PN-ABN-929

ISN 82010

WATER AND SANITATION FOR HEALTH PROJECT

Operated by
CDM and Associates

Sponsored by the U.S. Agency
for International Development

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The WASH Project is managed by Camp Dresser & McKee International Inc. Principal cooperating institutions and subcontractors are: Associates in Rural Development, Inc.; International Science and Technology Institute, Inc.; Research Triangle Institute; Training Resources Group; University of North Carolina at Chapel Hill; University Research Corporation.

# Community Sanitation Improvement and Latrine Construction Program

## A Training Guide

TECHNICAL REPORT NO. 83
MARCH 1993

Prepared for the Office of Health,
Bureau for Research and Development,
U.S. Agency for International Development
under WASH Task No. 337

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# COMMUNITY SANITATION IMPROVEMENT AND LATRINE CONSTRUCTION PROGRAM

## A Training Guide

Prepared for the Office of Health, Bureau for Research and Development
U.S. Agency for International Development
under WASH Task No. 337

by

John Gavin
Trevor Hockley
Steve Joyce

March 1993

**Water and Sanitation for Health Project
Contract No. DPE-5973-Z-00-8081-00, Project No. 936-5973
is sponsored by the Office of Health, Bureau for Research and Development
U.S. Agency for International Development**

## RELATED WASH REPORTS

*Excreta Management in Peri-Urban Areas,* by William Hogrewe, Steven Joyce, and Eduardo A. Perez. Technical Report No. 86. March 1993.

*Rethinking Sanitation: Adding Behavioral Change to the Project Mix,* by May Yacoob, Barri Braddy, and Lynda Edwards. Technical Report No. 72. July 1992.

*Evaluation Guidelines for Community-Based Water and Sanitation Projects,* by Philip Roark. Technical Report No. 64. May 1990.

*Tech Pack: Steps for Implementing Rural Water Supply and Sanitation Projects,* by May Yacoob and Philip Roark. Technical Report No. 62. August 1990. (Available in English and Spanish)

*A Training Guide on Hygiene Education,* by Graeme Frelick and Sarah Fry. Technical Report No. 60. March 1990.

*A Workshop Design for Community Participation, Vol. I - Starting Work with Communities and Vol. II - Planning and Implementing Sustainable Projects,* by Raymond B. Isley and David I. Yohalem. Technical Report No. 33. December 1988.

*Development of a Behavior-based Monitoring System for the Health Education Component of the Rural Water and Health Project, CARE-Guatemala,* by Lori DiPrete Brown and Elena Hurtado. Field Report No. 364. July 1992. (Available in English and Spanish)

*Follow-on Assessment of a Behavior-based Monitoring System for the Health Education Component of the Rural Water and Health Project,* by Lori DiPrete Brown, Elena Hurtado, and Steve Esrey. Field Report No. 385. February 1993. (Available in English and Spanish)

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Handout 7-1, 7-4, Handout 10-3 (Figs. 10-3, 10-4, 10-5, 10-7, 10-8. 10-9, 10-10, 10-14): E.G. Wagner and J.N. Lanoix. *Excreta Disposal for Rural Areas and Small Communities*. Geneva: World Health Organization, 1958.

Handouts 7-2, 7-3, 7-5: *Services for Shelter* by A.P. Cotton and R.W.A. Franceys. Liverpool: Liverpool University Press, 1991. Reprinted with permission.

Handout 7-4: For further information on the Sanplat design, contact Bjorn Brandberg, General Manager, SBI Consulting International AB, Rattaregarden, Box 217, S-530 30 TUN, Sweden. Tel: +46-(0)510 80050; Fax: +46-(O) 510 80434. Molds and manuals on the Sanplat design are commercially available from LCS Promotion, Flo 18, S-467 96 GRASTORP, Sweden.

Handout 7-6, 8-4, 10-3 (Fig. 10-2, 10-3): Taken from *Water for the World,* "Designing Pits for Privies." Technical Note No. SAN. 1.D.2.

Handout 10-3 (Fig. 10-13): *Water for the World,* "Constructing Privy Shelters." Technical Note No. SAN. 1.C.3.

Handout 8-5: WASH Field Report No. 312. *Final Evaluation of the CARE/Bolivia Child Survival and Rural Sanitation Project* by Andrew Karp, Patricia Martin, and Sharon Guild. August 1990.

Handout 10-3, Fig. 10-15: Material on pit design and VIP Latrine designs adapted from *Appropriate Sanitation Alternatives: A Planning and Design Manual* by John A. Kalbermatten, D.S. Julius, C.G. Gunnerson, and D.D. Mara. Published for the World Bank by Johns Hopkins University Press, Baltimore, Md. 1982.

Handout 10-3 (Fig. 10-6): *Sanitation without Water* by Uno Winblad and Wen Kilama. Revised and enlarged edition published by Macmillian Publishers Ltd., London, 1985. Originally published by the Swedish International Development Authority.

Handout 10-3 (Fig. 10-7): Sitting Slab and Squatting Slab from *Water for the World,* Technical Note No. SAN 1.D.1. Measurements and elevation drawings from Wagner and Lanoix, *Excreta Disposal for Rural Areas and Small Communities.*

## ABOUT THE AUTHORS

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## ACKNOWLEDGMENTS

A number of people were instrumental in the development of this training manual on community sanitation and latrine program planning. First, the WASH Project would like to acknowledge the contribution to the first draft of the manual by Graeme Frelick, Training Resources Group, and Trevor Hockley; and to the final draft of the manual by Dorothy LeRoux and Kevin Novotny, who pilot tested the manual in a training course for Peace Corps volunteers in Niger. In addition, appreciation is extended to the reviewers of the various drafts of this document.

# INTRODUCTION

## 1.1 Needs Addressed by the Training Program

The emphasis of this two-week training program is twofold:

- the improvement of community sanitation* in rural and peri-urban settings, and
- the design and construction of latrines.

The dual emphasis of the program is based on the generally accepted research finding that the availability of latrines does not guarantee use, nor does it guarantee health improvement.

Latrine technologies used in rural areas can also be used in peri-urban areas, subject to the same constraints. However, the constraints are much more prevalent in peri-urban areas. They commonly consist of lack of space, unsuitable soil types, high population density, user uncertainty about continued residential status, and so on. Thus, the implementation of latrine construction programs is much more problematic in peri-urban areas, if possible at all.

This training guide provides systematic skill development for local development agents in the steps and techniques necessary for *developing or upgrading a sanitation improvement and latrine construction program*—a program that involves the community from the start in clarifying the problem and choosing the appropriate interventions. The guide presents the role of the development agent—the training program participant—as that of sanitation educator, community facilitator and catalyst, and resource for identifying latrine options and supervising latrine construction and maintenance.

To equip the development agent with the right skills and values for success, the program devotes considerable time to developing specific skills in identifying excreta disposal behaviors, selecting the appropriate latrine design, planning, supervising construction, assessing and upgrading existing latrines, and making sanitation education interactive.

The training program does not address construction skills, however. For example, it does not teach participants how to mix and pour cement. What it does provide is the necessary skills to *oversee* latrine construction. It assumes that the actual construction will be carried out at the community level by a builder, or by the families a builder has trained, and not by the development agent.

*In this training course, sanitation refers specifically to disposal of human excreta.

## 1.2 Overall Goals of the Training Program

The overall goals of the training program describe what participants will learn by the end of this 10-day program. The workshop schedule at the conclusion of this introduction (Figure A) illustrates how the days are structured to achieve the learning goals.

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

- describe appropriate approaches for developing a sanitation improvement program in the community;
- identify the excreta disposal behaviors in a community and the impact of those behaviors on health;
- collect information to assist in the development of a sanitation improvement strategy;
- analyze critical factors in determining appropriate latrine selection;
- describe the design requirements for four types of latrines;
- develop a material, labor, and transport plan for a latrine program; supervise construction; and assess existing latrines for possible upgrading;
- apply appropriate preparation and delivery techniques to sanitation education;
- monitor and evaluate sanitation interventions; and
- develop an action plan to implement a sanitation improvement program "back home."

## 1.3 Approach of the Training Guide

This training guide uses a "program approach" to improving community sanitation and latrine construction. Its primary focus is neither strictly technical training nor community development training, but a blend of the two. The sessions provide all the basic steps necessary to develop and carry out a program—from problem clarification, to determining the appropriate interventions, to monitoring and evaluation.

The emphasis of the training program is on sanitary practices. Depending on the community, the attainment of appropriate sanitary practices may or may not require new latrines. In most cases it does, hence the focus in the training program on latrine design and supervision of construction. Participants in the program are exposed to four types of latrines and to the critical factors that go into choosing the right design. These factors include personal preferences of the users, design feasibility, and cost. By understanding these factors, the participant will be better able to assist the community in making the choice and less tempted to prescribe the choice.

In order to present this training program successfully, the trainer(s) will have to have access to a typical community. The trainers will also have to supervise the construction of a latrine concurrently with the training program. Several sessions require participants to supervise aspects of construction, even though they will not be doing the actual construction themselves. The construction will have to be carried out by a master builder (see 1.6.5).

