School WASH Facilities Operation, Maintenance and Management Training Manual

December 2022
Addis Ababa, Ethiopia



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Acronyms

AC	Alternating Current
COWASH IV	Community-led Accelerated WASH Project, Phase IV
DC	Direct Current
GoE	Government of Ethiopia
HWF	Hand Washing Facilities
MHM	Menstrual Hygiene Management
OM&M	Operation, Maintenance and Management
PE	Polyethylene
PPR	Polypropylene Random Copolymer
PP	Polypropylene
PTA	Parent Teacher Association
SIP	School Improvement Program
PVC	Polyvinyl chloride
SWASH	School Water, Sanitation and Hygiene
UNICEF	United Nations Children's Fund
UV	Ultraviolet
VIP	Ventilated Improved Pit
WASH	Water, Sanitation and Hygiene
WQM	Water Quality Management
WWO	Woreda Water Office
WHO	World Health Organization
HDPE	High Density Polyethylene

Forward

Ministry of Education is committed to increase access to school WASH for all students, including those with disabilities, to ensure equity, quality and management of WASH services. These key areas are clearly articulated in the fifth Education Sector Development Program 2016- 2020. In light of this, the Ministry of Education has placed School WASH as one of the 7 cross cutting issues in the Ethiopian Education Sector Development Plan V (ESDP V).

The ministry is striving to improve the coverage of water supply, sanitation and hygiene services throughout the country to achieve the sustainable development goals. As a result, school facilities are being provided with safe water and sanitation facilities combined with hygiene education thus improving school enrolment and attendance, potentially lowering the drop-out rate and repetition rates, especially of girls.

Through the work of the Ministry of Education, great attention is being paid to the development of standards and construction design of WASH facilities at our schools taking the age, gender and peoples with disabilities in to consideration. In addition, to address the software aspect, the ministry is working on developing gender and age sensitive curriculum on sanitation and hygiene, upgrading life skills of school children and teachers on sanitation and hygiene education and emphasizing the need for capacitating adolescent girls on Menstrual Hygiene Management.

All too often we find that the water supply systems, toilets and other services constructed quickly fall into disrepair due to the lack of properly managed operation and maintenance, resulting in the wastage of precious resources and funds.

This manual directly addresses the problem areas and clearly informs the school principals, operators, caretakers, guards and other key stakeholders, not only of their responsibilities and duties, but how to tackle the daily operation and maintenance tasks they face. The children are our future and the adoption of this manual will help us in our role to care for them.



Yohannes Wogasso Wodajo
Chief Executive Officer (CEO)
Educational Program and
Quality Improvement

Introduction to the Training Manual

Creating access for WASH services is the first step in School WASH (SWASH) programming. To ensure the continuity of the impact, the facilities must continue to work for a long time without disruption. Thus, effective operation, maintenance and management (OM&M) systems should be in place. SWASH facilities should be properly used, cleaned and maintained in a timely manner. Down the line operation and maintenance must be planned, budgeted, spare parts availed and skills developed.

The Government of Ethiopia (GoE) has made significant progress in increasing access to WASH services especially after the introduction of the One WASH National Program. The Ministry of Education with other WASH ministries and stakeholders has developed the SWASH strategy and implementation manual, as well as a management, operation and maintenance guide, along with the Design and Construction manual which paved the way for enabling the implementation of SWASH programs in Ethiopia. However, different assessments, project evaluations and observations showed that the sustainability of SWASH services is still a big challenge. One of the factors that hinder sustainability of SWASH services is the lack of skill in operation, maintenance and management of SWASH services, especially at the lower levels. To develop and promote proper skills on operation, maintenance and management of the SWASH facilities, the Ministry of Education in collaboration with the Community-led Accelerated WASH Project, Phase IV (COWASH IV) has developed this manual.

This training manual consists of the following modules:

Module I: Participant Introduction, Training Objectives and Pre-test

Module II: Training of Facilitators on Facilitation Skills

Module III: The Challenges of SWASH Facilities Operation, Maintenance and Management

Module IV: Role and Responsibilities of stakeholders

Module V: Operation, Maintenance and Management of Water Supply Systems

Module VI: Operation, Maintenance and Management of School Latrines

Module VII: Operation, Maintenance and Management of School Hygiene Facilities

Module VIII: Operation, Maintenance and Management of School Solid Waste Management Facilities

Module IX: Equity and Inclusion

Module X: Cross-cutting Issues in Operation, Maintenance and Management of SWASH Facilities

Purpose of the Manual

The country has different manuals and guidelines to address the issues of SWASH. However, there was no standard manual that helps to train caretakers and school principals and managers that are mandated to operate, maintain, and manage SWASH facilities daily and plan long-term sustainability. This training manual focuses on the OM&M of SWASH facilities that help to sustain the WASH services in schools. Each module addresses one aspect of the SWASH facilities that are commonly used in Ethiopia and are designed to lead trainers through the OM&M of SWASH facilities by providing an insight into the methodologies, activities and notes for each session. Though each school may have a slightly different system for OM&M, this manual will make that process easier and show that maintaining SWASH is far easier and less costly than dealing with the consequences of not maintaining it.

Target Audience

The primary audiences of this training manual are school communities including supervisors, parent-teacher associations (PTA), school directors/principals, SWASH health club and girl club members that are directly involved in OM&M of SWASH facilities. However, the manual can also be adopted and used by SWASH programmers and non-governmental actors which include practitioners, project managers, project teams and anyone else interested in SWASH facility OM&M.

How to use the Manual

The different modules in this manual are selected based on current SWASH facilities OM&M challenges. The manual should be used in conjunction with other SWASH guides and manuals prepared by the Ministry of Education and other WASH ministries (Ministry of Water and Energy and Ministry of Health). It is necessary to cover all the modules and give emphasis on modules related to the existing SWASH facilities in that specific area. Since the manual is competency based, the role of the facilitator/trainer is to facilitate the discussion and not to dictate or lecture. Thus, trainees should be encouraged to voice their concerns and views, share their experience and contribute to the learning process during the training.

Each session has clear instructions to follow and after each discussion and exercise, the facilitator is expected to summarize the session by highlighting the main points from the facilitator notes.

The manual provides detailed descriptions of how to run each session in the training. Each session consists of the following sections.

Session Objective - What trainees will learn in each session

Training methods - Describes the methods to be used for facilitating the session.

Training materials - Describes the materials needed to facilitate the session.

Time required - Indicates the time required to complete the session.

Instruction to facilitator - Describes the process to follow to facilitate the session.

Facilitator notes - Highlights the critical content of the session and should be used for reference.

Objective of the Manual

The primary objective of the manual is to provide school principals, teachers, caretakers and cleaners with the necessary knowledge, skills and attitude needed to operate, maintain and manage SWASH facilities in a sustainable and cost-effective manner.

Specific objectives: The specific objectives include

- To provide the participants with the knowledge, skills and attitude needed to facilitate training and to become effective training facilitators on SWASH OM&M.
- To increase the school principals', caretakers' and cleaners' competence on OM&M through enhancing their knowledge, skills and attitude needed to carry out SWASH facilities OM&M in their respective schools.

Scope of the Manual

The manual can be used in urban, rural, and pastoral areas by contextualizing the WASH facilities available in each setting. It will be applicable in public schools but can also be adopted and used by private and faith-based schools.

Training Duration

The training is designed to have a maximum duration of 40 hours, or one week, with possible adaptations according to the local circumstances and demand as well as types of trainees (Training of Trainers or cascading). The time required for each module is highlighted in detail although the trainers are free to adjust the time based on the knowledge and experience of the trainees. All the sessions are interlinked and should be covered in the training. However, the emphasis and time taken on each session depends on the experience and skill of the trainees.

Sample Training Agenda

Day 1		
Time	**Module**	**Session name**
8:30-9:00		Registration
9:00- 9:15		Opening Remarks
9:15- 10:15	I	Introduction, target audience, how to use the manual, purpose, scope and objective of the training
10:15- 10:30		Tea break
10:30- 11:00	I	Pre-test
11:00- 12:00	II	Approaches to effective adult learning
12:15-12:30		Questions and answers by participants on approaches to effective adult learning
12:30- 1:30		Lunch
1:30-2:15	II	Planning for training
2:15- 3:15	II	Developing effective facilitation skills
3:15-3:30		Questions and answers by participants on developing effective adult learning
3:30- 3:45		Tea Break

3:45- 4:30	III	Definition and concept of OM&M
4:30-5:15	III	Link between health, education and OM&M of SWASH facilities
5:15-5:30		Questions from participants on the presentations
Day 2		
8:30-8:45		Recap of day 1
8:45-9:45	IV	OM&M of hand pumps
9:45- 10:00		Questions from participants on hand pumps presentation
10:00- 10:15		Tea break
10:15- 12:00	IV	OM&M of spring water supply systems
12:00-12:30		Questions from participants on spring water supply presentation
1:30- 3:15	IV	OM&M of motorized water supply systems
3:15-3:30		Tea break
3:30- 5:15	IV	OM&M of solar powered water supply systems
5:15-5:30		Questions from participants on solar powered water supply system presentation
Day 3		
8:30-8:45	III	Recap of day 2
8:45-9:15	IV	OM&M of rain/roof water harvesting system
9:15-9:30		Questions from participants on the presentation
9:30-10:00	IV	Water quality management (WQM)
10:00-10:15		Questions from participants on WQM presentation
10:15- 10:30		Tea break
10:30- 12:15	V	OM&M of traditional pit latrines
12:15-12:30		Questions from participants on traditional pit latrine presentation
12:30- 1:30		Lunch
1:30- 3:00	V	OM&M of VIP latrines
3:00-3:45	V	OM&M of composting latrines
3:45- 4:00		Tea break
4:00-5:00	V	OM&M of pour-flush latrines
5:00-5:30		Questions from participants on OM&M of different latrine types
Day 4		
8:30- 8:45		Recap of day 3
8:45- 9:15	V	OM&M of urinals
9:15- 10:00	VI	OM&M of hand washing facilities (HWF)
10:00-10:15		Questions from participants on OM&M of urinals & HWF presentations
10:15-10:30		Tea break

10:30- 11:30	VI	OM&M of Menstrual hygiene facilities
11:30- 12:15	VII	OM&M of incinerators
12:15-12:30		Questions from participants on OM&M of MHF and Incinerator presentations
12:30- 1:30		Lunch
1:30-2:15	VII	OM&M of collection and management of solid waste disposal facilities
2:15-2:30		Questions from participants on waste collection and disposal facilities
2:30- 3:30	VIII	Basic concepts of equity and inclusion
3:30-3:45		Tea break
3:45-4:30	VIII	Mainstreaming equity and inclusion
		Questions from participants on the equity and inclusion presentation
4:45-5:15	IX	Health and safety
5:15-5:30		Questions from participants on the health and safety presentation
Day 5		
8:30- 8:45		Recap of Day 4
8:45- 10:15	IX	Roles and responsibilities of different stakeholders
10:15- 10:30		Questions from the participants on the presentation
10:30- 10:45		Tea break
10:45- 12:15	IX	Planning and budgeting of SWASH facilities OM&M
12:15- 12:30		Questions from the participants on the presentation
12:30-1:30		Lunch
1:30-2:30	IX	Monitoring and evaluation presentation
2:30 -3:30		Post-test
3:30- 3:45		Tea break
3:45- 4:15		Feedback/reflection from participants on improving the training/manual
4:15- 5:30		Results of the test, presentation of certificates and other administration issues

MODULE I: PARTICIPANT INTRODUCTION, TRAINING OBJECTIVES AND PRE-TEST

Session 1: Introduction, Objective of the Training and Pre-test

Objectives

At the end of this session, the participants will be able to:

- Get acquainted with each other to ensure smooth communication, learning and facilitation of the training process
- Explain the objectives, purpose and scope of the training

Methodologies

- Presentation
- Brain Storming
- Discussion

Material needed

- Flip chart and markers
- Copy of pre-test questions

Time needed: 90 minutes

Activity 1: Welcome and conduct participant introductions and expectations (30 minutes)

Instructions for the Activity

1. Welcome participants and thank them for participating in the training.
2. Introduce yourself.
3. Ask the participants to introduce themselves and where they come from.
    - The facilitator will prepare a ball from paper and ask participants to stand and make a circle. The trainer will throw the ball to one of the participants and ask her/him to introduce her/himself. Each person should state her/his name, organization, role, experience in SWASH and one hobby.
    - The ball should be thrown to another participant etc.
    - On completion, thank the participants and ask them to sit down.
4. Give some examples of disabilities then give participants pieces of paper to write their gender and whether they have a disability and what kind of disability they have. Then, consider the disability status in your communication throughout the training. E.g. if a participant has a hearing problem, you need to arrange a co-facilitator who can use sign language.
5. Hand out a plain piece of paper to each participant and ask them to write three of their expectations from the training. Summarize the responses on the flip chart.
6. Familiarize the participants with the venue (dining room/toilets/outdoor areas suitable for group work), administrative issues and review the general schedule for the training.
7. Set ground rules by asking the participants to propose one rule (note: the ground rules may include only one person speaking at a time, raise hands if someone has a question, listen to what other people are saying, be on time coming back from breaks, agree time of start, coffee break, lunch & end time, putting off/silence mobile phones, every idea is right and respect the ideas of others, avoid side talking, encourage active participation, include energizers, etc.). If the participants' do not list all the points, the facilitator can add any rule from his/her experience to help to create a conducive environment and achieve the objective of the training.
8. Facilitate the selection of a timekeeper and a person to lead the energizer. In order to keep track of the time, prepare two papers (one with yellow which shows 5 minutes remaining and one red with time over) and give to the timekeeper. The timekeeper will signal the time remaining for the facilitator
9. To have maximum attention and interaction of the trainees, it is advisable to provide a hard copy of the manual to each trainee after completion of the training.
10. Provide the schedule of the training before starting so that trainees will be clear about the training and align their expectations.

Activity 2: Objectives and Overview of the Training (30 minutes)

Instructions for the Activity

1. Briefly explain to the participants that the training to be conducted has been designed to build their knowledge and skills on SWASH facilities OM&M.
2. Before the training prepare the objectives of the training on a flip chart and go through the list of objectives of the training. Put the chart on the wall as a reminder of the objectives throughout the training.
3. Ask if anyone has any questions or additions to the list. If so, and they are appropriate, add them to the list.
4. To align the expectations of the participants and the training objective, verify the posted participant expectations by comparing them with the objective of the training.
5. Some participants may have expectations that may not be aligned with the objective of the training. Thus, put these expectations to one side and explain briefly how to address them at the end of the training

Activity 3: Pre- and Post-test (30 minutes)

Instructions to the Activity

1. Pass out copies of the pre-test to the participants and ask them to complete it individually (note: the pre-test and answers are annexed to this manual).
2. Ask participants to select a code number and then ask them to write their code number on the pre-test. Remind them to remember it for the post-test. Tell participants' that the codes are used to ensure confidentiality and must be the same in the pre- and post-tests.
3. Collect all the pre-test answer scripts and mark them as soon as possible the same day. Identify topics that were not answered by many participants and need to be addressed during subsequent training days. Participants should be advised that these topics will be discussed in greater detail during the training.
4. Conduct a post-test using the same questions as the pre-test after completion of the training and put the two results side by side using the codes to assess the knowledge, attitude and skill level changes as a result of the training. The facilitators undergoing Training of Trainers should score more than 75 percent in the post-test in order to receive certificates and train others.

The purpose of the pre-test is to measure the level of understanding and preparedness of trainees before conducting the training. The result of the test will also help to identify the gaps that need greater attention during the training. The trainees should not be expected to answer all the questions correctly. The post-test will also help to measure whether there is a change in knowledge, attitude and skills of trainees after the training is completed. The trainees will be expected to answer more questions in the post-test compared to the pre-test. The questions are aligned to the objective and cover all sessions. Assure trainees that the pre- test is not to judge their knowledge but is used to conduct more effective training. Do not forget to tell them that the post-test will be used to award a certificate so that they should attentively attend all of the sessions.

MODULE II: TRAINING OF FACILITATORS ON FACILITATION SKILLS

Session 1: Approaches to Effective Adult Learning

Session Objectives

At the end of this session the participants should be able to:

- Understand the approaches of effective adult learning techniques
- Effectively facilitate sessions

Methodologies

- Facilitator Presentation
- Brainstorming/discussion

Material needed

- Flip Chart
- Marker
- Scotch tape

Time needed: 60 minutes

Activity 1: Brainstorming and illustrated lecture

Instructions for the Activity

1. Brainstorm with the participants about their understanding of adult learning
2. List down their responses on a flip chart and make the list complete by adding those missed
3. Make a presentation on a brief overview of adult learning (facilitator note)
4. Ask participants if they have any questions on the presentation
5. Summarize the session with the main points followed by questions and answers

Facilitator Note on adult learning

Adult Learning

According to Dr. Malcolm Knowles Theory of Adult Learning (Kenyon and Hase (2001), citing Merriam and colleagues (2007) and Forrest and Peterson (2006), outlining the six main assumptions in Knowle's adult learning theory), there are six research-based adult learning principles:

Principle 1 - Adults are internally motivated and self-directed.

Adult learners will resist learning when they feel others are imposing information, ideas, or actions on them. Adults need to be free to direct themselves. Training providers must actively involve participants in the learning process and serve as facilitators rather than dictating teachers. They must guide participants rather than supply them with facts. They must get participants' perspectives and give them the flexibility to work on areas that reflect their interests.

Principle 2 - Adults need to draw upon their own life experiences and knowledge.

Adults have accumulated a wealth of life experience and knowledge from school, work and family life that can be a resource for their own learning as well as the learning of others. Facilitators who deliver training must value this experience and help adults connect it to the theories and concepts that are introduced during training activities. Facilitators should encourage collaboration and idea-sharing among adult learners. Thus, in the training the facilitator should give maximum attention to the sharing of life experience related to SWASH OM&M.

Principle 3 - Adults are goal oriented.

Adults appreciate learning when it is tied to specific professional or personal goals. They desire well-organized facilitator experiences that will help them attain their goals. Facilitators should identify learning objectives, follow clear agendas and show participants how the activities are helping them to achieve their goals. Thus, in the training the facilitator should try to link the importance of SWASH OM&M to their professional or personal goals or impacts on children's' lives.

Principle 4 - Adults are relevancy oriented.

Adults must be able to see how learning connects to their work. Trainers should be able to facilitate appropriate connections. They should demonstrate how the theory and content of the learning relates to the participants' work. The facilitator should give due emphasis to the impacts of mismanagement of SWASH facilities on educational outcomes and health and wellbeing of school communities.

Principle 5 - Adults are practical.

Adults will want to focus on those aspects of the training that will help them solve problems in their work. They like hands-on exercises that simulate real-world situations. Facilitators must design practical learning activities and assist learners to see explicitly how the information will be useful to them on the job. The facilitator should give due emphasis on practical issues that can be implemented within the schools and with minimum support from Woreda level and above. The training should also focus on SWASH facilities in their area or those which are planned to be implemented.

Principle 6 - Adults need to be shown respect.

Adults need to be given a strong voice during the training process. Facilitators should establish a learning atmosphere where adults are treated as equals and encouraged to share their opinions, experience and knowledge. The facilitator should show maximum respect to the ideas of the trainees and their different opinions. The facilitator should not consider him/herself as a person who has more knowledge and experience.

Session 2: Planning for Training

Session Objectives

At the end of this session the participants should be able to:

- Plan training

Methodologies

- Facilitator Presentation
- Brainstorming/discussion

Material needed

- Flip Chart
- Marker
- Scotch tape

Time needed: 45 minutes

Activity 1: Brainstorming and illustrated lecture

Instructions for the Activity

1. Brainstorm with the participants about their experience of planning training
2. List down their responses on a flip chart and make the list complete by adding those missed
3. Make a presentation on a brief overview of planning and training (facilitator note)
4. Ask participants if they have any questions on the presentation
5. Summarize the session with the main points

Facilitator Note on planning for training

Planning for training

Successful training does not come about by accident, but rather through careful planning. This planning takes thought, time, preparation and materials. Planning for training requires a considerable amount of time and attention to detail and ideally should begin at least one month before the training is due to take place.

The facilitator is responsible for ensuring that the training is carried out essentially as it was designed. The facilitator must make sure that the practice sessions, which are an integral part of OM&M skills, are conducted appropriately. In addition to taking responsibility for the organization of the training in general, the facilitator must also be able to give presentations and demonstrations and lead other training activities, all of which require prior planning. Well-planned and executed training and practical sessions will help to create a positive learning experience.

The facilitator should be prepared on the following issues.

- Prepare the necessary materials
- Ensure the selection and preparation of an appropriate venue
- Review the training manual
- Prepare formats, exercises and demonstration materials as described in the training manual
- The facilitator must know well in advance who will be the trainees and how many

The facilitator is responsible for making sure that the following items are available and organized before the training begins:

- Adequate space for classroom and practical activities
- Adequate learning materials
- Any supplemental written materials for the learning activities e.g. role play, case study etc.
- Supplies and equipment e.g. flipcharts, paper, pens and pencils, and other necessary supplies
- Reviewing the course materials and adapting them as necessary are also key components of the planning process
- Ensure proper toilets are available with handwashing facilities with soap
- Ensure catering arrangements are in place for breaks e.g. coffee/tea available at the right times and in sufficient quantities

Selecting participants

Selection of appropriate participants is critical to the success of any training. The facilitator may have an excellent training design, materials, facilities and supporting documents, but these mean very little if the wrong participants attend the training. Participants for this training should fulfill the following criteria:

- SWASH programs (Federal/ Regional/Woreda WASH experts) for the TOT training who have practical experience on WASH particularly SWASH
- For the cascaded training, school community members who understand SWASH such as school directors/principals, unit leaders, SWASH club leaders/focal persons, guards/care takers

Selecting the facilitator

It has often been assumed that anyone with strong academic credentials and skills can be a trainer, but experience in many parts of the world has shown that academic and training skills are two very different things. In selecting potential trainers, the following criteria should be considered:

- SWASH programs (Federal/ Regional/Woreda WASH experts) for the TOT training
- For the cascaded training school community members who understand SWASH such as school directors/principals, experienced teachers, SWASH club leaders/focal persons. :,

Session 3: Developing Effective Facilitation Skills

Session Objectives

At the end of this session the participants should be able to:

- Facilitate training effectively and use effective facilitation skills
- Create a positive learning environment
- Facilitate group exercises and brainstorming sessions
- Use PowerPoint and flip charts properly

Methodologies

- Facilitator presentation
- Brainstorming/discussion

Material needed

- Flip Chart
- Marker
- Scotch tape

Time needed: 60 minutes

Activity 1: Brainstorming and illustrated lecture

Instructions for the Activity

1. Brainstorm with the participants about their understanding of effective facilitation skills
2. List down their responses on a flip chart and make the list complete by adding those missed
3. Make a presentation on a brief overview effective facilitation skill (facilitator note)
4. Ask participants if they have any questions on the presentation
5. Summarize the session with the main points

Facilitator Note on developing effective facilitation skills

Effective facilitation skill

The environment within which learning occurs has a tremendous impact on the quality of the learning experience. A positive learning climate maximizes the effectiveness of various learning methods and thereby helps participants to achieve the course objectives.

An effective presentation can be one of the most rewarding aspects of a facilitator's responsibilities. The facilitator who is able to maintain participant interest with an exciting and dynamic delivery, using a variety of learning techniques is more likely to be successful in helping participants reach training objectives.

Using appropriate audiovisual aids is a critical step in the training process. Audiovisual materials supplement learning activities by highlighting important points or key steps or tasks. Because individuals have different styles of learning, using a variety of audiovisuals allows the participants to receive information in different ways and reinforces the learning process.

