Using Action Research to Address Poor Waste Management at Kijjabwemi C/U Primary School in Kijjabwemi Suburb, Masaka City.

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Abstract

Background:
This action research (AR) project was carried out at Kijjabwemi C/U Primary school at Kijjabwemi suburb of Kimaanya-Kabonera division of the newly formed Masaka City to identify, analyze, prioritize and identify solutions to address a health problem of priority at this setting using the locally accessible and available resources.

Methodology:
A participatory rural appraisal approach (PRA) guided how this research achieved its objectives right from collection of information about the health challenges faced by this school. Data was collected using Focus group discussions, interviewing and transect walk methods. Although the majority of data is qualitative, the quantitative data is as well-used especially where voting on an issue took place. At prioritization, a two-phase approach conceptualized by 1) multi-level voting techniques and 2) the Hanlon method of specifying criteria, PEARL testing and Priority scoring was adopted to priorities the most urgent, serious and feasible problem. The five Why/What for the root cause analysis was used to analyses the problem.

Results:
Out of the twelve health problems enlisted as urgent and serious by over 50% stakeholders in the first phase, Poor waste management was identified as a major and priority problem caused by excessive distance between generation and final disposal point, lack of designated collection points as well as containers, time and irregularity of disposal, shallow waste disposal pit and lack of well develop enforceable guidelines.

Conclusion and recommendation:[a]
Stakeholder-centered- learning about excellent waste management practices, utilizing transferable plastic bins of 40ml capacity, increasing the depth of the disposal pit as well as fencing it and developing settings-oriented guidelines to increase vigilance for waste generation reduction, frequency of disposal and burning of waste were implemented as interventions.

1 Background.

Action research is a research style that involves an intensive, systematic, and semi-structure learning to experience with a focus on problem identification, prioritization, analysis, and linkage to available sustainable resources for sustained solutions with community members. The background understanding is that local people are creative and capable and can do their investigations, analysis, planning, and decision-making.

Historically, Smith (2007) narrates that Kurt Lewin in 1946 coined the term 'action research': which he described as a cycle involving identifying an initial idea; doing fact-finding; plan taking action; evaluating plan; amending plan; taking a second action step; then the cycle continues as the need arises.

However, after the development and integration of the participatory rural appraisal (PRA) methodologies in action research in the late 1980s and early 1990s, action research was greatly improved to focus on a bottom-up approach as opposed to a top-down approach, and from the blueprint to the learning process (Cavsetro, 2003). PRA is intended to enable local communities to conduct their analysis and to plan and take action thus it involves project staff learning together with community members about their community.

It is a shift from extractive survey questionnaires to experience sharing by local people. (Abedi, 2011). Action research is based on community experiences where communities effectively manage their natural resources. This approach offers numerous benefits in that action research assist in quality improvement in a wide range of areas such as record keeping and hygienic practices in hard to change settings such as hospitals (Khresheh and Barclay, 2007); empowers communities to get involved and own results of health programs, addresses health-related equity issues at a local level (Mahmood et al., 2015); promotes stakeholders collaboration with others, creativity, attainment of goals and review of progress while

dealing with their health problems (Tetui et al., 2017). At the same time, it assists health systems in saving time and money through quick and locally workable solutions to the beneficiaries.

The benefits are achievable realistic and sustainable when action research is taken to settings. (Kasteren, 2020). Thus, according to WHO (1948) health cities settings approach for health promotion, a setting is a place or social context in which people engage in daily activities in which environmental, organizational, and personal factors interact to affect health and wellbeing. These include health-promoting schools, healthy workplaces, health-promoting hospitals, health in prisons, healthy villages, healthy markets, and healthy communities and municipalities.

According to Boutilier, Mason, and Rootman (1997), action research in the settings for health promotion is a popular methodology because health promotion practitioners/researchers are expected to build collaborative relationships and processes with stakeholders and work with communities in the settings up to the time of evaluating their programs and projects. Starting right away at the time of designing health promotion practice. This growth of collaborative approach research in health promotion influences timely improvements in heath situations, simultaneously developing sustainable evidence-based interventions in the settings. Thus, the researchers' choice for a settings approach.

Selection of the Primary School setting

Health Promotion is encouraged in schools in the attainment of health for all goals according to the Ottawa charter. Through such a setting, it is possible to reach and impact not only a young population but also a large population of pupils, teachers, support staff, and then to their families over several years through providing and sharing knowledge and skills. Furthermore, as this is a primary school our choice relies on the understanding that it is within the first years of life that eagerness to learn is prominent and most future health-related lifestyles, habits, and attitudes are formed (Dwyer, 2018) thus under this setting, we are sure stakeholders will build sustainable personal skills.

In addition, schools do offer an enabling environment for health promotion and are the main source of influence on children since pupils spend most of their time in this setting thus health-promoting practices learned from school can easily be transferred to the entire population which may lead to supporting and influencing the building of public health policies. School staff is as well targeted within the same setting which offers a big supportive environment for health promotion.

2 Background of the study area

Kijjabwemi primary is a Church founded school located 4.3 KM off Masaka - Mbarara highway who originally was located in Kimanya-Kyabakuza sub-county kijjabwemi village of Masaka municipality, is now found in Kimanya-Kabonera division of Masaka city which became functional on 1st July 2020.

Currently, it is entirely an Uganda government Universal Primary Education funded day school, educating largely pupils from the middle class and below families. It has a pupil population of 800 pupils with a well-composed staff of 22 members 8 female teachers, 9 male teachers, and 5 support staff. On observation, the school has well-built latrines with permanent school structures and a football pitch with at least

90M long and 45M wide which implies a promising environment for physical activities and oriented public health solutions. The school is located less than 10km away from Namajjuzi wetland, is situated along Masaka Mbarara highway.

3 METHODOLOGY

4 Introduction

The researchers used The Participatory rural appraisal approach as evidenced by Cavsetro (2003). Specifically, triangulation was employed. That is, the researchers guided the formation of an interdisciplinary team of thirteen people to organize, mobilize and coordinate the activities of problem identification, prioritization, and implementation; our sources of information were the stakeholders, direct observations on this setting, and discussion of events and processes that contribute to the identified problems with kijjabwemi C/U primary school community. Our tools and techniques which are described in 2.2.1 below collected qualitative data using Focus group discussion and unstructured interviewing, although quantitative information, specifically demographics and quantity of the study population were acquired from the background section of both the focus group interview schedule and interview guide tools.

Community entry

After approval of our proposal by the UMU Faculty of Health Sciences, an introductory letter introducing the researchers to the responsible offices in Masaka Municipality was granted. The researchers accessed the setting in February 2020, after acceptance by the municipality's education and health offices as well as the school headmaster.

Between the 6th and 11th February 2020, the researchers initiated meetings with the different levels of stakeholders to form a local lead action research team of thirteen members composed of a health assistant, health and sanitary teachers, deputy headmaster, sanitary and health prefects, two head prefects, one class representative from each of the three upper classes, school matron and a board member to lead the organization, mobilization, and coordination of activities. With the help of this team, different stakeholders were accessed. Below is the delineation of each category of the stakeholder with its respective numeric representation.

Primary stakeholders (pupils, teachers, and support staff): Although 36 pupils were selected, only 30 were able to participate in the research; 9 out of the 12 from each of the primary six and seven, then 12

from primary five, 5 support staff members as well as 6 out of the anticipated 12 teaching staff members participated. The 36 members were selected through a voting mechanism per group status. The mechanism involved proposing up to 12 names to form a focus group for discussion in line with Baral, Uprety, and Lamichhane (2016) who recommend an 8 to 12-member group. To democratically form up to 12 members, the secondment is sought by show of hands per proposed name with the first 12 mostly seconded names considered members of each focus group. The researchers together with the members of the local (settings) lead team guided the pupils, teaching staff, and non-teaching staff members to form democratically, directly, and gender-balanced elected 8 to 12 members focus discussion groups. In total, we had 41 members who initially participated as primary stakeholders up to the level of community diagnosis and the first phase of problem prioritization.

