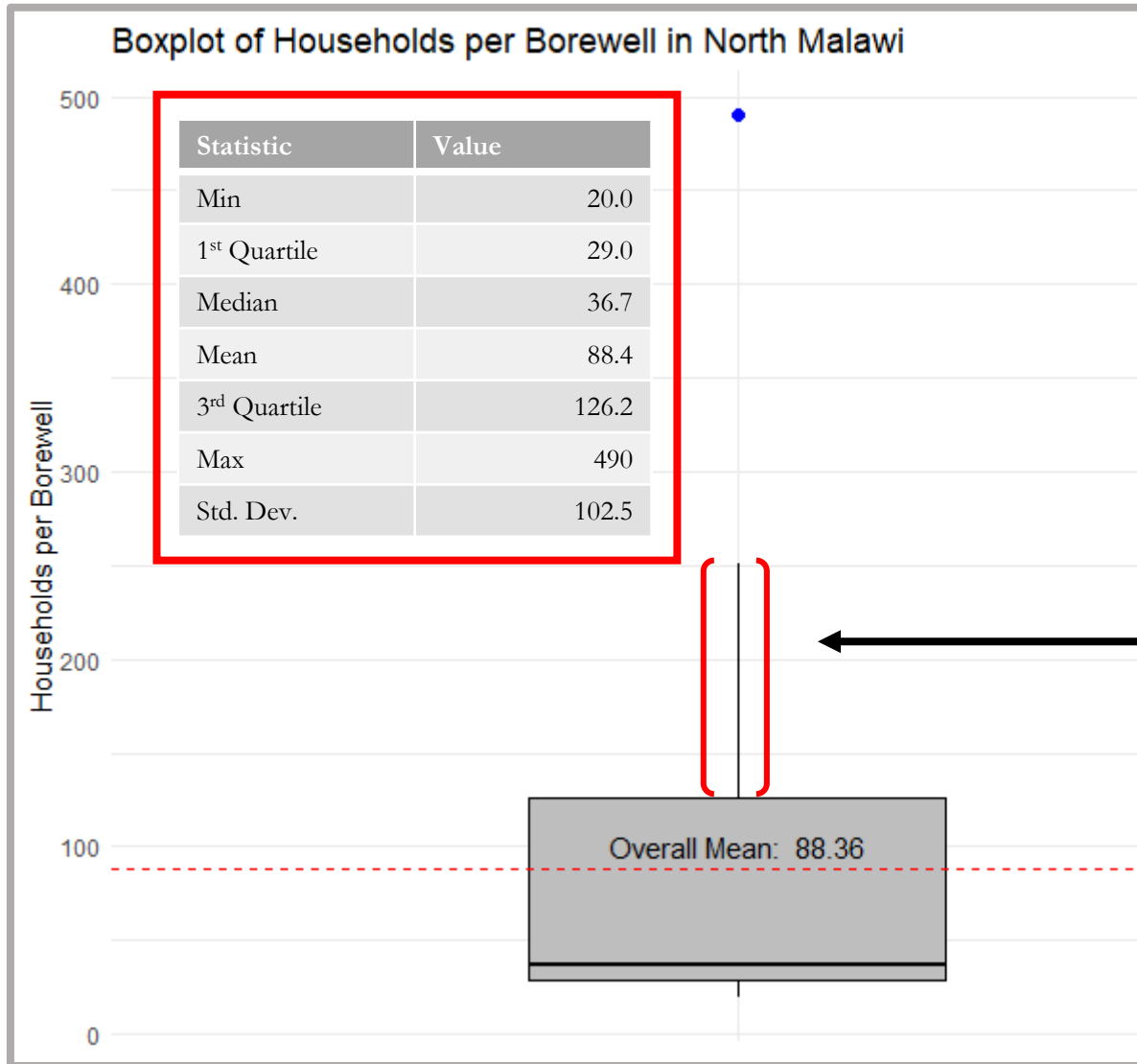
Prepared by: Prerna Prasad



A total of **108 boreholes** were surveyed in this dataset, capturing information about their management and functionality.

The graph represents the **percentage of boreholes that are functional versus those that are non-functional**, providing a clear overview of the current state of borehole functionality in Northern Malawi.