Creating a positive learning environment

Establishing a positive learning environment requires an understanding of how adults learn. The facilitator must have a clear understanding of what the participants need and expect and the participants must have a clear understanding of why they are there. Adults who attend courses to acquire new knowledge, attitudes and skills require the following characteristics:

Relevance - The facilitator should offer participants learning experiences that relate directly to their current or future job responsibilities

Motivation - People bring high levels of motivation and interest to learning if the facilitator provides clear learning goals and objectives to make the best use of a high level of participant interest. The facilitator should explore ways to incorporate the needs of each participant into the learning sessions e.g. the needs of people with disability should be considered in the training

Involvement – A few individuals prefer just to sit back and listen. The effective trainer will design learning experiences that actively involve the participants in the training process. These include:

- Allowing participants to provide input regarding schedules, activities and other events
- Questioning and feedback
- Brainstorming and discussions
- Hands-on work
- Group and individual projects
- Classroom activities

Variety - Participants attending training desire variety. The facilitator should use a mixture of learning methods and audiovisual aids.

Positive feedback - Participants need to know how they are doing, particularly in light of the objectives and expectations of the training. To maintain positive feedback, the facilitator can:

- Give verbal praise either in front of other participants or in private
- Use positive responses during questioning:
  - "That's correct!"
  - "That was an excellent response!"
- Let the participants know how they are progressing towards achieving the learning objectives
- Personal concern - the facilitator must recognize that many participants fear failure and embarrassment in front of their colleagues. Participants often have concerns about their ability to:
  - Fit in with the other participants
  - Get along with the facilitator
  - Understand the content of the training
  - Perform the skills being taught
- Being treated as an individual - People want to be treated as individuals, each of whom has a unique background, experience and learning needs. A person's past experiences are good foundations upon which the facilitator can base new learning.

To help ensure that participants feel like individuals, the facilitator should:

- Use participant names as often as possible
- Involve all participants as often as possible
- Treat participants with respect
- Allow participants to share information with others during classroom and practical instruction

Basic effective facilitation skills

There are several general facilitation skills which can be used to make a training session more effective. These include:

- Follow a plan and user manual
- Communicate in a way that is easy to understand
- Maintain eye contact with participants
- Project your voice
- Avoid use of slang, jargon or repetitive words, phrases or gestures that may become distracting with extended use
- Display enthusiasm about the topic and its importance
- Move around the room
- Use appropriate audiovisual aids during presentations
- Ask simple and more challenging questions
- Provide positive feedback
- Use participant's name as often as possible
- Display positive use of humour related to the topic
- Provide smooth transition between topics

Facilitation process

The facilitation process involves introducing conducting, and summarizing sessions/activities in a way that engages and enables participants to get the most out of each session.

Tips for PowerPoint presentations

- Ensure technical assistance in case the computer is down
- Avoid busy slides and confusing backgrounds; don't put more than six lines of text on one slide and use large fonts to make the text easy to read for those at the back of the room.
- Choose a color combination that is pleasing to the eye and legible
- Use contrasting, bright colors to delineate between categories.
- Use consistent backgrounds for each slide.
- Use bullets when listing items.
- Write only key words, phrases and/or concepts, no sentences and paragraphs.
- Use only one concept/point/idea per slide
- Capture the major point of the presentation on the title of the slide.
- Follow the six by six rule: Use no more than six words/line, and no more than six lines/slide.

- Use clear and large fonts; up to 40 size fonts for titles/main headings & 24-36 for sub-topics. Make sure the text is visible for all trainees including those sitting at the back of the room

Tips for using flip charts

- Use wide-tipped pens or markers
- Print in block letters that are large enough to be read easily at the back of the room.
- Use different colored pens to provide contrast
- Use headings, boxes, cartoons and borders to improve the appearance of the page.
- Use bullets (•) to delineate items on the page
- Leave plenty of white space and avoid putting too much information on one page
- Have scotch tape available to hang flipchart pages on the walls during brainstorming and problem-solving sessions
- Face the participants, not the flipchart, while talking

Facilitating group exercises

There must be a clear instruction for group activities. The instruction must include:

- Directions
- Time limit
- A situation or a problem to discuss
- Participants role (if role play is used)
- Questions for a group discussion
- Groups should select a chairperson to lead the discussions and a rapporteur to record the main points of the discussion.

Facilitating brainstorming

Brainstorming is "a conference technique by which a group attempts to find a solution for a specific problem by amassing all the ideas spontaneously by its members"

The following techniques should be used to facilitate brainstorming:

- Establish ground rules - this can be set at the beginning of the training e.g. all ideas are correct/respect other ideas
- Announce the topic or the problem
- Maintain a written record

MODULE III: THE CHALLENGES OF SWASH FACILITIES OPERATION, MAINTENANCE AND MANAGEMENT

Session 1: Definition and concepts of OM&M

Session Objectives

At the end of this session the participants should be able to:

- Define SWASH services OM&M
- Explain the factors that affect proper SWASH facilities OM&M

Methodologies

- Facilitator presentation
- Brainstorming/discussion

Material needed

- Flip Chart
- Marker
- Scotch tape

Time needed: 45 minutes

Activity 1: Brainstorming and illustrated lecture

Instructions for the activity

1. Briefly explain what operation of SWASH facilities means; what maintenance of those facilities means and what management of those facilities means
2. Brainstorm with the participants regarding their understanding about SWASH facilities OM&M
3. List down their responses on a flip chart and complete the list by adding those missed
4. Explain what the main SWASH facilities are in the Ethiopian context and what the problems are in maintaining them
5. Brainstorm with the participants about the main challenges faced in SWASH facilities OM&M in their localities. Prompt the participants to list more challenges if some are missing
6. Summarize the challenges and categorize the challenges as financial, other resources, administrative, ownership and related users
7. Make a presentation giving the definition and concepts on OM&M of the SWASH facilities (facilitator note)
8. Ask participants if they have any questions on the presentation
9. Summarize the session's main points

Facilitator Note for definition and concepts of OM&M

Operation - refers to the day to day running and handling of SWASH facilities. This involves several activities:

- The school administration led by the principal needs to appoint cleaners to clean the toilets twice a day

- The school needs to appoint caretakers to look after the hand pump or taps which supply water to the school for handwashing and drinking
- Opening of water taps for beneficiaries
- Make sure soap is available (use liquid soap container and tie with string to the tap to avoid students stealing the soap).
- Proper closing of water taps after use
- Ensure availability of spare parts e.g. washers for taps and fast-moving parts for hand pumps.
- The correct use of SWASH facilities by the beneficiaries
- Cleaning of the toilets regularly (twice a day) using appropriate cleaning materials and equipment

The proper operation of latrines and water points results in its optimum use and contributes to a reduction in breakdown and maintenance needed and ultimately enables students to use the toilets properly and wash their hands with soap afterwards.

Maintenance – refers to the activities required to sustain the SWASH services in a proper working condition. Maintenance can be divided into:

Preventive maintenance - is planned and carried out on a regular basis to maintain and keep the infrastructure in good condition and minimize breakdowns, such as regular inspection, cleaning and greasing of mechanical parts, replacement of damaged items and items with limited lifespan, regular painting of corrugated iron sheets before they get rusted, tighten bolts on hand pumps, etc. To carry out proper preventive maintenance, the caretaker should conduct a regular daily inspection, identify the maintenance required, and maintain the infrastructure. It is also essential to schedule preventive maintenance such as once a year to ensure that action is taken before it is irreparable.

An example of preventive maintenance is to replace the nylon bushes on an Afridev hand pump handle before they wear out completely and damage the fulcrum bolt, removing dust from solar panels, inspect electric cables in solar and other pumps, maintaining the hinge of toilet doors before they break, maintaining handrails in ramps before cracking and loosing etc.

Corrective maintenance - refers to replacing or repairing something that was done incorrectly or that needs to be changed in order to improve service. Examples include the relocation of a pipe or the replacement of a faulty pump or worn-out/broken parts, to sustain reliable facilities, replacing disability toilet seat, which was not the right design initially, replacing a new steel pipe with HDP (plastic) pipe etc.

Emergency/Crisis maintenance - is an unplanned reaction to a crisis or complaints and normally occurs as a result of failures or the malfunctioning or breakdown of equipment to restore the SWASH services. For example, if a roof is blown away by wind the roof should be replaced immediately. If a landslide occurs, immediate measures are to be taken to avoid any risk of harm to the structure and users. Emergency maintenance prevents greater damage and ensures the safety of the users of the school. An example includes replacing of non-functional taps, closing a full toilet after it becomes full of faeces. etc.,

Periodic maintenance - some components of the infrastructure need to be maintained periodically e.g. replacing the plunger seal of an Afridev hand pump every year.

Maintenance costs and procurement of spare parts should be planned and budgeted properly. Following crisis maintenance alone may appear cheap in the short-term. However, continuous crisis maintenance leads to frequent breakdowns, unreliable supply, poor service level and lack of user confidence and may ultimately lead to complete system failure and much higher costs.

Hand pump caretakers should receive practical hands-on training in the field. This should be done by members of the Woreda WASH Team.

Management - deals with the control and organization of SWASH facilities and encompasses strategic development, planning, skills in problem solving, assigning of cleaners and caretakers, allocation of budget for OM&M, availing of equipment, integration of technical and social issues, monitoring and mobilization of resources as the main functions.

Factors influencing effective OM&M of SWASH facilities/services.

Understanding some factors, which influence OM&M in schools, can enhance the efficiency of the system. Therefore, it is important to be aware of the following influencing factors:

Finance

- Availability of enough money for OM&M at the school
- Assistance from government, donors e.g. UNICEF and international non-government sources
- Establishment of OM&M funds and a regular operational budget
- Inefficient use of available funds
- Resources
- Availability of budget to recruit and train caretakers and cleaners
- Availability of cleaning equipment and materials
- Availability of skilled and trained human resources and appropriate materials e.g., tools
- Availability of tools and spare parts
- Inadequate data for planning of OM&M

Administrative

- Low priority given by policy makers for OM&M of facilities and the required skills
- A focus on capital construction and expansion of services while neglecting the maintenance of existing facilities
- Failure of school administrations in not prioritizing a budget for cleaning and maintenance of toilets
- Institutionalization of OM&M at school (how to conduct maintenance of the SWASH facilities on a regular basis)
- Rules and policies of government such as free service, role of different actors to support, budgeting policy

- Inappropriate design and technology choices e.g., lack of soak away pit, putting vent pipes inside the latrine building and not outside which is where they should be.

Ownership and support from local authorities

- Woreda Administrators need to show political will and actively support health and water offices for sustainability of SWASH facilities e.g. the town water supply authority needs to prioritise the maintenance of water supply to schools
- Availability of clear policies and plans at the local level
- Availability of an OM&M monitoring and evaluation mechanism at the local level
- Ownership and perception of users
- Caring for school facilities should be the concern of all who use and need them. This means using facilities for their intended purpose and in a proper manner. It involves active participation of all users. Both awareness and action are needed from all users to maintain school facilities
- Perception of community people towards public properties like schools. The community, that includes parents of students, need to be convinced that well-maintained school toilets are important when it comes to the health of their children. So, the Parent Teachers Associations need to campaign for better maintenance of school toilets and water supplies
- Kebele officials need to be educated on the importance of maintaining SWASH facilities in their local school.

Session 2: Link between health, education, and WASH facilities OM&M

Session Objectives

At the end of this session the participants should be able to:

- Understand the benefit of OM&M for health and education

Methodologies

- Facilitator presentation
- Brainstorming/discussion

Material needed

- Flip chart
- Marker
- Scotch tape

Time needed: 45 minutes

Activity 1: Brainstorming and illustrated lecture

Instructions for the Activity

1. Brainstorm with the participants about their understanding about the link between OM&M and health and education.
2. List down their responses on a flip chart and prompt trainees to come up with other points they have missed. Complete the list by adding those missed
3. Make a presentation on the link between health, education, and WASH facilities OM&M (facilitator note)
4. Ask participants if they have any questions on the presentation
5. Summarize the session's main points

Facilitator Note: the link between health, education, and WASH facilities OM&M

Creating the initial access alone does not solve the health problems over a long period of time. Its proper handling, its hygienic use, the continuous proper maintenance of water points and water sources, the protection of the environment, safe sanitation disposal and cleaning of hands all contribute to the improvement of health.

The table below shows the relation between different diseases and adequate operation and maintenance of SWASH facilities.

Table 1: The relation between different diseases and adequate operation and maintenance of SWASH facilities

Infection	Adequate operation and maintenance of sanitation facilities /safe disposal of excreta	Adequate operation and maintenance of hygiene facilities	Adequate operation and maintenance of Safe water facilities
Diarrhea Dysentery Typhoid Paratyphoid Cholera	✓	✓	✓
Round worm (Ascariasis) Whipworm (Trichuriasis)	✓	✓	✓
Hookworm	✓	✓	✓
Beef and pork Tapeworms	✓	✓	✓
Schistosomiasis (Bilharzia)	✓	✓	✓
Guinea worm	✓	✓	✓
Scabies, ringworm, Yaws	✓	✓	✓
Trachoma, conjunctiviatis	✓	✓	✓
Louse-borne typhus, Louse-borne relapsing fever	✓	✓	✓

Thus, failure in operation and maintenance of SWASH facilities leads risk of exposure to pathogens and hazardous substances that could affect the health of pupils, school staff members and communities and may ultimately affect the learning ability of students.

Table 2: Effective OM&M of SWASH facilities has numerous benefits for educational achievement

Component	Benefit on education
Continuous water supply	Increase girl's attendance at schools
Clean, gender segregated and well-maintained sanitation facilities	Increased school enrollment and decreased student dropouts. Girl's and adolescents' attendance to school once concerns about privacy and safety are solved.
Clean and well-maintained hygiene facilities	Changes in students' hygiene behavior will have a knock-on effect on community hygiene behavior
Proper waste management facilities	Increase safety and environmental pollution that risks students' health. Decrease of disease carrying vermin e.g. rats in and around schools.

MODULE IV: ROLE AND RESPONSIBILITIES OF DIFFERENT STAKEHOLDERS

Session 1: Definition and concepts of OM&M

Session Objectives

At the end of this session the participants should be able to:

- Understand who are the stakeholders
- Understand the role of stakeholders in OM&M of SWASH facilities

Methodologies

- Facilitator Presentation
- Brainstorming/discussion

Material needed

- Flip Chart
- Marker
- Scotch tape

Time needed: 45 minutes

Activity 1: Brain storming, case stories and illustrated lecture

Instructions for the Activity

1. Brainstorm with the participants who are the stakeholder and their roles?
2. List down their responses on a flip chart and make the list complete by adding those missed
3. Make a presentation on a brief overview of role and responsibilities of stakeholders (facilitator note)
4. Ask participants if they have any question on the presentation
5. Summarize the session with main points

Facilitator Note on roles and responsibilities of stakeholders

Responsibilities for operation and maintenance should be clearly defined, and appropriate skills provided. Maintenance, repair, and replacement of facilities should be planned and budgeted for by each school to keep the facilities functional. Some form of local income-generating system may be required if institutional funding from government is not guaranteed by involving the local community and PTAs.

Maintaining clean and user-friendly SWASH facilities is a challenge in most public schools, which is mainly due to the lack of attention to planning and budgeting for regular cleaning of school latrines and MHM facilities due to the lack of awareness of the use of WASH facilities in schools. There are several institutional bodies at school level, which are responsible for the operation and maintenance of WASH facilities such as school administration, teachers, guards, cleaners, school children, parents, , PTAs, Woreda WASH sector offices (education, health, and water). A good cleaning and maintenance system requires funds, spare parts, people and equipment, and a clear division of roles and responsibilities among the above actors.

The memorandum of understanding signed by the WASH sector ministries explicitly gives SWASH responsibility to the education sector. However, the education sector may not have professionals at lower levels. Thus, the Woreda Water Office (WWO) should support in construction and maintenance of sanitation and water supply facilities while the Woreda health professionals should provide technical support on construction and maintenance of sanitation and hygiene facilities. Thus, joint planning, implementation and evaluation of SWASH OM&M activities is crucial to have maximum impact.

School administration:

- Advocate locally for improvements in WASHX in their schools.
- Raise funds and help plan improvements with school directors and teachers.
- Support maintenance of school facilities regularly.
- Prioritize and allocate an appropriate budget for maintenance of school latrines, water supplies and solid waste management when preparing the annual school budget.
- Ensure supply of consumables such as soap, cleaning materials, sanitary pads, pain killers, toilet paper, etc.
- Assign responsible persons or group for regular cleaning, operation, and maintenance of SWASH facilities, particularly latrines.
- Make sure that pump operators are trained by the contractor who installs motorized or solar systems at or near the school

Teachers:

- Arrange induction session for newcomers and remind all students about rules and regulations regularly.
- Monitor the state and use of SWASH facilities.
- Organize the care and maintenance of facilities.
- Establish and support SWASH clubs.
- Encourage school children to adopt appropriate behaviors at school and at home through hygiene education.

SWASH Clubs:

- Lead the development of detailed work plans for SWASH at the school
- Facilitate and monitor the planning and execution of SWASH club activities such as mini media, talks, quizzes, and competitions
- Supervise and monitor students on proper use of SWASH facilities (latrines, water supply, MHM, hand washing with soap at critical times)
- Report the status of the SWASH facilities to head teachers and school directors

School children:

- Comply with procedures for use and care of WASH.
- Observe appropriate hygiene measures.
- Participate in cleaning of WASH facilities after awareness creation and every Friday with all school communities. But cleaning of facilities should be used as a punishment and those students below grade 5 should not be enforced to clean
- Tell parents about the importance of hand hygiene and keeping the latrine clean

Parents:

- Encourage children to comply with procedures for use and care of WASH facilities at school, and develop positive hygiene behaviors.
- Support or participate actively in, PTAs or similar bodies.
- Contribute budget for SWASH OM&M activities through the PTA.

Woreda WASH Sector Offices:

- Organize the setting of rules and operation and maintenance targets for SWASH
- Provide guidance on OM&M of SWASH facilities
- Support to solicit funds for OM&M of SWASH facilities
- Provide capacity building training on OM&M of SWASH facilities
- Create conditions in which staff are motivated to achieve and maintain targets
- Ensure hard copies of up-to-date manuals and guidelines are available to school administrations and are read and strictly followed
- Conduct regular water quality tests and disinfection and provide the school director with a written report with recommendations for solving water quality issues.
- Encourage school competitions to motivate the best performers
- Support the schools in major maintenance of water supply and sanitation facilities.

PTAs school governors, school committees and similar bodies:

- Advocate locally for improvements in WASH in their schools.
- Raise funds and help plan improvements with school directors and teachers.
- Support maintenance of SWASH facilities.
- Ensure the inclusion of SWASH OM&M in the school plans
- Ensure availability of funds for SWASH OM&M activities in approving annual PTA budget

Guards:

- Responsible to daily lock and unlock the latrines. Leaving the doors unlocked during the night may invite outsiders to miss-use or make a mess inside the latrines.
- Report to school administration for any problem pertinent to SWASH facilities.
- Capable guards are expected to take responsibility of SWASH facilities hence they should receive skill training.
- Responsible to look after susceptible SWASH facilities e.g., solar panels, soap, hand washing container.

Cleaners:

- Perform proper cleaning with detergent and disinfectant of SWASH facilities, particularly latrines.
- Report to school administration for any problems pertinent to keeping SWASH facilities clean.

Caretakers:

For small schemes, caretakers should be identified and trained on the maintenance of the hand pump and the water tap stands and associated pipework. Hand pump caretakers should be given the Afridev spanner and spare parts kit so that they can undertake periodic maintenance such as changing the fulcrum bushing bearing on Afridev hand pumps

Regularly check water supply facilities to identify preventive maintenance issues.

- Report to school administration for any defect and perform remedial action.
- Perform minor maintenance works that can be done at caretaker level e.g. greasing the chain of an India Mark II hand pump or repairing the fence or gate of the hand pump enclosure.

Water System Operators:

For motorized systems, operators should be identified and well trained on the O&M of the system. Training should include**:**

- On-time operation of the system i.e. how to operate the gate valves.
- Check irregularities and take remedial measures; if it is beyond his/her capacity, report to school administration.
- Take necessary records e.g. recording water meter readings in a book.
- Check oil, fuel, and water levels in the generator daily.
- How to check tension of the fanbelt
- How to check the water level in the radiator of a generator
- Change oil and filters at regular intervals (300 hours or every 3 months) according to the manufacturer's recommendations.
- How to check solar panels for faults
- How to clean solar panels
- How to operate the control panel (know what the different coloured lights mean) regarding stopping and starting the pump.
- How to check that the float valve is working in the elevated tank
- How to check electrical cables and joints

Private sector:

- Avail spare parts and lubricants
- Provide maintenance and emergency repair services
- Provide training to pump operators at installation on operation and maintenance of motorized and solar powered systems

MODULE V: OPERATION, MAINTENANCE AND MANAGEMENT OF SCHOOL WATER SUPPLY SYSTEMS

Schools can get water from their own on-site water supply, nearby community, or municipal water supply schemes. The most common school water supply systems include hand pumps on shallow wells or boreholes, solar pumps on boreholes, gravity schemes from springs and rainwater/roof harvesting systems. All these systems need proper operation and maintenance from school administrations supported by WWO technicians, and water utilities if the school is in a large town.

All water supply sources should be properly and regularly tested physically and bacteriologically to ensure the water quality is within the GoE standards. Reference should then be made as to where trainees can find these GoE standards and how to get the supply tested (by calling the WWO experts to come and take samples for testing).

Testing will be done at either the WWO or at regional laboratories and the results sent back to school administrations via the WWO. If harmful organisms like e-coli bacteria are detected in the water supply, it must be disinfected immediately. by addition of chlorine solution to the source.

All school water supply facilities may not be maintained by the school level capacity and needs the support of the Woreda water, town utility of Woreda health offices support. Since training guides and materials are available for experts the focus of this training manual is on those areas than can be managed by the schools with minimum support from Woreda offices or town water offices.

Session 1: OM&M of Hand Pumps

Session Objectives

At the end of this session the participants should be able to:

- Understand basic hand pump operations and maintenance
- Trouble shoot and establish appropriate remedial actions
- Perform simple operation and maintenance

Methodologies

- Facilitator presentation including photos
- Brainstorming/discussion

Material needed

- Flip chart
- Marker
- Scotch tape
- Diagram of an Afridev hand pump and list of what is in the spare parts kit.
- An Afridev Plunger and seals
- An Afridev spanner

Time needed: 45 minutes

Activity 1: Brain storming and illustration

Instructions for the activity

1. Brainstorm with the participants about their understanding of how hand pumps operate
2. List down their responses on a flip chart and complete the list by adding those missed
3. Ask participants about the parts that can be easily damaged and need preventive, corrective and periodic maintenance from their experience
4. Make a presentation on hand pump operation and the parts that need preventive, corrective and periodic maintenance (facilitator note)
5. Ask participants if they have any questions on the presentation
6. This needs practical skill. Therefore, preparations should be made to demonstrate the dismantling and maintenance of an Afridev hand pump either at the training venue or in the field, preferably at a school. Therefore, a hand pump has to be made available plus tools and actual spare parts to demonstrate as a hands-on learning experience
7. The trainer first demonstrates on the hand pump how to perform a maintenance task e.g. changing the fulcrum bushes or how to remove the pump rods and change the plunger seal
8. Ask one of the participants to carry out a maintenance task while the other trainees critically observe and give feedback. Repeat this until the trainees develop hands-on skill. This is especially crucial for caretakers who perform the actual operation and maintenance of hand pumps at schools.
9. Summarize the session by stressing the main points.