The training could be conducted exclusively in a classroom setting, but it would become a theoretical exercise and result in significantly reduced skill development. The assumption is that actual practice will provide better opportunities for learning how to develop and implement a community sanitation improvement program.

## 1.4 Trainers and Participants

### 1.4.1 Trainers

These training materials have been designed to be used by trainers experienced in sanitation and excreta disposal and in the training of adults. The guide is designed for use by a two-person team with technical and training skills.

At least one of the trainers should be skilled in the design and construction of latrines and should have some training experience. At least one of the two must have prior training experience. He or she should have participated in training-of-trainer workshops and conducted workshops using active learning techniques. This trainer must be skilled in facilitating group learning, have experience in community development work, and be comfortable with technical material. (One trainer could handle 10 or fewer participants. However, he or she would need both the training and technical skills described above.) All trainers who use this guide must be oriented toward practical training.

### 1.4.2 Participants

The assumption of all of these training materials is that a district-level development agent (such as a district health officer responsible for several communities) will be able to guide the development of a community sanitation program if he or has assistance with latrine construction from local master builders.

This training program does not assume that a district-level development agent will be able to learn—or needs to learn—all the skills necessary to become a master builder. He or she should understand, however, all the steps necessary to guide the process. Participants should be selected with this understanding in mind. They should be involved in community promotion activities, be able to learn a certain amount of technical material, and be willing to work with their hands to demonstrate techniques and assist local builders.

## 1.5 Session Organization and Methodology

### 1.5.1 Organization

Each training session is organized according to a standardized format, which provides the trainer with the information necessary to conduct the training. This format is as follows:

| | |
|---|---|
| Objectives | Each session includes specific objectives, which are measurable and which indicate most of the session's content. |
| Overview | The overview provides a rationale for the session and states what the session intends to accomplish within the framework of the overall program and the preceding and subsequent sessions. |
| Procedures | In this section of the session format, the trainers are given specific instructions on what to do and say at each step in the session. Suggested times are provided for each procedure. |
| Trainer Notes | Throughout the procedures, and at the end of a session design, trainer notes are provided to present trainers with session options or to provide helpful suggestions. |
| Materials | At the end of a session design, a list of handouts, flipcharts, and other materials required in the session is provided. |
| Handouts | Handouts, if required for a session, are provided at the end of the session design. A set of all the handouts is also provided at the end of the guide to facilitate photocopying. |

### 1.5.2 Methodology

The successful use of this training guide depends on the active involvement of participants. Participants must be willing to try out activities, reflect on and analyze or "process" those activities, and derive generalized learning from the session activities that can be applied later in their work setting.

The training activities are designed to be practical, hands-on work, that is, activities that are the same as, or nearly the same as, the actual work that will be done on the job. The trainers act as guides or coaches, which enables the participant to try out the skill first and then learn from the experience. The trainers provide theoretical or informational input through interactive lecturettes and handouts.

A real community provides the practice arena for several of the sessions. This allows the training program to take local conditions into account and provide a tailored approach to the many different physical, cultural, and economic conditions that may be encountered throughout the world, or even within a country. However, this approach also creates special planning responsibilities for the trainers and the organization that sponsors and arranges for the training program.

### 1.5.3 Suggestions for Co-Training

This course will be most effective if the two trainers co-train each session. Rather than each trainer taking responsibility for specific sessions, both trainers would share responsibility for each session. This shared responsibility would include preparation as well as delivery. By co-training, the trainers are better able to link key themes from session to session, because they both have been part of each session. They are also able to help each other out more--with examples, another follow-up question, and recording ideas on a flipchart. And finally, co-training gives the trainers a break from "up-front" training, which enables each to collect his or her thoughts before the next procedure.

A suggested approach for dividing responsibility for a session follows:

Example: Session 2

| | |
|---|---|
| Procedure 1 — Introduction | Trainer #1 |
| Procedure 2 — Lecturette | Trainer #2 |
| Procedure 3 — Small Group Task | Trainer #1 |
| Procedure 4 — Large Group Discussion | Trainer #1 |
| Procedure 5 — Conclusions | Trainer #2 |

## 1.6 Planning for the Training Program

There are a number of considerations in planning to conduct this training program. They are discussed below in chronological order.

### 1.6.1 Selecting the Training Site

This training program is designed to be conducted in a rural or peri-urban residential training location with ready access (preferably by foot) to a community with inadequate and/or a range of sanitation facilities. A large meeting room should be available during the entire program--daytime and evening. Participants meet as a total group (approximately 20), as well as in smaller work groups. Ideally, more than one meeting room will be available.

### 1.6.2 Organizing Materials for Participants

The materials (handouts, flipcharts, and so on) to be used in a session are listed at the end of the session design. The handouts can be taken out of the training guide, copied for distribution, and then put back in the guide for the next time the course is given.

The trainers can distribute handouts in one of two ways. One way is to distribute each handout at the conclusion of the lecturette that covers the information in the handout. The other way is to assemble all the handouts and put them into participant notebooks prior to the workshop. Then, on the first day, notebooks containing the handouts for the entire course can be distributed to the participants. Both methods work effectively, and the training staff should choose the preferred method.

### 1.6.3 Ordering Materials

Listed below are the materials needed for classroom training and the construction materials for the demonstration latrine. These materials must be ordered and ready ahead of time.

*Classroom Supplies*

- Notebooks, writing pads, and pencils.
- Flipchart stands (at least two) and flipchart paper (at least 300 sheets).
- Four tables for participants, each with five or six chairs, depending on the number of participants.
- Flipchart markers.
- Four or five calculators to be shared by participants.

*Demonstration Latrine Construction Materials*

Materials will have to be secured to construct the demonstration latrine. The kinds of materials and their quantities will be determined by the type of latrine construction to be demonstrated.

### 1.6.4 Selecting the Demonstration Latrine Type

The purpose of the demonstration latrine is to give participants firsthand exposure to an actual construction project and the opportunity to interact with the master builder in much the same way they would during an actual sanitation program.

It is suggested that the ventilated improved pit (VIP) latrine be chosen as the demonstration latrine. It is considered to be the best all-around latrine for a variety of conditions, for the following reasons:

- It has the fewest limitations with regard to soil type.
- It has proved to be a popular design in many diverse situations.
- It requires no water supply.

*Construction Suggestions*

Construction suggestions for the VIP latrine are provided below.

- Construct the latrine at the training site for ease of participant access.
- Dig the pit before training begins.
- Be sure the latrine is correctly sited. (See Handout 7-6, "Siting of Latrines.")
- Make the slab of concrete with reinforcement.
- Line the pit, even if the conditions at the training site do not require it. The lining should be of easily available local material, such as bamboo or timber.
- Construct the superstructure with the typical housing construction materials of the area.

It is important that the entire demonstration latrine be completed during the training program. The participants can best learn by observing each step in the construction process. Seeing a completed latrine aids not only in learning the correct procedures but also in the visualization and demonstration of maintenance activities.

See Appendix B, "VIP Latrine Design and Material Checklist," when planning for construction.

### 1.6.5 Selecting a Master Builder

The selection of the master builder for the demonstration latrine is an important consideration for this training program. Ideally, this individual should not only be a skilled builder, but also an individual who is interested and willing to interact with the participants.

It would be best for the trainers if the master builder were fully capable of managing the work crew, the resource requirements, and the time schedule. The trainers will be fully occupied with delivering the course and cannot afford to take time out to manage the latrine construction.

At various points in the training program, session activities will be held at the demonstration site (see 1.6.7). For this reason, the master builder will have to coordinate construction steps with the training activities.

### 1.6.6 Constructing the Demonstration Latrine

As noted earlier, the construction of a demonstration latrine concurrently with the training program will enable participants to learn the details of construction and construction supervision within the context of an actual situation. To facilitate ease of access, the demonstration latrine should be constructed within a short walk of the classroom.

As noted, the training program does not give participants hands-on experience in the actual construction of a latrine.* It is assumed that the participants in this program would not do the actual construction back at their work site, but rather that they would be responsible for overall supervision and quality control of construction.

The following sessions include scheduled activities at the latrine demonstration site:

*Session 7:* *Latrine Concepts*

As part of Session 7, which occurs on the afternoon of Day 3, the participants visit the latrine construction site to supervise slab construction (see Session 7, Procedure 6).

*Session 10:* *Details of Latrine Design*

In Session 10 the participants visit the demonstration site to analyze specific details of latrine design. This activity occurs on the afternoon of Day 6.

*Session 14:* *Sustained O&M and Upgrading Existing Latrines*

In this session, participants carry out a field activity in which they assess the operation and maintenance (O&M) of six latrines. As part of this exercise, they will also be asked to visit the demonstration latrine to assess the quality of its construction.

