

Performance of household's pit latrines compared to RS ISO 24521 standards: a case of Kigali City, Rwanda.

Authors: *M.L. Murebwayire, I. Nhapi, U. W. Garba*, E. Nilsson*** & E. Muhirwa****

*University of Rwanda, **Centre for Urban Resilience, Water and Climate Change, Chinhoyi, ZIMBABWE, ***Lund University, **** Save the Children

Introduction

Globally about 3.5 billion people have not access to safely managed sanitation (JMP,2024). Onsite sanitation systems (OSS) are the main sanitation technologies used in sub-Saharan African Cities including Kigali City (JMP, 2023).OSS includes pit latrines, and it is a system that collects excreta and wastewater, stores and partially treats them on the site where they are produced (Elizabeth *et al*, 2014). Poor OSS can lead to disease spread and water resource pollution (WHO, 2018).

A hilly city with marshlands and water bodies downstream
89% of households use pit latrines, 51.5% share with others
Poor quality toilets
Rapid growth: 2391/km2, about 3% annual growth

Available regulations: RS/ISO 24521, ISO 30500, and Guidelines for FSM
No client-based sanitation
No centralized sewer and treatment plants

Pits overflow during rain
Limited options for sanitation technologies
Limited access to sanitation: high % HH sharing toilets

Wastewater smell
Illegal emptying and dumping
Expensive professional emptying services
Leakages to environment

Unviable pit emptying and resource recovery businesses
Water bodies and 15% of Kigali's population use water from wells and springs
High risks of disease spread for sanitation workers

High risks of diseases spread with potential negative nutrition outcomes in under 5 yrs old children
Unsustainable FSM value chain
Potential contribution to GHG and landslides

Figure 1: problem statement

The study's objective was to determine the sustainability and environment protection performance of pits latrines and cesspits in Kigali City compared with RS ISO 24521.

Materials and methods

A household survey and toilet investigation were conducted in Gasabo District, in its 5 out of 15 sub-districts which are more representative due to their diverse settlement. Only households with pit latrines and cesspits were targeted and randomly selected

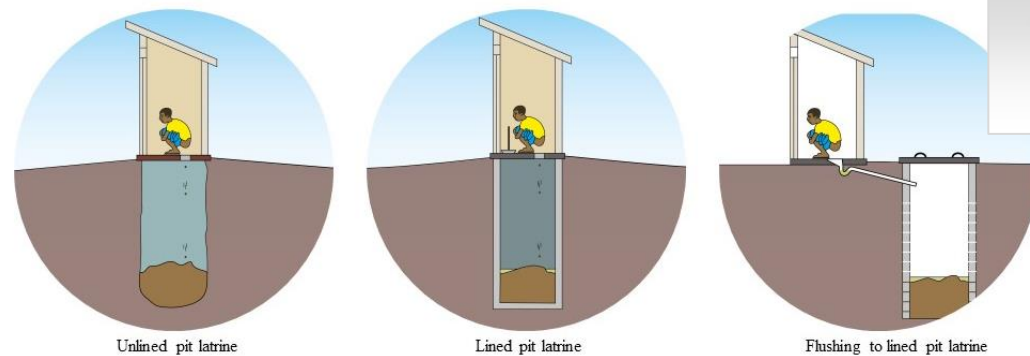


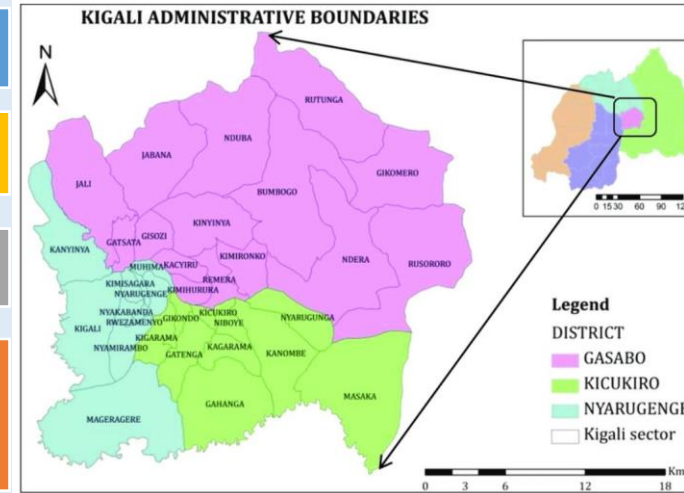
Figure 2: Types of pits. Shaw, Rod (2019). Latrines and toilets. Loughborough University. Collection

A sample of 969 households was calculated using the Cochran formula with a research confidential level of 95%, precision of 5%, and an estimated proportion of 80%.

The survey and inspection were done from December 2023 to February 2024, using mWater to collect data. A total of 923 households were surveyed with 438 households using pit latrines and 467 using cesspits.

67 households refused to participate in the survey, and 2 responses were rejected due to poor quality of data. Households who agreed to participate in the survey signed a consent form.