Facilitator Note on OM&M of hand pumps

Hand pumps

Most of the hand pumps used in Ethiopia are either Afridev or Indian Mark II so give more emphasis on this in the training. In the following paragraph the definition of the two hand pump technologies is highlighted to have full understanding and facilitate easy maintenance.

The school principal is responsible for appointing a competent caretaker to look after the hand pump and ensure students and staff uses the pump properly. The hand pump caretaker should be given a job description detailing what she/he is expected to do on a daily basis. This should be read out to the caretaker to ensure proper understanding. The school principal is also responsible for employing guards to prevent outsiders coming in and removing parts from the hand pump such as nuts and bolts.

Indian Mark II hand pump

The Indian Mark II hand pump was developed in India in the 1970s and was designed to be maintained by a team of mechanics in a truck deployed from district centers. Although it is a robust conventional lever action hand pump the parts of the Indian Mark II hand pump are not corrosion resistant unless stainless steel pipes and rods are installed. It is designed for heavy duty use and requires special skill for installation and maintenance. It needs 30 specialized tools for installation and maintenance. It is not considered to be a village level operation and maintenance pump and as a result Ministry of Water and Energy and the Ministry of Education recommend using **Afridev** as much as possible to reduce the challenges of operation and maintenance. The **Afridev** hand pump needs only two tools for installation and maintenance and features light weight, corrosion resistant parts made of stainless steel, Nylon, plastic and neoprene rubber. Thus, the focus in this manual will be on the **Afridev hand pump.**

The school should follow the proper maintenance and repair procedures of the hand pump and should request support from the WWO if there is a maintenance need because Indian Mark II hand pumps can't be maintained by school level skills and many specialized tools and expertise are required.

Afridev hand pump

The Afridev hand pump was specifically designed for women to maintain. Maintenance is straight forward using only two tools and skills which are easy to learn. The pump has several innovative design features such as eye & hook pump rod joints, extractable plunger & foot valve, adjustable handle, use of corrosion resistant materials in below ground components and nylon/ plastic bearing bushes. These features make the pump user friendly and easy to install and maintain. The pump is designed based on the Village Level Operation and Maintenance concept and can be maintained by women and school communities if trained properly. It needs only few tools (socket spanner, screwdriver for removing plunger seal and a fishing tool for retrieving the foot valve) to install and maintain. These tools come with the hand pump and the school administration needs to insist that tools are handed over by the contractor or whoever installs the hand pump. If tools are not provided, they should be purchased from the market that supplies hand pumps. The following figure shows the parts of a typical Afridev pump so that trainees will have full visualization and understanding of the parts that need maintenance

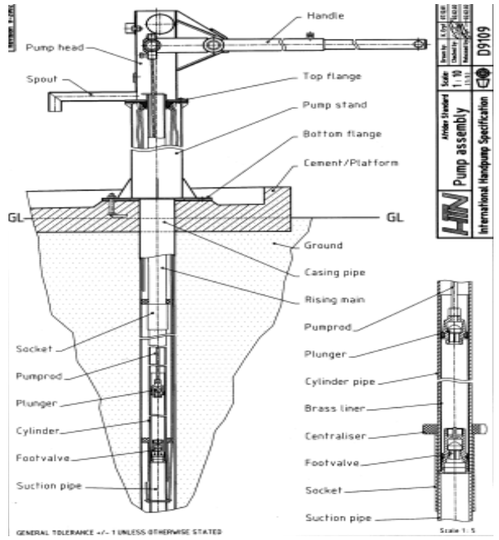


Figure 1: Typical Afridev hand pump parts from the Manual

Parts above the ground

- Pump head and T-bar adjustable handle
- Pump stand
- Water tank

Parts down the hole

- Pump rods
- Rising main of PVC
- Cylinder, plunger, and foot valve
- PVC suction tube
- Rope (nylon) to support the below ground components

Hand pumps are like any other mechanical device and need periodic maintenance to keep them in good working condition. In the absence of preventive maintenance, sudden breakdown of hand pumps may cause sudden disruption of water supply and more resources to replace parts.

Preventive maintenance of hand pumps

Every school director/principal and caretaker is responsible for the preventive maintenance of the water point (hand pump including surroundings) and therefore caretakers are entitled to receive training at installation from the supplier of the hand pump or the organization who installed it.

Preventive maintenance means regular check-ups of the hand pump at a fixed time interval and changing of spare parts before they are fully worn out. Example: if the estimated lifetime of a plunger seal is one year, the plunger seal should be changed after a period of one year even if it is still functional. If during a preventive maintenance check, foot valve leakage is noticed, the caretaker or any school community member who was trained will carry out repairs to the foot valve even though the pump has not broken down. Such interventions help in preventing the sudden failure of the pump.

Important Note:

In cases of major maintenance or problems which are difficult to handle at school level, the school's administration can seek professional support from community care takers or private sector skilled individuals or their WWO to handle the maintenance. However, the school should allocate a budget for personnel and spare part costs if not covered by the WWO. If individuals are employed, it will be good if the school follows competitive bidding to have appropriate costs. Tasks like tightening loose nuts and maintenance of pump apron cracks need to be handled at school level by participating skilled member of the PTA, caretaker or by employing a local mason.

Daily

- Instruct the hand pump users i.e. students and staff how to use the hand pump and how to keep the pump surroundings clean
- Check if any bolts, nuts or parts in the pump head are missing. If so, replace the parts
- If any unusual noise is noticed, check the source and take corrective action
- Check the cover bolt and water tank nuts and bolts for tightness but do not over-tighten!
- Check if the pump stand is shaky during operation. If it is, the stand is loose in the apron and contamination of the well can take place. Take corrective measures to repair the concrete apron by employing a local mason and make sure the pump is not used for three days thereafter to allow the concrete to set properly
- Check the water discharge is adequate. If more than five strokes are required before water comes out from the spout, it means the pump is leaking beyond an acceptable limit. The discharge should be no less than 10L / minute

Leakage test

- Testing shall start after a continuous flow of water through the spout has been obtained. The water shall then be collected in a container or bucket for 40 continuous full strokes of the plunger in one minute. Measure the quantity of water collected. Then allow the pump to rest for 30 minutes. Repeat the test and measure the discharge. The difference between the first and second reading of discharge indicates leakage. Also note the number of strokes required before water comes out of the spout. If after the beak of 30 minutes it needs more than 5 strokes until the water starts flowing, it is an indication that there is a leakage, (probably the foot valve not working properly) and it is advisable to take corrective action
- Eliminate stagnant water around the apron by filling the dents and holes with soil
- Sweep/clean the platform and the surroundings and keep the water supply system clean
- Ensure the hand pump is accessible and not locked during the school day
- Secure the hand pump during times when the school is closed. This can be done with a chain and padlock around the handle or by building a fence around the hand pump and apron and locking the gate with a padlock
- Guard should be employed by the school to make sure no one tampers with the hand pump

Weekly

- Check the pump handle, nuts, and bolts for any loose parts
- Check the pump head and pump foundation for alignment
- Inspect the pump platform for any cracks and if any maintain immediately
- Check the pump head for any cracks, damage, or loss of parts and if any maintain immediately
- Check if the pump stand is shaky during operation. If the stand is loose in the apron contamination of the well/borehole can take place. Thus, maintain the apron by employing a local mason.

Monthly

- Check for any leakage at the head of the pump, in the rising main and from the foot valve at the bottom of the well.

Annually

- Replace the fulcrum/hanger bearings
- Replace the plunger seal and plunger bobbin
- Replace foot valve bobbin and foot valve "O" ring. If it is difficult to remove the foot valve; leave it.

- Check discharge of water from the spout. If it has reduced this may be because there is a hole in the riser pipes. Call the Woreda WASH team to investigate and take corrective action.

List of spare parts and tools for Afridev hand pump

The following tools/items and spares are needed for the repair and maintenance of the Afridev hand pump. Please note: Always refer to the manufacturers' manual for detailed information

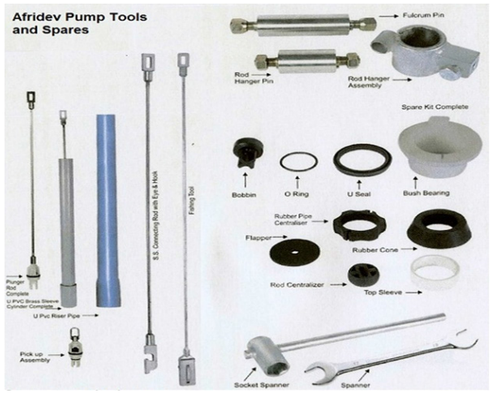


Figure 2: Parts of an Afridev hand pump

List of spare parts and tools for the Afridev hand pump:

Table 3: Spare parts with recommended time interval for replacement

Description	Quantity/ pump	Recommended Time interval for replacement
Rod centralizer	10	Two years
Bobbin	2	Two years
Handle bushes (inner & outer)	4	Annually
Plunger seal	1	Annually

Note: - for heavily used pumps the time interval can be shorter than indicated.

The basic tools required for Afridev hand pump maintenance are:

1. Spanner for M16 hexagonal bolts and nuts
2. Fishing tool for retrieving of foot valve
3. Screwdriver for removing plunger seal from plunger.

Maintenance steps

The hand pump is like any other mechanical device and needs maintenance to keep it in good working condition. The steps involved in the maintenance are to:

- Understand the cause of the problem and determine the remedy needed
- Dismantle the pump as necessary
- Assemble the pump after replacing the defective parts
- Record details of the repairs to provide insights about the function of the hand pump and future planning in an exercise book.

Diagnosing Hand Pump Problems.

To identify the causes for a problem please refer to the trouble shooting listed in the table below.

Table 4: Trouble shooting chart for hand pumps

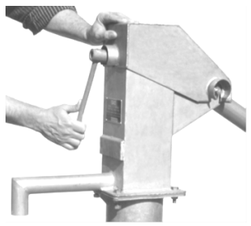
Problem	Operation	Possible Causes	Possible Remedy
Water is turbid	Drawing dirty water	Flood/surface water entered the well	Seal areas around well head Raise protection structure above ground level
		Walls of the well may have collapsed	Rebuild the walls and disinfect
Deterioration in water quality	Drawing contaminated water	Contamination through seepage of water through sides or cracks of apron	Scour the well and disinfect e.g., with chlorine Instruct the users on need to cover the well after use/Recast the lid
		Concrete apron broken (in open wells)	Instruct users on importance of closing well. Mason to re-cast apron
Reduced discharge	Handle operation is normal	Low static water level due to drought	Deepen well and disinfect e.g., with chlorine thereafter (where possible)
		Well walls could be collapsing	Rebuild well and disinfect e.g., with chlorine thereafter
		Full stroke is not possible	Adjust length of top rod
		Cup seal is worn	Replace seal
		Leaking of foot valve bobbin	Replace Foot valves bobbin
		Leaking rising main pipes	Pull out rising main and replace leaking pvc pipes and reconnect using solvent cement.
	Handle operation is hard	Cup seal too tight	Replace with correct size of seal
No water	Handle operation too easy or loose	Pump rods are disconnected	Pull out all pump rods and replace broken/corroded rods
	Hand operation is hard	Riser pipe is disconnected	Pull out complete rising main, repair/ replace pipes using solvent cement and pvc sockets to join the pipes. WWO assistance is recommended.
	Handle operation is normal	Cup seal is defective	Replace the seal
		Borehole is clogged with silt or sand	Rehabilitate borehole through flushing with compressed air or by bailing. WWO assistance required.
		Static water level dropped below end of suction tube	Add short piece of a riser pipe and pump rods if there is room between end of suction tube and bottom of well or borehole.

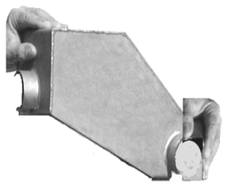
Problem	Operation	Possible Causes	Possible Remedy
Delayed discharge of water	Handle operation is normal	Leaking of valve Bobbins	Replace Bobbins (Plunger and Foot valves)
		Leaking foot valve O-ring	Replace O-ring
		Leaking through holes / cracks in pvc pipes	Pull out rising main and cut out leaking part and replace with equal length of pvc pipes using solvent cement . WWO assistance required.
Abnormal noise during operation	Handle operation is normal	Pump rods rubbing against riser pipes	Replace bent pump rods and worn-out riser pipes
		Pump rods centralisers worn out	Replace worn out centralisers. Also replace bent pump rods
	Handle operation is abnormal	Bearings are worn out or handle fork touching the sides of the pump head	Check and replace bearing sets
Pump handle shaky	Handle moves from side to side during operation	Bearing bushes are worn out	Check and replace bearing bush set
Pump head shaking	Shaking Pump head during operation	Fulcrum pin is loose	Check Fulcrum pin and bearing bush set and fully tighten both nuts
		Pedestal loose	Tighten bolts, re-concrete if the concrete is cracked
		Hanger pin is loose	Check Hanger pin and bearing bush set and fully tighten both nuts
		Flanges are loose	Tighten all bolts and nuts of the flanges
		Pump platform is cracked	Repair Pump apron or well cover for dug wells

Procedure for dismantling of the Afridev Hand Pump

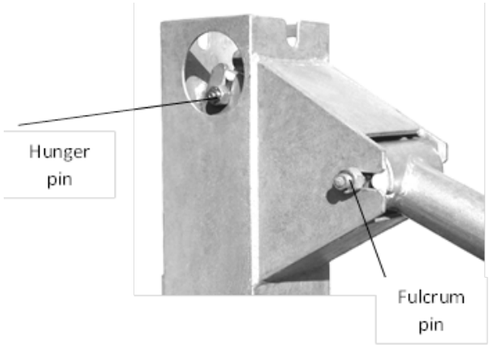
Above ground component

- Loosen pump cover bolt and remove the cover

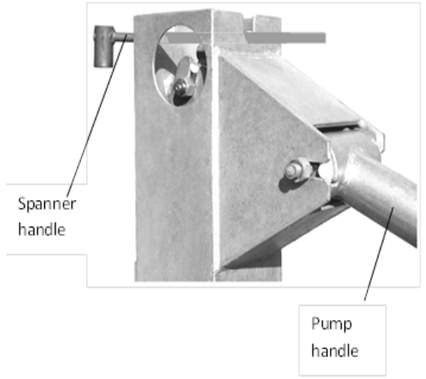


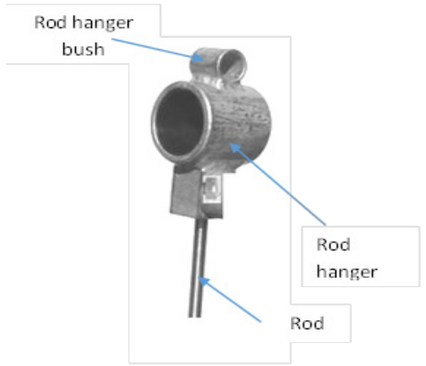


- Loosen rod hanger pin-nuts and fulcrum pin-nuts

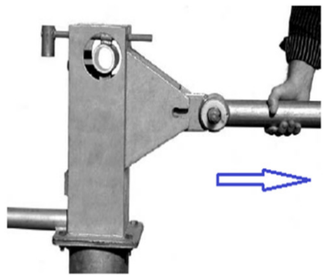


- Insert spanner handle into the rod hand hanger eye. Support the spanner handle in the slots provided on the pump head top.

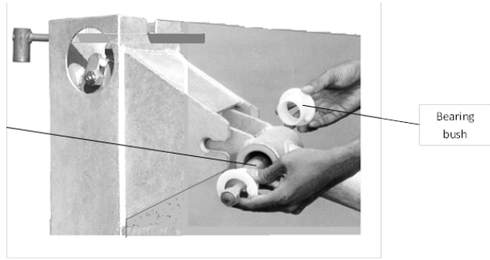




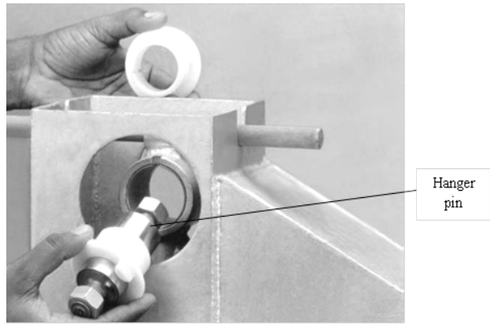
- Lift the handle so that rod hanger pin ends are disengaged from the slots provided in the handle fork
- Pull out the handle



- Remove fulcrum pin and bearing bushes from handle



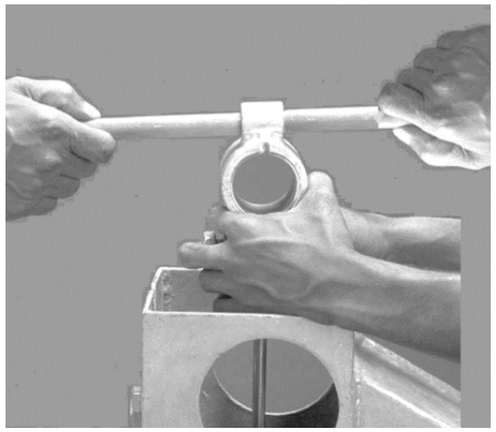
- Remove the rod hanger pin and bearing bushes from the rod hanger



- Place all small components (fulcrum pin, hanger pin, bearing bushes etc.) inside the pump head cover to prevent them getting dirty.

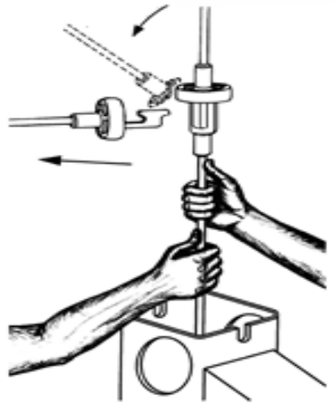
Dismantling the hook and eye pump rods

- Take an additional pump rod and attach the connecting tool
- Pull out the top rod with rod hanger and disconnect the first joint.



- Connect the additional pump rod with the connecting tool and lower the whole assembly slowly until the bottom of the plunger rests on the top of the foot valve.
- Take the T-bar of the connecting tool and turn it clockwise for 3 complete revolutions.
- The foot valve is now connected to the plunger and the removal of the whole assembly can start.
- Remove all pump rods “one by one” until the plunger rod with plunger and foot valve is released. Make sure that all rods are neatly placed near the pump and are in a clean place.





Hook and Eye pump rod

Changing the plunger seal

- Remove the old plunger seal by levering it out with a screwdriver.
- Push on the new seal with your fingers.

Changing the foot valve O ring

- Remove the old O ring with a screwdriver
- Push into place the new O ring with your fingers

Changing the plunger bobbin

- Push out the old bobbin with your fingers
- Insert the new bobbin with your fingers (Same procedure for changing the bobbin of the foot valve).

Re-installing the hook and eye pump rods

- Attach the foot valve to the plunger (max. 3 revolutions) and connect plunger rod to the first pump rod
- Lower the rods into the rising main one at a time.
- Instead of the Top rod, connect an additional pump rod with connecting tool.
- Gently push the rods down until you feel the foot valve has gone into the groove in the bottom part of the cylinder.
- Turn the T-handle of the connecting tool anti-clockwise for approximately six revolutions.
- Lift the pump rod assembly to the extent that the additional pump rod and connecting tool can be replaced by the original top rod and Rod Hanger.
- Insert the spanner handle into the bush of the rod hanger and let the assembly rest in the two slots provided in the pump head.

Removing the foot valve

- Pull out the top rod with rod hanger and disconnect the top rod from the next rod.
- Remove all pump rods “one by one” until the plunger rod with plunger is released.
- Remove plunger rod and plunger from the last pump rod and replace them with the Fishing tool.
- Re-install all pump rods “one by one” until the fishing tool is resting on top of the foot valve.
- Turn the pump rod assembly slightly so that the hook of the Fishing tool connects with the foot valve assembly.
- Pull up on the top rod until the foot valve comes out of its groove in the bottom of the cylinder
- Remove all pump rods “one by one” until the rods with fishing tool and foot valve are released.
- Make sure that all rods are neatly placed near the pump and are in a clean place.

Re-installing the foot valve

- After replacing the O ring on the foot valve
- Drop the plastic foot valve into the rising main pipe.
- Re-install plunger, plunger rod and all the pump rods.
- Attach an additional pump rod with the connecting tool and push the foot valve gently into its correct position.
- Lift the pump rod assembly to the extent that the additional pump rod

with connecting tool can be replaced by the top rod and rod hanger.

- Insert the spanner handle into the bush of the rod hanger and let the assembly rest in the two slots provided in the pump head

Session 2: OM&M of Spring Water Supply Systems

Session Objectives

At the end of this session the participants should be able to:

- Understand the siting and construction basics of spring water supply systems
- Appreciate the need for pollution and contamination prevention of springs
- Understand OM&M issues related to springs
- Perform simple operation and maintenance

Methodologies

- Facilitator presentation
- Brainstorming/discussion
- Photos

Material needed

- Flip chart
- Marker
- Scotch tape
- A large diagram of a protected spring showing protection of the eye and collection chamber.

Time needed: 105 minutes

Activity 1: Brain storming, photo presentation and illustrated lecture

Instruction for the Activity

1. Brainstorm with the participants about their understanding of spring water supply systems
2. List down their responses on a flip chart and complete the list by adding those missed
3. Show photos of different spring water supply systems, so that trainees will clearly visualize the components of the spring water supply systems
4. Make a presentation on the design, construction and the parts that need preventive, corrective, and periodic maintenance (facilitator note)
5. Ask participants if they have any questions on the presentation
6. Summarize the session with main points

Facilitator Note on OM&M of spring water supply systems

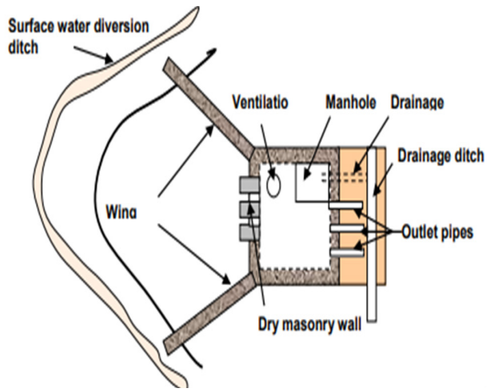
Springs occur when groundwater naturally flows out of an aquifer (underground layer of water-bearing permeable rocks such gravel and sand). The water may emerge either in the open as a spring, or invisibly as an outflow into a river, stream, lake, or the sea (World Health Organization 2000). Springs in Ethiopia are found in large numbers in high rainfall areas, along the slopes and valley bottoms of mountainous areas and escarpments or edges of plateau that have adequate rainfall and vegetative land cover.

There are two types of spring systems. One is on the spot (where water is collected directly from the collection chamber) and gravity (where water is collected from taps at the end of pipes coming from the collection chamber. Gravity schemes can supply several communities with water while on spot springs normally only supply one community living nearby.

Protected spring water supply system components

The main parts of spring water supply system are:

- Spring box constructed from mortar and brick, stonework, or concrete
- Water outlet usually of galvanized iron/steel (sometimes with wire gauze/screen)
- Overflow pipes to drain excess water (sometimes with wire gauze/screen)
- Scour pipe with a protected valve
- Heavy concrete cover



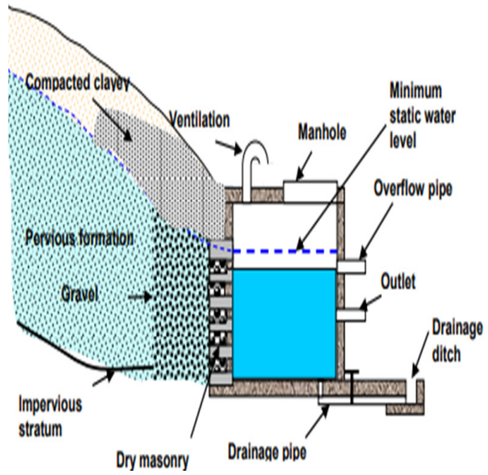


Figure 3: Spring water supply design



Figure 4: Protected spring showing on the spot collection

Spring water is generally safe water and inexpensive in its development. Spring water can be supplied either on-spot or through gravity pipe systems.