### 1.6.7 Preparing the Community

The community should be prepared well ahead of time for the arrival of the participants. Key community members should understand the purpose and goals of the training program, and they should be willing to cooperate with the trainers. Details on the specific community preparation needed for the program can be found in the following sessions:

*Session 5:* *Conducting a Survey of Excreta Disposal Practices*

In this session, participants will go into the community to observe hygiene behaviors.

*Session 9:* *Information Collection Field Exercise*

This session includes a three-hour activity in the community. Participants interview selected community members about hygiene and sanitation issues.

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*For a latrine training program that does give participants hands-on experience in actual construction, see WASH Technical Report No. 25, *A Workshop Design for Latrine Construction*.

*Session 14:* *Sustained O&M and Upgrading Existing Latrines*

During this session, participants visit the site of existing latrines to assess O&M and recommend options for upgrading the latrines.

*Session 16:* *Sanitation Education Presentations*

It is recommended in this session that participants give presentations on sanitation topics to community audiences.

### 1.6.8 Preparing for Training Sessions

The trainers must carefully read through all the training sessions well in advance of the workshop and double-check all of the materials needed (needs will vary with local conditions). The trainers must also prepare their presentations and write the task instructions for the group activities and the key points of lecturettes on flipchart paper.

Each session is designed as a guide for the trainers. Trainers may have to adapt the sessions in some way to the reality of the available time and resources or their personal training style.

### 1.6.9 Organizing the Classroom Seating Arrangement

Figure B provides a suggested classroom seating arrangement. It requires four tables large enough to seat six people comfortably. With this seating arrangement, participants can quickly be assigned small group tasks. The seating arrangement also promotes more active participation by the trainees because everyone is able to see one another without much effort.

It is recommended that table groups be reassigned every two or three days to provide opportunities for participants to work with different people in small groups, not only to facilitate the sharing of participant experiences, but also to promote team building.

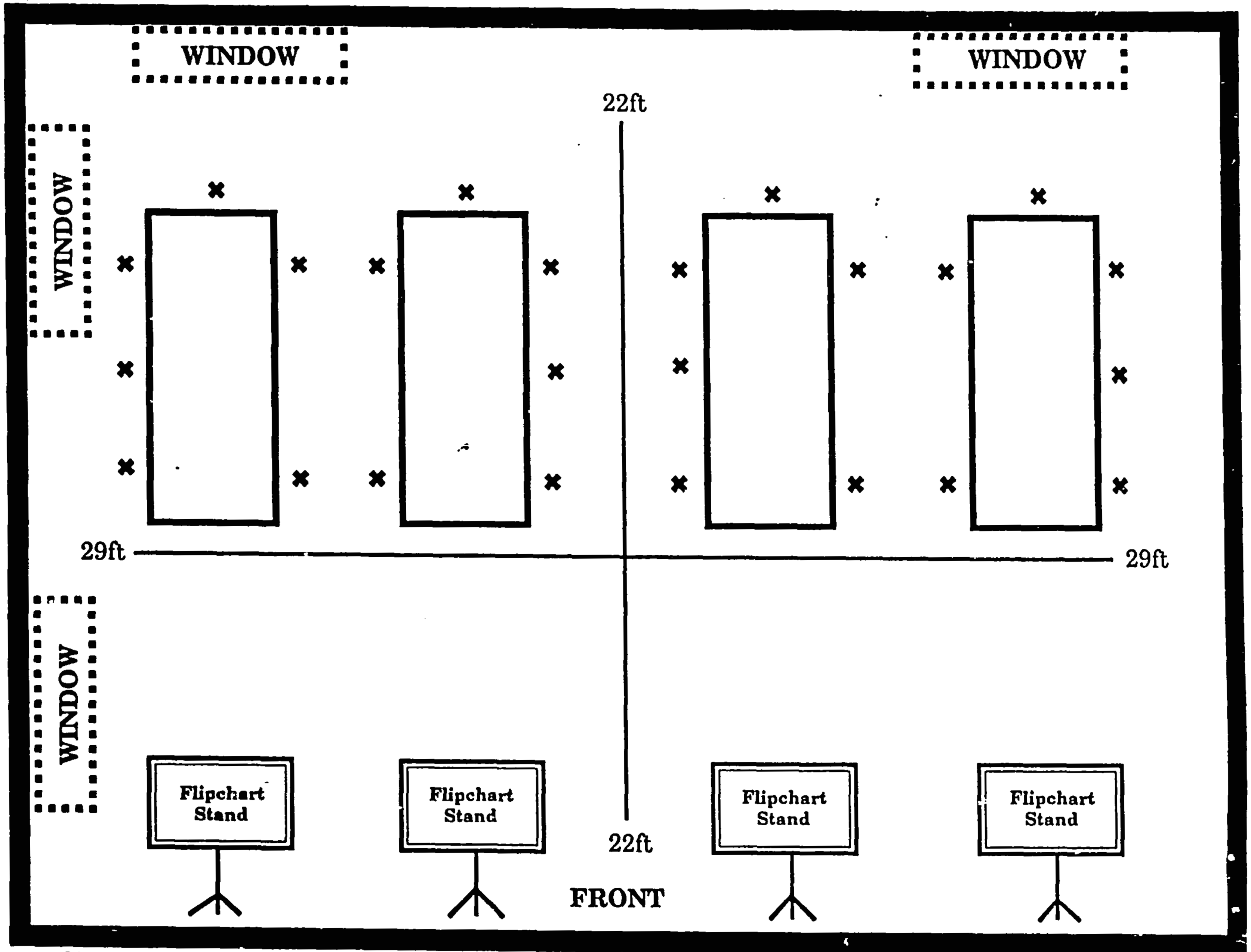
| DAY | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| WEEK 1 | 1. Introduction to the Training Course (1 hr., 50 min.)<br><br>2. Approaches to Improved Excreta Disposal Mgmt. (1 hr., 45 min.)<br><br>3. Problem Clarification (3 hr., 25 min.) | 4. Skills for Conducting Behavioral Surveys (3 hr.)<br><br>5. Conducting a Survey of Excreta Disposal Practices (4 hr.) | 5. Conducting a Survey —continued (2 hr.)<br><br>6. Determining Appropriate Interventions (4 hr., 20 min.)<br><br>7. Latrine Concepts (1 hr., 10 min.) | 7. Latrine Concepts —continued (4 hr., 5 min.)<br><br>8. Factors in Latrine Choices (2 hr., 50 min.) | 9. Information Collection Field Exercise (7 hr., 10 min.) |

| DAY | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|
| WEEK 2 | 1. Details of Latrine Design (7 hr.) | 11. Planning a Latrine Construction Program (7 hr.) | 12. Supervision of Construction (2 hr.)<br><br>13. Sanitation Education Methods (4 hr., 15 min.) | 14. Sustained O&M and Upgrading Existing Latrines (5 hr., 30 min.)<br><br>15. Monitoring and Evaluation (3 hr., 40 min.) | 16. Sanitation Education Presentations (3 hr., 55 min.)<br><br>17. Action Planning (2 hr., 15 min.)<br><br>18. Training Program Evaluation (1 hr., 10 min.) |

**FIGURE A**
Workshop Schedule

**FIGURE B**

Suggested Training Room Floor Plan




1. It's important to have windows in the training room – we are in this room for 6 days and people get irritable without natural light.
2. Square or round tables that seat 6 people comfortably.
3. 29ft. by 22ft. is an appropriate size. If you're off by a few feet that's okay.

## Session 1

# INTRODUCTION TO THE TRAINING COURSE — 1 hour, 50 minutes

### Objectives

By the end of this session, the participants will have

- become acquainted,
- clarified their expectations about the course, and
- reviewed the course goals and schedule.

### Overview

The overall purpose of the opening session is to set the tone for the entire workshop. After the official opening comments and introductions, the participants are given the opportunity to discuss their expectations about the workshop in a small group exercise and with the full group. This is intended to demonstrate that the trainers value the concerns and hopes of participants while showing how participation will be encouraged in the workshop.

The trainers present the workshop's goals and schedule and review them in light of participants' expectations. Any reactions to the workshop schedule can be discussed at that time. Trainers should discuss with participants which of their expectations will be met and which ones may fall outside the scope of the workshop. Finally, trainers discuss the norms of behavior intended to create a positive learning atmosphere throughout the workshop.

### Procedures

**1. Official Opening Comments** — ***25 minutes***

Trainers should plan this activity in coordination with the sponsoring agency and appropriate government and community officials. The guests should be given a total of 20 minutes for their speeches. Trainers will need 5 minutes to introduce themselves and explain the purpose of the workshop.

The trainers should discuss the goals of the workshop with the speakers prior to this session so that their opening comments are consistent with the purpose of the workshop. Trainers may wish to share the following information with the speakers:

- The overall purpose of this workshop is to improve the skills of district-level development agents for conducting community sanitation activities, particularly the construction and use of latrines. These activities are aimed at influencing behaviors to maximize the health benefits of safe water supplies and sanitation structures.
- In order for community sanitation activities to succeed, the community must work in close collaboration with development agents. Together, they must identify and plan actions that will result in excreta disposal practices that improve the health of community members.
- This workshop draws upon the extensive practical field experience of participants. It is therefore structured to involve participants actively in the learning process. This structure includes classroom and field exercises that enable participants to share their current knowledge and skills as they learn new ideas and develop new skills.