Secondary stakeholders (school board members and community members): the researchers had anticipated 5-member participation from the school management board. However, the board members selected 2 out of its 11 members. Owing to the inability of the rest to be compliant with the scheduled visits. As well, we engaged five members of the community who were mobilized by the teaching and non-teaching staff to participate in

the implementation processes. The community members did not participate in the initial process of problem identification and prioritization because the researchers and local leadership team failed to mobilize them as many of them live on day-by-day income thus accessing them for a meeting was extremely difficult. The Pandemic-related lockdown provided the opportunity to find them at home for action this time around.

Tertiary stakeholders (education officer, health inspector, and health assistant): The education officer and the Masaka city's senior health inspector offered permission and expert opinions towards this research and, one health assistant from the City's public health officials in charge of Kimanaya-Kabonera division directly participated in this research up to implementation stage.

Problem identification (community diagnosis)

Engaging a coordinated schedule with the settings local leadership, On the 14th February 2020, the researchers segregated themselves into 3 groups and conducted Focus Group discussions (FGDs) to the first batch of the respective formed 3 focus groups, that is, primary 5, 6 and 7 pupils; dubbed FGD1, FGD2, FGD3 respectively. The research procedures were communicated to each group of potential participants before the FGD sessions and It was precisely communicated before the sessions that each

the participant would be allocated a letter of the alphabet A to L against which verbatim responses would be recorded, and that signing on the attendance list meant that consent has been granted to the researchers to conduct all the research procedures to the participants. It was further communicated that the participants who opted out would do so at their discretion without giving reasons at any stage of the research. However, it was emphasized that participants' contributions could not be withdrawn once the session has ended.

Again, on the 6th March 2020, the researchers segregated into 3 groups and conducted FGD to focus group 4 and group 5 comprising of the teaching staff and non-teaching staff respectively observing the same ethical considerations above. The researchers conducted in-depth interviews with the two selected board members on this same day and conducted a transect walk with the staff members to assess the general health situation of this setting focusing on the state of the general infrastructure

such as buildings, toilets, kitchen, walkways, deep pits, and water supply, general hygiene and behavior such as food hygiene and waste disposal. The researchers consequently came out with a list of problems affecting the health of this school community for the stakeholders to prioritize in the next meeting.

Methods and tools and the target stakeholder category for each method.

To gather information and appropriately engage with the stakeholders using a PRA approach (Cavsetro, 2003), the researchers together with the members of the local (settings) lead team guided the pupils, teaching staff, and non-teaching staff members to form democratically, directly, and gender-balanced elected 8 to 12 members to focus discussion groups.

Hence, the setting produced FGD1, FGD2, FGD3, FGD4, and FGD5 to represent the respective statuses of the primary stakeholders, that is, primary 5,6,7, teaching staff, and non-teaching staff members. It is worth noting that the researcher's focus group discussed with 30 pupils in line with their anticipated range of 24 to 36 pupils. The school only had five non-teaching staff members who were all willing and all participated in the research thus their group did not make up the eight to twelve-member range, similarly, only 6 teachers preferred to participate at the time of the discussions owing to their school scheduled activities.

Before the FGD sessions, the researchers selected a secretary to carry out the verbatim and the session audio recordings, a photo man, and a modulator to guide the discussion group using the FGD guide from each of their formed 3 groups of at least 3 members.

Before the sessions, verbal guiding group rules were formed by the FGD members, then researchers sought consent from the potential participants evidenced when one appends their name and/or signature on the attendance list, the researchers informed the potential and actual participants of their right to withdrawal from the research at any stage but their views will not be withdrawn once they opt out when the session is done. Afterward, each participant was allocated a letter of the alphabet sequencing from A to L against which verbatim responses were recorded.

Each group of researchers administered an FGD guide to each Focus discussion group separately in different isolated locations to ensure confidential-

ity and comfort to identify health-related problems and find ideas for solutions. During the sessions, open-ended semi-structured questions in the FGD guide were asked to the FGD members, and an interactive approach was emphasized to generate the maximum amount of discussion and opinions on the health problems in this community within 60 minutes for each session. The researchers used a one verbatim recording document for each Focus discussion group to record all the contributions of each participant. Group photos were taken from each of the participating groups together with the researchers to provide further evidence on the attendance. Audio and video recordings to enhance data quality were used as well. As emphasized by Baral, Uprety, and Lamichhane (2016), the FGD approach was appropriate and relevant to this setting because participants with similar characteristics freely talk with each other in the sizeable groups easier to manage by the researchers, encourages in-depth discussions to provide the appropriate experiences and works well within the time and resources of both the setting and the researchers.

For secondary and tertiary stakeholders, the researchers took verbal consent to administer an individual semi-structured interview guide using interviewing techniques to two selected members of the school management board. There was a delay in accessing the health assistant for an interview owing to the COVID-19 preventive lockdown which started in Mid-March, 2020. However, in July, the researchers accessed the Kimanya-Kabonera Health assistant who as well joined the local leadership team. Being a newly appointed person in the division, she offered not to provide any interviews as she was not acquainted with settings health-related issues.

As observed by Harrell and Bradley (2009), interviewing using semi-structured questionnaires provides two benefits which this research process maximized; firstly, it allows the researchers to set out an opening broad open-ended question that allows the stakeholder to talk about the health problems in this setting and the researchers occasionally intervene to direct the discussion and get clarifications. Secondly, it allows minimum control of the researcher over the respondent's answers. Thus, this method provided the participating stakeholder an opportunity to identify, deeply, and widely speak about each health problem and possible solutions in the company of the researcher.

Problem prioritization.

The researchers used Hanlon's worksheet tool (Table. 1) to prioritize the health problem. The Prioritisation process was conceptualized by two concepts, that is, 1) Multi-level voting techniques and

2) the Hanlon method using Hanlon worksheet (NACCHO, 2020). The rationale for these concepts is based on consideration for the nature of slightly distant and instructive power relations between the pupils, the teachers, and non-teaching staff; the numerosity of generated problems-out of which one most urgent and serious health challenges need to be prioritized; and consideration for the feasibility of effective interventions which address the health challenges.

The two concepts were applied in two phases; **In phase one**, the researchers ranked the enlisted health challenges in numerically ascending order of majority voting outcome per stakeholder status. The researchers only considered the first four health challenges which had been voted up to at least 50% majority out of the enlisted health challenges per stakeholder category to the grand list of health challenges.

During this phase, the researchers aimed at reducing the number of health challenges to a sample of only those that the majority of stakeholders (at least 50%) perceived as urgent and serious this was carried out at the end of each session of data collection from each stakeholder status per category. That is, the voting was done immediately among the pupils, non-teaching staff, teaching staff, and board members after enlisting the problems per group status among stakeholder category during the focus group discussions sessions and interviews. Each participant was entitled to one vote per health problem they considered very urgent and required immediate attention thus a person could vote as many times as there is the number of stated problems. The numeric outcomes per voting per problem were processed to percentages at this stage thus frequency (n) represents the total number of sample votes

in a particular group status of the stakeholders but not the total of potential votes per stakeholder category.

This process led to forming a grand list of health challenges supported by at least 50% of all stakeholders. The formation of the grand list of health challenges marked the end of phase one. This was

done between February and early March 2020. The results of phase one are numerical and presented categorically under each group status in the prioritization section of results.

Phase two: this phase was delayed till July 2020 due to COVID-19 related lockdown, during this period the pupil group of stakeholders was not accessible. After communication from the university accepting us to continue with action research, the researchers reengaged the remaining stakeholders in the second phase to recompose a new local lead research team of stakeholders for a single problem prioritization and implementation. This new team comprised of seven members; five members of the teaching staff, one member of the non-teaching staff, and the Kimanaya-Kabonera division's health assistant.

In this phase, the researchers aimed at finding out one most urgent, serious, and feasible problem from the grand list of health challenges produced during phase one. During this phase, the researchers used Hanlon's worksheet tool (**Table. 1**) to prioritize the health problem.

The following explained steps were taken to fill table 1 above.

First step: each listed health challenge on the grand list was subjected to Hanlon's criteria A, B, and C using a scale ranking of zero to ten as illustrated in table 2 below. The grand list of health problems was presented to a new set of composed stakeholders to A) determine the size of the problem-perceived.

the proportion of the population affected by the problem including those at risk for the problem by the attending stakeholders; B) seriousness of the health problem - contribution to morbidity, economic loss, Time loss and the degree to which there is an urgency for intervention as perceived by the attending stakeholders and C) Effectiveness of the intervention –the degree to which an intervention is available to address the health problem has been identified as discussed by the researchers and attending stakeholders.