On-spot springs

This is a type of spring water supply that involves the protection of the spring whereby water is directed to a collection chamber. Then it will be connected to a water point or on spot use. This is suitable for springs having less than 1L/minute yield. The operation, maintenance, and management of these types of systems are easy and can be done locally.

Springs with piped system (gravity water schemes)

If the yield of the spring is enough (5lts/minute or more) spring water can be piped into a school compound or community to make the water more accessible. The pipe system can be either gravity or pumped. If the system is gravity fed, the operation and maintenance will be straight forward and can be managed locally. If a pump is used, the maintenance will be high and will be similar to borehole pumps.

There are two types of gravity scheme, open and closed.

Closed schemes are more common where there is one pipe from the spring collection chamber and off this main pipe branch lines are attached taking water to individual tap stands.

An open system has multiple vertical pipes from the spring box and each pipe goes to a tap stand downstream. The advantage is that if one supply pipe breaks or leaks it does not affect the supply to the other taps.

Operation of spring water supply

Springs come from aquifers (bodies of permeable rock that can contain and transmit groundwater). They are simply a place where the water from aquifers flows out of the ground naturally. Some springs are seasonal. To prevent contamination by infiltration from the surface, a ditch (known as the interceptor or cut-off drain) diverts surface water away from the spring box, and a fence keeps animals out of the spring area. Gravel and a large stone open wall are placed at the spring eye to prevent sediment flow, filter the water, and reduce the flow velocity into the spring box, which acts as a storage unit. Water accumulates in the box with excess water flowing out through the overflow pipe. Water is collected through an outlet pipe. A scour pipe is used to clear the spring box of debris and sediment.

In most cases springs may not be the source of water supply for a school only. Thus, the maintenance of them can be handled by WASHCOs and caretakers. However, there may be schools which have either spring sources or connections from community sources. The maintenance requirement thus depends on whether the water supply is only for school or shared with communities.

Preventive maintenance of springs

Protection zone. The school should perform the following if the source is inside the schools' compound or work with the community to ensure the protection of the spring if the source is shared. All these activities should be done immediately after construction and maintained throughout the service year.

- The area around the spring should be fenced after protection of the spring with strong posts properly dug into the ground and rammed or concreted in. Bamboo or wire mesh can be used fixed firmly to the posts. A lockable gate should be provided with proper hinges and fastener.
- A diversion ditch about 50cm deep should be dug above the spring to divert surface water away from the spring protection site.
- A local bye law should be enacted that no farming activities can be conducted near to the spring catchment i.e. above the spring site if applicable.
- Another bye law should be made to avoid open defecation and urinating in the catchment area.
- The school should work with PTAs and surrounding communities to provide proper latrines by the community to avoid open defecation.

At the spring chamber, if the source is inside the schools, the school administration should perform the following, but if shared with communities the school's administration should ensure whether the following activities are implemented.

- Leakage at the chamber to be avoided by making sure the chamber is properly constructed and the concrete allowed to cure for two weeks
- Integrity of manhole cover to be maintained
- Blockage at the supply line - water coming through the overflow pipe should be avoided. Unblock the outlet pipe.
- Ventilation of the spring chamber should always be ensured. Make sure air vents are clear.

The water quality and quantity should be good (tasteless, not muddy, or murky). The school should always follow up on any water quality complaints by users and inform the WWO to come and test the water.

Operation and Maintenance Activities for Springs

Important Note:

Maintenance of some problems can be difficult to be handled at school level. Hence, it is recommended that the school administration communicate with the WWO or local professional plumber and/or mason with the required skill to carry out repairs or maintenance.

The school administration needs to source funds from parents through the PTA to augment contributions from the local Woreda education office.

The school administration should allocate sufficient budget during annual financial planning to maintain the spring such as being able to procure cement, taps, and pipes and hire professional technicians as the need arises. Works like repairing fences and gates, protection of the vegetation cover growth within the spring and the surrounding area and freeing the apron from any pooled/drainage water needs to be handled at school level by participating PTA, students, and staff.

Daily maintenance tasks

- Check all taps for leaks and repair. Use long lasting taps like **Talbot gravity operated taps**
- Clean the site and the basin. Drain if there is a pool of water including the water from the overflow.
- After cleaning, make sure the washout valve is fully closed and the manhole cover sealed

Weekly

- Check the apron. Apron should be free of any pooled/drainage water.
- Regularly check and repair animal-proof fences and gates
- Protect the vegetation cover within the spring and the surrounding area
- Check the break pressure tanks and air release valves on gravity spring schemes to ensure they are working.
- On gravity schemes check that the pipeline is intact with no leaks. Leaks should be repaired immediately by a qualified plumber.

Monthly

- Check the yield of the spring and keep a record. Measure the time it takes to fill a 20 lt jerry can and work out the yield per second.
- Check screens regularly. If they are found damaged or blocked, they should be cleaned or replaced with non-rusting materials.
- Frequently check the water flow from the spring box in order to detect water turbidity or increased flow after rainstorm. In case of surface run-off, protection of the spring should be improved. However, if the system is clogged with silt, old gravel should be replaced by new.
- Contact the WWO to come and take regular water samples as recommended by the national drinking water monitoring and surveillance guidelines of the Ministry of Water and Energy to check for evidence of fecal contamination
- Observe for any damage to the fence or the spring chamber

Annually

- Check for any leakage surrounding the spring eye protection box
- Open the service hole cover and disinfect the chamber with chlorine solution.
- Disinfect the spring box each time a person enters to clean or repair or when there is bacteriological contamination
- Open the washout to remove the accumulated silt
- Repair any leaks in the protective seal, undermining of the head wall, or damage caused by erosion or settlement of soil must be repaired
- Contact the WWO to come and take regular water samples as recommended by the national drinking water monitoring and surveillance guidelines of the Ministry of Water and Energy to check for evidence of fecal contamination

Table 5: Trouble shooting of springs and recommendations

Problem	Possible Cause	Possible Remedy
Water is turbid	Flood water entered the spring, or walls could be collapsing	Seal areas around protective structure (spring box) Raise protective structure above ground level Repair walls if collapsing
Deterioration in water quality	Contamination through seepage of water into spring	Scour the spring and disinfect e.g., with chlorine Seal seepage passages
	Foreign material could have entered the spring	Replace wire mesh in exposed pipes
Reduced discharge	Drought/Low rainfall	
	Walls could be collapsing	Rebuild spring box and disinfect after
	Flow from the spring eye may have gone somewhere else; not into the spring box	Call WWO to investigate and to suggest a solution.
Foreign matter coming out	Wire gauze damage and children pushing foreign matter through spouts	Clean spring and replace wire gauze on spouts. WASHCO to warn parents to control their children.
Wet or algae around the tap	Leaking taps	Replace with better quality taps Example. Talbot taps, lever type taps

Session 3: OM&M of Motorized Water Supply Systems

Session Objectives

At the end of this session the participants should be able to:

- Understand the basics of motorized pump operation and maintenance
- Trouble shooting and establish remedial actions

Methodologies

- Facilitator presentation
- Brainstorming/discussion
- Photos

Material needed

- Flip chart
- Marker
- Scotch tape
- Diagram of a borehole, submersible pump, generator, control panel, water meter, elevated reservoir

Time needed: 105 minutes

Activity 1: Brain storming, photo presentation and interactive lecture

Instructions for the Activity

1. Brainstorm with the participants about their understanding of motorized water supply systems. Motorized water supply systems need special skill and may not be maintained at school level. Thus, the participants may not have enough knowledge and the detail should be based on their experience
2. List down their responses on a flip chart and make the list complete by adding those missed
3. Make a presentation on a brief overview of parts that need preventive, corrective, and periodic maintenance (see facilitator note). Since motorized systems need special skills with professionals needed to repair faults, the detail of the discussion should consider the capacity or experience of the trainees.
4. Ask participants if they have any question on the presentation
5. Summarize the session with main points

Facilitator Note on OM&M of motorized water supply system

Centrifugal submersible pumps are by far the most used motorized borehole pumps. There are many different manufacturers and suppliers, and the pumps are made in almost any size that will meet the needs of any borehole installation, from small 3-inch diameter pumps for small boreholes to 12-inch diameter borehole pumps to supply urban centers. The pump is close coupled with the pump motor with both having the same outside diameter such that both can be inserted into the borehole to the optimal pumping depth. It is extremely important to match a borehole or well with a submersible pump that is designed for the yield of the borehole and the desired discharge of the pump. This includes the flow rate, the pumping head, and the water quality.



Figure 5: Motor at borehole head



Figure 6: Generator



Figure 7: Water meter



Figure 8: Raised school water tank



Figure 9: Submersible pump and cross section

System components

The submersible borehole pump is made up of several centrifugal pump chambers (see Figure 9 above) each with its own impeller, stacked on top of each other. These are called stages and the more stages a pump has, the greater the height it can pump to. The size of the stages and the impellers govern the volume of water that can be pumped.

Energy sources

Submersible centrifugal pumps come in two main types, alternating current (AC) and direct current (DC). Pumps with DC motors are used for solar pump installations where the pump is supplied power directly from the solar panels and those using AC are normally connected to an electrical grid but can also be powered from a generator.

Operation

With an automatic electrical submersible pump, the operator must check the settings and correct operation of the pump control and pump protection systems. This would typically include the operation timer, no-flow switch, and pressure cut off switch, and can include electrical components like variable speed drives, soft starters, phase failure protection relays, overload and under load protection relays and dry running cut off switch.

Important Note:

In most cases, schools share motorized water supplies with surrounding communities and the school may not have the skill and equipment to maintain them. Hence, the maintenance of motorized pumps should be done by skilled personnel who may be available at a water utility, WWO, Zone Water Department or Regional Water Bureau. However, adequate budget should be allocated by the school during annual financial planning based on expected repair needs of the water supply system. It is also recommended to have two operators for motorized systems to avoid interruption of services. Thus, on top of reporting to the operator or utility, the school can perform the OM&M activities stated below.

OM&M of Water points

- The school administration is responsible to hire a caretaker to look after all water points at the school and to control water collection by students or staff.
- The caretaker has to be trained by the WWO as to his/her role and responsibilities and should be given a written job description in Amharic.
- The school should check whether there are leakages in the distribution pipes or not. If a leakage is found to be big the school can close the gate valve and liaise immediately with operators or utilities or skilled individuals to replace or maintain the leaking pipe.
- Clean and sweep the water point daily
- Check for leakage of taps and replace tap washer or the whole tap if necessary. Replacing of taps is a simple procedure and can be done by the caretakers or guards if a pipe wrench is available. Thus, having pipe wrenches and other plumbing tools is important to maintain school water supply systems instead of outsourcing and having to wait for a plumber to show up.
- Clean the drainage and soak-away pit regularly
- The water point should be fenced with a lockable gate so that animals can be kept out or students may not damage the water point during breaks.
- Assign SWASH club members or guards to open and close the taps

Maintenance of Water Tanks

- Water from a borehole is normally pumped up to an elevated steel or concrete tank from where it is distributed by pipes to tap stands. This applies to motorized pumps and solar operated pumps.
- Check the tie down cables annually for tension and retighten as needed.
- Check for leaks. If there is a leak, contact a professional plumber or the WWO
- If the tank overflows this is probably because the float switch has malfunctioned. Switch off the pump and call the WWO or the contractor who installed the system.

Annually

- Let the tank get empty by switching off the pump and let water go to the taps
- Get inside the tank with a scrubbing brush and VIM (abrasive cleaner), bucket attached to rope and large sponge and scrub the walls and bottom of the tank
- Remove dirty water with jug and sponge into bucket and haul out of tank with the rope,
- Have someone switch pump on for five minutes and rinse sides of tank with jug
- Remove dirty water by jug and sponge into bucket and haul out of tank with the rope
- Clean surface of float valve carefully with damp cloth
- Get out of the tank and close the lid
- Switch on the pump and let the tank get full until the float switch kicks in and turns off the pump
- Disinfect the water in the tank with two small plastic bottles of water purifiers
- Wait for six hours before opening gate valve to allow water to flow to the taps
- Call WWO to come and test the water AT THE TAPS for e-coli and follow their instructions

Fiberglass tanks maintenance

- While fiberglass tanks can withstand extreme temperatures, over time, ultraviolet light will degrade the resins that hold the glass in place. Ultraviolet damage is a surface phenomenon. Simply applying a coat of paint or gel coat will “refasten” the fibers into the paint or gel coat. When recoating, it is best to paint the entire tank instead of just a section that needs attention. Lightly sanding the entire tank before applying the paint or gel coat will help the coating adhere to the surface better
- Another sign that a tank may need attention is when the walls on the outside of the tank show a spider web pattern. Such patterns are often caused when something hits or bumps a tank. This requires need to repair these cracks from the outside. If you observe seepage through a fiberglass tank or wet areas on an outside wall that indicates that the water from the inside has broken through the resin.
- Repairing an internal leak or external crack takes more skill and a fiber glass repair kit than just painting over a tank’s surface. Therefore, this is a job for a specialized technician, so contact the WWO to arrange one. Then drain the tank and let it dry out by leaving the lid open while waiting for the expert to arrive
- If a crack is seen from the outside, fix it from the outside. If seepage is seen in a specific area, fix that from both the inside and the outside. The rule of thumb when patching an area is to make a patch that’s at least twice the size of the cracked or seeping area. Before patching a tank, completely drain the tank and let it air dry. Then, apply the repair piece of fiberglass to the sanded area. Once applied to the tank, roll out any air bubbles while the area dries. Once the fiberglass dries, apply a good quality paint or gel coat over the surface. A general rule of thumb is to allow new fiberglass to cure two to four hours before allowing fluid to touch the repair

Polypropylene Random Copolymer (PPR) maintenance

- Properly installed PPR like HDPE pipes are durable and no major issues are expected.
- The joint between a pipe and a fitting is where most leakage normally occurs. The common reason for the leakage of the PPR water pipe:
  - The PPR water pipe has been subjected to high water pressure for a long time.
  - Weak joints

- Seek the services of a Professional plumber or WWO if the PPR or HDPE pipes or fittings need to be changed or repaired.

A special HDPE welding kit is needed to replace a leaking pipe so this is the job for a professional plumber so contact the WWO for assistance or call a plumber who has such a kit.

Session 4: OM&M of Solar Pump Water Supply Systems

Session Objectives

At the end of this session the participants should be able to:

- Understand how a solar pump water supply system works
- Identify the components of solar pump water supply systems
- Understand the OM&M requirements

Methodologies

- Facilitator presentation
- Brainstorming/discussion
- Photos

Material needed

- Flip Chart
- Marker
- Scotch tape
- Diagram of a borehole, submersible pump, inverter, solar panels, control panel and elevated reservoir and tap stands

Time needed: 105 minutes

Activity 1: Brain storming, photo presentation and illustrated lecture

Instructions for the Activity

1. Brainstorm with the participants about their understanding of solar pump water supply systems
2. List down their responses on a flip chart and complete the list by adding those missed
3. Show photos of solar pump systems, so that trainees will clearly visualize the parts of solar pumps
4. Ask participants about the main components of the solar pump water supply system
5. Make a presentation of parts that need preventive, corrective, and periodic maintenance (see facilitator note)
6. Ask participants if they have any questions on the presentation
7. Summarize the session with main points

Facilitator Note on OM&M of solar pump water supply systems

There is little that can go wrong with a solar system if it is installed correctly. The submersible pump in combination with a controller unit has several safety features that protect it in the event of a problem occurring.

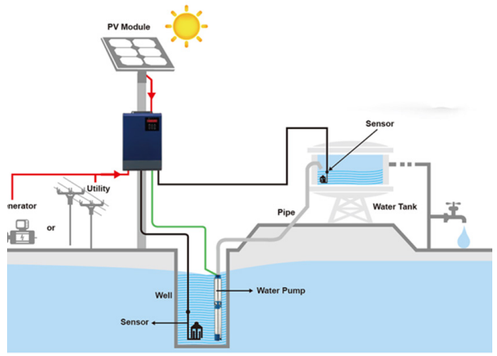


Figure 10: Solar water supply systems

System Components

The solar borehole pump installation consists of three main components, the borehole pump, the solar panel array to power the pump, and a controller. While most solar pump motors operate on DC, some can be supplied with AC but then an inverter is also required to convert the DC from the solar panels to AC. Because of low efficiency, electricity storage in batteries is rarely practiced. The idea is that the pump is supplied power during daylight hours and fills the reservoir or overhead tank. The public taps open for water collection in the early morning when the tank is full so that there is enough pressure for water to reach the taps. The tank will be topped up during the day if there is enough sun

The pump does not work at night or on very cloudy days.

The solar array (group of solar panels) should be installed by the contractor on top of the elevated water tank for safety and to minimize theft of the panels.

The school administration should hire guards to protect the panels from looters.

Operation and Maintenance of Solar Pump Water Supply Systems

Important Note:

Solar pumps do not require a lot of maintenance once installed properly. In most cases, schools may share Solar Pump Water Supply Systems with surrounding communities and the school may not have the skill and equipment to maintain them. Hence, the maintenance of these pumps should be done by skilled personnel who may be available at water utility, WWO, Zone water department or regional water bureau. However, budget should be allocated by the school in case the system has to be maintained or repaired during the financial year. Works like cleaning the panels, protecting the panel from looters, and repairing fences and gates needs to be handled at school level by appointed and trained pump operators PTA, staff and guards.

Weekly maintenance tasks

- Clean the panels with water and soft wet cloth followed by dry cloth
- Check electric cables
- Check the pipes for leaks
- Check the elevated tank for leaks
- Check that the float switch is working by observing if the tank overflows while the pump is on. If it overflows this indicates that the float switch is not working. Or if the pump does not start automatically when the water level in tank drops after users have collected water.

Monthly

- Check electric cables
- Check control box or panel
- Check the water pipeline to the storage tank
- Check for any damage and leaks along the distribution line
- Observe for any trouble with the submersible pump by observing the time taken to fill the tank on a sunny day. This should be the same time as it took to fill the tank when the system was installed and tested by the contractor.

Annually

- Drain and clean the inside of the water tank (see Maintenance of Tanks above).
- The school administrator should include a budget for the solar system in case the pump has to be removed and serviced or some taps needs replacement.
- No need to check the submersible pump if it is working properly

Table 6: Trouble shooting of solar pump systems and recommendations.

The school administration should seek expert advice to deal with the problems mentioned in this table

Problems	Possible remedy
Pump failing to start/ function	**Check the voltage of the system:** Voltage should be at 10%± motor ratings. Read voltage at pressure switch, control box, and any other components that power may be running through. **Check Pressure Switch:** Look for deformed, burned, or melted parts or discoloration, namely all black components. Check for sediment/debris in the tube/nipple leading to switch. Check that contact points are being opened and closed accordingly. **Check Control Panel:** Check for apparent defects or simply signs of wear and tear. Look specifically for burnt, loose or melted components. **Check Splice Connections:** Check for any corrosion or obvious damage. Typically, there is a splice connection at the top of the well, between the submersible cable and the UF/THHN. **Check the Pump and Motor:** If none of the above yields results, it may just be time to replace the pump and/or motor.
Low water production	Check the surroundings of the chosen site. Consider locating your solar pump in an area that has little foot traffic (both animals and humans), to avoid casting shadows, and get rid of any overhanging vegetation that may even completely block some of the cells. Examine the panel closely for cracks or any deformities in the cells. Check the SWL
Water running continuously	Keep an eye out in the yard for any puddles. This will be a tell-tale sign of where the leak is occurring. Shut off the water in the pump house and look at the water pressure gauge. If it remains consistent, there is no problem with the check valves and no leaks. If the pressure drops, there is a leak in the line to the pump house or an issue with the check valve. Check that the float valve is working, i.e. the FV should shut off the pump when the tank is full.
Malfunction with low (dry) well sensor	Check that the sensor is submerged and perform a system reset. Once on again, the system will recognize that the sensor is submerged, shut off the Low (dry) Well alert and continue pumping water.
Damaged pumping mechanism	Remove the pump and determine the problem. Have the pump repaired and re installed or if beyond repair buy a new pump.
Moisture inside or on PV panel	Look at the type of solar panel. Some panels are made with ventilation apertures to allow airflow into the panel to solve the inevitable build-up of condensation within the plate. For wetness on the exterior of the panel, make sure to regularly clean the glass, as water, debris and anything that can reflect light away from or cast a shadow on the panel will significantly reduce energy production.
Hot spots in cells (Burn Marks inside cell)	This instance is considered a failure of the solar panel, and it needs to be replaced.
Hot cells (Outside of cell burned)	This instance is considered a failure of the solar panel and it needs to be replaced.

Note: - maintenance of solar pumps needs a high level of skill and professionals. If any of the problems occurred, it is good to link the maintenance with electromechanical professionals or trained personnel through the WWO.

Session 5: OM&M of Rain/Roof Water Harvesting Water Supply Systems

Session Objectives

At the end of this session the participants should be able to:

- Understand how the rain/ roof harvesting water supply system works
- Identify the components of rain/roof harvesting water supply systems
- Understand the OM&M requirements

Methodologies

- Facilitator presentation
- Brainstorming/discussion
- Photos

Material needed

- Flip chart
- Marker
- Scotch tape

Time needed: 45 minutes

Activity 1: Brain storming, photo presentation and illustrated lecture

Instructions for the Activity

1. Brainstorm with the participants about their understanding rain/roof harvesting water supply systems
2. List down their responses on a flip chart and complete the list by adding those missed
3. Show photos of rain/roof harvesting water supply system, so that trainees will clearly visualize the parts
4. Ask participants about the main components of the rain/roof harvesting water supply system
5. Make a presentation on parts that need preventive, corrective, and periodic maintenance (see facilitator note)
6. Ask participants if they have any questions on the presentation
7. Summarize the session with main points

Facilitator Note for OM&M of Rain/Roof water harvesting systems

Rainwater harvesting is a technology used to collect, convey, and store rainwater for later use from relatively clean surfaces such as a roof, land surface or rock catchment. Using gutters and downpipes (made of local wood, bamboo, galvanized iron, or PVC); they catch rainwater and divert it to one or more storage containers ranging from simple pots to large tanks. If properly designed, a first flush device or detachable downpipe is fitted for exclusion of the first flush water. As a general guideline First Flush devices should remove about 40 liters of water per 100 square meters of roof/ catchment area. If harvesting rainwater in an area with high pollution e.g. urban area with poor air quality, an area with lots of dust or other pollution sources, a larger First Flush is required.

Rainwater harvesting systems components

Although rainwater can be harvested from many surfaces, rooftop harvesting systems are most used as the quality of harvested rainwater is usually clean following proper installation and maintenance. The effective roof area and the material used in constructing the roof largely influence the efficiency of collection and the water quality.

