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Sandec Department of Sanitation, Water and Solid Waste for Development

Integrated assessment of water, sanitation and solid waste service in schools in small towns in Uganda

Schools require dedicated attention to understand the current service levels of water, sanitation and solid waste management. It not only exposes children to public health risks, but also extends impacts into the larger communities.

Currently, due to a lack of integrated planning for basic services, unaccounted negative interlinkages exist between these services such as contaminated drinking water supply or waste clogged in drains. This work explores the current service levels of water, sanitation, hygiene and solid waste, and their interlinkages in schools using an integrated assessment method in two small towns in Uganda.

Key Takeaways

- Almost 40% of the schools lack basic water and sanitation services, and 65% lack basic hygiene and solid waste management.
- Negative interlinkages between the three services lead to exposure of pupils to disease pathways such as fecal contamination in drinking water due to unlined pits.
- Finance and policies inhibit positive interlinkages and Limited skills and capacities amplify negative interlinkages.
- There is scope to leverage existing funding towards an integrated management of the three services in schools.
- Priority areas for intervention include menstrual hygiene management and lining of pit latrines.

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Introduction

Schools are critical institutions that cater to children, one of the most vulnerable segments of society. Additionally, they serve as hubs that connect children with their communities and households, thereby establishing pathways for pathogens transmission. This importance was recognised by the Joint Monitoring Program run by UNICEF and WHO **[1]** and included an exclusive monitoring of schools as part of Sustainable Development Goals (SDGs targets 6.1 and 6.2). Not only does access to adequate WASH facilities ensure the well-being, health and dignity of students, but also affects the regular attendance and education towards WASH practices that children can bring to the home.

The COVID-19 pandemic triggered attention to the WASH situation of schools in low- and middle-income countries (LMICs). A review study assessed that the WASH school infrastructure and menstrual hygiene management in 30 LMICs was largely insufficient, raising major concern towards strategies to contain the spread of the SARS-CoV-2 **[2]**. An important link to the failure of WASH is the fact that these services are conventionally planned independently, which creates negative interlinkages such as contamination of groundwater for drinking due to unsafe containment of faecal and solid waste **[3].**

Table 1: Classification (level and size) of the schools chosen for field visits

Wobulenzi town	Kakooge town
4 private schools	**4 private schools**
- 1 primary middle	- 1 primary middle
- 1 primary small	- 1 primary small
- 1 secondary small	- 1 secondary small
- 1 secondary big	- 1 secondary middle
4 public schools	**4 public schools**
- 1 primary big	- 1 primary big
- 1 primary middle	- 1 primary small
- 1 secondary big	- 1 secondary big
- 1 secondary big	- 1 secondary big

Case Study and Methods

This research is situated in two Ugandan small towns - Wobulenzi and Kakooge, where less than 40,000 people reside in each town. Here, a total number of 16 schools were surveyed (8 schools per town) between February and April 2023, a transition period from dry to rainy season. Schools were of primary, primary-nursery and secondary classification, and of different sizes (up to 200, 500 and more than 800 pupils represented as small, middle and big in **Table 1** respectively). Additionally, the schools were carefully chosen to be 50% private and 50% public for both towns (**Table 1**).

An integrated assessment survey was developed, containing a questionnaire on water supply, sanitation, solid waste management, school characteristics and operation and maintenance and included an observations section as well. The survey was directed at head teachers or deputy head teachers. Furthermore, water quality samples were taken at each school for drinking water, handwashing and rainwater to measure E-coli, total coliform, turbidity, pH and free chlorine residuals. These elements would help understand the status quo of services at schools and identify currents interlinkages between them. Key informant interviews with service providers, town council members, Officers from the District Administration and Ministry of Education were conducted to identify the enabling environment factors that influence these interlinkages.

An adapted version of the Joint Monitoring Programme's service ladder indicators for WASH in Schools was developed since the original version largely underrepresents current issues and does not adequately capture nuances related to temporal differences which are required to understand the situation **[4]**. Furthermore, SWM is newly included in this ladder and allows us to gain a comprehensive perspective. The new ladder has the following service levels introduced, namely Poor Service and Advanced Basic Service.