The stakeholders were asked to rank each problem against this criterion using a scale from zero to ten as guided by the researchers through voting techniques. Any problem that achieved at least five out of ten would be included to the next step of determining feasibility using Hanlon's PEARL test.

Step two: The researchers applied Hanlon's 'PEARL' test to screen and eliminate health problems on the grounds of not being feasible based on the following feasibility factors: 1) Propriety –Is our action research program suitable for the health problem listed? 2) Economics –Does it make economic sense to address the problem? Are there economic consequences if a problem is not solved? 3) Acceptability – Will this community want and accept the intended and decided interventions? 4) Resources –Is funding available or potentially available for these activities? 5) Legality –Do current laws allow such activities and interventions? Is there evidence that supports these interventions and activities to be implemented? The researchers eliminated health problems that receive an answer of "No "to any of the above feasibility factors.

Step three: The researchers then calculated priority scores based on the three criteria rankings assigned to each health problem in Step 1 of the Hanlon Method using the following formula: D = [A + (2 x B)] x C. Where: D = Priority Score, A = Size of health problem ranking, B = Seriousness of health problem ranking, C = Effectiveness of intervention ranking,

Step four: The researchers ranked the health problems based on the priority scores calculated in Step 3 of the Hanlon Method, then assigned ranks to the health problems with the highest priority score receiving a rank of '1,' the next high priority score receiving a rank of '2,' and so on. Coming up with a problem with rank "1" implied the problem of priority has been identified.

Problem analysis

The researchers employed the "five Why and what" questions to understand the root cause of the problem (WASH and HEALTH working together, 2020). The principles followed by the researchers under this approach included; clearly stating the specific problem, discussing why did the problem happen, and recording the response. To determine if the response is the root cause of the problem, the researchers and the stakeholders loudly and continuously reflected on the responses to the stated cause of the problem; "If the stated cause were corrected, is it likely the problem would recur?" If the answer is yes, it was concluded that the response at that level is a likely contributing factor, not a root cause, then the team keeps asking "Why?" until there is agreement from the research team and the

Table 1. Demonstration Sample of Hanlon Worksheet for Priority Scoring and ranking .

Problems identified	Problem Size (A)	Problem seriousness (B)	Effectiveness of intervention (C)	Priority Score (A + 2B) C	Total Rank
Health Problem A.	Number scored on the scale.	Number scored on the scale.	Number scored on the scale.		
Health problem B.	Number scored on the scale.	Number scored on the scale.	Number scored on the scale.		

Table 2. Demonstration Sample Hanlon criteria ranking of each health problem listed.

Health Problem	Criteria A Size of health problem	Criteria B Seriousness of health problem.	Criteria C:Effectiveness of interventions.	Ranking (0 to 10)
1				9 or 10
2				7 or 8
3 etc.				5 or 6 etc.

stakeholders that the root cause has been identified.

This approach provided three advantages; firstly, the 5 Whys get to the root of a problem through communicative brainstorming. Secondly, the route cause process points towards behavior that is failing or missing, which can be changed through action (i.e. researchers and the local stakeholders were able to identify workable factors and leave those beyond the control of the research project such as the climate or political regime). Thirdly, this approach also helped identify interim opportunities at each 'why' level to intervene or lead to possible solutions at once (Vitar, 2017). Thus, the method is appropriate in this situation.

Quality control.

The following measures were taken to ensure the validity and reliability of the findings.

Validity.

To ensure the trustworthiness and integrity of our findings, the following strategies which are adopted from Nobble and Smith (2015); Kriukow, (2019) were used.

Prolonged involvement: the researchers took at least 4 months with the stakeholders in this setting which led to the development of a working trust and understanding of the stakeholder's perspectives through a two-way communication approach.

Triangulation approach: the researchers used focus group discussion for primary stakeholders and semi-structured interviewing for the secondary to make sure a list of health problems is produced to be considered for prioritization with relevant solutions. Photos, Video, and audio recordings were used to enhance the accuracy of the data editing process.

Supervisor debriefing: the researchers regularly opened their findings to their supervisor to solicit constructive criticism and guidance. After the lockdown, the researchers mainly engaged with the supervisor on digital Smart applications-WhatsApp and emailing of photos, research progressive reports, and minutes of meetings.

Member checking: The researchers at the end of each session of a focus group discussion, an interview conducted, and every meeting throughout the research process validated their findings in a group meeting to clarify whether what they understood is what the stakeholders meant.

Audit trail; Meticulous record-keeping using a compilation of five document types, that is, the tool, the response record, meeting minutes, the attendance list, work plan schedule as well as photographs taken and kept with the team leader assisted in demonstrating a clear decision trail and ensuring interpretations of the finding are consistent and transparent.

Reliability

To ensure that the tools and methods accurately and factually record the appropriate reproducible results, the researchers; -

Pretested the tools; The tools were pretested at Hill road public school Masaka a primary school in a similar locality as Kijjabwemi primary school in January 2020 which allowed the improvement in accuracy of the tools.

Sizeable Focus group discussions. During Focus Group Discussions, Researchers ensured a sizeable group of people of between 8 to 12 participants. Apart from the teaching and non-teaching staff members who would not make up to the desirable range and could not be integrated with other stakeholders whose settings-related status would prevent them to participate in the research. The researchers were sensitive and considerate to identify opposing relations and status within this setting which would affect the contributing attitude to the problems and solutions as well as the general participation.

Clarifications: Since the data is largely qualitative, the researchers made on-spot clarifications and error collections together with the stakeholders on the subject matter in question immediately during the sessions.

Data recording: All responses and meeting minutes were accurately recorded in their respective tools and archived by the local team secretary and copies archived by the researcher's team leader. Photos taken were archived on storage devices designated by both the researchers and the stakeholders.

Ethical considerations

Before conducting this research, researchers sought permission from the District Education Officer, the principal medical officer, senior health inspector, and the school headmaster. The researchers sought verbal consent before the introduction of any procedure of this research project to any participant. No names or identifying details of individual stakeholders were collected if the stakeholder considers that information confidential.

The researchers respectfully observed the setting's ethical standards and only took participants' photos after verbal consent was granted. All activities done after the pandemic declaration that involved gathering people observed social distancing, handwashing, antiseptic use, and mouth-nose masking standard operating procedures.

5   Limitations and delimitations

Limitations: The research process was limited by the emergency of the highly infectious COVID-19 pandemic, the setting was not accessible by the pupil stakeholders thus the pupils, some teachers, and some members of the non-teaching staff were not able to participate in the second phase of the problem prioritization process as well as the implementation. Thus, Phase two of the prioritization process was carried out without the pupil's representation throughout the time of implementation.

Delimitations: However, six members of the teaching staff, one member of the non-teaching staff, and one health assistant of the Kimanya-Kabonera division were organized and formed the new team of stakeholders (local lead team) which engaged in the second phase of the prioritization process and implementation. In addition, the lockdown provided the opportunity to the researchers and the lead local research team to easily mobilize the community members for action at the implementation stage.

Reflection.

At every stage of this research process, the researchers gained confidence in working with the community under this setting and appreciated the role of appropriate research methods and continuous interaction between themselves and the settings stakeholders for health promotion in such settings.

Adjusted stakeholder composition in a set during the research process life limit monitoring and evaluation of the action research project as activity-oriented outcomes may not be easily realistic in a setting without full composition. Nonetheless, the dedication of the significant setting stakeholders even though not fully composed influences the creation of a change action research intends to create.

6   RESULTS.
7   Results of the community diagnosis:

The researchers Engaged a coordinated schedule with the settings local leadership and observed the ethical considerations as stated above. On the 14th February 2020, the researchers segregated themselves into 3 groups and administered Focus

Group discussion (FGD) guides to the first batch of the respective formed 3 focus groups, that is, primary 5, 6, and 7 pupils; dubbed FGD1, FGD2, FGD3 respectively. Again, on the 6th March 2020, the researchers segregated into 3 groups and administered FGD guides to focus group 4 and group 5 comprising of the teaching staff and non-teaching staff respectively. Thirty pupils participated in the FGD, 14 males and 16 females. Overall, each class contributed as follows; - nine from primary six and seven-plus twelve pupils from primary five. We had, only female five support staff members as well as only two males from the six teaching staff members. In total, we had 41 participants in the primary stakeholder category. The researchers administered interview guides to the two selected board members; One male and another female.