- A collection (catchment) area - is generally a simple structure such as roofs and/or gutters that direct rainwater into the storage facility. Roofs of school classrooms and stores are ideal as catchment areas as they easily collect large volumes of rainwater.
- A conveyance system consisting of pipes and gutters is required to transfer the rainwater from the roof catchment area to the storage system by connecting roof drains (drainpipes) and piping from the roof top to one or more downspouts that transport the rainwater through a filter system to the storage tanks. Materials suitable for the pipework include polyethylene (PE), polypropylene (PP) or galvanized steel sheets.
- A storage facility retains harvested rainwater for use when needed. Depending on the space available these tanks can be constructed above the ground, partly underground, or below the ground. They may be constructed as part of the building or may be built as a separate unit located some distance away from the building.
- A delivery system consisting of a tap or pump- delivers rainwater and it usually includes a small pump, a pressure tank, and a tap, if delivery by means of simple gravity on site is not feasible.

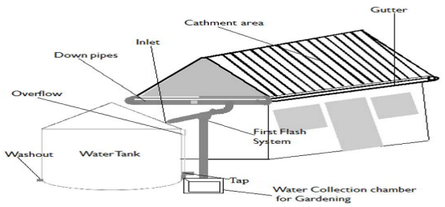










Figure 11: A schematic diagram of a rooftop rainwater harvesting system

Some examples and collapsed tank stand demonstrating the importance of constructing a stand strong enough to support a full tank of rainwater

Operation of rain/roof water harvesting systems

- Before water is stored in a storage tank or cistern, and prior to use, it should be filtered to remove particles and debris.
- "First flush" systems which filter out the first rain and diverts it away from the storage tank should be also installed. Automatic devices that prevent the first 20-25 liters of runoff from being collected in the storage tank are recommended.
- For effective operation of a rainwater harvesting system, a well-designed and carefully constructed gutter system is also crucial. 90% or more of the rainwater collected on the roof will be drained to the storage tank if the gutter and down-pipe system is properly fitted and maintained.
- Disinfection of the harvested rainwater, which includes filtration and/or ozone or UV disinfection, is necessary if rainwater is to be used as a potable water source.

Maintenance of rain/roof water harvesting systems

Important Note:

- Budget for maintenance of RWH is required to be allocated by the school administration.

Maintenance of most problems associated with RWH is possible at school level with minimum skill requirement.

Maintenance generally consists of:

- Annual cleaning of the tank, (Maintenance of tanks above)
- Regular inspection and cleaning of gutters and down-pipes. These typically consist of the removal of dirt, leaves, and other accumulated material.
- Clean roofs & gutters annually or before the start of the major rainfall season,
- Inspect and clean filters on a monthly basis
- Repair any cracks in storage tanks.
- If there are any issues beyond the school's capacity, the school administration should call the WWO or a professional plumber/mason with required skill to handle any problems.

Daily maintenance tasks

- Ensure that the First Flush System is operational.
- Check the taps for leaks and malfunctions.
- If using a bucket to draw water, ensure that the bucket and rope are clean.
- Restrict access to the storage tanks and taps by unauthorized people
- Ensure the leaf screen is cleared of leaves.

Weekly

- Check the gutters for any damage
- Check tank for leaks and repair.
- Filters should be cleaned weekly during the rainy season
- Check that the first flush device is working
- Add bottles of water purifiers according to the quantity of water in the tank if the water is to be used for drinking.

Monthly

- Check the gutter and fix if there is damage
- Inspect the tanks for any leakage
- Check the water quality by taking water samples before use for drinking purposes. The WWO can do this on behalf of the school.
- Seek support from WWO or Woreda health office to disinfect and treat the water
- Cover and ventilate the tank to avoid mosquito breeding, prevent insects and rodents from entering the tank, and minimize the growth of algae.
- If a filter is provided, it should be cleaned every month and/or when required, filter sand should be washed at least every six months.

Annually

- Check and clean the storage tank (see Maintenance of Tanks, above).
- Before the start of the rainy season, the complete system should be checked for cracks, holes and broken parts should be repaired as necessary
- Regular water quality testing and disinfection with the assistance of the WWO or health office.
- In cases where the water is pumped, periodic preventive maintenance is required on the small pumps that lift water to tap stands or provide public supply from underground storage tanks.
- The school administration should prepare an O&M plan and allocate a budget to maintain the system.

Table 7: Trouble shooting for rainwater harvesting systems

Problem	Operation	Cause	Remark
Little or no flow at the tap	No visually observed problem	The level of water in the storage tank is low or fully depleted	Check availability of water in the storage
		Water might not flow into the storage tank	Check smooth entrance of water into the storage and fix if any problem.
		Leakage of storage tank that may not be visible	Check floor and walls of storage tank for leakage and maintain
		Tap problem	Repair or replace the tap
		Gate valve located between water point and storage tank may be damaged	Repair or replace the gate valve
		Pipeline between water point and storage tank may be clogged	Check the pipeline and clean any blockage
Water not flowing into the storage tank	No visually observed problem	Downpipe may be clogged	Check for any blockage of the downpipe and clean, if necessary
		Gutters may be blocked or broken	Unblock gutters or repair
		Clean out plug/ bottom plug may be open	Close the clean out plug
Water in the tank is dirty		First flush device not working	Repair the first flush device

Session 6: Water Quality Management

Session Objectives

At the end of this session the participants should be able to:

- Understand the meaning of water quality and its importance
- Identify the types of water quality issues
- Perform water sample collection and disinfection

Methodologies

- Facilitator Presentation
- Brainstorming/discussion

Material needed

- Flip Chart
- Marker
- Scotch tape

Time needed: 30 minutes

Activity 1: Brain storming, demonstration of water sampling and illustrated lecture

Instructions for the Activity

1. Brainstorm with the participants about their understanding of water quality and the types of tests
2. List down their responses on a flip chart and complete the list by adding those missed
3. Make a presentation on water quality management (see facilitator note)
4. Participants are not responsible to take water samples and the focus will be more on the importance of water quality checks. Ask participants if they have any questions on the presentation
5. Summarize the session with main points

Facilitator Note on water quality management

To maintain water quality, it is pertinent to conduct sanitary surveys, water quality tests (biological, chemical, and physical) and on-site water treatment or disinfection. Schools need to ensure that regular tests, disinfection, and monitoring of water quality takes place and take remedial action. This can be done in collaboration with Woreda health offices and WWOs, water utilities or water and sewerage enterprises**.** These issues demand more when the water source is unprotected like ponds and rivers. Hence, depending on the availed source and need point of use treatment (with Wuha Agar, P & G, Bishan Gari, etc.) or water filters (NAZAVA, Tulip, etc.) can be applied at school level. But as per Ethiopian National drinking water quality monitoring and surveillance and response guideline (MoH, 2017), Household water treatment and safe storage (HWTS) technology options with a range of devices or methods can be employed for the purposes of treating water in the home or at point of use in other settings. These are also known as point-of-use (POU) water treatment technologies (Cotruvo & Sobsey). These technologies include filtration, chemicals, disinfection by heat, solar and /or ultraviolet (UV), or combination of technologies, such as flocculant disinfectants which applies multi-barrier approach. These categories of the technologies are being used by different segment of the population in Ethiopia, being promoted by Health Extension Workers and partners in the country.

Water quality testing comprises of three major activities. These are:

- **Physical tests:** The physical characteristics of water are mainly described by its color, turbidity, taste, and odour
- **Chemical tests:** There are many chemicals that may occur in water but not all of them are objectionable or a risk to health. In the rift valley the high levels of fluoride in ground water are a risk to health and filtering systems to reduce fluoride levels are required if the groundwater is being used for drinking.
- **Bacteriological tests:** the greatest microbial risks are associated with ingestion of water that is contaminated with human or animal (including bird) faeces. Faeces can be a source of pathogenic bacteria, viruses, protozoa, and worms. The most common disease-causing bacteria are known as E-coli. Presence of e-coli can be determined in a bacteriological test of the water.

Cleaning, Disinfection, and chlorination

Cleaning

Water supply facilities such as pipes, reservoirs, wells, etc., must be disinfected before being put into use and regularly cleaned, during use. (See section on maintenance of tanks above). Before disinfecting, the pipe should be drained and flushed, flushing water drained again and refilled with clean water. In refilling care must be taken to avoid entraining or entrapping air in the disinfectant except when it is dissolved in the water.

The following disinfecting and cleaning procedure is recommended when starting new lines or after maintenance of broken pipes:

- Keep the inside of the pipe clean
- Block the open ends of the pipe to prevent trench water from entering
- Flush the main with water with a velocity of at least 0.6m/sec.
- Disinfect with chlorine or chlorine water
- Apply disinfectant at one extremity of pipe section and bleed at the opposite extremity.

Disinfection

The methods used to disinfect water are as follows:

Chlorination

The most common chemical disinfectant for water treatment in Ethiopia is chlorine. Chlorine for water treatment is usually in the form of sodium hypochlorite solution.

The bacteria killing efficiency of chlorine in water depends on several factors but the school administration just needs to follow the advice of the WWO when adding chlorine solution to water tanks or follow the directions below.

Table 8: Operation and maintenance requirements for chlorination

Task description	Frequency	Tool/materials required
Prepare chlorine solution (see below)	Quarterly	calcium hypochlorite and measuring equipment, containers
Conduct periodic tests of residuals in the distribution system	Monthly	Comparator
Inspect equipment in the chemical store	Annually	Pen and paper
Clean water tank	Bi- annually	Cleaning materials (brush, heavy duty gloves, goggles, gown, rubber boots, mask, detergent)

Note: - The water quality test and disinfection need professionals and it will be better if the school contacts with technicians at the WWO.

Consequences of an infected water tank:

If the school water tank is repaired or accessed for maintenance it can easily become contaminated by pathogenic bacteria on the boots of the cleaner, sediment, animal products, biofilm, corrosion, or stagnant water. To avoid this, the tank must be cleaned and disinfected at regular intervals such as every three months. If the tank is not cleaned regularly, it can grow bacteria and other microbes which carry waterborne diseases like typhoid, cholera, and dysentery. Viral and parasitic organisms in contaminated water can also cause infections and other conditions such as diarrhea. These water-related problems cause a horrifying 3.4 million deaths around the world each year, which is why disinfecting the water storage tank is so important.

Chlorinating (disinfecting) a Water Tank

1. Fill a quarter of the tank with fresh water, and then add calcium hypochlorite, which has a high percentage of chlorine, for the disinfection. Add 80 grams of calcium hypochlorite for every 1000 liters of the tank, and then fill up the tank to full capacity. Close the lid and leave the full tank for 24 hours.
2. Empty the tank, fill it again with clean water, leave for 30 minutes, and empty it again.
3. Now the tank is ready to use and can be refilled with normal drinking water.

MODULE VI: OPERATION, MAINTENANCE AND MANAGEMENT OF SCHOOL LATRINES

Session 1: OM&M of Traditional Pit Latrines

Session Objectives

At the end of this session the participants should be able to:

- Understand the components of traditional pit latrines
- Understand the OM&M requirements of traditional pit latrines

Methodologies

- Facilitator Presentation
- Brainstorming/discussion
- Photos
- Case story

Material needed

- Flip Chart
- Marker
- Scotch tape
- Photos

Time needed: 105 minutes

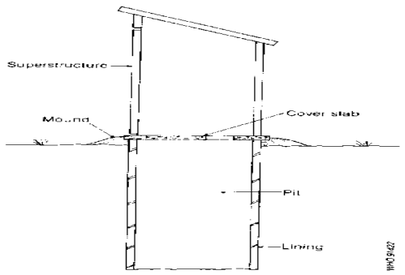
Activity 1: Brain storming, Photo show and illustrated lecture

Instructions for the activity

1. Brainstorm with the participants about their understanding of traditional pit latrines, their component parts, regular cleaning, and maintenance problems
2. List down their responses on a flip chart and make the list complete by adding those missed
3. Make a presentation on a brief overview of traditional pit latrines, their parts and maintenance requirements (facilitator note)
4. Show photos of different pit latrines used in Ethiopia
5. Read the case story and the issues behind the cases
6. Ask participants if they have any questions on the presentation
7. Summarize the main points of the session

Facilitator Note on OM&M of School Traditional Pit Latrines

Pit latrines have three basic components: the substructure (pit & pit lining), floor (slab & mound) and the superstructure (wall, roof, and doors).





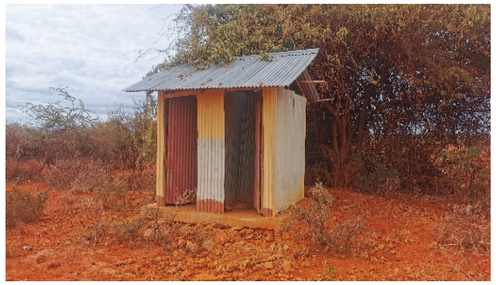


Figure 12: Side elevation of traditional school pit latrine and examples of traditional latrines

Operation and Maintenance of Pit Latrines

Important Note:

The school director is responsible for cleaning and maintaining school latrines by including it in his annual budget by mobilize resources through PTA or from other external partners and by employing cleaners to regularly clean the latrines and providing them with the necessary cleaning equipment and materials like soap and disinfectant (bleach), The budget should include the cost of hiring a vacuum tanker to empty the pit or pits and the cost of soap and toilet paper for the whole school year.

The school director should delegate unit leaders and SWASH club members to carry out regular daily inspections of school latrines to make sure the cleaners are doing a proper job. Teachers also have a responsibility in telling students how to use the latrines properly and to report any dirty cubicles with immediate effect.

The school administration/director is also responsible for hiring a mason and/or carpenter as required to carry out maintenance work.

The operation and maintenance of a pit latrine can be done at school level and consists of the following measures:

Daily

- Regularly cleaning the slab with a little quantity of water (and a little disinfectant) to remove any excreta and urine.
- Avail appropriate anal cleansing materials like toilet paper or leaves. Students should be told not to use stones or corn cobs as this fills up the pit.
- Ensure soap is always placed next to the hand washing tank and that the tank has enough water.
- Non-biodegradable materials like stones, plastic, rags, needles, bandages etc. should not be thrown in the pit as they reduce the effective volume of the pit and hinder mechanical emptying. They should be put in a separate waste pit or rubbish container which should be placed near the entrance of the latrine.
- Check the proper utilization of the latrine (the floor has been cleaned, no visible faeces in the slab, the hole was not closed by faeces/ other materials, no cracks in the floor slab with no risk of collapse). This should be checked by cleaners and members of SWASH club or unit leaders.

Monthly

- Checking the slab for cracks. If cracked maintain immediately by hiring a mason or artesian. If the crack has a safety risk close the latrine until it is maintained (see case story below).
- Check the superstructure for structural damage.
- Ensuring that surface water continues to drain away from the latrine.
- Immediate action must be taken if the following problems occur; - parasites or maggots in cracks in the floor (as a result of unsuitable materials for the floor slab or improper curing of concrete); flooding of the latrine by surface water, etc.

When the pit is full

- The contents of the pit must be covered with at least 0.5m of topsoil to provide a hygienic seal if emptying is not feasible.
- Cubicle doors should be locked and students told not to use that latrine.
- The school administration should organize for a vacuum tanker to come and empty the pit.

CASE STORY: Children can die if school latrines are not maintained

Burayu is a town found 23kms west of Addis Ababa. In one of the kindergartens in that town, eight students went to use the school latrine. However, the latrine suddenly collapsed, and eight children were trapped under the debris among the faeces in the pit after the slab collapsed. Four of the children died immediately and the other four were taken to hospital. Fortunately, the four-student taken to the hospital were treated and recovered.

This is a true real-life story and what do you understand from this?

Possible answers

- The school was negligent about safety
- Schools were not forced to have proper toilet before licensing
- School administration did not check the latrine situation regularly
- Generally, negligence on OM&M of school pit latrines may lead to loss of life of students as well as affecting school attendance and students being afraid to use the latrine. The issue may also lead to legal punishment. It gives latrines a bad image.

Session 2: OM&M of Ventilated Improved Pit (VIP) Latrines

Session Objectives

At the end of this session the participants should be able to: -

- Understand the components of latrines
- Understand the OM&M requirements of VIP *latrines*

Methodologies

- Facilitator Presentation
- Brainstorming/discussion
- Photos
- Case story

Material needed

- Flip Chart
- Marker
- Scotch tape
- Diagram of a VIP latrine

Time needed: 90 minutes

Activity 1: Brain storming, Photo show and Illustrated Lecture

Instructions to the Activity

1. Brainstorm with the participants about their understanding of VIP, their components and operation and maintenance needs
2. List down their responses on a flip chart and make the list complete by adding those missed
3. Make a presentation on a brief overview of VIP latrines and their parts (facilitator note)
4. Show photos of different VIP latrines used in Ethiopia
5. Ask participants if they have any question on the presentation
6. Summarize the session with main points

Facilitator Note for OM&M of school VIP latrine

The ventilated improved pit (VIP) latrine is a pit latrine with a black vent pipe fitted to the pit on the outside of the superstructure and a fly/mosquito screen fixed to the top of the pipe. The pipe is painted black so as to absorb heat from the sun which aids air to move up from the pit. VIP latrines are an improvement to overcome the disadvantages of simple pit latrines, e.g., fly and mosquito nuisance and bad smells. The smell is carried upwards through the vent pipes by the chimney effect and flies are prevented from leaving the vent pipe by the mosquito screen at the top. The vent pipe should have an internal diameter of at least 110 mm and reach more than half a meter above the highest point of the toilet roof. Wind passing over the top creates a suction pressure within the vent pipe and induces air circulation. Air is drawn through the squatting hole into the pit, moves up inside the vent pipe and escapes into the atmosphere. Flies are caught by the mosquito netting on top of the pipe, die and fall back into the pit. Therefore, flies cannot escape to contaminate food and drinks.

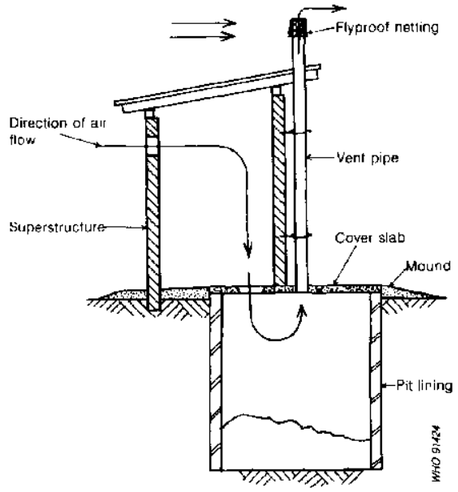


Figure 13: Typical VIP latrine

VIP latrines have similar basic components to that of traditional pit latrines but have vent pipes and are constructed with a more substantial superstructure including a concrete floor.

Operation and Maintenance of VIP latrines

Important Note:

The Woreda education office and school directors are the ones responsible to communicate with town or Woreda water and sewerage utility to hire a vacuum tanker to empty pits and safely disposal of the sludge. The school director, unit leaders and SWASH club members should make regular inspection to identify either the latrine is functioning well or if there is any damage that requires maintenance. As per their investigation and need, the school can hire an experienced mason and carpenter whenever the maintenance of the latrines is needed. The school should allocate funds during annual financial planning from internal sources, mobilize resources through PTA or allocate school grants for maintenance of VIP latrines including buying soap, toilet paper and cleaning equipment and materials.

The operation of VIP latrines consists of

- Regularly cleaning the slab with water and a little disinfectant, to remove any excreta and urine.
- Appropriate biodegradable anal cleansing materials should be used like toilet paper or leaves.
- Non-biodegradable materials like stones, plastic, rags, needles, bandages etc. should not be thrown in the pit as they reduce the effective volume of the pit and hinder mechanical emptying.
- The vent pipes should be on the outside of the superstructure facing towards the sun to increase heating and flow of air up the pipes.

Daily tasks

- Monitor the proper utilization of the latrine
- Ensure that the door closes properly and can be locked.
- Ensure that the door hinges have not come loose - remedy problems if necessary.



Figure 14: Latrine with broken door

- Clean and wash the latrines, urinals and hand washing facilities with water and detergent. Remove faeces from around squatting holes, mop the floor and clean the doors, handles, handrails, and wall (superstructure) of the toilets.



Figure 15: A poorly maintained latrine

- Collect papers and other solid wastes from the latrine and transport to a solid waste disposal pit or incinerator
- In the wet season, especially, check for subsidence of the slab.
- Keep children away from playing around the vent pipes as they can damage them

Monthly

- Inspect mesh wire over the vent pipe and replace if showing signs of damage.
- Inspect the floor slab, footrest, disabled toilet seat, slab cover for access to the pit and superstructure, vent pipe and fly screen.
- Perform small repairs such as lining the cracks on the slabs and wall of the latrine with cement
- For raised latrines: Inspect for leakage on the sides of the raised pit (assess presence of wet surfaces on the walls of the pit and the ground around the latrine
- Assess for foul smell.
- Check that the vent pipes do not have cracks or holes, if so, these need to be patched up.

Annually

- Check level of faeces in the pit depending on the amount of usage. The contents of the pit must be covered with at least 0.5m of topsoil to provide a hygienic seal if emptying is not feasible.
- The filled pit should be completely isolated or protected and definitely kept out of the reach of children and animals. Lock all the cubicle doors and tell children not to use that latrine.
- Clean the fly screen and repair/ replace damaged vent pipes and fly screen and fly screen wire.
- Monitor the proper use of the latrines and assess the changes in hygienic behavior of students on latrine utilization.
- Repair the slabs, doors, handles, handrails, and superstructure of the latrine
- The pit should be used until it the contents are within 0.5m of the underside of the slab.
- When the pit is full the doors should be locked, and it should be emptied either by vacuum tanker or manually. Or it can be closed for one to two years, and the contents will decompose as well as volume will be reduced.

CASE STORY

On 28 April 2022, a young girl, Harleen, was abducted and raped when she had gone out to defecate in a school latrine, 35km (21 miles) from the state capital, Patna in India. The man who raped the girl was HIV positive. Harleen had dropped out from school and was forced to marry a man to cover the consequence of the rape. Then she became pregnant and went to clinics to attend ante natal care. One of the ANC services was to test for HIV. She tested positive and did not have the courage to go back home and tell her husband. As a tragic option she committed suicide.

What was the root cause for all these problems? The following are the possible answers.

- The latrine lacked a door during construction
- The latrine door lacked internal lock
- The latrine door had been broken but not maintained
- The internal lock may not have worked due to lack of maintenance
- Shortage of anti-retroviral drugs in rural India
- Lack of counseling for HIV patients in rural India
- Do you think this sort of tragic incident could happen in rural Ethiopia?

Session 3: OM&M of Composting Latrines

Session Objectives

At the end of this session the participants should be able to:

- Understand how the composting latrine's function
- Understand the OM&M requirements of composting latrines

Methodologies

- Facilitator presentation
- Brainstorming/discussion
- Photos

Material needed

- Flip chart
- Marker
- Scotch tape

Time needed: 45 minutes

Activity 1: Brain storming, photo show and illustrated lecture

Instructions for the Activity

1. Brainstorm with the participants about their understanding of composting latrines and how they work and the maintenance requirements
2. List down their responses on a flip chart and complete the list by adding those missed
3. Make a presentation on composting latrines (facilitator note)
4. Show photos of different composting latrines used in Ethiopia
5. Ask participants if they have any questions on the presentation
6. Summarize the main points of the session

Facilitator Note for OM&M of school composting latrines

Composting latrine

A composting toilet is a toilet that can convert excrement into a useful soil-conditioning like material which can then be safely disposed of in the environment after adequate time has passed for composting. When conventional school toilets are full, the pit is covered with soil and abandoned. If the composting latrine is properly constructed and used, it is a sustainably usable toilet that can serve three or four times the life of other conventional latrines. In composting latrines, human waste is treated as a valuable resource for soil conditioning and crop production but requires careful management for its use. Composting latrines are emptied by manual labour after the contents have decomposed for one to one and a half years. The big plus is that they can be used for many years unlike conventional pit latrines which are often abandoned when the pit gets full.