Thank the guests and permit them to leave so that the workshop may begin.

## 2. Pair Interviews — *10 minutes*

Instruct the participants to form groups of two. Explain that this exercise is a way for everyone to meet by making introductions less formal. Add that each person in the pairs will interview his or her partner for about five minutes. When the interview is over, each participant should be prepared to introduce his/her partner to the rest of the group.

Display the following flipchart and ask participants to use the questions listed in their interviews:

*Flipchart A: Pair Interview Questions*

- What is your name and what do you like to be called?
- Where are you from?
- Where have you been working, and for how long?
- What are the easy and the difficult aspects of your job?

Interview your co-trainer while participants interview each other.

### 3. Introductions *15 minutes*

Start by introducing your co-trainer in a light, relaxed manner in less than one minute. Your co-trainer will then introduce you. Then, ask participants to introduce their partners in less than one minute.

When the introductions are over, tell the participants that they make up a very interesting group with a rich background of practical experience. Explain that this exercise was just the start of getting to know each other and that participants will get to know each other much better over the course of the workshop.

### 4. Participant Expectations *20 minutes*

Describe the importance of discussing the participants' expectations of the workshop. Explain that you now wish to discuss what they hope to accomplish during the workshop so that you and your co-trainer can assess which parts of the workshop will meet their needs and which expectations may either not be addressed or not be dealt with in much depth. In addition, knowing their expectations will help you to identify which topics should be particularly stressed.

Ask them to take a few minutes to think about their work in the field and how this workshop can help them be more effective in their work. Give them a few minutes to think and write down what they expect to accomplish or get out of this workshop. Present the following task:

*Flipchart B: Expectations Task*

- At your table, share your expectations.
- Agree on two expectations that you all share.
- Select someone to present your two expectations to the entire group.
- Take 15 minutes.

### 5. Presentations of Expectations *15 minutes*

Start by taking one expectation from each group, then go back and take a second expectation from each group, and so on. Record the expectations on a flipchart. Do not repeat expectations already listed, but note the one being repeated with a mark. After all the groups have reported,

- point out the most commonly held expectations;
- ask groups to explain unclear expectations; and
- if an expectation is outside the purpose of the workshop, ask if everyone wants to spend some time on it during the evenings, or if they can meet it on their own (see Trainer Notes for more on this type of situation).

Explain that you will now present the workshop goals and compare them with the participants' expectations.

### 6. Overall Workshop Goals and Schedule — *20 minutes*

Distribute Handout 1-1: "Workshop Goals." Post the same list of goals on Flipchart C: "Workshop Goals." Ask the participants to read along as you present the goals. Clarify any goals that were unclear and refer to the list of expectations to show where they are covered by a goal.

Explain that you will now turn to the workshop schedule to show when participants' expectations and the workshop goals will be met over the course of the workshop.

Distribute Handout 1-2: "Workshop Schedule." Go over the session headings in the schedule. Point out the following while going over the schedule:

- time frames
- classroom sessions
- field exercises
- small and large group discussions to encourage active participation
- use of presentations in combination with case studies, stories, and practical tasks to create an active learning environment

Refer to the goals and expectations and show in which sessions they will be met.

### 7. Workshop Norms — *5 minutes*

Display the following flipchart:

*Flipchart D: Workshop Norms*

- Share responsibility for learning.
- Participate actively in all session exercises.
- Start and end sessions on time.
- Respect the views of other participants.
- Help one another.
- Refrain from smoking in the training room.

Explain that so far you have looked at *what* participants will learn. However, in order to accomplish the workshop goals within the scheduled time, everyone must agree on *how* that learning can be done most effectively. Tell the participants that you propose these norms to help everyone work and learn better together as a group.

Ask participants if they agree with the norms and have any others to add. Discuss the norms and seek a consensus on following them.

Introduce the next session by saying that it will provide an overall framework for the entire workshop.

**Trainer Notes**

1. It is important that the participants think about and express their expectations before reviewing the workshop goals and schedule. In this way, you can be frank with them on the first day as to which of their expectations will be met and which may not be met.

   Do not spend a lot of time discussing those expectations that are outside the purpose of the workshop. It is important to discuss those expectations and to try to adapt the workshop to meet them if possible, but only small changes in the goals or schedule should be made at this time.

   The discussion of the participants' expectations can be made easier by providing the intended participants with information about the purpose and structure of the workshop before they arrive.

2. Keep the flipcharts of the goals, schedule, and norms posted in the classroom throughout the workshop so that you can refer to them when it is necessary.

**Materials**

Welcoming package for participants, with pads and pencils

Handout 1-1: Workshop Goals

Handout 1-2: Workshop Schedule

Flipchart A: Pair Interview Questions

Flipchart B: Expectations Task

Flipchart C: Workshop Goals

Flipchart D: Workshop Norms

## Workshop Goals

- Describe appropriate approaches for developing a sanitation improvement program in the community.
- Identify the excreta disposal behaviors in a community and their impact on health.
- Collect information to assist in the development of a sanitation improvement strategy.
- Analyze critical factors in determining appropriate latrine selection.
- Describe the design requirements for four types of latrines.
- Develop a material, labor, and transport plan for a latrine program; supervise construction; and assess existing latrines for possible upgrading.
- Apply appropriate preparation and delivery techniques to sanitation education.
- Monitor and evaluate sanitation interventions.
- Develop an action plan to implement a sanitation improvement program "back home."

## Workshop Schedule

| DAY | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| WEEK 1 | 1. Introduction to the Training Course (1 hr., 50 min.)<br><br>2. Approaches to Improved Excreta Disposal Mgmt. (1 hr., 45 min.)<br><br>3. Problem Clarification (3 hr., 25 min.) | 4. Skills for Conducting Behavioral Surveys (3 hr.)<br><br>5. Conducting a Survey of Excreta Disposal Practices (4 hr.) | 5. Conducting a Survey —continued (2 hr.)<br><br>6. Determining Appropriate Interventions (4 hr., 20 min.)<br><br>7. Latrine Concepts (1 hr., 10 min.) | 7. Latrine Concepts —continued (4 hr., 5 min.)<br><br>8. Factors in Latrine Choices (2 hr., 50 min.) | 9. Information Collection Field Exercise (7 hr., 10 min.) |

| DAY | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|
| WEEK 2 | 1. Details of Latrine Design (7 hr.) | 11. Planning a Latrine Construction Program (7 hr.) | 12. Supervision of Construction (2 hr.)<br><br>13. Sanitation Education Methods (4 hr., 15 min.) | 14. Sustained O&M and Upgrading Existing Latrines (5 hr., 30 min.)<br><br>15. Monitoring and Evaluation (3 hr., 40 min.) | 16. Sanitation Education Presentations (3 hr., 55 min.)<br><br>17. Action Planning (2 hr., 15 min.)<br><br>18. Training Program Evaluation (1 hr., 10 min.) |

## Session 2

# APPROACHES TO IMPROVED EXCRETA DISPOSAL MANAGEMENT

***1 hour, 45 minutes***

### Objectives

By the end of this session, the participants will be able to

- explain the importance of proper excreta disposal and water supply to overall health improvement in the community,
- define the terms *behavior* and *behavioral change*,
- give a working definition of the proper management of excreta disposal,
- describe a three-part model for developing or upgrading a sanitation improvement program, and
- identify some current obstacles to effective excreta disposal.

### Overview

The purpose of this session is to provide participants with a program approach to improved excreta disposal that will help to frame the two-week training course.

The session begins with a lecturette establishing the equal importance of proper management of excreta disposal and proper water supply and usage to community health improvement—that one without the other will likely not result in an improved health status for the community. *Behavior, behavioral change,* and *management of excreta disposal* are then defined, and a three-part model for developing a sanitation improvement program is presented.

Following the lecturette, participants are asked to work in small groups to identify what they perceive to be the current obstacles to improved management of excreta disposal at the local level. The obstacles are then discussed by the full group. The two exercises will help the participants—as well as the trainers—take stock of the information and perceptions that participants are bringing to the course; they should also help clarify the different levels of experience in the group. By the end of the session, participants will understand how the three-part model provides the basis for the entire course.

**Procedures**

**1. Introduction** ***5 minutes***

Explain that in this session they will be looking at an overall program approach to sanitation improvement they can use in working with the community.