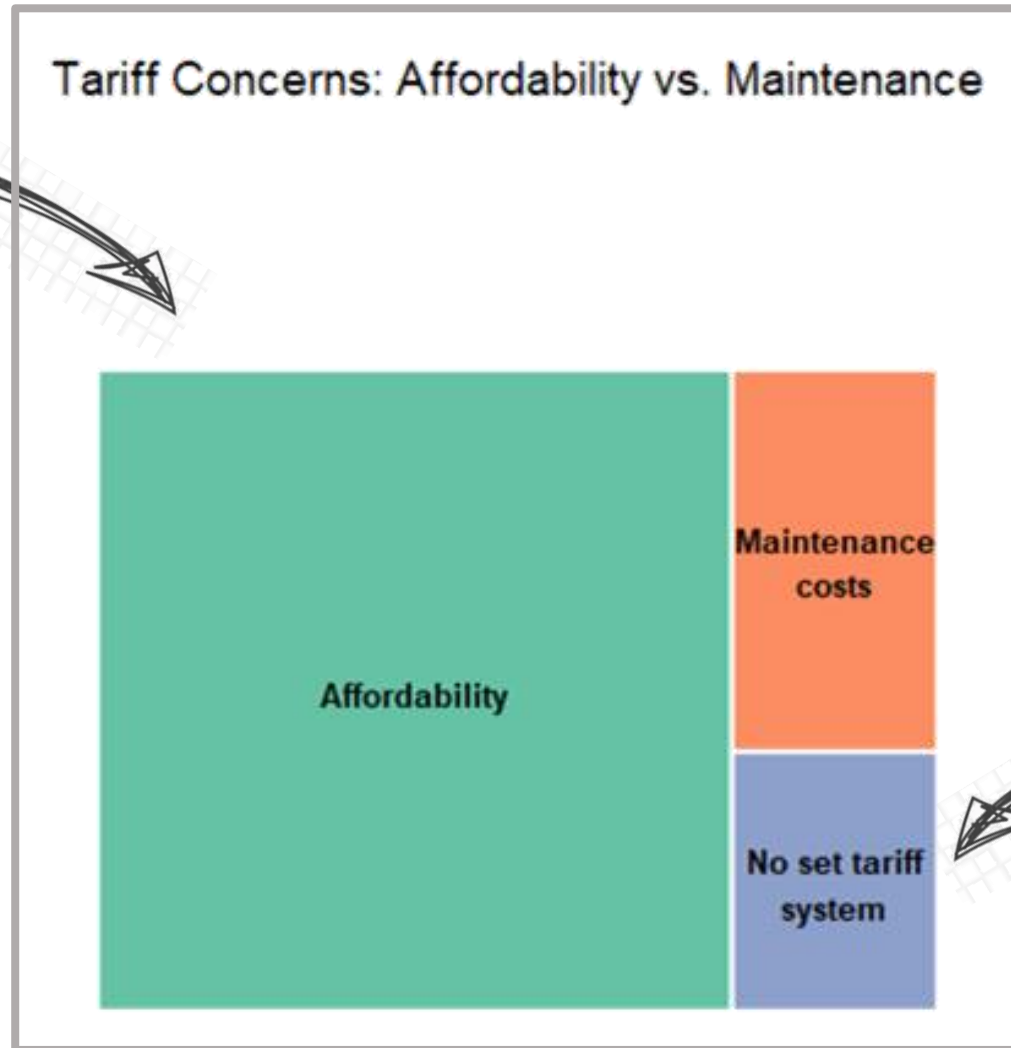


Ratio of households per borehole???

crucial for assessing the adequacy of water access, ensuring equitable distribution, and identifying potential overuse or strain on borehole resources that could lead to functionality issues.

The top 25% of villages, with the highest values for households per borewell, may be experiencing significant stress on their water sources, raising important questions about alternative water sources and the impact on daily routines, particularly for women, though further investigation would be needed to confirm these challenges.

In the villages of North Malawi, affordability is a major concern when it comes to setting up a tariff system, which could likely be due to economic constraints, limited access to resources, and the vulnerability of many households to fluctuating incomes.