On this same day, the researchers conducted a transect walk with some lead staff members to assess the general health situation of this setting focusing on the state of the general infrastructure such as buildings, latrines, kitchen, walkways, deep pits, and water supply, general hygiene and behavior such as food hygiene and waste disposal.

The researchers consequently came out with a list of problems affecting the health of this school community for the stakeholders to prioritize in the next meeting.

Problem identification

The findings of the community diagnosis are presented below according to the methodology used and the category of stakeholder participants in form of tables and illustrated by the photos below each table. The participants included pupils, teaching, non-teaching staff who are classified as primary stakeholders as well as secondary stakeholders.

Results from Focus Group Discussions: FGD 1, FGD 2, FGD 3, FGD 4 and FGD 5 (Primary stakeholders).

8   Results From Interviews:

These were conducted on secondary stakeholders who included two school management board members. The results are presented as below.

9   Results from the transect walk:

10   Problem prioritization:

The results are presented as phase one and phase two in line with prioritization process which was conceptualized by a step-by-step multi-level voting technique and the Hanlon method of specifying criteria, PEARL testing and Priority scoring (NACCHO, 2020). The Step-by-Step Multi-level voting technique assisted in coming up with three very urgent but solvable list of problems. The three urgent Workable problems were then subjected to Hanlon's methods to guide the researchers and stakeholders on deciding one very urgent, very serious and feasible problem.

Phase one results- step-by-step Multi-level voting technique :

11   Round 1 vote results.

The voting outcomes has been processed to percentages according to the respondents in each group status thus frequency (n) represents the total number of sample votes in a particular group.

All pupils (100%) sighted lack of a sick bay and a school nurse, limited latrine facilities and inadequate water supply as a common problem to all of them and needed to be prioritized, 28 (93%) sighted lack of drinking water, Trespassers and distraction from external environment and 26 (87%) observed that the small waste disposal pit and dirty latrines were as well problems

All the non-teaching staff (100%) noted that lack of a sickbay to cater for the sick and injured persons, Tress passers and lack of security officers as well as too much smoke in the Kitchen were burning health problems that needed action. On the other hand, all the teaching staff (100%) sighted lack of a sickbay, few and almost filled latrines as burning problems. In addition, 4 (67%) sighted lack of safe drinking water, and 3 (50%) pointed to the bats in class rooms as well.

It was common among all the participating secondary stakeholders recognised old inadequate latrines and high prevalence of fevers and respiratory tract infections as burning problems. But individually sighted that waste management, inaccessibility to safe drinking water, poor drug adherence to HIV drugs by the infected pupils, Poor status and hygiene of the kitchen were additional health problems which required quick action as well.

Grand list of health problems:

Table 3. Health challenges raised by primary stakeholders

HEALTH CHALLENGES	CAUSES
PRIMARY FIVE.	
Dirty latrines	Insufficient stances of latrines., leaky loof, urinating on the latrine floor.
Lack of drinking water	Lack of established drinking water points.
Trespassers	School does not have a fence.
waste spilling	Small waste disposal pit
Lack of a sick bay	The school leaders have not established such a facility.
PRIMARY SIX.	
Lack of sick bay and a school nurse.	The school leaders have not established such a facility.
Trespassers	School does not have a fence.
Waste spilling	Small rubbish pit
PRIMARY SEVEN	
Limited latrine facilities.	The school built fewer latrines.
waste spilling	Small waste disposal pit
Inadequate water supply	No established water points.
Distraction from external environment	Unfenced school, trespassers and noise from cars.
NON-TEACHING STAFF .	
Undried pieces of firewood and unsplit logs.	Administrators never consult them and no established mechanisms to give feedback on the supplies.
Lack of a sickbay to cater for the sick and injured persons.	The school leaders have not established such a facility.
Tress passers and lack of security officers	School does not have a fence; School management has not hired any one to provide security.

Table 4. Health challenges raised by primary stakeholders

Too much smoke in the Kitchen.	Use of undried pieces of firewood.
TEACHING STAFF	
Lack of safe drinking water	No established procedure to bring safe for drinking.
Lack of a sickbay	The school leaders have not established such a facility.
Bats in class rooms	Broken glasses in the windows
Few and almost filled latrines.	The school leadership and management built fewer latrines

Across cutting list of problems with their causes was compiled into a tabular form from the above problems. A problem would make it to the table as long as it acquired at least 50% of the votes in each group status of stakeholders. However, this list does not associate problems to stakeholders' categories.

Phase two results.

Each Hanlon's criteria A, B and C were rated from zero to ten as perceived by the stakeholders. Criteria B scores were interpreted as follows; Very serious (9 or 10), relatively serious (7or8), serious (5or6), moderately serious (3 or 4), relatively not serious(1or2) and not serious (0). The intention of this criteria ranking was to determine the size of the health problem (A), the seriousness of the health problem (B) and the effectiveness of the interventions (C) as perceived by the stakeholders.

Overall, eight problems scored at least five out of ten indicating that these were perceived by the stakeholders as affecting a larger proportion of the population at this setting, were serious-could contribute to morbidity and would lead to economic loss and time and their proposed respective interventions were perceived to be effective in addressing them hence these were subjected to the PEARL test to determine feasibility as below.

Hanlon's 'PEARL' test results:

Table 5. list of challenges according to secondary stakeholders.

Health Problem	Cause
Board member 1	
Malaria, flue and cough	No sickbay.
Inadequate, nearly full latrines.	School management lacks sufficient funds is reluctant to construct new ones
Waste management	No provisions to separate biodegradable from non-degradable, lack of disciplinary disposal, poor collection, small pit and irregular burning.
Poor status and hygiene of the kitchen	Kitchen constructed long ago now it has broken down.
Board member 2	
Very old inadequate latrines	School management lacks sufficient funds is reluctant to construct new ones
Inaccessibility to safe drinking water	No safe water dispensing points.
Poor drug adherence HIV drugs by the infected pupils.	Lack of disclosure
High prevalence of fevers and respiratory tract infections	Possibly Malaria parasites and respiratory germs, health services are far away from the pupil's residence.

Table 6. Observations made through a transect Walk.

Item	Observations
Numerosity and status of the Buildings	The school has a total of seven permanent buildings with hydro electricity supply. Five of them are in good state with cement and good ventilation, three are relatively new standardly constructed buildings, one is a very old cracked building still enclosing classrooms and a poor in-state of the canteen-Kitchen building; lacking plastered walls, cemented floor, standard windows and without a chimney. The boy's dormitory has falling

All problems ranked atleast five out of ten in the ranking above were subjected to the Hanlon's PERAL test to screen and eliminate health problems on the grounds of not being feasible based on the following feasibility factors: 1) Propriety –Is our action research program suitable for the health problem listed? 2) Economics –Does it make economic sense to address the problem? Are there economic consequences if a problem is not carried out? 3) Acceptability –Will this community want and accept the intended and decided interventions? 4) Resources –Is funding available or potentially available for these activities? 5) Legality –Do current laws allow such activities and interventions? Is their evidence that support these interventions and activities to be implemented?

Health problems which received "No" to any of the above factors were eliminated. After a long discussion, three health problems passed the 'PEARL' test as the interventions for each problem were judged to be proper, economical, acceptable, feasible based on available resources, and legal. These are presented in table 11 below for priority ranking.

Problem analysis:

The researchers used the five Why and/ or What for root cause analysis methods to understand the root cause for poor waste management as delineated in the methodology.

Step 1: specific problem: Poor garbage management was explained as having garbage littering in classrooms, over the school compound, out of the garbage collection and disposal site, and to the surrounding communities. In addition, smell occasionally arises from the disposal site.

Step 2: What sort of waste is generated in this setting?

Response: A lot of waste is biodegradable but non-biodegradable is as well generated.