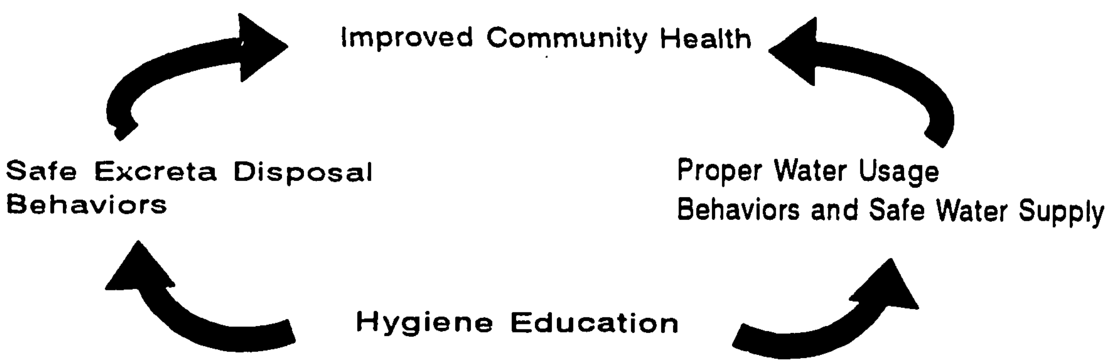
Display Flipchart A: "Session 2 Objectives." Read the objectives and ask if they are clear.

**2. Lecturette: Program Framework for Effective Excreta Disposal** ***45 minutes***

Introduce the lecturette by saying:

- Recent findings indicate that safe excreta disposal, a safe water supply, and proper use of water (for personal and domestic hygiene) outweigh provision of safe water itself in their effect on community health.
- It is now believed that potable water and safe excreta disposal must be equally considered in bringing about community health benefits.

Present Flipchart B.




Emphasize the following points:

- Although this course will focus on the proper management of excreta disposal, safe excreta disposal behaviors are equally as important as proper water usage behaviors and a safe water supply in achieving long-term health benefit sone without the others will likely not result in an improved health status for the community.
- The development of a sanitation improvement program in the community should be carried out in conjunction with water usage and water supply programs. For example, the community sanitation committee and the community water committee should engage in active collaboration.

- In the past, sanitation programs have often centered on the provision of latrines. But there is ample evidence that the provision of new latrines does not guarantee usage or health improvements.

Say that now you want to define *behavior* and *behavioral change* because they are key elements in the overall framework for improved community health.

Present the definitions for behavior and behavioral change, Flipchart C.

*Flipchart C: Behavior and Behavioral Change*

*Behavior*: One's observable activity

*Behavioral Change*: The modification one's observable activity

Emphasize the following points:

- *Behavior* in this training course refers specifically to the things a person does—his or her actions.
    - ☐ For example, excreta disposal practices involve a set of specific individual actions, or behaviors: where one goes to defecate, and what one does after defecating i.e., isolating feces, anal cleansing, and hand washing. This definition applies to a man, a woman, or a child.
- *Behavioral change* in this training course refers to *permanently* modified behavior.
    - ☐ For example, improved excreta disposal practices may require that individuals modify specific individual behaviors or actions, such as where one defecates and what one does after defecation. These improved practices would result from permanent behavioral change—they would not vary from morning to night, from location to location, or from season to season.

Stress the following:

- Changing people's behavior can be very difficult, and understanding the barriers to change is important.
- Knowing the religious, cultural, social, and other barriers to behavioral change is a key aspect of understanding the problem.
- It is also important to know what is in the power of the individual to change, and what needs other inputs or help for change to occur.
- If the participants are to have an impact in changing behaviors, they will need to develop strong observational skills.

Say that before you go any further, you want to be sure that everyone has the same definition for *proper management of excreta disposal*. Present Flipchart D.

*Flipchart D: Proper Management of Excreta Disposal*

The isolation of human excreta in ways that prevent excreta from becoming a threat to health, that are acceptable to all members of the local population, and that are sustainable.

Discuss key points from this section of Handout 2-1: "A Program Framework for Improved Community Health."

Explain that there are three key parts to developing an effective excreta disposal management program. Present Flipchart E.

*Flipchart E: Three-Part Model of an Effective Excreta Disposal Management Program*

1. Problem Clarification

2. Appropriate Interventions　　　　3. Monitoring and Evaluation

Briefly define each part as outlined in Handout 2-1. Pass out Handout 2-1, and tell participants that they will be revisiting this model throughout the course.

## 3. Small Group Task: Obstacles to Effective Excreta Disposal *20 minutes*

Explain to participants that you want to discuss current obstacles to effective excreta disposal, and that the discussion will begin in small working groups.

Present the following small group task.

*Flipchart F: Small Group Task*

In your table group:

- Review the definition of proper management of excreta disposal and the three-part model.
- Discuss: What do you think the current obstacles are at the local level to improved management of excreta disposal?
- Reach consensus on the three greatest obstacles (at the local level).
- Be prepared to report to the rest of the class. Select a spokesperson.
- Take 15 minutes.

**Trainer Note**: You may want to assign the participants to the small groups. For example, you may want participants from the same-sized communities to work together—people from peri-urban areas in one group, people from medium-sized communities in another, and so on.

### 4. Large Group Discussion *20 minutes*

Ask for one obstacle from each group. Then get a second obstacle from each group, and then a third. Record the obstacles on a flipchart.

Point to the obstacles on the list and ask the full group one or both of the following questions:

- How does this obstacle affect excreta disposal?
- How does this obstacle affect an excreta disposal program?

### 5. Conclusions *10 minutes*

Review highlights of the session. Ask participants to reflect for a few minutes on the following question (on Flipchart G):

> *Flipchart G: Conclusions*
>
> What conclusions have you drawn in this session about developing an excreta management program in the community?

Then, ask for responses to the question. Record their responses on a flipchart, and read back through them once all responses have been volunteered.

### 6. Wrap-Up *5 minutes*

Ask participants:

- What do you especially want to remember to do when you return home?

Summarize the main learning points of the session. Review the session objectives and ask if they were achieved. Link this session to the next one by telling the participants they will be looking in detail at the first part of the three-part model, Problem Clarification, in Session 3.

**Materials**

Handout 2-1: A Program Framework for Improved Community Health

Flipchart A: Session 2 Objectives

Flipchart B: Improved Community Health

Flipchart C: Behavior and Behavioral Change

Flipchart D: Proper Management of Excreta Disposal

Flipchart E: Three-Part Model of an Effective Excreta Disposal Management Program

Flipchart F: Small Group Task

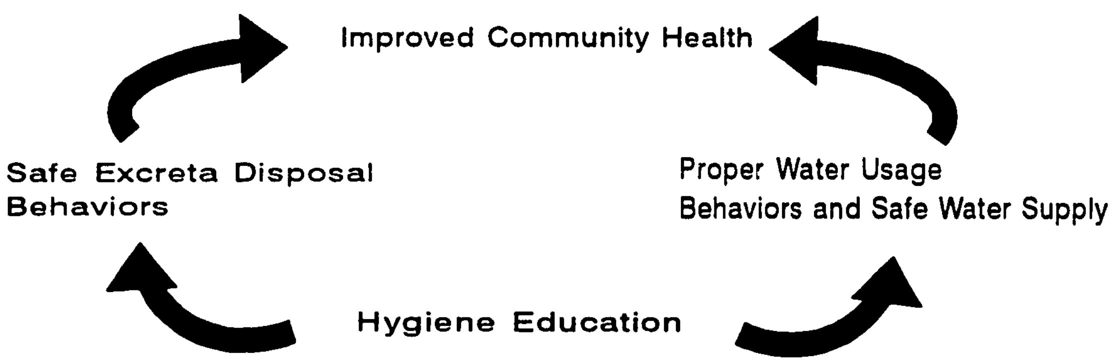
Flipchart G: Conclusions

## A Program Framework for Improved Community Health

### A. Equal Consideration to Safe Excreta Disposal

Although the 1980s saw the provision of safe water to thousands of communities worldwide, health benefits have not lived up to expectations. It is now widely recognized that potable water alone cannot bring about the health benefits anticipated from the Water Decade (1980-1990).

Recent findings provide convincing evidence that safe excreta disposal is equally as important as proper water usage and safe water supply in achieving long-term health benefits—one without the others will likely not result in an improved health status for the community. These findings suggest that much more attention should be given to developing or improving community-level excreta management programs. They also suggest that such programs should be carried out in conjunction with water usage and water supply programs, and not at their expense.




Note: This handout is based on WASH Technical Report No. 72, *Rethinking Sanitation: Adding Behavioral Change to the Project Mix*. Prepared by May Yacoob, Barri Braddy, and Lynda Edwards. July 1992.

## B. Understanding the Problem in Light of Excreta Disposal Behaviors

Failures in past sanitation programs have been blamed on many reasons. In some cases, blame has gone to the excessive emphasis that was placed on technological improvements—constructing new latrines, for example—at the expense of behavioral considerations, such as latrine usage and upkeep and general hygienic practices. In other cases, blame has gone to the lack of understanding by program planners of the religious and cultural context within which the latrine or other sanitation promotional activities took place.

Regardless of the reasons, many inappropriate latrines were constructed—inappropriate in terms of the type constructed, where they were constructed, or for whom they were constructed. Consequently, there is ample evidence that the provision of new latrines does not guarantee usage or improved health.