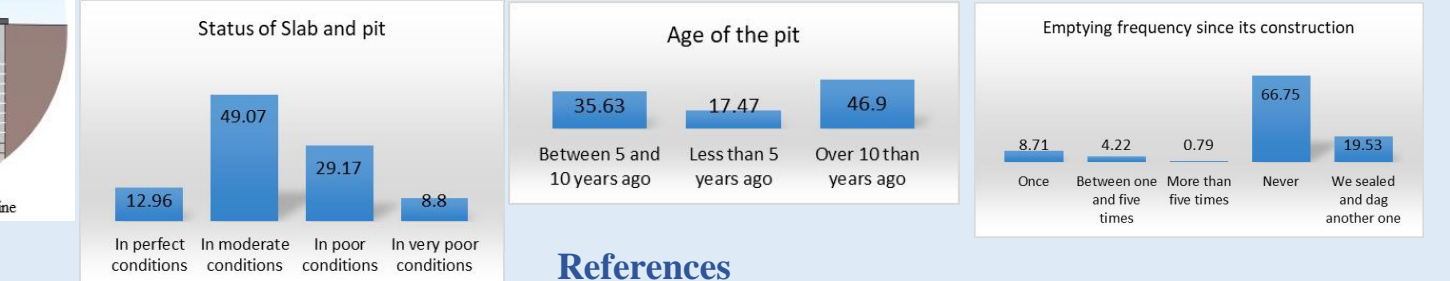
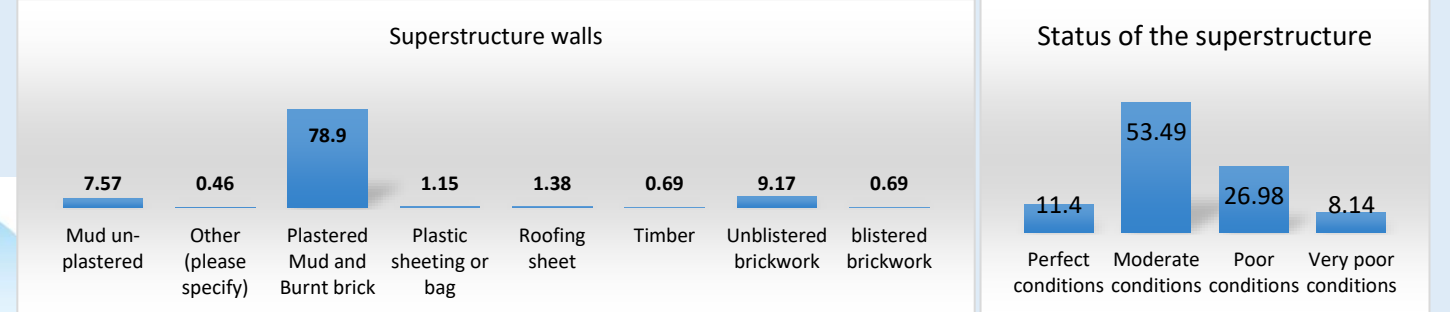
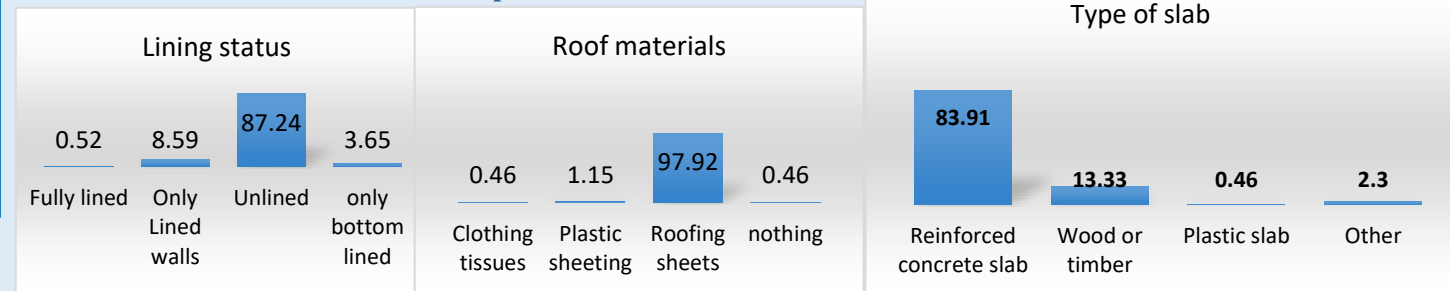
Results were analysed using SPSS 20. Descriptive statistics and measuring frequencies were used to estimate the frequency level of variables identified as measuring sustainability and environment protection, and then they were compared to RS ISO 24511 Standards' objectives ensuring sustainability and environment protection.



Results

For this presentation, only results from pits latrines are presented. The preliminary results show that low- and middle-income households use 85% of pit latrines. While households living in their own single residence are 49.5%, those owing a compound with one or many small apartments are 50.5%. only 28.7% of households are renting a single residence.