Step 3: Why a lot of biodegradable over non-biodegradable?

Response: because the most commonly used material is paper, cooked food items, grass, and

Table 7. obervations

	plaster off the walls with a surrounding bush-covered –deep- pit.
General plan and status of the walkways and grass.	Untarmacked, dusty, unpaved road surfaces, clearly net worked inter -linking the school buildings within the school compound, to the Kijjabwemi C/U prayer house, Masaka- Mbarara highway, Kijjabwemi town and the surrounding residential villages. The compound is covered with clear trimmed grass.
Waste collection system	No provisions to separate biodegradable from non-degradable on the premises, rubbish spill over at the disposal pit owing to the small size and shallow depth of the pit, apart from the administrative offices, there is no small containers in classes and the compound to ensure a systematic collection of waste right from livable areas to the disposal pit.
Play ground	Very wide, flat and grass covered playground of approximately 1 hectare at the main entrances of the school compound.
Prayer house	The school is situated very near the church of Uganda prayer house of Kijjabwemi parish community. The researchers observed prayer services provided to the pupils of this school.
Latrines	The school has two isolated separate blocks enclosing both the latrines and urinals lying in side-by-side location behind the main administrative block. The two blocks are well constructed with cemented floor, plastered, exteriorly rough casted, painted, wooden standard doors, locks, ventilation pipes and ventilators. Front walls providing additional privacy are well positioned and are in good state, one block dedicated entirely to the staff, and another to the pupils; clearly separated into boys' and girls' sections. On inspection they were generally clean although urine spill could be observed on the floor of the pupil's latrines. The stance representation ratio was 3:350 (females) and 4:450(boys). The foul smell could be detected within a distance of approximately 5 metres near the latrines.
Compound	The school lies on approximately 4 hectares without a fence. The compound is well organized with clear walk ways, trimmed glass, educatively inscribed anti premarital sex, anti-violence and hygiene promoting wooden and metallic posters permanently positioned. There were no observed waste collection points within the compound, one water tap supplied by the piped national water systems was sighted at the kitchen building.

Table 8. Quantitative summary of votes per identified health problem from Pupils.

HEALTH PROBLEM	FREQUENCY (n=30)	PERCENTAGE
Lack of sick bay and a school nurse.	30	100
Limited latrine facilities.	30	100
Inadequate water supply	30	100
Lack of drinking water	28	93
Trespassers	28	93
Distraction from external environment	28	93
Small waste disposal pit	26	87
Dirty latrines	26	87

Table 9. Summary of votes per identified health problems from Non-teaching and teaching staff.

Health problem	Frequency	Percentage
Non-teaching staff (n=5).		
Lack of a sickbay to cater for the sick and injured persons.	5	100
Tress passers and lack of security officers	5	100
Too much smoke in the Kitchen.	5	100
Teaching staff (n=6)		
Lack of a sickbay	6	100
Few and almost filled latrines.	6	100
Bats in class rooms	4	67
Lack of safe drinking water	3	50

Table 10. Quantitative summary of votes per identified health problems from School board members.

HEALTH PROBLEM	FREQUENCY (n=2)	PERCENTAGE
Very old inadequate latrines	2	100
High prevalence of fevers and respiratory tract infections	2	100
Waste management	1	100
Inaccessibility to safe drinking water	1	50
Poor drug adherence HIV drugs by the infected pupils.	1	50
Poor status and hygiene of the kitchen	1	50

Table 11. Compiled grand list of health problems and their brainstormed causes.

Item	HEALTH problems	CAUSES
1.	Bats in class rooms	Broken glasses in the windows
2.	Dirty, few and almost filled pupil's latrine facilities.	Insufficient stances of latrines., leaky loof, urinating on the latrine floor. low Frequency of cleaning,
3.	Distraction from external environment	Unfenced school, trespassers and noise from cars.
4.	Few and almost filled latrines.	The school leadership and management built fewer latrines,
5.	Waste management	No provisions to separate biodegradable from non- degradable, lack of disciplinary disposal, poor collection, small pit and irregular burning.
6.	High prevalence of fevers and respiratory tract infections	Possibly Malaria parasites and respiratory germs, health services are far away from the pupil's residence.
7.	Inaccessibility to safe drinking water	No safe water dispensing points.
8.	Lack of sick bay and a school nurse.	The school leaders have not established such a facility.
9.	Malaria, flue and cough,	No sickbay.
10.	Poor drug adherence HIV drugs by the infected pupils.	Lack of disclosure
11.	Poor status and hygiene of the kitchen	Kitchen constructed long ago now it has broken down.

Table 12. Hanlon's Ranking of health problems against a specified criteria A, B and C.

HEALTH Problem	Criteria A: Size of health problem Rated out of 10.	Criteria B: Seriousness of health problem. Rated out of 10.	Criteria C: Effectiveness of interventions. Rated out of 10.	Rating (0 to 10)
Poor waste management	10	Very serious	9	9 or 10
Lack of sick bay and a school nurse.	10	Very serious	8	9 or 10
Dirty latrines	7	Relatively serious	2	7 or 8
Distraction from external environment	7	Relatively serious	2	7 or 8
Few and almost filled latrines.	7	Relatively serious	2	7 or 8
Inaccessibility to safe drinking water	10	Relatively Serious	7	7 or 8
Poor status of the kitchen	10	Relatively serious	2	7 or 8
High prevalence of fevers and respiratory tract infections	10	Serious	5	5 or 6
Bats in class rooms	3	Moderately serious	3	3 or 4
Poor drug adherence HIV drugs by the infected pupils.	2	Relatively not serious	2	1 or 2

Table 13. Hanlon Priority Scoring and Ranking Matrix.

HEALTH Problem	Criteria -ASize of health problem Rated out of 10.	Criteria -BSeriousness of health problem.Rated out of 10.	Criteria -CEffectiveness of interventions. Rated out of 10.	Priority Score- D (A + 2B) C	Total Rank
Poor waste management	10	9	9	252	1
Inaccessibility to safe drinking water	10	7	7	168	2
Dirty latrines	7	8	2	46	3

leaves. although polythene bags and plastic containers are also generated in this setting not even a quarter of the other category. Both categories are collected, transported, and disposed of to the designated garbage pit and burnt regularly.

Loud reflection: Is it necessary to separate the biodegradable and non-biodegradable given the type of garbage collection and the method of disposal.

Response: No because a change to introduce separation from the collection point between biodegradable and non-biodegradable will not add any sight-able public health advantage as both will be finally burnt at the same disposal destination.

Step 4: Why is garbage littering and smelling in this setting?

Response: Because pupils, staff members, trespassers, and other people throw garbage at non-specific points. In addition, the rubbish at the disposal pit overfills quickly that the wind blows over and spreads the garbage. The smelling comes occasionally if the garbage at the disposal pit has not been burnt.

Loud reflection: suppose we educated pupils and staff members on the disciplined garbage disposal to the existing garbage pit, dug the pit up to the standard of 2 meters deep, and educate the primary stakeholders on the importance and how to regularly schedule stakeholders to ensure burning at the disposal pit, would this solve the problem?

Response: Not, because a lot of garbage is generated from classrooms, staffrooms, dormitories, and the kitchen which is far away from the disposal pit, indiscipline disposal of garbage and smell are likely to be related to distance, collection issues such as time, shallowness of the disposal pit, trespassers and lack of regular burning schedules hence these are contributing factors but not the route cause.

Step 5; What can we do to reduce the distance, improve the collection, and ensure adherence to burning schedules?

Response: we can mark out collection points at the verandahs of the classrooms, administrative blocks, staffroom, kitchen, and near the main pathways for trespassers generally observing a minimum of the 6-meter distance between each collection point. Install garbage collection containers that are weather, tear, and wear-resistant at the designated points. Develop guidelines on how stakeholders can be timely and regularly involved

in garbage transportation to the expanded waste collection pit.

Loud reflection: suppose collection points are designated and containers installed as well as guidelines developed to ensure regular and timely disposal to the designated grand garbage disposal pit, will this significantly limit garbage littering and smell.

Response: yes, because a lot of waste generation happens very far away from the designated disposal pit and possibly stakeholders find it hard to deliver garbage at the garbage disposal site.