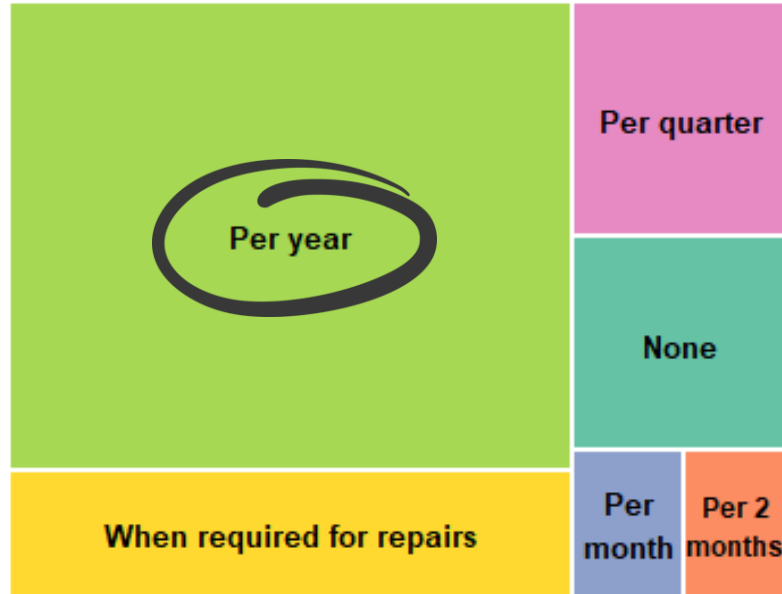
14 villages without a set tariff system

Setting up a tariff system should be the first step for the 14 villages as it lays the groundwork for sustainable borewell maintenance.

A well-designed tariff can ensure a steady flow of funds for repairs, reduce unexpected costs, and create accountability in water usage.

It can also empower communities by making them proactive stakeholders in maintaining their water infrastructure, leading to more reliable and long-lasting access to clean water.

Annual Payment Dominates Borewell Tariff Preferences



Possible reasons for preference for annual payments

- irregular cash flow/seasonal income
- easier administration
- traditional communal contributions
- perception that lump-sum payments are more manageable.

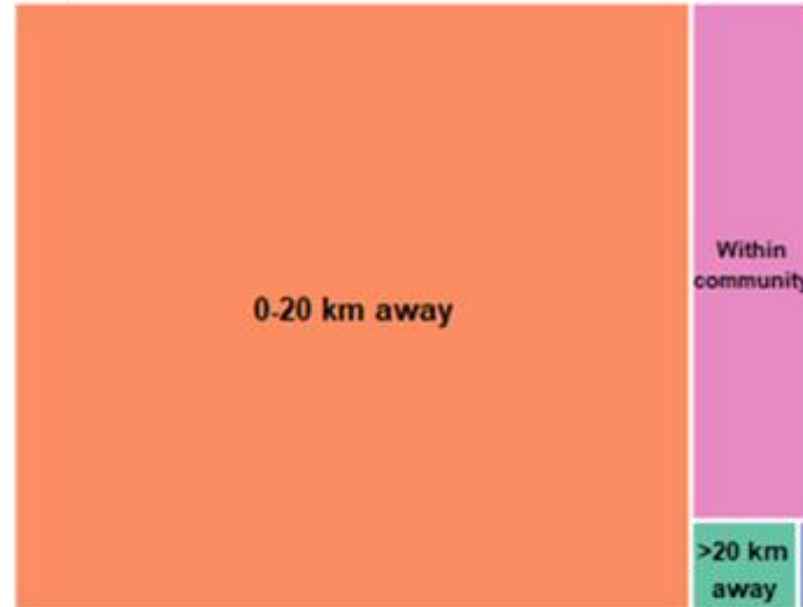
83%

Households paid the last time money was collected for maintenance or repairs

This indicates a relatively high level of responsibility and engagement among households regarding the upkeep of the borewells. However, it could also imply that the remaining 17% either face financial constraints or may not fully recognize the importance of contributing to the maintenance, potentially affecting the sustainability of water access in the long term.

How Far Are Repair Materials? Community Insights

The majority of households report that repair materials are accessible within 0-20 kilometers, indicating that most communities have reasonable access to these resources.