SUSTAINABILITY OF BASIC ON-SITE DOMESTIC WASTEWATER SYSTEMS (ISO 24511 APPLIES): The system (assets) should be maintained and should provide the capacity to meet current and future needs. Preventative maintenance of the facility and desludging should be identified and performed periodically so that the assets meet the criteria for functional lifespan



References

Akumuntu, B. J., Wehn, U., Mulenga, M., & Brđjanovic, D. (2017). Enabling the sustainable Faecal Sludge Management service delivery chain case study of dense settlement in Kigali Rwanda. Elizabeth, T., Lucas, U., Christoph, L., Philippe, R., & Christian, Z. (2014). *Compendium of Sanitation Systems and Technologies. 2nd Revised Edition*. Dübendorf.
NISR. (2023). *The Fifth Rwanda Population and Housing Census*.
Ross, I., & Pinfeld, J. (2017). *Kigali urban sanitation study*. Oxford policy management.
RSB. (2019). RS ISO 24521: Guidelines for the management of basic on-site domestic wastewater services.
WHO. (2019). *Burden of Disease attributable to unsafe drinking water, sanitation, and hygiene*.

PROTECTION OF ENVIRONMENT (ISO 24511 APPLIES):

(1) Only basic on-site domestic wastewater systems that do not hurt the environment should be set up. (2) Competent authorities should ascertain the system's compatibility with the environment. Existing basic on-site domestic wastewater systems that are found to hurt the environment should be replaced by systems that meet local environmental requirements and are affordable

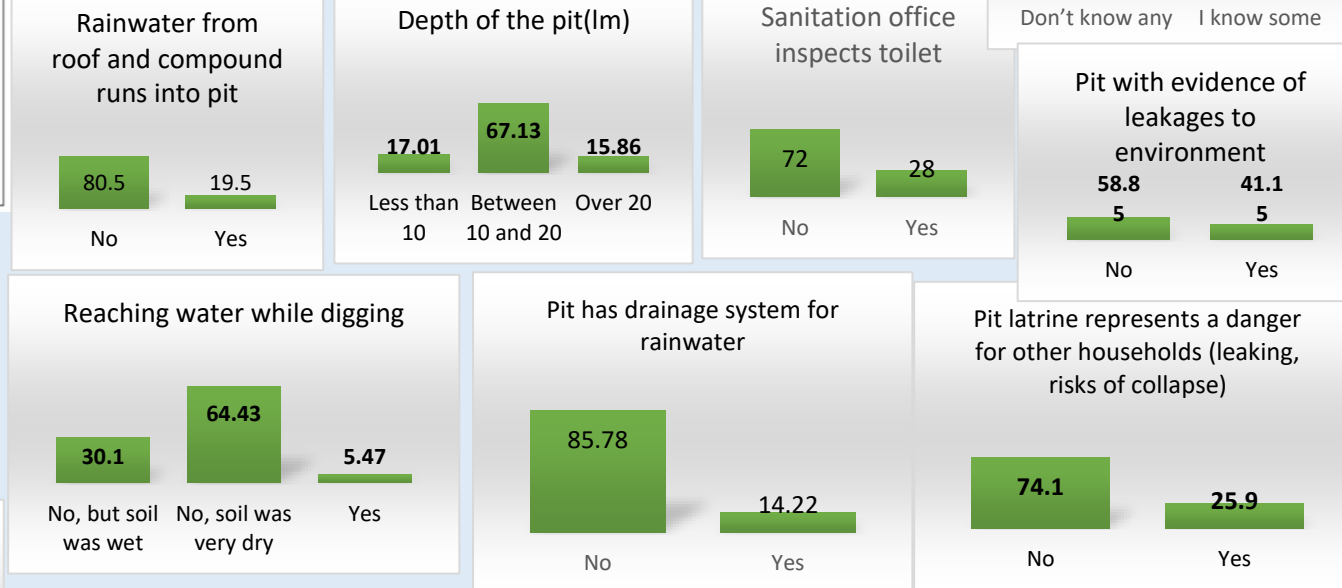


Figure 3: Different latrines and cesspits of surveyed households. Source: Survey Dec 2023 to Feb 2024

Conclusion and recommendations

Despite the adoption of standards, the majority of pit latrines in Kigali city are not compliant and not climate resilient. The majority of people are not aware of those standards. Furthermore, sanitary inspections are not conducted by the local authorities. The increased and sustained use of such pit latrines is a public health threat and a high risk of polluting ground and surface water. The unsustainability of pit latrines makes them vulnerable to climate change. Dissemination and enforcement of standards are highly needed. Further research on appropriate OSS for different types of settlements and topography is needed to meet demand and ensure safely managed service.



UNIVERSITY of RWANDA

COLLEGE OF SCIENCE AND TECHNOLOGY