Root cause analysis outcome: poor garbage management at this setting is caused by the excessive distance between generation and final disposal point, lack of designated collection points as well as containers, time and regularity of disposal, shallow waste disposal pit, and lack of well-developed enforceable guidelines.

Problem statement.

Poor garbage management characterized by littering in classrooms, all over the school compound, out of the garbage collection and disposal site, and to the surrounding communities, occasional bad smell arising from the disposal site is a very urgent and serious problem of Kijjabwemi C/U primary school.

A wide range of direct but interconnected factors contributing to and causing this public health problem include the excessive distance between generation and final disposal point, lack of designated collection points as well as containers, time and regularity of disposal, shallow waste disposal pit, and lack of well- developed enforceable guidelines.

Pupils and teachers in this school spend a lot of time trying to collect waste from every angle of the school compound through picking. In addition, the stakeholders in this setting are at risk of developing hygienic-related diseases such as diarrheal diseases from improperly disposed of food items and pollution from the bad smell. If not correctly disposed of, waste may provide breeding sites for insect- vectors, pests, snakes, and vermin (rats) that increase the likelihood of disease transmission. It may also pollute water sources and Namajjuzi wetland and the environment. Hence, it is imperative to intervene and break the potential source of infection, prevent pollution, save the stakeholders time to concentrate on studies and improve the overall process and organize garbage disposal.

Reflection:

Problems generated in real settings with stakeholders together with understanding their respective causes as well as focusing these problems and their causes to available resources and policy guidelines creates a clear way of action to improve public health outcomes using locally accessible and sustainable solutions.

The Intervention Or Innovation

12 Introduction:

Under this chapter, the researchers present the theory of change pathway in terms of a diagram, set objectives to improve garbage management, and action plan to implement interventions developed and decided collaboratively with the stakeholders.

The interventions that were implemented include Stakeholder-centred- learning about excellent waste management practices, utilizing transferable plastic bins of 40ml capacity, expanding the depth of the disposal pit as well as fencing it, and developing settings-oriented guidelines to increase vigilance for waste generation reduction, frequency of disposal and burning of waste. These were developed responsive to the specific action objectives and supported by the reviewed literature, human health, and environmental health expertise. In addition, the researchers report their time frame of implementation of these interventions, how they monitored and evaluated the results created by these interventions, how they ensured reliability and validity in this section, and the lessons learned.

Improvement of objective and Theory of Change (TOC).

The researcher's improved objective is to create innovations that improve waste management at Kijjabwemi C/U primary school with the stakeholders by intervening at generation, collection, storage, transportation, and disposal levels between July and September 2020.

Hence, the process of implementing the interventions to improve waste management in this setting was conceptualized by the Snowdown et al. (2008) solution diagram to clarify the theory of change below.

Research/Action plan Objectives;

i. To implement a stakeholder-centered-sensitization about proper waste management at Kijjabwemi C/U primary school before the end of July 2020.

i. To inclusively establish working waste management guidelines to guide implementation at this set before the end of July 2020.

i. To establish eight waste collection points of at least 6M apart at Kijjabwemi C/U primary school before the end of July 2020.

i. To increase the depth of the disposal pit to at least one meter and fence it at Kijjabwemi C/U primary school before the end of July 2020.

i. To establish improved waste management guidelines and a sanitation committee to sustainably lead, guide, and supervise waste management at Kijjabwemi C/U primary school before the end of October 2020.

Plan of action:

The researchers scheduled regular action meetings with the primary stakeholders during the COVID-19 restrictions, during the meetings, the researchers and the stakeholders developed an action plan that scheduled the dates of designating the eight waste collection points, designing guidelines that would be integrated into the existing guidelines that guide the actions of pupils, teachers and non-teaching staff in ensuring sanitation and hygiene, implementing stakeholder-centered sensitization and formation of the local sanitation committee whose role is to ensure continuity and sustainability of the innovations and continuous improvements.

13 Time frame of the implementation of intervention/innovation.

Monitoring & Evaluation:

There were no primary stakeholders actively using this setting during the lockdown hence the researchers did not monitor how waste management was being conducted at the setting after the interventions were implemented. However, Performance evaluation of the activities towards implementing the interventions developed was done through meetings with the teaching staff, secondary stakeholders, and the sanitation committee. Minutes and attendance lists are attached in the appendix.

Reliability and Validity

Reliability

The proceedings were documented and kept for future reference in form of minutes, attendance

Table 14. Time frame for implementation of planned interventions to improve waste management.

ACTIVITY	TIME FRAME	INDICATORS	TARGET	OUTCOME	RESPONSIBLE PERSON
Sensitizing the set- up research lead committee of stakeholders on the procedures and steps of proper waste management plus planning, developing and sourcing intervention items.	4th July, 2020	Number of sensitization meetings carried out. -Plan of items needed generated	All lead research committee primary Stakeholders	Demonstration of understanding steps for proper waste management. Summary of items required to implement interventions.	Researchers
Developing working guidelines to guide	4th July, 2020	One document detailing the set	One document	Adoption of the set provisional	Researchers and

lists, and action framework documents. Attached is the appendix.

Validity

The research made it a point to share with the stakeholders and the school administration whatever findings were got at each stage of the implementation. The researchers met regularly with the lead research committee, the available primary and secondary stakeholders at the school to confirm the findings.

Lessons Learnt/Self-evaluation.

1. Although the burning of waste is an appropriate intervention in this setting, it has environmental pollution and contributes to the greenhouse effect.

1. Interventions and innovations developed and conceived collaboratively by researchers and stakeholders provide implementable cost-effective solutions.

1. There is less compliance to school WASH standards as set by the ministry of education and sports.

IMPLEMENTATION OF ACTION PLAN

14   Introduction.

Under this chapter, we present activities are done in this setting, the person who took responsibility, and the outputs. Additionally, the researchers support their outputs with photos taken during the implementation. Because of the pandemic lockdown, pupils were not involved. Summary of actions carried out and outputs.

Objective one: To implement a stakeholder-centered-sensitization about proper waste management at Kijjabwemi C/U primary school before the end of July 2020.

Objective two: To inclusively establish working waste management guidelines to guide implementation of interventions at this setting before the end of July 2020.

Objective three: To establish eight waste collection points of atleast 6M a part at Kijjabwemi C/U primary school before the end of July 2020.

Objective four: To increase the depth of the disposal pit to atleast one metre and fence it at Kijjabwemi C/U primary school before the end of July 2020.

Objective five: To establish improved waste management guidelines and a sanitation committee to sustainably lead, guide and supervise waste management at Kijjabwemi C/U primary school before the end of October, 2020.

Under this objective the researchers and the stakeholders intended to improve working waste management guidelines set at the beginning of implementing the interventions to new one which will ensure sustainability of proper waste management. At the same time, dissolve the temporary local lead research team and form a relatively permanent sanitation committee as supported by MoES- WASH standards, (2006).

Researchers and stakeholders after the sustainability meeting.

Communication strategy.

Table 15. Time frame for implementation of planned interventions to improve waste management.

interventions for improving waste management.		guidelines		guidelines	stake-hold-ers
Designating and fixing the plastic bins.	10th July, 2020	Number of waste collection points designated. Number of waste collection containers installed at the points	Atleast 8 points designated as waste collection and temporary storage points.	Atleast 6M apart 8 waste collection points marked and waste collection containers installed.	Re-searchers and stake-hold-ers
Increasing the depth of the disposal pit and fencing it	10th July, 2020	Depth to which the disposal pit is increased.	Greater than 1M increase in depth and fencing	Disposal pit depth increased to > 1M.	Re-searchers and stake-hold-ers
Demonstration of the collection of waste	10th July, 2020	Number of demonstrations carried out.	Atleast one session of demonstratio n.	Stakeholders have developed skills to ensure proper waste disposal.	Re-searchers and stake-hold-ers
Pupils orientation and training about the WASH standards and the provisional guidelines which were used to improve Waste management during the lockdown when they were absent.	3rd Oc-to-ber, 2020	Number of trainings carried out	Atleast one training of 6 members from the stakeholders.	Understanding and contextualizing proper waste management concepts.	Re-search team and stake-hold-ers
Dissolving the settings lead research committee and composing a new sanitation committee to ensure sustainability.	3rd Oc-to-ber, 2020	Sanitation committee formed.	Forming a 6-member sanitation committee.	A sanitation committee leading the sustainable waste management efforts.	Re-search team and stake-hold-ers
Improving working guidelines for adoption to ensure sustainability of waste management	3rd Oc-to-ber, 2020	One set of guidelines indicating frequency of waste disposal and responsible personnel	One set of guidelines developed and permanently adopted.	Adoption of, and continuous waste management using the developed guidelines.	Re-searchers and stake-hold-ers.
Monitoring and evaluation	On-go-ing through-out the	Extent of achieving action	Compliance with action	Improved waste management	Re-searchers.