Table 2: Definitions of the adapted version of the JMP WASH in Schools Service ladder indicators

SERVICE LEVEL	DRINKING WATER	SANITATION	HYGIENE	SWM
ADVANCED BASIC SERVICE	Treated drinking water from an improved source, not shared with community, available at time of survey	Improved facilities that are single-sex, usable and respect national ratio	Handwashing facilities with water and soap available at time of survey and repect national ratio	Solid waste is gathered in specific containers, separated into at least 2 types, and reused or collected/disposed of partially or fully outside of school grounds
BASIC SERVICE	Untreated drinking water from an improved source, not shared with community, available at time of survey	Improved facilities that are single-sex and usable and clean	Handwashing facilities with water and soap available at time of survey at double the ratio	Solid waste is gathered in specific containers, separated into at least 2 types, and reused or disposed of on school grounds in a designated or closed space
LIMITED SERVICE	Untreated drinking water from an improved source, shared with community, available at time of survey	Improved facilities that are not single-sex or in poor state (broken infrastructure) but clean	Presence of at least 1 functional handwashing facility with water and soap available	Solid waste is gathered in specific containers, not separated, and disposed of on school grounds in a designated or closed space
POOR SERVICE	Untreated drinking water from an improved source, over 30 min journey away including queuing	Improved facilities that are not clean	Handwashing facilities that are broken or empty at time of visit	Solid waste is gathered in specific containers, not separated, but no clear designated disposal area
NO SERVICE	Unimproved source or no source	Unimproved facilities or no facilities	No handwashing facilities or no water available	Solid waste is not gathered in any container and not separated

Results

Overall, the services of water and sanitation fare better than hygiene and solid waste; a majority of the schools have access to Basic to Advanced Basic Service for both water and sanitation. On the other hand, hygiene and solid waste management remain mostly at the levels of No Service to Limited Service, highlighting a major challenge for schools. 13 schools (81%) had insufficient number of handwashing facilities, failing to meet the national student-to-facility ratio of 40. Schools struggle with water supply especially during the dry season since most schools do not have piped water supply. Most schools aim only to keep school grounds clean, and not to safely manage their solid waste. Therefore, the waste is often openly burnt and leads to air pollution and likely related health hazards. Only two of the surveyed schools had an external collection of their waste, therefore avoiding disposal issues on school grounds. Waste segregation into different types was not commonly practiced, except occasional Polyethylene Terephthalate (PET) bottle storage for informal collection.

Although there were not many differences within the service provision of the schools of the towns, two minor differences existed. While all schools of Wobulenzi reported regularly treating the water before consumption, half the schools in Kakooge never treated their water. This may be due to the higher perceived safety due to regular treatment of piped water network in Wobulenzi, compared to Kakooge. With respect to sanitation, since Kakooge has a faecal sludge treatment plant (FSTP), which is built to serve various nearby towns including Wobulenzi, more schools in Kakooge reported to have at least emptied their latrines once in the past ten years. No differences between school types (level or private/government) could be observed, apart from the size of schools, where most secondary schools were significantly bigger than primary schools.