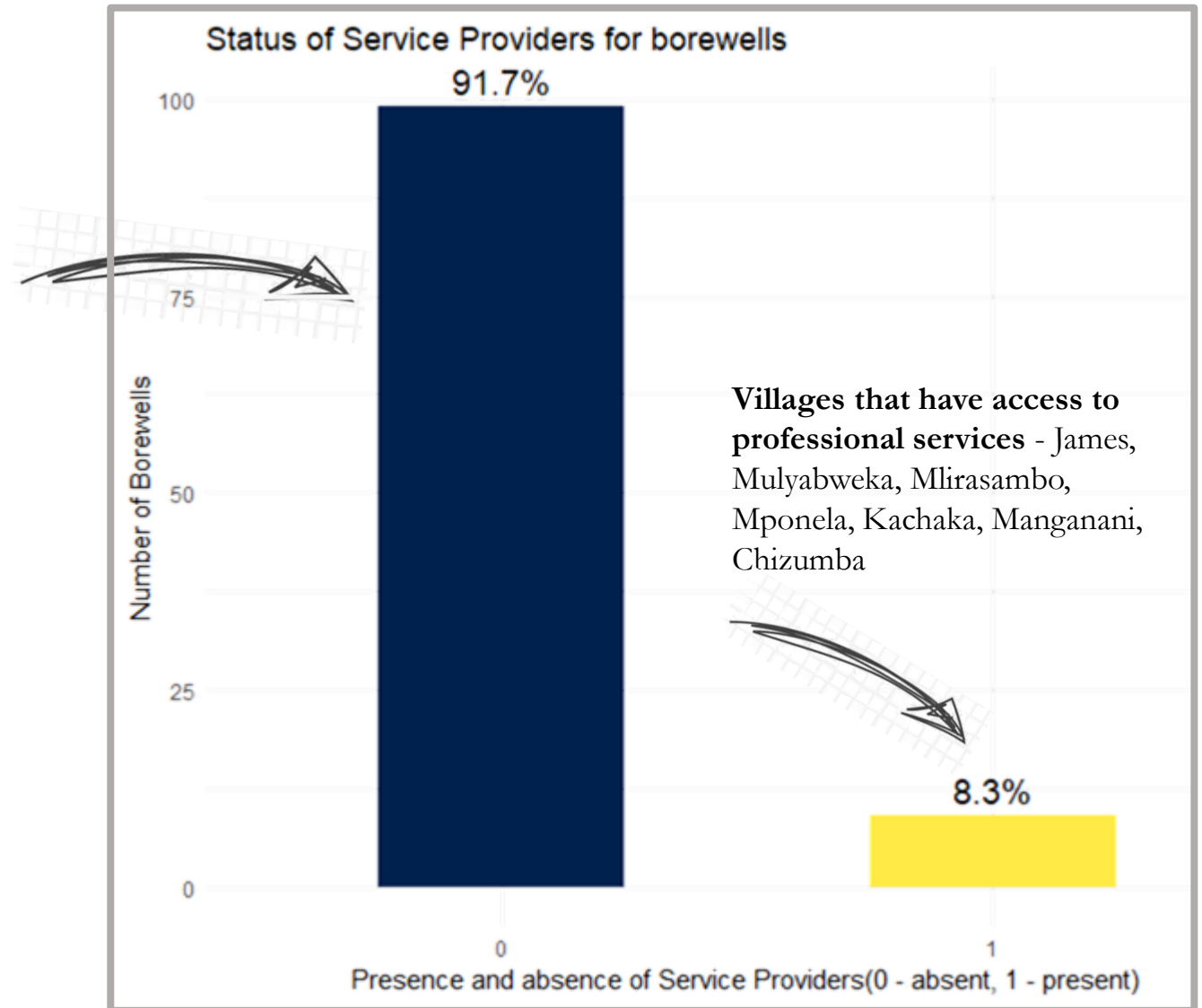
A small proportion of households noted that materials are available more than 20 kilometers away, suggesting logistical challenges in remote areas, where poor transportation or limited resources could impact the sustainability of borewell maintenance.