Most experts agree that understanding excreta disposal behaviors is a prerequisite to determining the appropriate intervention. The progression of understanding could be viewed as follows:

| *Influence of Environment on Behavior* | *Health Conditions Relevant to Sanitation* | *Indicators of Behavioral Change* | *Interventions* |
|---|---|---|---|
| ■ free-roaming domestic animals | ■ pathogen-related illness (e.g., diarrhea) | ■ application for latrine | ■ sanitation education |
| ■ children defecating indiscriminately | | ■ attending sanitation sessions | ■ latrines |
| | | ■ teaching children to use latrines | ■ policy changes |

In this progression, solutions to health problems are linked to specific behaviors. What are the individual behaviors that are contributing to the problem? What steps should be taken to help change those behaviors? If children are defecating indiscriminately—behavior that causes pathogen-related illness—how can that behavior be changed? One part of the solution might be to teach children how to use latrines. Another part of the solution might be to have older children accompany younger children to the latrine, especially if they are frightened by it. Building more latrines may or may not be part of the solution. The important point is that until the excreta disposal behaviors of children and adults are clearly understood, and thus the behavioral changes required to improve health conditions, one can never be certain that the best, most appropriate solution has been identified.

## C. Definition of Proper Management of Excreta Disposal

Taking the lessons learned from the past into account, the following definition is proposed for the proper management of excreta disposal:

> The isolation of human excreta in ways that prevent excreta from becoming a threat to health, that are acceptable to all members of the local population, and that are sustainable.

The key terms in understanding this definition are:

*Isolation*

Human excreta must be isolated to prevent oral-fecal contamination. There are many ways to isolate human excreta effectively, including low- and high-technology options.

*Acceptable*

If a percentage of the community's population is not isolating its excreta, oral-fecal contamination can occur and can adversely affect everybody in the community, including those who are isolating their feces. Therefore, ways must be found for safe excreta disposal that all members of a community—men, women, children—are willing to adopt.

*Sustainable*

If lasting improvements in community health are to be achieved, the ways selected for feces isolation must not only be appropriate and acceptable to all members of a given community, but they must also be readily affordable and maintained by the local users.

This definition is intended to take into consideration the technology introduced, the individual behavior of users, and the religious and cultural context within which the promotion of an excreta disposal management program is to take place.

**D. Three-Part Model—An Effective Excreta Disposal Management Program**

To achieve effective excreta management, as defined above, the following three-part model is recommended:

1. Problem Clarification

2. Appropriate Interventions

3. Monitoring and Evaluation

In general this model signifies the following:

- Effective excreta management is an *ongoing process* of clarifying the problem, introducing appropriate interventions, and then monitoring and evaluating those interventions and the resulting behavioral changes, if any, to clarify additional problems.
- Planners should first *clarify the problem* in order to determine what changes in excreta disposal can reasonably be introduced within the community, and only then choose the technologies and supporting interventions to be implemented.
- If Part 1 was not well executed, Part 2 of the model will likely not result in the best interventions for the right problems.

Specifically, the three parts of this model are delineated as follows:

*Problem Clarification*

- What is the prevailing oral-fecal contamination route?
- What are the contributing environmental conditions?
- What are current excreta disposal behaviors?
- What are barriers to modifying behaviors?

*Appropriate Interventions*

- What is the problem(s)?
- What do people say they need? What are they interested in?
- What has been done before?
- What local or national policies impinge on sanitation practices or latrine choices?

- What interventions would help reduce or eliminate high-risk behaviors associated with excreta disposal?
  - ☐ latrines
  - ☐ sanitation education, referring specifically to isolation of human excreta
  - ☐ local and national policy changes
- What are the technological options?
- What interventions would help overcome religious or other barriers to changing behavior?
- What human and organizational resources are available to ensure program sustainability?

*Monitoring and Evaluation*

- To what extent are the interventions resolving the excreta disposal problems?
  - ☐ current versus desired excreta disposal behaviors
  - ☐ contributing environmental conditions
- Which interventions are working well? Why?
  - ☐ indicators of success exhibited
- Which are not working well? Why?
  - ☐ indicators of success not exhibited
- What additional problems have been uncovered?

With this model, the basis for future problem solving in the management of excreta disposal is based on

- knowing what the existing hygiene behaviors and practices are, and
- knowing what behavioral changes the community must undertake to achieve better health.

This three-part model presents development and change as a process of modification that solves problems relating to what people currently do, rather than as a means by which "newer" and "better" technologies replace existing practices and arrangements. If this process is adhered to in planning new or improved excreta disposal management programs, the chances for program success and better community health will be improved.

Session **3**

## PROBLEM CLARIFICATION *3 hours, 25 minutes*

### Objectives

By the end of this session, the participants will be able to

- describe the cause and effect of oral-fecal contamination,
- cite examples of cultural, religious, and social barriers to behavioral change,
- identify high-risk observable behaviors related to excreta disposal, and
- determine some indicators for change.

### Overview

The purpose of this session is to help participants understand the key elements of problem clarification, Part 1 of the three-part model for developing or improving an excreta disposal management program. These elements were introduced in Session 2.

The session begins with a review of the problem clarification part of the model, followed by case studies and discussions to illustrate the cause and effect of oral-fecal contamination. Next, the terms "behavior," "behavioral change," and "high-risk behavior" are examined through an activity and discussion. The concept of cause and effect and a clear understanding of the definitions for behavior and behavioral change introduced in the previous session are important for participants to understand if they are to become skillfull in identifying a community's current excreta disposal practices.

Participants then explore barriers to behavioral change, using an exercise on AIDS prevention. The purpose of this exercise is to help participants relate in a personal way to the difficulties in changing one's behavior, even when the health consequences are known. Behaviors for excreta disposal are then identified and discussed, as are some examples of desired excreta disposal behaviors. To close the discussion, participants are asked to identify some indicators that high-risk behaviors have been modified.

**Procedures**

1. **Introduction** ***10 minutes***

Begin by referring participants back to Flipchart E in Session 2, "Three-Part Model of an Effective Excreta Disposal Management Program." Say that in this session they will focus on the first part of the three-part model: problem clarification.

Ask participants for some examples of excreta disposal behaviors in their communities:

- What percentage of families in your communities use latrines?
- Do all members of families use latrines? babies? children?
- What other means of excreta disposal are common?

Say that the purpose of this session is to explore and discuss why the answers to questions such as these are vital in developing an appropriate excreta disposal management program in a community.

Present a brief overview of the session in your own words and present the objectives on Flipchart A: "Session 3 Objectives." Ask if the objectives are clear.

2. **Lecturette: Problem Clarification** ***10 minutes***

Refer to the problem clarification questions presented in Part D of Handout 2-1. Explain that in Part 1 of the model, development agents should be trying to do the steps outlined below (Flipchart B).

*Flipchart B: Key Steps in Problem Clarification*

In Part 1 of the model, it is important to

- understand the extent of oral-fecal contamination in a community,
- identify current high-risk behaviors associated with excreta disposal in the community,
- identify indicators of modified behavior, and
- identify the barriers to changing high-risk behaviors.

Add points from Handout 3-1: "Key Steps in Problem Clarification." Tell the participants they will be working on the four steps in problem clarification in the next three sessions—through Session 6, "Determining Appropriate Interventions"—so there will be ample opportunity for them to become clear about the steps. Pass out Handout 3-1.

## 3. Small Group Task: Oral-Fecal Contamination *35 minutes*

Tell participants that they will now examine the first step in Part 1 of the model—gaining a clear understanding of the cause and effect of oral-fecal contamination.

Tell them that you want to examine the cause and effect of oral-fecal contamination by using a case study. Say that the case study is based on a real place, but this place is not any of their communities. Explain that because they come from different communities and situations, using a case study will give them a common situation within which to discuss and share their experiences. Say that after the case study, you will give them an opportunity individually to examine their own community and situation.

**Trainer Note**: Using a case study initially can also be less threatening to participants who might not be ready to admit that there is oral-fecal contamination in their communities.

Distribute Handout 3-2: "Case Study—Cause and Effect of Oral-Fecal Contamination". Ask participants to read the case study individually (5 minutes).

Then, describe their small group task using Flipchart C: "Case Study Task" as follows:

*Flipchart C: Case Study Task*

1. Break into groups of four or five people.
2. Discuss the answers to the following questions:

- What are three cause-and-effect relationships in this case study?
- What is the likely impact of each relationship?
- What are ways in which each impact could be lessened?

3. Take 30 minutes.

Keep close track of the time, and tell them when they have a few minutes left.

## 4. Large Group Discussion: Oral-Fecal Contamination *25 minutes*

When participants have completed their small group work, lead a discussion of their answers by asking for the answer to the first question from all groups, then move to question two, starting with a different group. Then ask if other groups have additional information, and repeat the process with question three. This discussion should move quickly; do not take the time to write any answers on a flipchart. Some points to highlight in the discussion follow:

- Unprotected wells contaminated by rope having fecal matter on it can result in diarrheal and parasitic infections. One can rectify this situation by devising a winch system to keep the rope and bucket off the ground, followed by a one-time purification of the well. Boiling of contaminated water will kill all disease organisms, but experience has shown that due to the time and fuel needed to boil water, it is not in reality a practicable solution in many cases.