Table 16. Time frame for implementation of planned interventions to improve waste management.

	research period.	objectives and the our interventions.	impact created by objec- tives.
Site departure and total handover.	15th October, 2020	Action research Report handover.	Re- searchers

Table 17. Actions and outputs in relation to achievement of action plan objective one.

Activity	Personnel /Inputs	Outputs
Developing sensitization guidelines	Researchers, Markers, papers and News prints. WASH standards document.	One document guide on stakeholder centred sensitization.
Carrying out stakeholder centred sensitization in 3 to 4 hours at the school premises.	Researchers, teaching staff and other local team lead members. Assorted stationary.	5 teaching staff members and 1 board member sensitized about proper waste management.

Table 18. Actions and outputs in relation to achievement of action plan objective two.

Activity	Personnel /inputs	Outputs
Developing and adopting working waste management guidelines.	Researchers and the lead stakeholders, Papers, pens and markers.	One document of written waste guidelines filed and pinned up at the school communication board.

Table 19. Activity and outputs in relation to achievement of action plan objective three.

Activity	Personnel /inputs	Outputs
Designating eight waste collection points of atleats 6 metres apart at the school verandahs or classrooms.	Researchers and the stakeholders	Eight points designated
Buying and installing the plastic 40ml transferable bins at the designated points.	Researchers, stakeholders and eight plastic 40ml bins.	Eight plastic 40ml transferable bins bought and installed.

Table 20. Activity and outputs in relation to achievement of action plan objective four.

Activity	Personnel/inputs	Outputs
Increasing the depth of the disposal pit to > 1M & fencing it.	Researchers, community members and other stakeholders, wooden logs, nails and garden tools.	Depth of the disposal pit increased to > 1m and fenced.

Table 21. Activity and outputs in relation to achievement of action plan objective five.

Activity	Personnel /inputs	Outputs
Composing the seven-member sanitation committee.	Researchers and nine stakeholders.	One fully composed sanitation committee to support and maintain proper waste management.
Developing and adopting new improved waste management guidelines.	Researchers and the lead stakeholders, Papers, pens and markers.	One document of written waste guidelines filed and pinned up at the school communication board.

This strategy aimed at forming an ongoing two-way dialogue between researchers and stakeholders

thus the strategy facilitated effective communication in such a way that findings of the research reach stakeholders to have the potential to impact practice, and allow stakeholders to feed into the research process thereby making the action research work relevant to the stakeholders.

Communication objective: To effectively and timely inform, persuade and engage the different categories of stakeholders of kijjabwemi primary school with specific information relevant to each category.

Stakeholders Analysis: This was done to identify target audiences intended to be engaged with specific kinds of communication messages. The levels of influence and interest were determined based on the observing stakeholder's category who influence and are interested in the desired change of improving waste management.

We managed closely high influence, high interest group, minimum monitoring effort toward the low influence, low interest group, kept and tried to increase the interest of the high influence, low interest group and keep informed and showed consideration to the low influence, high interest group.

Communication feedback: The researchers and the stakeholders received constructive two-away feedback during each meeting they held.

Sustainability plan: To ensure there is sustainable proper waste management, the stakeholders and the researchers formed a sanitation committee made up of the sanitation teacher, health teacher, head boy, head girl, sanitation perfect, health prefect, and head monitor and these shall be inhabitants of the committee position based on post and not name, hence the revolving leadership shall always depend upon the school electoral process. The sanitation committee formed suggested that

they will forward a proposal to the school management board to allow the school administration to engage parents as well on hygiene and sanitation maintenance.

A twenty-seven points improved waste management guideline was developed, written, and adopted by the settings designated member of staff on behalf of the headmaster. Copies are filed and pinned on the school communication board. The eighth group of stakeholders composed of five pupils and three teachers was oriented about the formed guidelines. In case of accidental breakage of a waste management bin, pupils in a class will ensure they raise the money to re-establish the container, Otherwise, any person who breaks the container is liable to replace it. The sanitization committee shall introduce inter-house and inter-class competitions towards maintaining hygiene and sanitation in this school.

Reflection of the intervention:

The researchers and stakeholders determined that stakeholder-centered- learning about excellent waste management practices, utilizing transferable plastic bins of 40ml capacity, expanding the depth of the disposal pit as well as fencing it and developing settings oriented guidelines to increase vigilance for waste generation reduction, frequency of disposal and burning of waste were the effective innovations and interventions that needed implementation to cause a significant improvement in waste management. However, these interventions could not be fully monitored and evaluated due to lockdown.

Lessons learned/ way forward.

For successful improvement in garbage management, the continuous engagement with the most influential and interested stakeholders, in terms of information flow and tapping into their expertise builds a very functional rapport that they collectively decided interventions create significant re-

Table 22. Target group engagement.

Target group (WHO)	Message (What)	Engagement techniques (how)	Schedule (When)	Responsible person.
Primary and secondary stakeholders.	Data collected, list of health problems and interventions	Letters, meetings, phone calls	Feb to October 2020	Researcher, local lead team
Tertiary stakeholders	Introductions, acceptance and expert opinions	Letters, meetings and phone calls	Feb to October, 2020	Researchers and public health inspectors
Community members surrounding this school.	Mobilisation for action	House to house verbal messages	July, 2020	Researchers, local lead team

sults on public health and health promotion. In this case, for instance, researchers have succeeded in causing implementable interventions without any resistance and abandonment.

Discussion of Results from the Implementation Section

Elimination of waste littering and smell.

Elimination of waste littering and the smell would be the most significant results that point to a successful improvement in waste management in this setting. However, due to the absence of the pupils who generate the most significant part of the waste, it was not feasible for the researchers to evaluate the achievement of such outcomes. Hence, the researchers discuss the short-term outcomes that were evaluated and achieved below.

Stakeholders sensitization on proper waste management and WASH standards.

The researchers sensitized stakeholders about the steps-generation, collection, storage, transportation, and disposal of waste as well as aims of proper waste management per step. Hoanga and Kato, (2016), concluded that waste management educational interventions improved Vietnamese school waste management for sustainable development knowledge significantly.

The researchers took lessons from the WASH guidelines (2006) and the emergency sanitation manual (2005). The researchers sought expert guidance on desired minimum standards of waste disposal in schools from the health assistant of Kimanya-Kabonera division of the newly created Masaka city who doubles as a tertiary stakeholder. Information provided from her expertise included the minimum desirable width and depth of the dis-

posal pit as being at least greater than 1 meter by 1 meter utmost 1X2 meters pit.

The stakeholder's role was to learn about the desirable components to ensure proper waste management as well as an insert in specific standards that applied to this setting, such as the "at least 6 meter apart collection points on school verandahs garbage collection points, the wooden fencing of the dug disposal pit and deciding that separation of waste at the collection and disposal points into recyclable and non-recyclable did not make sense given the lack of access to expertise, funds, and infrastructure to properly dispose of these kinds of wastes." This specific approach of non-separation of the recyclables from the non-recyclables are against numerous expertise recommendations in literature (World, bank, 2019; WASH standard guidelines, 2006; Kaza and Barna, 2014; Khatib, 2011; Linda et al,2019; Cornell Waste Management Institute, 1996; united nations, 2011).

However, the researchers did not persuade the stakeholder's view of setting such a solution for the obvious reasons cited above. At the same time, the non-separation approach is observed as a proper procedure in the emergency sanitation manual, (2005).

Overall, the primary stakeholders-centered-sensitization and the formation of the sanitation committee to maintain and ensure the sustainability of implementing interventions is in line with encouraging community participation, enabling communities to develop their public policy setters who can re-orient setting to provide health solutions.