Composting latrines have four main parts:

1. Reactor (storage chamber)
2. Ventilation pipes to provide oxygen and allow gases (CO_2, water vapor) to escape
3. Leachate collection system.
4. Access door to remove the mature compost.



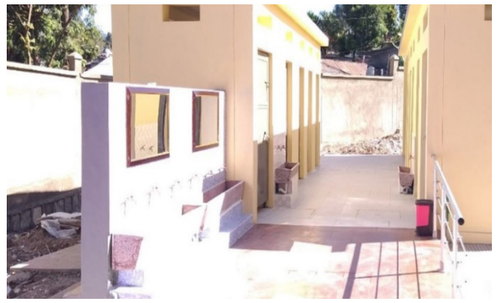




Figure 16: Profile and examples of composting toilets

Operation and Maintenance of Composting Latrines

Although simple in theory, composting latrines are not that easy to operate.

- The moisture must be controlled, the Carbon: Nitrogen ratio must be well balanced, and the volume of the pit must be such that the temperature of the compost pile remains high to achieve pathogen reduction.
- After each defecation, a small amount of bulking material, like ash or sawdust is added to absorb excess liquid, improve the aeration of the pile, and balance the carbon availability.
- If the material in the chamber becomes too compact and humid, additional bulking material should be added.
- If one of the toilet pits is full (50 cm below the lower side of the slab), transfer to the second drop hole. Before closing, pour ash, soil, or other organic material into the drop hole. Remove the tile over the empty hole and seal the hole over the full compartment so that it is air-tight
- If a urine diverting dehydrating toilet is used, some water should be added to obtain the required humidity.
- Depending on the design, the composting chamber should be emptied every two to three years.
- Only the mature compost should be removed. How often this occurs depends on the pit size, usage, and composting conditions, such as temperature. Active, hot composting may take months while passive, cold composting may require years. It is recommended to wait at least two years for safe removal of the mature compost.
- Safety of workers should always be kept in mind during removal processes.
- The material may require further treatment to become hygienically safe e.g., Co-Composting

Maintenance of Composting Latrines

Important Note:

The school management, Woreda health and education office should work together with town and Woreda water and sewerage office/utility to dispose of the sludge safely. The school management committee should take all the necessary precautions during pit emptying in the school compound. The school administration is responsible for maintenance of the composting latrine with the support of the WHO and Woreda education and construction offices. The Woreda construction office can give technical support and participate in supervision related activities during the maintenance of the latrine. The Woreda

education office will be responsible for allocating funds from its school budget and mobilizing resources from external partners to cover latrine maintenance costs as well as to hire an experienced mason to maintain the different parts of the latrine including removing and ceiling tiles over drop holes.

The operation and maintenance of the composting latrines

Daily

- Assure availability of ash, soil, or sand in each compartment
- Monitor the proper utilization by all users
- Check that toilet paper or leaves are available
- Ensure cleaning of the toilet
- Ensure water and soap are available at the hand washing facility

Weekly

- Thorough cleaning in and outside
- Ensure students are getting the right message on proper utilization of toilets

Monthly

- Check sludge level in pits
- Check that mosquito screen is in place at top of vent pipes if a double VIP type

Undetermined period when the pit is full

- Close off full pits and start using adjacent pit. The pit is used until it is filled to within about half a meter of the top.
- Empty latrine, minimum after two years. The purpose of the composting toilet is to use the compost. Thus, as much as possible the compost should be emptied and used in school gardening. It can be emptied manually with proper health and safety measures
- The pit emptying can be done by daily labourers under proper supervision by experienced people with all safety measures in place.
- Students should not be around during pit emptying.
- Ensure that the vacuum truck has all the features to transport the excreta safely. Consult water utilities or WWO if necessary
- Ensure that the excreta is disposed of in a legally designated area. As much as possible use water utility or municipality owned trucks to ensure the safe disposal of the sludge.

Case Story

Mr Samual Eruwa of Hai Mairo village, Torit, South Sudan decided to construct a compost toilet in April 2019 after he received some support from the Water for Eastern Equatoria Project. He said he had heard about the advantages of compost latrines on the local radio. He said he was motivated by the fact that the human waste after proper composting could be used as a valuable soil conditioner. When his neighbors heard about it, they said they also wanted compost toilets so the project decided to construct a communal toilet for 10 households. So, a communal toilet was constructed using korkoro sheets and eucalyptus poles. Three bamboo compost bins were woven near the toilet in which the faeces mixed with sawdust was placed and covered with dried grass.

After about a year the compost bins were full and the material in the first bin had already composted due to the hot environment of South Sudan. Then Mr. Eruwa removed the compost material and spread it on his nearby garden plot and dug it into the soil.

Then he planted tomato seedlings and in three months was able to harvest 10 large crates of fresh tomatoes which he sold in Torit market for the equivalent of 50 US dollars.

Encouraged by this achievement other households in his village also constructed compost toilets and are on the way to produce value compost for their gardens.

Mr. Eruwa remarked that the cost of constructing his compost toilet was by far cheaper than hiring someone to dig a pit and then buy a Sanplat in town for 20 dollars and then he would have had to dig another pit when that one got full because of no vacuum tankers being available.

What can we learn from this true story?

- Small scale farmers in South Sudan are willing to build compost toilets once the benefits are explained to them.
- Treating human waste as a resource and not as something to be got rid of can be a reality
- It is cheaper to build a communal compost toilet than a conventional pit latrine
- The compost toilet is more sustainable because there is no pit to fill up
- There is no smell or flies because the faeces are immediately covered by sawdust or ash

Session 4: OM&M of Pour-flush Latrine

Session Objectives

At the end of this session the participants should be able to:

- Understand how the pour-flush toilets work
- Understand the OM&M requirements of pour-flush toilets

Methodologies

- Facilitator Presentation
- Brainstorming/discussion
- Photos
- **Case story**

Material needed

- Flip Chart
- Marker
- Scotch tape

Time needed: 60 minutes

Activity 1: Brain storming, photo show and illustrated lecture

Instructions for the Activity

1. Brainstorm with the participants about their understanding pour-flush toilets and how it works as well as maintenance requirements
2. List down their responses on a flip chart and make the list complete by adding those missed
3. Make a presentation on a brief overview of pour-flush toilets and their parts (facilitator note)
4. Show photos of different pour-flush toilets used in Ethiopia
5. Ask participants if they have any question on the presentation
6. Summarize the session with main points

Facilitator Note for OM&M of school Pour-flush Latrines

Pour-flush latrines

Pour-flush latrines provide an improved option in terms of use, maintenance, and construction. They are a cross between a pit latrine and a septic tank or sewer. A small amount of water is used to flush excreta out of a collection pan, down a short pipe and into a pit. Pour-flush latrines use a pit for excreta disposal and have a special pan which is cast in the floor slab and provides a water seal of 20-30 millimeters. This ensures that smells cannot escape from the pit into the cubicle. However, their use in schools is limited due to lack of water supply.

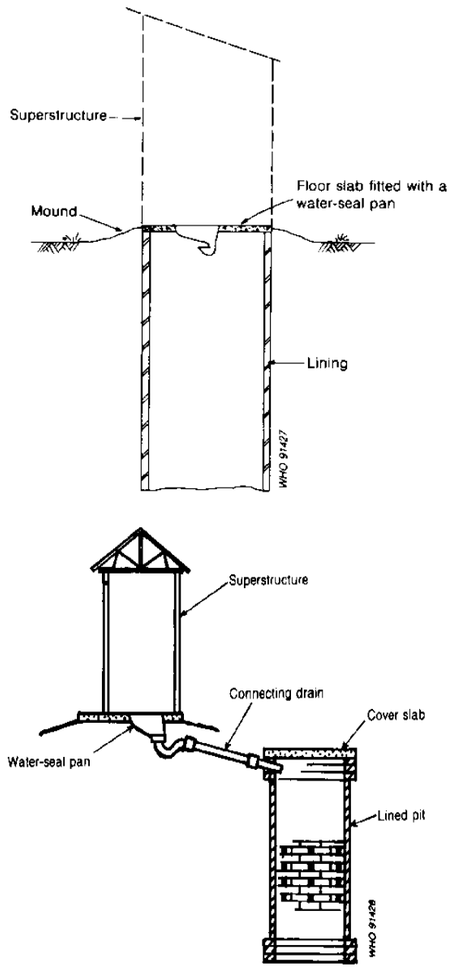




Figure 17: Diagram of a pour-flush latrine and an example with two pits

Operation and Maintenance

Important Note:

Regular follow-up and check-up on operation and maintenance of pour-flush latrines should be done by the school director, unit leaders and SWASH club members. The school management committee should allocate and mobilize funds from internal sources, school grants, and other external partners. The school administration/director need to hire mason and/or carpenter, as required, managing the operation and maintenance of the latrines. When the pit is full, the Woreda/town education office and school director shall communicate with the Woreda or town water and sewerage utility office to arrange a vacuum truck to suck out the sludge and transport to a proper disposal site.

Because there are no mechanical parts, pour-flush toilets are quite robust and rarely require repair.

- Even though it is a water-based toilet, it should be cleaned regularly to maintain hygiene and prevent the buildup of stains.
- To reduce water requirements for flushing and to prevent clogging, it is recommended that dry anal cleansing materials and sanitary pads be disposed of separately in a nearby bin and not flushed down the toilet.
- Pour one to three liters of water after each use to flush the excreta
- In cistern (small tank) flush toilets, water is stored in the cistern above the toilet bowl and is released by pulling a rope attached to the cistern.
- Alternatively, water can be poured in manually using a small bucket or jug (pour-flush toilet).

Daily

- Ensure availability of water for flushing
- Monitor proper use by all users
- Ensure daily cleaning takes place
- Ensure emptying of sanitary bucket daily to burnt in an incinerator
- Check the functionality of the water trap

Weekly

- Thorough cleaning inside and outside

Undetermined period when the pit or pits get full

- Empty pit using vacuum tanker or manually exercising safety protocols
- Unblocking pipes
- Measures in case of high floods

CASE STORY: Clean but smelly toilet

Goro Primary School is one the schools found in Lemi Kura sub city of Addis Ababa. The school has well-constructed pour-flush latrines. The school has cleaners that clean the toilet every morning. The SWASH club focal person always checks the cleaning of the toilet before class. It was neat and clean but smells. He called the cleaners to clean the toilet again using disinfectant. The problem seems solved for the time being, however, the smell continued after a few minutes.

What are the possible causes of the smell?

- The pipe installation of the toilet may not be correct, and the S-trap may not be installed.
- The S-trap may be broken and not maintained. The S-trap allows water to accumulate, forming a physical barrier that stops toilet gases and odors from wafting into the toilet.
- The vent pipe may be cracked thus not drawing bad odours out of the pit as intended.
- The pit might be nearly full of smelly faeces

Session 5: OM&M of Urinals

Session Objectives

At the end of this session the participants should be able to: -

- Understand how the urinals function
- Understand the operation and maintenance requirements of urinals

Methodologies

- Facilitator presentation
- Brainstorming/discussion
- Photos
- Case story

Material needed

- Flip chart
- Marker
- Scotch tape

Time needed: 30 minutes

Activity 1: Brain storming, photo show and illustrated lecture

Instructions to the Facilitator

1. Brainstorm with the participants about their understanding of urinals and how they work as well as maintenance requirements
2. List down their responses on a flip chart and make the list complete by adding those missed
3. Make a presentation on a brief overview of urinals (facilitator note)
4. Show photos of different urinals used in Ethiopia
5. Ask participants if they have any question on the presentation
6. Summarize the session with main points

Facilitator Note for OM&M of school urinals

Urinals

Urinals are a channel or surface mounted receptacle that receives urine. It can be a good solution for schools to avoid long queues for the toilet and stops the pit from filling up quickly. Also, less urine in the pit means that the faeces decompose quicker because urine being high in nitrogen preserves the solid matter rather than helping to break it down. However, they should be well operated to avoid smell that discourages use.

Urinals for girls

The COWASH/Ministry of Education latrine design includes urinals for girls but there are no dividing walls for privacy. So, girl's urinals should have dividing walls otherwise girls may not use them.





Figure 18: Girls urinal with dividing walls for privacy and a boys urinal

Operation and maintenance of urinals

Urinals do not have mechanical parts and their operation and maintenance is relatively straightforward. The following operation and maintenance are needed:

- Use the channel properly and avoid splashing
- Always pour water after use
- Check the pipes that are connected to the soak away pit and maintain if there are leaks.

Daily

- Ensure water is available for flushing. Pour not more than half a liter of water in the urinal after each use.
- The urinal needs to be cleaned twice a day with minimum water and detergent.
- Ensure the pipe to the soak away pit is not blocked.

Weekly

- The urinal and its surroundings should be thoroughly cleaned.
- Spider cobwebs and strain waste should be removed.
- Spread detergent or bleaching powder on the surfaces of the urinal (some more than the daily amount).

Undetermined period

- When the urinal does not drain properly anymore, then it is most likely that the drain has become blocked.
- Remove the sieve over the drainpipe and put a flexible thin bamboo stick to push the blockage through. This can also be done from the soak away end.

The school director, unit leaders, SWASH club members and gender clubs etc. should carry out regular inspections and assessments to identify which hygiene facilities (hand washing and MHM) are working well or not. The status of the facilities should be presented to school management committee in order to take immediate remedial action on the non-functional/damaged facilities. Based on the findings, the school management committee shall allocate and mobilize funds from internal income, school grants, and other external partners either private or non-governmental organizations. Based on the budget availability, the school administration/director needs to hire a mason and/or carpenter or other relevant personnel for operation and maintenance of the hygiene facilities.

Alternatively, when there is a budget deficit, the director should notify the Woreda education office to notify the regional Bureau of Education about the type of the hygiene facilities that are non-functional and requires immediate maintenance so that the Bureau of Education will mobilize domestic or external resources to alleviate the problem.

CASE STORY: Tambora Woreda, SNNP Region

Under COWASH, Tambora Woreda Education office selected Madula Comprehensive School to get new school latrines in 2020. So, a new boy's latrine and a new girl's latrine were constructed by a local contractor. At the girl's latrine the four cubicles are well constructed and were being used when a COWASH team visited in June 2022. However, the girl's urinal looked like it had never been used. When some of the girls were asked why they don't use the urinal they replied that there is no privacy because there are no dividing walls. So, they chose to use the cubicles over the pit to urinate like the other 500 girls attending that school. Over the course of one academic year one can imagine how much urine has entered the pit that should have been diverted into a soakaway pit behind the latrine had they used the urinal.

What consequences do you think this will have on the girl's toilet?

- The pit will fill up quickly as large amounts of urine are going into the pit.
- The urine entering the pit acts like a preservative on the fecal matter so that it does not break down as fast as it would have there been only small amount of urine entering the pit.
- The investment cost in constructing the girl's urinal has been wasted as none of the 500 girl students is using the urinal.

Solution: Revise the girl's latrine design by adding one meter high HCB dividing walls as shown in the photograph in Figure 18 above.

MODULE VII: OPERATION, MAINTENANCE AND MANAGEMENT OF SCHOOL HYGIENE FACILITIES

Session 1: OM&M of Hand Washing Facilities

Session Objectives

At the end of this session the participants should be able to:

- Understand the importance of hand washing with soap and the types of hand washing facilities
- Understand the OM&M requirements of hand washing facilities

Methodologies

- Facilitator Presentation
- Brainstorming/discussion
- Photos

Material needed

- Flip Chart
- Marker
- Scotch tape

Time needed: 45 minutes

Activity 1: Brain storming, photo show and illustrated lecture

Instructions for the Activity

1. Brainstorm with the participants about the importance of hand washing and types of hand washing facilities available in schools as well as maintenance requirements
2. List down their responses on a flip chart and make the list complete by adding those missed
3. Make a presentation on a brief overview of hand washing facilities (facilitator note)
4. Show photos of different hand washing facilities used in Ethiopia
5. Ask participants if they have any question on the presentation
6. Summarize the session with main points

Facilitator Note for OM&M of school hand washing facilities

Hand washing facilities

A hand washing facility is a basin with a container or tap on a pipeline with an adequate supply of water and soap or sanitizer for hand washing. Schools can access water for hand washing by connecting to a piped water supply line, roof water harvesting or paying for water to be transported manually and filling the water tanks placed for this purpose. The hands of school children often encounter a lot of dirty substances during the school day, particularly after using school latrines. Proper hand washing with soap is essential to stop fecal-oral contamination and prevent the spread of diseases to improve children's health.

Schools must provide hand washing with soap as it will boost attendance and is an essential component of healthy schools. The facilities should be available near the toilets, near the MHM facility and near school feeding centers to help staff and students practice good hand hygiene. The habit will become a lifelong practice that will impact students' and staffs' families in the school catchment area. There are numerous types of hand washing facilities in schools. Therefore, their OM&M depends on the type of hand washing facilities used.

Proper hand washing technique is important when it comes to effective hand hygiene. Washing hands with water only is a waste of time and water because it does not remove germs from the skin. It is the use of soap which removes germs. Many disease-causing micro-organisms can be spread with our hands if we don't wash them properly with soap.

Operation and maintenance of Hand Washing Facilities

- Hand washing facilities should be regularly inspected and cleaned to ensure they remain in good working condition
- Hand hygiene facilities should not be used for any other purpose
- Make sure that water is always available. It should be filled every day before school time if the water supply is not connected to a pipe. Water can be filled by guards, students, or cleaners as to the context of the school. The school administration should develop a roster of students who are responsible for making sure that the container always has water and soap available.
- The school administration should provide a budget for buying of soap so that soap is always available at hand washing places
- Check availability of soap or sanitiser.
- Instruct students on proper hand washing techniques.
- If water is provided with a container, the inside must be cleaned daily and disinfected weekly.
- Taps must be repaired immediately, especially when leakages appear.
- Post hand washing guidelines at each facility to promote proper hand washing practices.
- Ensure drains and drainage pipes are clean and functional.
- Check urinals for a bad smell; and clean with disinfectant.

Session 2: OM&M of Menstrual Hygiene Management Facilities

Session Objectives

At the end of this session the participants should be able to:

- Understand the importance of menstrual hygiene and types of MHM facilities
- Understand the OM&M requirements of MHM facilities

Methodologies

- Facilitator Presentation
- Brainstorming/discussion
- Case Stories

Material needed

- *Flip Chart*
- *Marker*
- *Scotch tape*

Time needed: 60 minutes

Activity 1: Brain Storming, and illustrated lecture

Instructions to the Activity

1. Brainstorm with the participants about the importance of MHM and types of facilities available in schools
2. Ask the experience of participants on the challenges of MHM
3. List down their responses on a flip chart and make the list complete by adding those missed
4. Make a presentation on a brief overview of MHM facilities and their maintenance. (Facilitators note)
5. Ask participants if they have any question on the presentation
6. Summarize the session with main points

Facilitator Note for OM&M of School Menstrual Hygiene Management Facilities

Menstrual Hygiene Management

MHM refers to the way in which women and girls deal with their menstruation. Adequate MHM is defined as "women and adolescent girls have awareness on menstrual hygiene, have access to water, sanitation and hygiene facilities that ensure privacy, sanitary pads and having access to facilities to dispose of used sanitary pads as well as resting rooms."

In schools, these facilities include sanitary pad disposal box at latrines, separate dedicated room or a separate building having four rooms:(i) a counseling room, (ii) a waiting room with space to accommodate a seat for three school girls, (iii) a resting room equipped with a resting bed and mattress for girls who are suffering from menstrual cramps, and (iv) a wash room with a washing basin for washing pads and clothes, elevated water storage container with a shower.



Figure 19: Plan view of a school MHM facility



Figure 20: School MHM facility with sanitary pad disposal box and rainwater tank

Different materials are used as menstrual hygiene materials, and some are as shown below.



Figure 21: Different menstrual hygiene materials











Figure 22: School latrine with hand washing facilities

Operation and Maintenance of Menstrual Hygiene Management of Facilities

- Ensure availability of resting room with mattress and pain killers with instructions
- Ensure availability of emergency sanitary pads in the MHM room
- Ensure availability of water in the room and functionality of the shower.
- Make available closed bucket/ structure for disposal of used sanitary napkins/ pads
- Check the rooms are always safe and dependable/ doors being lockable from the inside.
- Check that the sanitary pads are incinerated at the safe side of the school compound.
- Ensure the used sanitary pads are collected from the collection box in the MHM room and latrine facility and burnt.
- Ensure the cleaners are frequently checking to ensure that they are collecting and taking the used sanitary pads from the collection box to the incinerator.
- Ensure the cleanliness of menstruation rooms
- Assign at least two responsible female teachers, if available, to run the MHM facilities
- Empower the SWASH/ Girls' club so that they can manage menstruation by themselves
- Ensure availability of proper store keeping so that supplies are not out of stock in uncontrolled manner

MODULE VIII: OPERATION, MAINTENANCE, AND MANAGEMENT OF SCHOOL SOLID WASTE MANAGEMENT FACILITIES

Session 1: OM&M of Incinerators

Session Objectives

At the end of this session the participants should be able to: -

- Understand the importance of incinerators and other types of solid waste facilities
- Understand the OM&M requirements of incinerators

Methodologies

- Facilitator Presentation
- Brainstorming/discussion
- Photos

Material needed

- Flip Chart
- Marker
- Scotch tape

Time needed: 45 minutes

Activity 1: Brain Storming, Photo Show, and Illustrated Lecture

Instructions to the Activity

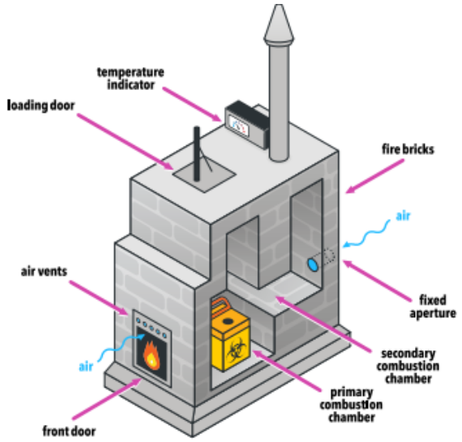
1. Brainstorm with the participants about the importance of incinerators in schools and the maintenance required
2. List down their responses on a flip chart and make the list complete by adding those missed
3. Make a presentation on a brief overview of incinerators (facilitator note)
4. Show photos of incinerators available in schools and their components
5. Ask participants if they have any question on the presentation
6. Summarize the session with main points

Facilitator Note for OM&M of school Incinerators

In schools, solid waste is commonly collected and disposed of using incinerators and pits. Properly handling solid waste in schools not only maintains the health of students, but also keeps the aesthetic value of the school compound and if not managed properly, it has the potential to contaminate the environment of the school and beyond.

An incinerator is a facility used to burn solid waste until it is reduced to ash. Incineration is a waste treatment process involving the burning of organic substances that are contained in waste. They can be made from a metal barrel, bricks, or concrete rings. The COWASH/ MoE Design and Construction Manual have a design for a school incinerator.

Incinerators generally have the following: lower fire chamber, metallic tray for ash collection, a middle chamber with gate for stacking waste materials and vertical pipe for exhaust of smoke and gas.