- A child coming into contact with other people's feces can get diarrheal and parasitic infections. One needs to educate the rest of the community in appropriate disposal techniques.

- Fishermen come into contact with schistosomes indirectly from feces and the cycle of parasitic infection is completed. One needs to educate a community about parasitic infections and treat the community.

- Questioning Hawa alone would not have given an accurate picture of the overall situation.

## 5. Case Example: Large Group Discussion — *15 minutes*

Tell the participants that you want them to practice identifying oral-fecal contamination some more. Distribute Handout 3-3, "Case Examples," and ask them to read the first situation. Then, briefly discuss. Do the same with situations 2 and 3. Move through these quickly.

## 6. Individual/Pair Task: Cause and Effect — *25 minutes*

Ask them to reflect on their own community and to write down some notes in response to the following question (5 minutes):

*Flipchart D: Individual Task*

- In your community, what are three cause-and-effect relationships?

Say that you want to give them a chance to discuss the relationships they identified with one other participant.

*Flipchart E: Pair Task*

- Pair up with another participant.
- Share the three cause-and-effect relationships that you identified in your community.
- Take 15 minutes.

Ask for some examples of cause-and-effect relationships they heard. As a way to summarize and close this activity, pass out Handout 3-4: "Cause-and-Effect Relationships in Oral-Fecal Contamination" and briefly highlight the key points. Stress again that the benefits of good excreta disposal practices can be negated by bad practices nearby.

## 7. Small Group Activity: Exploring Barriers to Behavioral Change *40 minutes*

Say that you want to spend some time exploring barriers to behavioral change and that you've chosen a topic area that most people can relate to: AIDS prevention. Explain that exploring cultural, social, and other barriers to AIDS prevention may help them understand the barriers that other people have to improved excreta disposal practices.

**Trainer Note**: If AIDS as a topic is too culturally sensitive an issue, see the alternative activity on smoking in the Trainer Notes at the end of this session.

Tell the participants they will be working in small groups again. Present Flipchart F.

*Flipchart F: Exploring Behavioral Change in AIDS Prevention*

In your table group,

- Identify the high-risk behaviors associated with contracting AIDS.
- Choose two high-risk behaviors and identify the modified behavior that is advocated by AIDS prevention experts.
- Identify the barriers that keep people from modifying these behaviors.
  - ☐ cultural reasons
  - ☐ social reasons
  - ☐ other reasons
- Take 20 minutes.

Ask groups to first report out high-risk behaviors and the corresponding modified behavior desired. Record the behaviors on a flipchart. Ask the group if all the responses meet the definition of *behavior*. Delete those that do not.

Examples would include

- ☐ having multiple sex partners
- ☐ not using condoms
- ☐ re-using disposable needles

Then ask people to identify the barriers to changing the high-risk behaviors. For example, Why might men not use condoms? Explore whether the barriers are cultural, social, or other. Emphasize the point, if not already made, that even when we know certain behaviors could potentially harm our health—and, in the case of AIDS, kill us—we often resist modifying our behavior for a variety of reasons. Stress that

- Education—giving knowledge—may not be enough. Doing what needs to be done to change behavior is the real challenge.

## 8. Large Group Discussion: Citing High-Risk Behaviors in Excreta Disposal and Some Indicators for Change *30 minutes*

Tell participants they've had a chance to explore the difficulties of behavioral change in an area that concerns many people in a personal way. Now, you want them to look at high-risk behavior associated with excreta disposal.

Define *high-risk behavior* related to excreta disposal as follows:

*Flipchart G: High-Risk Behavior*

High-risk behavior related to excreta disposal is behavior that allows exposure to excreta.

Ask participants for some examples of high-risk behaviors related to excreta disposal. Record their responses on a flipchart.

Review the list and ask if the responses all meet the definition of *behavior*. Add other high-risk behaviors if not volunteered by the group, including the following:

- children defecating indiscriminately
- individuals leaving exposed feces in fields or other areas adjacent to the community or individual houses
- individuals not covering latrine holes if a basic latrine is used
- individuals leaving wiping paper (or other wiping material) exposed
- individuals not washing their hands with soap and water after defecation

Ask participants what the desired or modified behaviors might be for some of the high-risk behaviors cited.

Then say that they obviously will not be able to verify many of the modified behaviors firsthand through observation, but ask,

- What would *indicate to you* that behaviors have changed?

Give the following examples if not volunteered:

- seeing people using the soap and water available at the latrine
- latrine holes covered in basic latrines
- feces and wiping paper not visible
- children can demonstrate the proper use of a latrine

Tell participants they will continue to explore these questions in Sessions 4 and 5.

## 9. Conclusions *10 minutes*

Summarize key points for the session and ask participants to reflect for a few minutes on the following question (on flipchart):

*Flipchart H: Conclusions*

What insights did you gain from this session?

Then ask for responses to the question and record them on a flipchart. Read back through them once all responses have been volunteered.

## 10. Wrap-Up *5 minutes*

Ask:

- What do you especially want to remember to do when you return home?

Review the session objectives and ask if they were achieved. Link this session to the next one by saying that problem clarification requires considerable skillfulness, and they will be working with two of the skill areas that are essential to problem clarification—observation skills and facilitating skills.

Distribute Handouts 3-5, 3-6, and 3-7 as additional reference material for participants. Ask that they read these handouts as a homework assignment. The information they contain will be helpful in upcoming sessions.

**Trainer Notes**

1. If participants come to the training course with strong knowledge and experience in the information contained in Handouts 3-5, 3-6, and 3-7, it may not be necessary to distribute these handouts. On the other hand, if participants in the training course are "generalists" with little knowledge and experience in disease transmission, you may want to consider an optional evening session, using Handouts 3-5, 3-6, and 3-7 as the basis of a lecturette.

2. Alternative activity on smoking for Procedure 7: Say that you want to spend some time exploring barriers to behavioral change, and that you've chosen a topic area that many people can relate to: how to quit smoking tobacco. Ask how many participants smoke. Ask what they see as the medical dangers in smoking. Explain that exploring cultural, social, and other barriers to quitting smoking may help them understand the barriers that other people have to improved excreta disposal practices. Say that they'll be working in small groups again. Present Flipchart F.

   *Flipchart F: Exploring Behavioral Change in Smoking*

   In your table group,

   - Identify the barriers that keep people who smoke from quitting.

- ☐ cultural reasons
- ☐ social reasons
- ☐ other reasons

■ Take 20 minutes.

Continue with Procedure 7 as outlined, making appropriate changes to accommodate this alternative topic.

**Materials**

Handout 3-1: Key Steps in Problem Clarification

Handout 3-2: Case Study—Cause and Effect of Oral-Fecal Contamination

Handout 3-3: Case Examples

Handout 3-4: Cause-and-Effect Relationships in Oral-Fecal Contamination

Handout 3-5: Problems of Sanitation

Handout 3-6: Disease Transmission

Handout 3-7: Blocking Transmission Routes

Flipchart A: Session 3 Objectives

Flipchart B: Key Steps in Problem Clarification

Flipchart C: Case Study Task

Flipchart D: Individual Task

Flipchart E: Pair Task

Flipchart F: Exploring Behavioral Change in AIDS Prevention (or Smoking)

Flipchart G: High-Risk Behavior

Flipchart H: Conclusions

## Key Steps in Problem Clarification

1. **Understand the extent of oral-fecal contamination in a community.**

2. **Identify current high-risk behaviors associated with excreta disposal in the community.**

   *High-risk behaviors* are actions by men, women, and children that allow exposure to human excreta.

3. **Identify indicators of modified behavior.**

   An indicator is an observation or a verbal response that would prove or suggest that a high-risk behavior has been modified or eliminated. Examples are observing that lids cover latrine holes, and seeing a soap dish with soap and a bucket of water next to the family latrine and observing family members use the soap to wash their hands after defecating.

4. **Identify the barriers to changing high-risk behaviors.**

   A *barrier* is a belief, a norm, an attitude, or a condition that either reinforces the high-risk behavior or limits the modified behavior. Barriers can be religious, cultural, social, economic, or technological in nature; and they may not be readily observable.

   For example, a crumbling slab or a dark latrine are conditions that may cause people to fear using the latrine; or religious beliefs may dictate that women and men cannot use the same latrine; or it may be a community norm that a certain abandoned field or lot is an acceptable place for children to defecate. These are all examples of barriers to changing behaviors.

## Case Study—Cause and Effect of Oral-Fecal Contamination

Hawa lives in a community of about 100 families. The government installed two wells many years ago. Both wells were well constructed and provided with hand pumps. One pump broke down a while back and the people in the village took it out and now get water from it by dropping a bucket on a rope down the well. The area around this well is always wet, and the animals in the village often come to drink from the puddles.