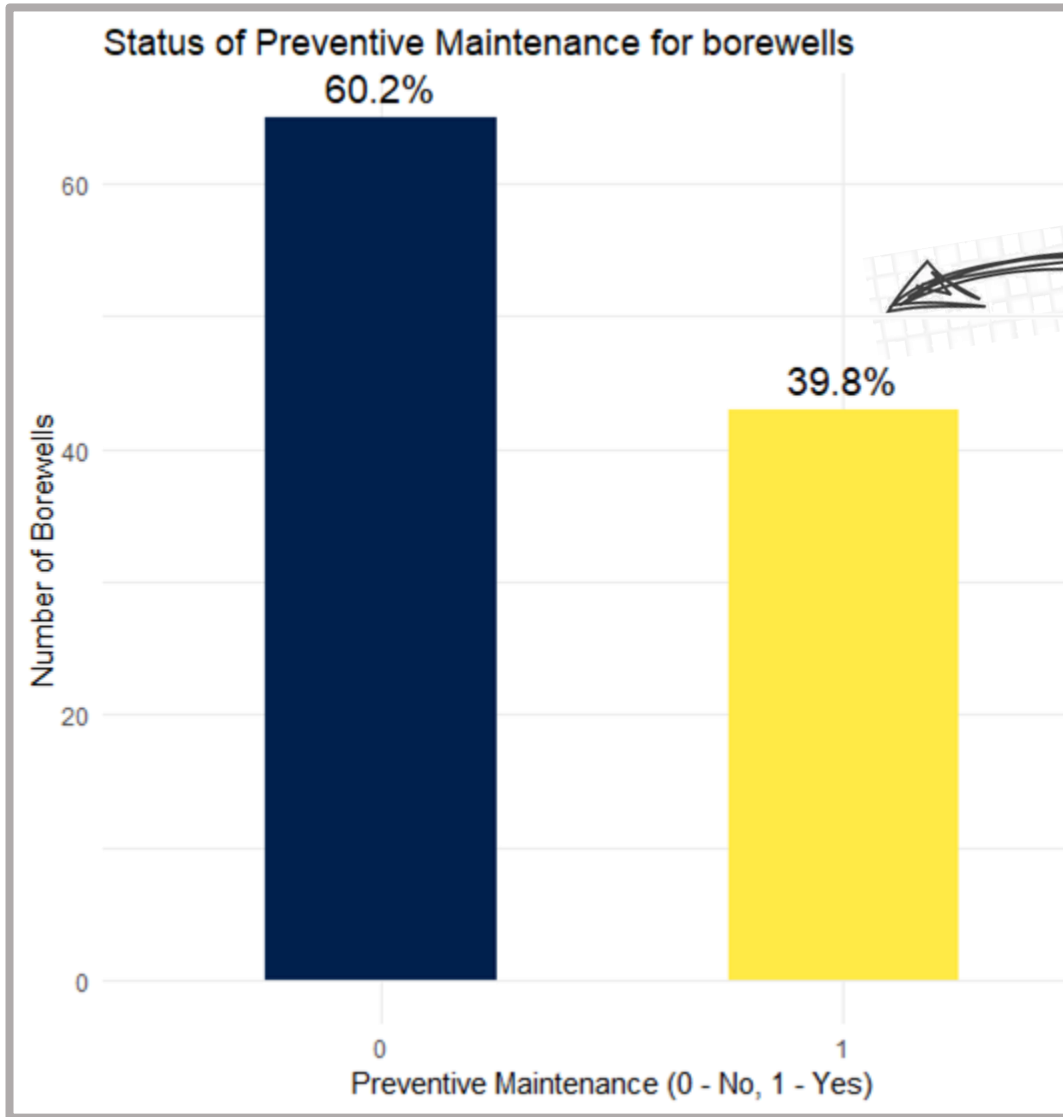
Villages that reported >20 kms distance for availability of repair materials -
Mulyabweka, Mirasambo, James, Kaputamwera, Kayuni

The fact that $\approx 92\%$ of the borewells did not have a service provider likely indicates **limited access to professional maintenance services**.

Communities may be relying on informal or local solutions, with maintenance and repairs handled by local residents instead of trained professionals. This could be due to financial or logistical barriers that make hiring dedicated service providers challenging.

This also highlights a reliance on community-based management, which, while resourceful, might lead to inconsistent maintenance quality and increase the risk of future breakdowns.





This suggests that a **significant portion of the community values the importance of regular upkeep to ensure the functionality and longevity of their water sources.**

However, it also indicates that a majority may lack the resources, awareness, or organization to prioritize preventive measures, potentially leading to higher rates of non-functional boreholes in the long term.

Understanding these practices can provide insights into community behaviors and the need for targeted interventions to promote sustainable water resource management.



Summary

- 22.2% of borewells are non-functional, highlighting the need for improved maintenance efforts.
- High household-to-borewell ratio in top 25% of villages stresses water sources, with potential access issues.
- Affordability issues hinder the establishment of a tariff system for borewell maintenance, with 14 villages lacking one.
- Yearly tariff payments are preferred by households, reflecting agricultural income cycles and administrative ease.
- Repair materials are accessible within 0-20 km for most households, but logistical challenges remain for remote areas.
- 92% of borewells lack professional maintenance services, relying on informal community-based solutions with variable quality.