Kalcha school water point and incinerator



Figure 23: Different options for a school incinerator

Operation and Maintenance of Incinerators

- When burning waste, a trained operator must be in attendance. Operator safety needs to be maintained through correct training and provision of safety equipment like gloves.
- Proper operation is critical to achieving the desired combustion conditions and emissions. There needs to be appropriate start-up and cool-down procedures, maintenance of a minimum temperature, use of appropriate loading/charging rates (both fuel and waste), and proper disposal of ash.
- Place the grate/tray back in the incinerator.
- Place firewood or other material in the incinerator.
- Light the wood or other material.
- After 5 minutes of a steady burn, add more waste material.
- Dispose of ash from the incinerator in an ash pit
- Daily
- Proper transportation and disposal of waste in the incinerator (zero waste spillage en-route to and in the vicinity of the incinerator)
- Monitor the proper combustion of waste materials inside the incinerator (if there is remaining un-burnt waste, burn it again until all waste is turned to ash)
- Proper collection and disposal of the ash from the incinerator to a solid waste disposal pit.
- Carefully sweep the area around the incinerator.
- Monitor the proper functioning of all parts of the incinerator (cover, chimney, grate and ash collection chamber)

Weekly

- Remove lumps of melted glass/ plastics and clean grates.
- Properly reinstall the grates after cleaning.
- Maintain good housekeeping of the waste disposal site.

Monthly

- Clean the chimney and remove the soot.
- Ensure the fence of the site is intact.
- Check the external brickwork/ barrel/concrete ring for evidence of thermal damage.
- Check the cement seal to brickwork.
- Check the ash door for corrosion.
- Check the ash door for damaged hinges.
- Check the ash door for latch blockage in the doorframe.
- Take an inventory of condition of tools and equipment.
- Inspect the entire structure of the incinerator (cover, wall, chimney etc.)
- Perform small repairs such as lining the cracks on the wall, cover, and damaged chimney

Annually

- Inspect and replace metal parts, and damaged bricks
- Inspect pointing of brickwork and call a mason to repair if necessary.
- Check the status of the ash pit.
- Make planned and well financed maintenance of the entire structure of the incinerator

Important Note:

The school director, unit leaders, environmental and SWASH club members should work together to provide proper school solid waste management and keep the cleanliness of the school compound. The school administration needs to work with the municipality or other entities that are responsible for safe management of solid waste. The school management committee shall allocate and mobilize funds from internal income, school grants, and other external partners either private or NGOs. The school administration/director needs to hire an experienced mason or other relevant person for O&M of solid waste management facilities. Relevant school club members, school administrations and cleaners are responsible for day-to-day operation of the solid waste management facilities

Session 2: OM&M of Waste Collection and Disposal Facilities

Session Objectives

At the end of this session the participants should be able to: -

- Understand the importance of integrated solid waste management and types of waste generated in schools
- Understand the OM&M of solid waste management facilities

Methodologies

- Facilitator Presentation
- Brainstorming/discussion

Material needed

- Flip Chart
- Marker
- Scotch tape

Time needed: 45 minutes

Activity 1: Brain storming, case stories and illustrated lecture

Instructions for the Activity

1. Brainstorm with the participants about the importance of integrated solid waste management and types of wastes generated in schools as well as maintenance requirements of facilities
2. List down their responses on a flip chart and make the list complete by adding those missed
3. Make a presentation on a brief overview of integrated solid waste management (see facilitator note)
4. Display photos of integrated solid waste management
5. Ask participants if they have any question on the presentation
6. Summarize the session with main points

Facilitator Note for OM&M of solid waste collection materials and disposal facilities

Solid waste – any discarded solid, semi-solid, liquid, or plastic materials which have been deposited in the solid waste pit.





Figure 24: Lack of solid waste handling at a school and a SW pit

OM&M of solid waste collection materials and disposal facilities

- Students should be told to dispose of waste materials in the bins or waste pits on the school premises.
- The school administration should prepare a roster of students who are responsible for emptying bins into the waste pit or incinerator and burning it.
- Separating, reducing, reusing, recycling, and composting are good options for managing school waste in a sustainable way.
- Separate bins may be provided for organics, paper, and plastics so that they can be disposed of in different ways.
- Paper and plastics can be sent for recycling especially from the Kuralyo's (boys who collect rubbish) who collect different reusable or recyclable materials and dispose of it outside the town.
- Where composting of organic waste (especially at schools that have a feeding service for students) is carried out, it should be done under strict supervision of a teacher who has the technical know-how. These wastes pose increasing disposal and potentially severe pollution problems. Waste management options include disposal to covered pits to avoid bad smells. The pits need to be shallow (<1.5m) and fenced to avoid risk to children.
- All bins and surrounding areas, especially bins for organic waste shall be kept clean and well-attached to posts or buildings to prevent theft.

The solid waste generated in schools consists of used sanitary pads and rags, paper, dust, animal shit, food waste, leaves, wooden items, metal scraps, cans, plastic bags and bottles, glass bottles, and old batteries. There is a need for a trained cleaner to collect the solid waste and segregate it into non-hazardous and hazardous waste.

The solid waste can be managed by:

- On-site collection - waste bins made of metal sheet, plastic, local material (bamboo)
- Transport – wheelbarrow, manually carried by barrel to disposal site
- Treatment – burn using an incinerator. If not well-suited to burn using an incinerator, burn in a solid waste disposal pit.
- Hazardous waste that cannot be burnt e.g. needles and razor blades; broken glass should be buried in a pit and covered with soil.
- Solid waste disposal pits should be properly fenced with a proper hinged, lockable gate.
- The solid waste disposal pit should be checked regularly and emptied by kuralyo when full.
- Organic waste like leaves and toilet paper can be composted in a purpose-built compost pit or cage and used on the school garden when converted to soil-like material.

MODULE IX: EQUITY AND INCLUSION

Session 1: Basic Concepts of Equity and Inclusion

Session Objectives

At the end of this session the participants should be able to:

- Understand the basic concepts of equity and inclusion
- Understand the barriers for inclusion

Methodologies

- Facilitator Presentation
- Brainstorming/discussion
- Photo show

Material needed

- Flip Chart
- Marker
- Scotch tape

Time needed: 60 minutes

Activity 1: Brain storming, photo show and illustrated lecture

Instructions to the Activity

1. Brainstorm with the participants about their understanding about equity and inclusion in SWASH.
2. Ask the participants about the barriers of equity and inclusion available in their school.
3. List down their responses on a flip chart and make the list complete by adding those missed
4. Make a presentation on a brief overview of equity and inclusion (facilitator note)
5. Display photos of different barriers
6. Ask participants if they have any question on the presentation
7. Summarize the session with main points

Facilitator Note on equity and inclusion in WASH

Equity and inclusion

Everyone has the right to access WASH including those that are particularly poor and marginalized and those who have a disability, without discrimination.

Equity involves recognizing that people are different and need different support and resources to ensure their rights are realized. To ensure fairness, measures must often be taken to compensate for specific discrimination and disadvantages.

Inclusion is the process of ensuring that all are able to participate fully.

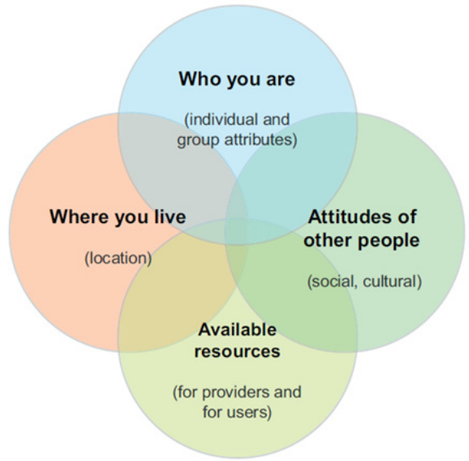


Figure 25: The Circle of Inclusion[1]*

The overlapping circles indicate that there may be more than one reason for exclusion of any individual or group.

Barriers to inclusion in WASH

A barrier to inclusion is anything that prevents or hinders accessibility or the full participation of persons with disabilities and other marginalized persons from WASH facilities and WASH activities.

There are several barriers that result in the exclusion and hinder the participation of persons with disabilities and other marginalized persons from WASH initiatives.

1 Water Aid, Open WASH: Count me in! Inclusive WASH in Ethiopia

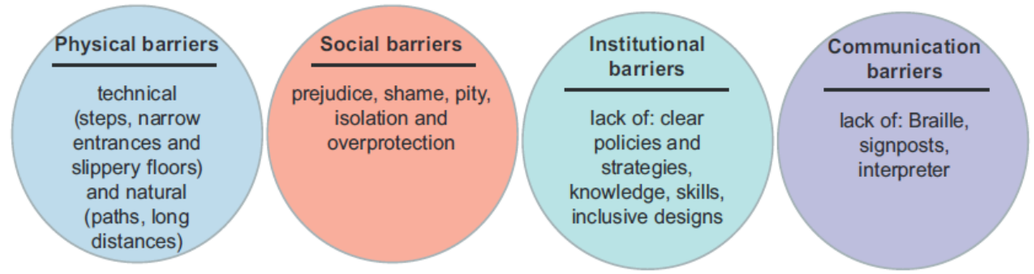


Figure 26: Barriers to inclusion in WASH

Physical barriers - can be natural (uneven, rough, or steep paths on muddy ground and long distances that often need to be walked to reach a water source or latrine) or technical (slippery floors and steps are created by poor, non-inclusive design, and construction).

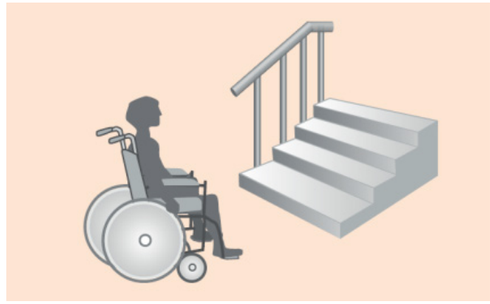


Figure 27: An example of a physical barrier

Social barriers- social and attitudinal barriers of shame, fear, prejudice against disabled people and the mistaken belief that disability is a curse cause the greatest problems for exclusion of people from WASH services.

Institutional barriers- refer to policies, programmes and directives that do not include clear statements about inclusion and how it should be achieved. It can also mean a lack of enforcing mechanisms where these statements do exist but are not implemented, for example, there are many public buildings without ramp access even though this is required by legislation.

Communication barriers- These barriers vary with different types of impairment. For example, visually impaired people need non-visual resources to receive information such as listening to audio recordings or, if they are able to, reading from Braille. They face a communication barrier if these alternatives are not available

Addressing them requires better recognition and understanding of the different needs of individuals and groups; identifying and tackling the root causes of exclusion; promoting and supporting their inclusion in decision-making processes; and identifying and implementing appropriate and sustainable solutions

Inclusive WASH facilities

Inclusive WASH facilities are safe, accessible, and usable by everyone in the community. The design of inclusive WASH facilities should consider the following:

- Availability of a wide, even path to a water point or latrine which is regularly cleaned and maintained
- Avoid steps and use a gentle sloping ramp
- Availability of a sufficient number of taps installed at different heights
- A wide door that can be opened and closed easily by someone in a wheelchair.
- Availability of enough space inside the latrine for wheelchair users or someone who uses crutches or someone who needs help from a care giver
- Handrails at the sides of the toilet and possibly other supporting devices.
- A raised seat for those who cannot squat
- Access to hand washing facilities with a water supply and soap at a convenient height.

Operation and maintenance of inclusive WASH facilities

Although the operation and maintenance of inclusive WASH facilities are the same as the overall SWASH facilities. They need:

- Frequent cleaning of the SWASH facilities
- Regular maintenance of the cubicle for disabled people
- Avoid locking doors and check the door is functioning to ensure privacy
- Regularly check if there are cracks in the ramp and maintain it properly
- Regularly check the firmness of the handrail and maintain it immediately. Loose handrails are dangerous.

- The entrance of the facilities should be maintained to make it accessible for everyone.



Figure 28: Inaccessible toilet for people with disabilities

- Lack of ramp, handrail and raised entrance
- Unclean latrine is more dangerous for people with disability than others



Figure 29: Raised hand pump presents challenges to PWD Figure 30: Inaccessible to small children

Session 2: Mainstreaming Equity and Inclusion

Session Objectives

At the end of this session the participants should be able to:

- Understand the importance of mainstreaming equity and inclusion
- Understand the steps to mainstream equitable and inclusive WASH

Methodologies

- Facilitator Presentation
- Brainstorming/discussion

Material needed

- Flip Chart
- Marker
- Scotch tape

Time needed: 45 minutes

Activity 1: Brainstorming and illustrated lecture

Instructions for the Activity

1. Brainstorm with the participants their understanding of mainstreaming equity and inclusion
2. List down their responses on a flip chart and make the list complete by adding those missed
3. Make a presentation on a brief overview of mainstreaming equity and inclusion in WASH (see facilitator note)
4. Ask participants if they have any question on the presentation
5. Summarize the session with main points

Facilitator Note: Mainstreaming equity and inclusion

Mainstreaming of equity and inclusion is a strategy for making the needs and experiences of poor, marginalized and disabled people an integral part of the design, implementation, monitoring and evaluation of a policy, project, or programme in all areas at all levels in all political, economic, and social spheres so that all human beings benefit equally, and inequality is not perpetuated. Equity and inclusion mainstreaming is not about adding a specific "component" to a project but including poor and marginalized people and their needs and experience as a normal part of project planning and implementation.

Equity and inclusion should be addressed at multiple levels. The policy level issues are addressed by the Ministry of Education or other concerned institutions, but operational issues can be addressed by schools themselves.

1. Equity and inclusion at policy level- Policy is the starting point for equity and inclusion mainstreaming, as this is when a government demonstrates its commitment to redress inequality and adopt a rights-based approach. A policy articulates goals and what must be done to achieve them. The policy in turn, forms the documented basis for strategy development and resource allocation.
2. Equity and inclusion at operation level- The operational level is one of the most important interfaces for equity and inclusion in WASH, because decisions made here shape engagement with students. Schools need to adopt institutional policies and strategies that address equity and inclusion at two levels: internal school policies, and how those policies are implemented at a practical level in schools.
3. Equity and inclusion in monitoring and evaluation - A central component of effective equity and inclusion mainstreaming is a monitoring system to record, analyze and document input, output, and implementation by the use of impact indicators of equity and inclusion. When data is disaggregated, it is possible to assess the positive or negative impacts of a program on poor and marginalized students and school administrations can make informed decisions on making SWASH facilities more accessible going forward.
4. Equity and inclusion at student level is a critical element of ensuring access to SWASH services that are used and valued by all students. This equates to the ability to tap into, and strategically channel the voices of excluded students. Poor and marginalized students and school communities often lack the necessary experience, tools and opportunities to ensure that they are heard and that their voices are acted on.
5. Schools have been slow to create channels for effective engagement and receive input to shape their programs or services. Tools that help increase the ability of poor, marginalized and disabled people to exercise their rights and responsibilities are useful for empowerment and in highlighting and redressing equity and inclusion issues during key phases of the project cycle.

MODULE X: CROSS-CUTTING ISSUES IN OPERATION, MAINTENANCE AND MANAGEMENT OF SWASH FACILITIES

Session 1: Health and Safety

Session Objectives

At the end of this session the participants should be able to:

- Understand the importance of health and safety in schools
- Understand the measures to be taken to ensure health and safety at schools

Methodologies

- Facilitator Presentation
- Brainstorming/discussion

Material needed

- Flip Chart
- Marker
- Scotch tape

Time needed: 45 minutes

Activity 1: Brainstorming and illustrated lecture

Instructions for the Activity

1. Brainstorm with the participants about the importance of health and safety in schools and the measures to be taken to ensure health and safety in schools
2. List down their responses on a flip chart and make the list complete by adding those missed
3. Make a presentation on a brief overview of health and safety (facilitator note)
4. Ask participants if they have any question on the presentation
5. Summarize the session with main points

Facilitator note on school health and safety

Health and safety

Health and safety are an important consideration for schools as they have a responsibility to protect students from harm. There are a variety of health and safety risks in schools, all of which must be considered. For example, a student may need a tetanus injection if the injury has broken the skin and the students' tetanus vaccinations are not up to date. Tetanus is a serious condition that can be fatal if untreated. The bacteria that can cause tetanus can enter your body through a wound or cut skin. Other risks and their measures include:

- **Slips, trips, and falls** – ensuring that corridors and walkways are clear, and uneven areas of floor or ground are highlighted and then made smooth.

For people with disability, the following should be assessed and the school administration must address these issues:

- What is the path to the latrine made of?
- How wide is it? Is it wide enough for all users including those with wheelchairs?
- Is the path clean and clear of debris such as fallen branches that could trip people up?
- Are slopes too steep for wheelchairs?
- Are there parts of the path which makes girls, boys or women feel unsafe? If so, what is the cause and what could be done about it?
- Is the entrance flat and wide enough for a wheelchair user to enter?
- At the latrine, is there a secure door? Is it easy to open? Does it open inwards or outwards? (should open outwards).
- Inside, is there a raised seat? Are there handrails for support? If yes, are they positioned appropriately? Are they at the right height? i.e. 50cm.
- Are the latrines clean (floors, walls, doors)?
- Do all groups of people feel safe when using the latrine? (Particularly adolescent girls, women, and children of different ages)
- Are there facilities for girls and women to dispose of used sanitary pads? And are there washing facilities for menstrual hygiene?
- Is water available for hand washing? Is there soap? Can water and soap be reached by someone sitting in a wheelchair? And by a small child?

Session 3: Planning and Budgeting for Operation, Maintenance, and Management

Session Objectives

At the end of this session the participants should be able to: -

- Understand the importance of planning and budgeting
- Develop a plan and budget for SWASH facilities OM&M

Methodologies

- Facilitator Presentation
- Brainstorming/discussion
- Group exercise

Material needed

- Flip Chart
- Marker
- Scotch tape

Time needed: 90 minutes

Activity 1: Brain storming, group exercise and illustrated lecture

Instructions for the Activity

1. Divide the participants into groups and instruct them to perform group exercise on school planning and budgeting of OM&M of SWASH facilities. The main points to be recorded by a rapporteur.
2. Ask some groups to present their discussion results and open the debate for larger group discussion
3. Make a presentation on a brief overview of planning and budgeting (see facilitator note)
4. Ask participants if they have any question on the presentation
5. Summarize the session with main points

Facilitator Note on SWASH facilities OM & M planning and budgeting

Planning and budgeting

An essential component of an effective SWASH program is a well-conceived and budgeted school facilities operation and maintenance plan. Unless facilities OM&M planning is a component of a greater organizational management plan, it is doomed to failure.

"Planning" is the formulation of a strategy for getting an organization from the here and now to the future. As circumstances change over time, strategies for achieving tomorrow's successes often change as well. Good school administrators are always mindful of the need to review, and even revise plans and budgets to meet the changing needs of the school and its environment.

Planning and budgeting for SWASH facility OM&M is challenging because most schools lack resources.

Budgetary planning is the process of constructing a budget and then utilizing it to control the operations of a business. The purpose of budgetary planning is to mitigate the risk that schools' expenses will exceed their income. The first step in budgetary planning is to draw up a budget.

The importance of understanding the costs associated with SWASH facility OM&M are crucial. However, costing is dependent on a range of factors such as site conditions, costs, spare parts, and their availability. The school administration must therefore estimate the annual costs involved in maintaining their latrines, water supplies and waste disposal systems and then calculate their annual income from various sources like school fees and grants from local authorities or NGOs or contributions from the PTA. If there is a shortfall between costs and income, then other forms of income have to be explored and actions taken to bring in more income.

Developing a SWASH facility OM&M plan requires:

- Involving all stakeholders in the planning/budgeting process
- Identifying needs. This should include the estimation of resources needed for OM&M of SWASH facilities
- Establishing priorities and targets for the year
- Collecting and using supporting data to inform decision-making
- Sharing the plan with important stakeholders to get their support/ buy in.
- Allocating funds to pay for planned activities

- Allocating funds to pay for unplanned activities
- Training staff (cleaners, water system operators, and hand pump caretakers) to implement planned activities
- Implementing and then monitoring the plan
- Evaluating the plan systematically after six months and making adjustments to the plan.
- Refining efforts based on evaluation findings
- Reviewing and revising the plan/ budget periodically because plans/ budgets need to be flexible and adaptable

Possible sources of finance for SWASH facilities OM&M

SWASH facility OM&M can be financed from different sources depending on the context of schools. The following sources can be assessed or used.

Public finance- as WASH is often viewed as a human right, the option for government to fund all aspects of SWASH OM&M is very crucial. However, experience shows that the priority given to OM&M of SWASH is very low. Therefore, schools are advised to lobby the local Woreda Education Office and to persuade the WEO to approach the focal person in the Regional Education Bureau to allocate more budgets for maintenance of SWASH facilities.

Donor/project- Donor funding is a source of funding for operation and maintenance of SWASH facilities which is more related to specific projects. Although traditionally responsible for constructing SWASH facilities, there are some donors who assume the responsibility of OM&M and its associated costs. To get budget support from a donor/NGO, a proposal should be written to assist in maintaining SWASH facilities.

School internal income- these are untapped resources which can be used for OM&M if the right guide and controls are in place. For example, most schools in rural areas have land for renting and schools in urban areas also rent some shops and rent out the schools themselves for private events at weekends.

School fees- parents of students can contribute money either monthly or at the beginning of the school year towards the OM&M of school latrines and water points. This can be determined by discussing with parents and students themselves.

Mobilizing of resources from volunteers- It is good to be creative in fund raising and explore all the opportunities. Schools can raise funds from different sources such as asking parents to contribute, requesting local businesses to donate supplies such as soap, cleaning materials, mobilizing previous students at the school to provide support etc.

School Improvement Program (SIP) - SIP is a national program, developed by the Ministry of Education in 1999, to improve student results in primary and secondary schools. Domain 2 which deals with the learning environment has a provision in Element 2 about student facilities which includes provision of sufficient number of toilets for teachers, girl and boy students; clean and safe water for drinking and hand washing; soap and water at all toilets; hygiene education for all students; daily cleaning of toilets; good management and maintenance of water and sanitation facilities. Thus, with this provision, it is possible to fund the budget for OM&M of SWASH facilities through the SIP budget allocated for each school.

The following items should be budgeted

1. Hand pump maintenance (spare parts and service contract with a local artisan)
2. Cistern maintenance (ablution blocks)
3. Padlocks for steel gates/doors on toilets
4. Toilet paper rolls (can be contributed by pupils)
5. Cleaning materials (brush, mop, bucket, gloves, boots, detergent and disinfectant)
6. Emergency sanitary menstrual pads and pain killers
7. Soap (can be contributed by pupils)
8. Replacement taps and washers
9. Monthly payment for School cleaners
10. Water quality tests and chlorination
11. Maintenance personnel costs e.g. mason to repair latrine superstructure
12. Replacement fly screen and wire for top of vent pipes

Session 4: Monitoring and evaluation

Session Objectives

At the end of this session the participants should be able to: -

- Understand the importance of monitoring and evaluation in SWASH operation and maintenance
- Able to use the monitoring checklist

Methodologies

- Facilitator Presentation
- Brainstorming/discussion
- Case story

Material needed

- Flip Chart
- Marker
- Scotch tape

Time needed: 30 minutes

Activity 1: Brain storming, case stories and illustrated lecture

Instructions for the Activity

1. Brainstorm with the participants about their understanding about M&E and their practices
2. List down their responses on a flip chart and make the list complete by adding those missed
3. Make a presentation on a brief overview of M&E (facilitator note)
4. Ask participants if they have any question on the presentation
5. Summarize the session with main points

Facilitator Note of SWASH facilities OM&M monitoring and evaluation

Monitoring and evaluation

Monitoring SWASH facilities and services involves checking the functionality, quality and improvement of WASH services and hygiene practices over time and identifying potential problems early to prepare action plans to improve service. A simple monitoring checklist completed periodically (every quarter or bi-annually) can help school principals, administrators, teachers, and SWASH club members track the ongoing quality and functionality of their SWASH systems. During monitoring, data (both qualitative and quantitative) is collected and reported both formally and informally. Monitoring and evaluation should be an integral component of any particular school since it helps in planning and budgeting.