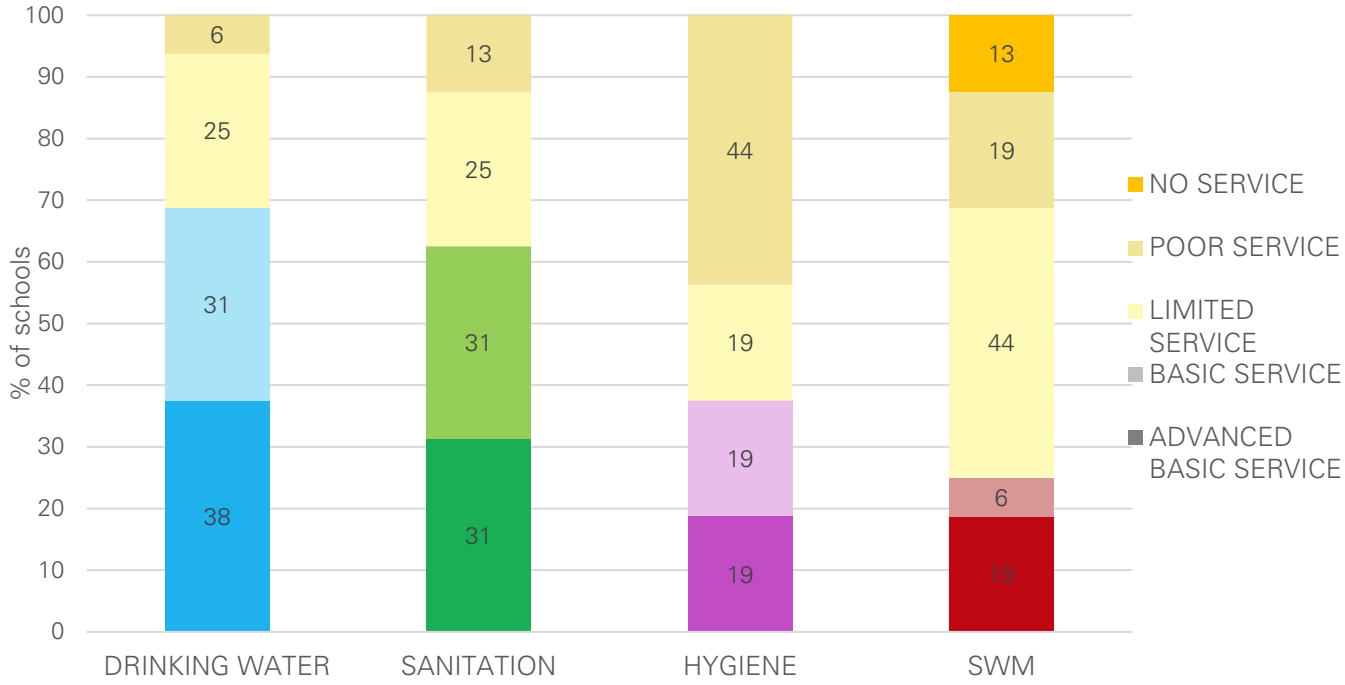

Figure 1: Representation of the schools' status quo of drinking water, sanitation, hygiene and solid waste management (SWM) with the variation of the JMP service ladder indicators

Interlinkages

Various contamination pathways between water, sanitation, hygiene and solid waste could be observed in schools. The drinking water samples from point of consumption showed presence of faecal bacteria in 75% of the schools, with an average of 27 CFU/ml for E.coli and 49 CFU/ml for Total Coliforms. Since only two schools mentioned their latrine containment to potentially be lined and emptied on a regular basis, there is a high risk of seepage reaching the groundwater table, and surface waters during flooding events in the rainy season. Furthermore, two schools had an external collection of their solid waste, all others were disposing of it on school grounds, in pits or piles, regularly practicing open burning, which can also lead to contamination of the ground water sources from solid waste leachate. Three schools were equipped with sanitary pads incinerators, enabling a separate disposal for this type of waste and reducing the risk of disease transmission. In these cases sanitary pads were therefore not thrown in pit latrines, which was reported as common practice in all other cases. Solid waste in pits leads to contamination of the pit humic substances and affects the pumping and treatment of the sludge. Open dumps were completely exposed to stormwater and floods, leading to contamination of surface water sources.

In terms of positive interlinkages, rainwater harvesting was practiced in all of the schools and represents an important source of drinking water. The rainy season allows to store significant amounts of water which were used mostly for cooking and handwashing/ cleaning and less frequently, for drinking purposes. Generally, leftover cooking water containing organic matter was used for feeding animals. Other isolated positive interlinkage practices include the recovery and reuse of certain types of waste streams. For example, urine was collected for fermentation into fertilizer for the school ground plantations and used paper waste was stored for use as toilet paper.

> "Finance and policies inhibit positive interlinkages...
> ... Limited skills and capacity amplify negative interlinkages. "

Recommendations

The results establish that interlinkages are present between all sectors and affect overall service provision. The following recommendations could help to reduce or mitigate negative interlinkages that affect service provisions and foster positive interlinkages between water supply, sanitation and solid waste management in schools.

1. Solid waste management requires further attention, especially prevention of uncontrolled open burning. Lack of control and protection of the open dumps is also likely to pollute soil and groundwater. Regular collection of solid waste from schools by the municipality can mitigate these hazards.

2. Promoting waste segregation and creating effective circular economy loops for resource recovery and reuse may create job opportunities and potential revenue streams.

3. Reinforcing the construction of lined pits for latrines is necessary to prevent contamination of ground water. This could be mandated through regular inspections and requirement for any municipal services.

4. Regular treatment of drinking water using appropriate and affordable treatment measures, depending on the source and scale of water supply, including boiling, chlorination and filtration at the point of use would greatly improve the safety of the drinking water.

5. Management of the menstrual hygiene products through context appropriate ways is required. Incineration in situ, and external collection are proven ways in the surveyed schools and must be introduced in other schools as well.

6. Targeted financial resources could be allocated and spent for improving these services in schools from the Universal Primary and Secondary Education Programs (UPE/USE) and similarly relevant funds. This may help to secure enough funds for basic number of handwashing facilities, dustbins and number of latrine stances in order to at least meet the national student-to-facility ratios.

References

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Authors: Charlotte Farine, Abishek S Narayan, Christoph Lüthi

Reviewers: George Wainaina, Marisa Boller, Charles Niwagaba

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Photos: Christoph Lüthi (Eawag-Sandec)

Further information: www.sandec.ch | info@sandec.ch