Eight collection points fitted with transferable 40ml plastic bins.

The research interventions of setting up eight collection points fitted with 40ml plastic bins per point created collection and storage points before sending the waste to the disposal pit. This shifted the practice of having to massively pick waste and directly dispose of it to the disposal pit in this setting as at the end of the close of business in a day thereby reducing waste littering. Rada et al., (2016) observed that establishing collection bins in school corridors and classrooms as well as improving containerization of waste was associated with improved collection and storage of waste.

The introduction of the durable transferable plastic collection bins has been viewed by stakeholders as a significant milestone in not only reducing the distance to the disposal pit but also providing easy access to temporary collection and storage points. This will reduce the proportion of unregulated waste littering by The World bank, (2019) recommendation to the developing countries. As well, this intervention is supported by the emergency sanitation manual (2005), which mentions that in case of onsite disposal practices, planners and implementers need to consider utilization of improved waste management facilities which provide fairly maximum walking distance, reasonably safe from theft or vandalism and encompass a certain threshold for waste; be located where people are able to use them easily; are sizeable, enough, and properly distributed to achieve proper waste management.

This intervention allows temporary storage of a day's garbage collected and eases transportation to the disposal pit by hand. The settings stakeholders and the researchers yearned to contribute a whooping 240,000UGX to facilitate the purchase of these state-of-the-art plastic bins, consequently, improving the waste management infrastructure, process, and system. This motivation to make such a contribution is viewed from a local-level perspective. This may imply that in such settings, what is only required, is focusing the attention of the influential and interested actors using action research concepts to develop a sustainable waste management infrastructure.

Depth of the disposal pit increased to at least one meter and fenced.

As one of the sources of the littering waste was the shallow disposal pit that could easily fill and be browned over by the wind, the action research team, the teaching, and non-teaching staff, as well as the community members, intervened by increasing the depth of the pit to at least greater than one meter and fenced it with wooded eucalyptus medium-sized eucalyptus logs. The community members were motivated to act because the disposal pit spread waste towards their gardens and residences. On mobilization, they became responsive. The waste disposal method in this setting has always been burning, this has a significant impact on the environment and health in terms of greenhouse emissions and pollution respectively, however, the WASH standards, (2006) and Emergency sanitation manual, (2005) support this disposal practice setting without alternative interventions thus the researchers and stakeholders observed the practice as appropriate in circumstances.

Waste management guidelines developed and adopted.

One document waste management guideline was written, this was through engagement with the primary stakeholders and the researchers. Enabling this school to develop its waste management guidelines that would advance the reduction of generation of waste, point out how collection, storage, transport, and disposal should be practiced within the resourcefulness of this setting, providing not only a quick one-point reference center about the local policy but also workable guidance to enhance proper waste management to improve health.

This intervention assists in clarifying roles provides avenues for implementation and enforcement as well as creates the spirit of ownership for sustainable waste management. Lenkiewicz and Taremwa (2018) noted that in Uganda, there are a hundred ways of waste management people can talk about, and 95% of the waste management activities are done by the informal sector, the formal sector has little clarity of roles, only related to implementation and enforcement with profound lack of ownership within the industry thus waste management initiatives die along the way.

Forming the local sanitation committee.

To ensure there is sustainable, coordinated, and focused proper waste management, the stakeholders and the researchers formed a seven-member sanitation committee made up of the sanitation teacher, health teacher, head boy, head girl, sanitation perfect, health prefect and head monitor and these shall be inhabitants of the committee position based on post and not name, hence the

revolving leadership shall always depend upon the school electoral process.

This intervention output was based on the fact that the school lacked a collective committee over individual health and sanitation teachers and prefects working separately. This is the normal way of running health, sanitation, and hygienic practices in numerous schools. Giancotti (2015), clarified that strategies to sustainably manage school waste include innovative partnership collaborations and solutions for waste management in schools targeting pupils, students, and teachers.

In addition, clean river recycling solutions, (2020), emphasized that communication, culture, and collection among elementary school children are strategies that need local school leadership to motivate, create classroom audits and introduce challenging competitions in schools to properly and sustainably bring proper waste management.

14.1   Plan for sustainability;

To ensure there is sustainable proper waste management, the stakeholders and the researchers formed a sanitation committee made up of the sanitation teacher, health teacher, head boy, head girl, sanitation perfect, health prefect, and head monitor and these shall be inhabitants of the committee position based on post and not name, hence the revolving leadership shall always depend upon the school electoral process. The sanitation committee formed suggested that they will forward a proposal to the school management board to allow the school administration to engage parents as well on hygiene and sanitation maintenance.

A twenty-seven guideline point was developed, written, and adopted by the settings designated member of staff on behalf of the headmaster. Copies are filed and pinned on the school communication board. The eighth group of stakeholders composed of five pupils and three teachers was oriented about

the formed guidelines. The stakeholders decided to carry out monthly reminders and sensitizations on proper waste management at the school assembly. In case of accidental breakage of a waste management bin, pupils in a class will ensure they raise the money to re-establish the container, Otherwise, any person who breaks the container is liable to replace it. The sanitization committee shall introduce inter-house and interclass competitions

towards maintaining hygiene and sanitation in this school.

15   Conclusion

Improved waste management at this school has enabled individuals and communities to manage their health hence public health promotion.

The research outcomes such as forming the sanitation committees and breaking the long distance between generation and disposal by introducing plastic collection bins have saved the stakeholders a lot of time to concentrate on school programs and minimize the scattering waste on the school.

Recycling of waste was impractical because it required intensive sophisticated skills, huge resources, and specialized expertise which were outside what the school setting could afford within the allocated period.

Recommendations.

The researchers recommend that to make recycling a practical solution to waste management, this school needs to link up with recycling companies need in this country to forge the way forward.

In the meantime, responses need to be generated and directed towards building an incinerator as recommended by the WASH standards.

The Sanitation Committee is recommended to continuously look for resources to improve general sanitation and hygiene at this school.

Self-evaluation:

The researcher excellently tackled the waste management problem with adequate evidence and the right procedures in line with the setting's accessible resources and expertise to promote health. The research excellently achieved its objectives in the areas of building healthy public policy, strengthening community action, creating supportive environments, developing personal skills and re-orienting health prevention services and promotion of health by developing and adopting waste management guidelines, stakeholders participation maximized in an enabling manner, activities accessibly done at schools premises, interventions developed and trained to stakeholders within accessible and sustainable resources and reoriented waste management practices at this schools respectively. However, due to the limitations brought down by COVID-19 related lockdown and time constraints which prevented the evaluation of the intermediate and long-term outcomes, the researchers should have

had significant lessons while monitoring and evaluating a completely composed and functional setting using the developed theory of change.

16 List of Abbreviations

17 Acknowledgment:

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Operational definition of terms

Community collaboration: this means productively working relationships between the primary, secondary, tertiary stakeholders and the researchers.

Feasible or Workable problem: defined as one which has 1) available and accessible solutions, 2) available resources (access to personnel and expertise, time, money, equipment, and any other form of support such as legal framework), 3) determined magnitude/size and 4) impact on the population health at this setting.

The grand list of health challenges: a compiled list of identified health challenges from the respective category of stakeholders presented at the problem prioritization meeting.

Group status: refers to a unit of composition in the stakeholder's category. For example, pupil status is one group status, the teaching staff is another group status, etc.

Health promotion practices; are activities aimed at enabling individuals and communities to take control and improve their health and its determinants.

Stakeholder: Anyone or group of persons who will be affected by the procedures of this action research. These include district education officers, Kijjabwemi primary school board of governors, teachers, support staff, and pupils.

Suburb: means kijjabwemi peri-urban area or village.

Triangulation method; an interconnected method between the settings and researchers' team with the formal techniques and tools of data collection and sources of data for this action research project.

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Table 23. List of Abbreviations

AR	Action Research
FGDs	Focused Group Discussions
LC1	Local Council One
UMU	Uganda Martyrs University
WHO:	World Health Organization.
PRA:	Participatory rural appraisal.
CU:	Church of Uganda.
WASH:	Water, hygiene and sanitation.

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