Monitoring is a key factor of sustainable OM&M. However, it is seldom practiced in an efficient way, if at all. Monitoring is mostly practiced during the construction phase in order to control progress and expenditures, and rarely after the construction phase.

Key principles of monitoring:

- Monitoring should be based and planned on a solid knowledge of objectives and activities
- Information should be used (to solve a problem, answer a question, improve SWASH services, adapt activities)
- Schools need to develop SMART [2]indicators to use for regular monitoring based on a careful definition of indicators (they should really be adapted to SWASH facilities OM&M.)
- Monitoring information should be collected and acted upon at the lowest level possible e.g., Schools
- Monitoring should be focused and simple (limit number of indicators, length, and cost of data collection)
- Monitoring should combine measuring qualitative and quantitative indicators
- Monitoring should ensure checks and balances, (validity and reliability of information)
- Monitoring should become an in-built integrated activity of school administrations and not a separate activity

Steps in planning a monitoring system

- Identify key issues, concerns, questions or demands which will become the focus of monitoring
- Determine SMART indicators
- Determine strategies for collecting, analyzing, and reporting data
- Determine the use of the information and how action will be taken
- Determine information flow, checks and verification of information
- Test the monitoring system practically
- Develop a spreadsheet on the school computer to input, store and compare data
- Provide training or orientation to groups involved in the monitoring

2 Specific, Measurable, Achievable, Relevant, Time-bound

Case story

In order to design a project, consultants went to visit a school in Gebre Guracha, North Shewa Zone, Oromia Region. We went to the school with the town utility head and asked the school guard to show us the office of the director. But the director was not around, and we directly went to the school latrine and to assess the situation as well as to take photos. Coming back from the visit, we met with the director and asked him about the situation of the school latrine. He was confident to talk about the latrine. He mentioned that the latrine was constructed with the support of Menschen fur Menschen (German non-governmental organization) with good construction quality and had no problem. One of the visitors acknowledged the quality of the construction and asked him when the last time he visited the latrine was. He replied that he visited last week but the team insisted and probed him to tell the truth. Somewhat embarrassed, he told the team that he never visited the toilet after construction because he was busy, and the latrine was located far from his office. The team asked him to go together and see the situation of the toilet. When he saw the toilet, he was highly ashamed and embarrassed and asked excuse. Because the latrine was so filthy, had never been cleaned, the slabs were full of faeces, the water point was not functioning, and the students were using the hand washing facility for defecation.



Figure 30: Typical filthy toilet in a rural Ethiopian school

What do you learn from this? Possible answers

- The school director never considered it his responsibility to ensure that the school toilets are kept clean
- The school director did not think checking the condition of the toilets was important
- The school director does not pay much attention to sanitation and hygiene in his school
- The school cleaners are not doing what they are paid to do so should be given warning letters
- Daily monitoring is very crucial to ensure that latrines are kept clean
- The school supervisors have not included checking the latrines in their checklist
- Awareness creation about clean latrines and good hygiene practices in the school was weak
- The SWASH club is negligent
- The students think it is normal to use filthy toilets because they did not bring the filthy state of the toilets to the attention of the director

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ANNEXES

Annex 1- Daily SWASH and Operation checklist

School name:		
Head Teacher:		
Drinking water stations		
Tasks	Who is responsible?	Done
Morning fill-up		
Afternoon top-up		
Wash out and safely store		
Cleanliness check of water stations		
Check all taps are working		
Latrines		
Stock cleaning supplies		
Unlock toilets (if kept locked overnight)		
Clean slab with brush, water, and detergent		
Fill up water buckets for flushing (ablution blocks)		
Check walls for faeces, clean, and report to responsible person		
Girls WASHROOM		
Fill water tank (morning)		
Refill water tank (noon)		
Clean with brush, soap, and water		
Stock sanitary pads		
Hand Washing facilities		
Fill tippy taps, buckets, or tanks with water		
Refill tippy taps, buckets, or tanks with water		
Make sure each hand washing station has soap or ash available		
Check taps and tanks for breakage and report		

Annex 2- Monitoring checklist for SWASH facilities

Part 1- School Information

1.1. Region.....

1.2. Zone.....

1.3. Woreda..... Kebele.....

1.4. Name of school.....

1.5. School level- pre-primary, primary, secondary

1.6. Locality: rural..... urban.....

1.7. School type (day school/boarding school/other specify.....)

1.8. Student population (boys.....girls..... total.....)

1.9. Students with disabilities (boys..... girls..... total.....)

1.10. Teachers (male..... female..... total.....)

1.11. Teachers with disabilities (male..... female.....total.....)

1.12. School ownership (government/private/ missionary/religion/other specify .....)

Part 2- Water supply

1.1. What is the main source of water for the school? a) hand dug well with hand pump b) Shallow well (drilled borehole) with hand pump c) Borehole with motorized pump from generator d) BH with motorized pump from ELPA e) BH with solar powered pump f) Pipeline from town utility g) pipeline from a spring h) On spot spring in school compound i) rainwater harvesting system with storage tanks

1.2. In the previous two weeks, was drinking water from the main source available at the school throughout each school day? Yes No

1.3. Is drinking water from the main source typically available throughout the school year? Yes (always), Mostly (unavailable ≤ 30 days total), No (unavailable > 30 days total)

1.4. Is the water point accessible for disabled boys and girls? Yes No

1.5. Is drinking water accessible to the smallest children at the school? (Applicable for pre-school and primary) Yes No

1.6. How many drinking water taps/points/ hand pumps are at the school?

1.7. Are all the taps working? Yes/No

1.8. How many taps not working?

1.9. Why are the taps not working?

1.10. Are water points clean? Yes/No

1.11. Is there a caretaker to look after the water points/hand pump? Yes/No

1.12. Is the hand pump working? Yes/NO

1.13. If not, why not?

1.14. Does the hand pump caretaker have tools to do minor maintenance? Yes/No

1.15. Is the hand pump locked when the school is closed?

1.16. Does the water supply for drinking conform to the Ethiopian water quality requirements?

1.17. When was the last time the water was tested? a) Bacteriologically..... b) chemically.....)

1.18. What were the results?

1.19. What type of water treatment method does the school use to make it safe to drink? Filtration, Boiling, Chlorination, SODIS, Ultraviolet disinfection, Other, No treatment

1.20. Is the water supply facility functional? Yes, Partially, No

1.21. If not functional, what is wrong with it?

1.22. Is there an operation and maintenance plan?

1.23. Is the plan budgeted?

1.24. Is there a responsible body assigned for operation and maintenance?

1.25. Does the school pay a local utility for water?

1.26. Is the water meter working?

1.27. Are the gate valves working?

1.28. Are there leaks in the supply pipes?

Part 3- Sanitation facilities

1.1. Are there sanitation facilities? Yes No

1.2. If yes, what type of sanitation facilities? a) Basic pit latrine b) VIP3 latrine c) Compost latrine

1.3. Are the latrine blocks separated for girls and boys?

1.4. How many sexes segregated cubicles does the school have? Check with the national standard. A) Girls..... b) Boys.....c) Male teachers..... d) Female teachers

1.5. Are the latrines accessible to people with disability? Yes No

1.6. If no, what are they not accessible?

1.7. Is there a latrine for male and female teachers?

1.8. In the last previous two weeks, has the latrine provided service each day? Yes No

1.9. Is there an operation and maintenance plan?

1.10. Is the plan budgeted?

1.11. Is there a responsible person or persons assigned for operation and maintenance?

1.12. If not, why not?

1.13. Is the fly screen fixed with wire to the top of all vent pipes?

1.14. Are all vent pipes in good condition? Yes/No

1.15. If no, what is wrong with them?

1.16. Are the vent pipes painted black? Yes/No

1.17. Is toilet paper available in the cubicles?

1.18. If not what forms of anal cleansing are available?

1.19. What is the plan for emptying the latrines when they get full?

1.20. Is there a vacuum tanker available locally to empty the pits?

Part 4- Hand washing facilities

1.1. Is there a hand washing facility in the school? Yes No

1.2. Is it enough for all students? Yes No

1.3. Is water available for hand washing? Yes No

1.4. Is soap available at hand washing stations? Yes/No

1.5. If no, why not?

1.6. Are the hands washing facilities accessible to those with disability? Yes No

3 Ventilated Improved Pit

1.7. Does the school have a separate menstrual hygiene management room? Yes No

1.8. If no, is there a separate cubicle in the girl's latrine block for the use of menstruating girls? Yes/No

1.9. If there is a MHM building, does it have a reliable water supply? Yes/No

1.10. How many rooms does the MHM facility have?

1.11. Are there emergency sanitary pads available for adolescent girls? Yes No

1.12. Is there established and functional SWASH club? Yes No

1.13. If yes, how often does it meet?

1.14. What have the club members done in the last two weeks?

1.15. Is there an operation and maintenance plan?

1.16. Is the plan budgeted?

1.17. Is there a responsible body assigned for operation and maintenance?

Part 5 Solid Waste Disposal

1.1. What kind of SWD does the school have?

1.2. Does it work?

1.3. If not, why not?

1.4. Is there an incinerator?

1.5. Does it work?

1.6. If not, why not?

1.7. Is there someone responsible for SWD?

1.8. Is there a budget for SWD?

1.9. Does a kuralyo collect SW from the school regularly? Yes/No

1.10. If so, how often?

Annex 3- Tool to collect data on persons with disabilities

Instructions to the trainer:

1. Ask the participants to take a blank paper and explain that the health information given here is confidential and will not be forwarded to anyone. The information is anonymous so there is no need to write any names on the paper.
2. Ask the participants to write on the paper whether they are MALE or FEMALE without their names
3. Show and explain the questions on the next page to the participants.
4. Ask the participants to think about the questions.

   If they feel the answer to all of them is NO, they should write NO on the paper.

   If they feel the answer is YES to at least one of the questions, ask them to write YES on the paper. They should only answer YES if they have a lot of difficulties and if the problem is permanent and has lasted for some time already.
5. The paper should only read two words: 1) MALE or FEMALE 2) YES or NO
6. Collect the papers and count the numbers of YES and NO and disaggregate by sex for reporting purposes.
7. After collecting the data, explain to the participants that the purpose of the sheet is to determine how many of the training participants have some type of disability. If a participant has answered YES, the person is counted as having a disability.

Do you have any of the following permanent health problems:
A lot of difficulties seeing with one or both eyes, even with glasses? e.g. Have difficulties seeing and recognizing a familiar person until they come very close or have difficulties seeing and recognizing an object at arm's length or your vision in one eye is a lot worse than the other
A lot of difficulties hearing, even with a hearing aid? e.g. Have difficulties hearing someone talking on the other side of a room in a normal voice or yourhearing in one ear is a lot worse than the other
A lot of difficulties walking or climbing steps? e.g. Have difficulties moving around inside your home or going outside of your home or have difficulties walking long distances (1 km or more)
A lot of difficulties washing yourself fully or getting dressed by yourself?
A lot of difficulties in remembering so that it severely affects your daily activities? e.g. Have difficulties to remember to do important day-to-day things, difficulties going to familiar places, or difficulties remembering names of familiar people
A lot of difficulties in understanding or talking (speech or sign language) with others? e.g. difficulties in generally understanding what other people say or do others generally have difficulties understanding what you say
Do you use any assistive devices, e.g. crutches, wheelchair, artificial limb, someone's assistance
Do you have any other health problems e.g. epilepsy, leprosy, partial paralysis

Annex 4. Pre-test and Post-test questions

1. One of the following is not a principle of adult learning:

   A. Self- concept

   B. learning from experience

   C. External motivation

   D. Goal and relevance oriented.

2. Ensuring the availability of training materials, knowing the trainees in advance and logistics arrangement is the responsibility of the facilitator.

   A. True

   B. False

3. One of the following is not a feature of good training facilitation skill

   A. Active listening

   B. Provide positive feedback

   C. Considering trainee's personal concern

   D. Asking simple questions only

4. Which of the following factors can affect the sustainability of SWASH facilities

   A. Finance

   B. Environment

   C. Institution

   D. Technology

   E. Social

   F. All

5. Which of the following is not part of a preventive maintenance schedule in SWASH facilities OM&M?

   A. Inspect all bolt connections, nuts and screws for tightness

   B. Removing dust from a solar panel

   C. Replacing the handrails of the ramp

6. ----- refers to the day to day running and handling of SWASH facilities.

   A. Operation

   B. Management

   C. Maintenance

   D. All

7. Replacing of a disability toilet seat which was not correctly installed is an example of -------

   A. Preventive maintenance

   B. Corrective maintenance

   C. Emergency maintenance

   D. Periodic maintenance

8. Crisis maintenance is cheap compared to preventive maintenance

   A. True

   B. False

9. Which the following factors affect operation, maintenance, and management of SWASH facilities in Ethiopia

   A. Finance

   B. Ownership

   C. Capacity

   D. Institutional factors

   E. All

10. One of the following is not a disease caused by lack of adequate operation and maintenance with all water, sanitation, and hygiene facilities as a package

    A. Diarrhea

    B. Trachoma

    C. Scabies

    D. Schistosomiasis, also known as bilharzia

    E. None

11. One of the following may not be the possible cause of reduced water discharge in a well fitted with Afridev hand pump.

    A. Cup seal is worn

    B. Leaking of bobbins

    C. Leaking of cylinder

    D. Cup seal too tight

    E. Pump rods are disconnected

    F. None

12. Which one is the correct order when dismantling an Afridev hand pump for maintenance?

    A. Remove fulcrum pin & bearing bush from handle

    B. Remove the rod hanger pin and bearing bushes from the rod hanger

    C. Loosen rod hanger pin-nuts and fulcrum pins

    D. Loosen pump cover bolt and remove the cover

    A. A, B, C & D

    B. D, C, B & A

    C. D, A, B & C

    D. D, B, C & A

13. One of the following is not a tool used to operate and maintain the Afridev hand pump

    A. Spanner

    B. Fishing tool

    C. Pipe cutter

    D. Screwdriver

    E. None

14. Which of the following are spare parts that should be stored in schools in order to operate and maintain Afridev hand pumps

    A. Rod centralizer

    B. Bobbin

    C. Plunger seal

    D. Inner and outer handle bushes

    E. All

15. What will be the possible causes of the diversion of a spring eye after protection?

    A. The outlet pipe fitted above the eye

    B. Leaking protection box

    C. Clogging of the outlet pipe

    D. None

16. Which of the following are the causes of turbidity in protected spring water except

    A. The diversion ditch may not be intact

    B. Leakage at collection chamber

    C. Lack of integrity in manhole cover

    D. Lack of ventilation

    E. All

17. All of the following are possible remedial actions in a protected spring water whose water quality is deteriorating except

    A. Replace wire mesh in exposed pipes

    B. Disinfect with chlorine

    C. Replace gate valve

    D. Avoid open defecation

    E. None

18. Which one cannot be done in motorized water supply systems by a school water supply technician or caretaker?

    A. Check pipe work for leaks

    B. Check the electric system using equipment

    C. Record hours run

    D. Record meter reading

19. One of the following can be the role of the caretaker/technician who operates water supply system using solar power

    A. Orientation of the solar panel

    B. Cleaning the panels

    C. Adjusting the angle of the panel towards the sun

    D. checking the submersible pump.

    E. None

20. One of the following may not be the cause for having little water or lack of flow at the tap in a school rainwater harvesting system

    A. The level of water in the storage tank is low

    B. Tap problem

    C. Leak problem of storage tank

    D. None

21. As a school water supply caretaker/ technician, what do you do if an electric pump will not switch on?

    A. Verify availability of power

    B. Correct the voltage if there is drop out

    C. Replace/repair the starter

    D. Remove the motor and check if faulty

    E. Notify the school director to call the WWO experts

    F. All

22. Which one of the following water supply systems needs less maintenance compared to others?

    A. Afridev hand pump

    B. Motorized pumps

    C. Solar powered water supply system

    D. None

23. One of the following is not the role of a school water supply technician/caretaker in ensuring the quality of water

    A. Disinfect the water with chlorine as instructed by the water quality officer

    B. Conduct water quality test

    C. Report to WWO/utility if there is a water quality problem

    D. None

24. Chlorine is the only chemical used to disinfect water supply

    A. True

    B. False

25. Which the following factors that affect the bacteria killing efficiency of chlorine in water except

    A. Contact time

    B. Concentration

    C. Number of organisms

    D. pH level

    E. All

26. ------- is the instrument that is used to measure residual chlorine

    A. Water meter

    B. Comparator

    C. Water quality test kit

    D. Chlorine dispenser

27. --------- is the type of school latrine that has less operation and maintenance requirements compared to other

    A. VIP latrine

    B. Composting latrine

    C. Pour-flush latrine

    D. Urine Diversion Toilet

28. All the following problems need immediate action in operating of traditional pit latrines in schools except

    A. Parasites in cracked floor

    B. Flooding of the latrines

    C. Damaged or broken lids that have fallen into the pit

    D. Changing damaged superstructure

    E. None

29. What is the advantage of vent pipes in a schools ventilated improved pit latrine?

    A. Reduce smell

    B. Control flies

    C. Avoid parasites in the pit

    D. A & B

30. Which one of the following is considered as incorrect positioning of vent pipe in a latrine

    A. Fitting outside the wall

    B. Facing toward the sun

    C. Inside the latrine by penetrating the roof

    D. Following wind direction

    E. None

31. When do we close the pit of a double ventilated improved pit latrine?

    A. Fully filled

    B. Within 0.5m of the top

    C. Within 1m of the top

    D. Within 0.25m of the top

32. Which latrine type is difficult to operate and needs proper safety measures compared to others?

    A. Traditional pit latrine

    B. Composting latrine

    C. Single ventilated improved pit latrine

    D. All

    E. None

33. ------ is a type of school latrine that can change the excreta to useful composting material

    A. Double VIP latrine

    B. Composting toilet

    C. Urine Diversion Toilet

    D. All

    E. None

34. -----is a kind of toilet that needs to avail ash or soil or saw dust daily to assure proper operation

    A. Pour-flush toilet

    B. Composting latrine

    C. Ventilated improved pit latrine

    D. Traditional pit latrine

    E. None

35. Pour-flush toilets do not need regular cleaning because they are water based

    A. True

    B. False

36. The advantage of S-pipe in pour-flush toilets is to control smell only.

    A. True

    B. False

37. One of the following may be the major cause for clogging of urinals in schools

    A. Faeces defecation

    B. Inappropriate slope during construction

    C. Pouring of water

    D. A & B

    E. None

38. Which of the following are methods used to assess the utilization of school hand washing facilities

    A. Availability of soap/substitutes near the hand washing facility

    B. Availability of water

    C. Wetness of the area around the facility

    D. All

39. Which of the following are an intervention to maintain the proper operation of menstrual hygiene facilities

    A. Availing of sanitary pads

    B. Availing of pain killers

    C. Availing of separate rooms

    D. All

40. One of the following is used to dispose of solid wastes in schools

    A. Composting

    B. Incinerator

    C. Pit

    D. All

41. Which of the following is a barrier for inclusive WASH access in schools?

    A. Steepness of the toilet

    B. Narrowness of the toilet room

    C. Height of the water point

    D. Creating shame by students

    E. All

42. Which one is not a correct operation of inclusive WASH facilities?

    A. Locking the doors

    B. Maintaining a handrail

    C. Having wider room and door

    D. None

43. ------- is the act of including people who have disabilities in the same schools as everyone else in all actions:

    A. Equity

    B. Mainstreaming

    C. Affirmative action

    D. None

44. ------ in SWASH means that everyone has access to safe WASH facilities and the needs of all the school community, regardless of who they are and their circumstances, are fully addressed in the design, planning and implementation of WASH services.

    A. Equity

    B. Inclusion

    C. Mainstreaming

    D. Affirmative action

45. Difficulties in walking and other movement are described as ----------impairments

    A. Intellectual

    B. Physical

    C. Barriers

    D. Sensory

46. Which of the following are a right practice in budgeting of SWASH facilities operation, maintenance, and management?

    A. Engaging stakeholders

    B. Identifying needs

    C. Sharing the plan with management

    D. All

47. Which comes first in planning a SWASH facilities OM&M?

    A. Setting priorities

    B. Costing

    C. Sharing with management

    D. Training on plan implementation

48. Which of the following can be budget sources for SWASH facilities OM&M

    A. SIP budget

    B. School fees

    C. Public funding

    D. Internal Income

    E. All.

49. Monitoring information should be collected and acted upon at school level.

    A. True

    B. False

50. Which one comes first in planning and monitoring in SWASH

    A. Identifying the issue

    B. Determining indicators

    C. Defining strategies for data collection.

    D. Determining the information flow

Annex 5- Answers for the Pre and Post-tests

Question number	Answers	Question number	Answers
1	C. External motivation	26	B. Comparator
2	A. True	27	A. VIP
3	D. Asking simple questions only	28	D. Changing damaged superstructure
4	F. None	29	D. None
5	C. Replacing the handrails of the ramp	30	C. Inside the latrine by penetrating the roof
6	A. Operation	31	B. Within 0.5m of the top
7	B. Corrective maintenance	32	B. Composting latrine
8	B. False	33	E. All
9	E. None	34	B. Composting latrine
10	C. Scabies	35	B. False
11	E. Pump rods are disconnected	36	A. True
12	B. D, C, A & B	37	D. A & B
13	C. Pipe cutter	38	D. None
14	E. None	39	E. None
15	A. The outlet pipe fitted above the eye	40	D. All
16	E. None	41	E. All
17	C. Replace gate valve	42	A. Locking the doors
18	B. Check the electric system using equipment	43	A. Equity
19	B. Cleaning of the panel	44	B. Inclusion
20	D. None	45	B. Physical
21	A. Verify availability of power	46	D. All
22	C. Solar powered water supply system	47	A. Setting priorities
23	B. Conduct water quality test	48	E. All
24	B. False	49	A. True
25	E. None	50	A. Identifying the issue

Annex 6- Photo gallery

Water supply

Afridev hand pump























Water supply from rainwater harvesting from a latrine and tap stand from an elevated tank

Sanitation








Photos of different latrine types

























Photos of different latrine types in schools

Urinals:

Dividing walls for privacy in a girls' urinal

Missing urinal in a boys toilet





Hygiene











Types of hand washing facilities in different schools













MHM facility, student with counsellor and sanitary pads and MHM kit

Solid waste management







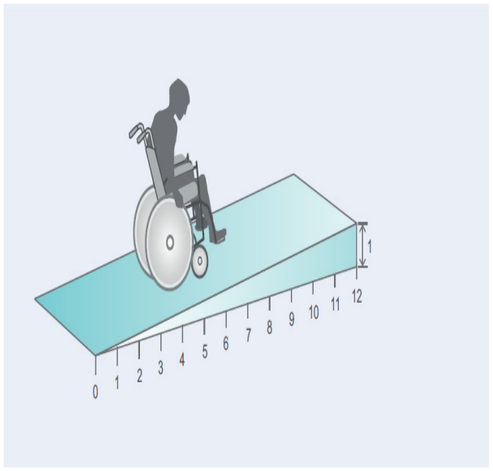




Solid waste pits and an incinerator in schools

Equity and inclusion









Different types of photos that reflect the equity and inclusion considerations. The handrail behind the toilet is in the wrong place and should be beside the toilet. When there is no toilet for the disabled: How is this disabled student going to access this latrine which has no ramp and no handrails?

SWASH Facilities Operation, Maintenance and Management Training Manual

December 2022
Addis Ababa, Ethiopia