Hawa understands about hygiene and tries very hard to keep her family clean and healthy. She dug a latrine near her house sometime ago and trains her children to use it as soon as they are big enough. Hawa has had eight children, two of whom died very young after severe bouts with diarrhea. She has been very careful with her most recent child, who is now two years old.

For the first year, the youngest child did very well, only suffering minor bouts of diarrhea that cleared up very quickly. However, the child now seems to be sick more and more, and nearly always with diarrhea. Hawa works hard at keeping the child clean and is doing well in training her to always use a chamber pot for defecation.

Hawa is very upset about her daughter, because it seems to her that no matter what she does the child still gets sick. In fact, it seems that the more mobile the child gets, the more often she gets sick.

If this wasn't enough, Hawa has noticed that her husband and eldest son, both fishermen at the nearby lake, seem to have less energy and interest in things than they used to have. The son also seems to be getting a swollen belly, almost like a lopsided pregnancy. Hawa talks to her husband, who confirms that he is indeed feeling tired a lot.

Not everyone in Hawa's community is as enlightened as she. In fact, the majority of the people use the surrounding bush and lakeside for defecation, and small children are allowed to go almost anywhere. As Hawa's daughter gets older, she comes into greater contact with other children and animals, and possibly their feces. Both Hawa's husband and son are suffering from cholera, a common disease when infected people defecate near fresh water.

## Case Examples

1. The people of Dombashawa traditionally defecate in the bush. They are aware of the dangers of fecal contamination and always bury their feces. They use a small hoe-like implement for this purpose and always carry it with them when going to relieve themselves.

    - Is this an appropriate means of waste disposal?

2. Bambung is a village close to a river. The people have built defecation platforms over the river. Mothers throw their children's feces into the river. Health workers have tried to convince the people to start using latrines, but the people are not interested and say that their current method is much better. They talk of the smell from latrines and point out that they cannot come into contact with fecal matter by using their current method. The incidence of typhoid and dysentery infection is very high in the community.

    - Is this an appropriate means of excreta disposal?

3. At Bhaktapur in Nepal, community members thought themselves to be healthy. A deworming campaign was carried out, which included a competition to produce the greatest number of ascarides—roundworm that are large and easily seen in feces. Mothers were shocked to discover that their children produced the greatest number of worms. The health workers explained that the worms were caused by improper defecation habits.

    - Why were the children the most infected?

## Cause-and-Effect Relationships in Oral-Fecal Contamination

- Interaction between a practice and its effects:
    - It is important to remember that the effect of a practice may not be "seen" for a very long time, if at all. It can be very difficult for people to understand the link between things—for example, defecating in lakes today and a swollen abdomen from schistosomiasis five years later.
- Feces and water contamination:
    - It is important to understand that water is an ideal medium for the transmission of most pathogens. Once pathogens enter a water source, they have a greater chance of infecting a large number of people.
- Feces and direct transmission of disease:
    - The above point refers to this issue: Harmful organisms will cause disease once ingested by a new host. Disease organisms cannot be seen on hands, and even if hands do not appear to be dirty, they may well be contaminated.
- Feces and indirect transmission through animals:
    - Disease organisms are tiny and can live a long time in the mouth of a dog that has been touching feces. Many disease organisms, for example, schistosomes, spend part of their life in another animal (intermediate host), then leave that animal and enter a new, human host.
- Contamination of food by poor personal hygiene behavior:
    - Otherwise clean hands may well harbor disease organisms if not washed after defecation. Food is also an excellent medium for the growth and reproduction of most disease organisms.

# Problems of Sanitation

## A. Isolation of Fecal Matter

- Throwing waste in rivers or lakes does not guarantee isolation.
- Many diseases are perpetuated by animals—pigs, snails, fish, for example—coming into contact with excrement.
- The need to isolate the feces of small children often goes unaddressed. *It is a misconception that children's feces are not dangerous.*
- Latrines are not the only method of isolation.

## B. Personal Cleanliness

- The crucial times for handwashing are
  - after defecation,
  - before preparing food,
  - before offering food,
  - before eating, and
  - before and after attending to babies.
- It is important to use soap.
- Small children should be bathed daily, and their hands should be washed with soap before they eat.

## C. Contact with Excreta

- Direct contact:
  - touching or treading in your own or other people's feces.

- Indirect contact:
    - feces on food,
    - flies on food,
    - dogs licking people,
    - animals eating feces, then being eaten by people—pigs, cows, fish, and
    - coming into contact with parasites that came from feces, for example, guinea worm.

## D. Consequences of Sanitation Problems

- death,
- pathogen-related diseases,
- economic loss—cost of treatment, loss of productivity, and
- constant illness among children: they will put almost anything in their mouths.

## Disease Transmission

A disease-causing organism is known as a *pathogen*. Four types of pathogens cause disease:

- **Viruses**—Many viruses infect the intestinal tract of people and can be passed on in feces. They can survive outside the body in an inactive state. They can infect a new human host by ingestion or inhalation.
- **Bacteria**—They are found almost everywhere. They can enter a new host by ingestion (in water, food, or dirt), inhalation, through the eye (rubbing eye with fecally contaminated fingers), or by contact with an open wound. During infection, large numbers of bacteria will be passed in feces, thus allowing the spread of infection.
- **Protozoa**—They are often found in the intestinal tracts of humans and animals. Infective forms are passed as cysts in feces. They can often survive in this state for a long time until ingested by a new host.
- **Helminths**(worms)—They have massive powers of reproduction, producing great numbers of eggs, which are often passed in feces and which help to guarantee infection of a new host.

Main methods of disease transmission:

1. Fecal-oral, either directly or through water and food, for example, diarrhea, cholera, typhoid, and poliomyelitis. Example: Water in a protected well may be contaminated from a latrine that is situated too close to the well.
2. Fecal-oral, or through the skin, requiring a length of time outside the body in a suitable environment (usually warm, moist soil). For example, with ascaris (roundworm), trichuris (whipworm), and Ancylostoma (hookworm), infective larvae penetrate unbroken skin, usually the foot.
3. Infections requiring intermediate hosts—three main types:
   - Infections with aquatic intermediate hosts.
     - Schistosomiasis. Excreta from an infected person enters water. Eggs of parasite hatch and enter snail (intermediate host); parasite develops into infectious stage, leaves snail, and penetrates human skin.

- Guinea worm. Eggs break out of skin of infected person in water and enter Cyclops (intermediate host, a tiny water crustacean). Cyclops ingested by humans when drinking.
- Clonorchiasis (liver fluke). Infected excreta enter water, parasite enters snail (first intermediate host). Snail is eaten by fish (second intermediate host). Undercooked fish eaten by humans.

■ Infections with land animals as intermediate hosts.

- Taenia (pig and cow tapeworms). Pig or cow (intermediate host) ingests parasite eggs from infected person's feces; undercooked pork or beef is eaten by human.

■ Infections with insects as intermediate hosts.

- Most of these insects are water related, because the insects involved need water to breed, for example, plasmodium (malaria), Onchocerca (river blindness), filaria (elephantiasis in severe cases). Parasite passed from infected human to intermediate hosts—mosquito (malaria, filariasis) or blackfly (river blindness) when insects take a blood meal. Insects infect the next person they feed on.

## Blocking Transmission Routes

This handout gives several examples of the ways certain contaminating activities can be blocked.

***Object: Hands***

| *Means of Contamination* | *Means of Blocking Transmission* |
|---|---|
| 1. Touching Feces | Wash hands after defecation |
| | Isolate feces |
| | Wash hands after attending to babies |
| 2. Contact with fecally contaminated soil | Wash hands |
| | Stop defecation in fields |
| 3. Contact with dogs' mouths | Wash hands after touching dogs |
| | Avoid touching dogs |

***Object: Food***

| *Means of Contamination* | *Means of Blocking Transmission* |
|---|---|
| 1. Touched by hands | Wash hands before preparing, offering, or eating food |
| 2. Touched by animals | Keep food in protected place |
| 3. Touched by dirty utensils | Clean all utensils before cooking and eating |
| 4. Contaminated in the field | Wash all fruits and vegetables thoroughly |
| 5. Contaminated by parasites | Cook all meat and fish very well isolate feces so animals and fish cannot come into contact with them |

## Session 4

## SKILLS FOR CONDUCTING BEHAVIORAL SURVEYS *3 hours*

### Objectives

By the end of this session, the participants will be able to

- cite key considerations in using observation as a technique for gathering information on excreta disposal practices in a community,
- use four specific facilitative skills that are important for conducting individual interviews and community meetings, and
- practice observational skills.

### Overview

The basis for determining appropriate interventions to improve excreta disposal practices is to first identify current excreta disposal practices. Two skill areas are key in strengthening the capability of development agents to identify current practices accurately: observational skills and facilitative skills.

This session defines the two skill areas within the context of conducting behavioral surveys, which the participants will do in the next session. But these skills—facilitative skills, in particular—are also the essential skills needed when acting as a facilitator or meeting leader. By introducing these skills early in the workshop, the training course provides ample opportunities for participants to practice using them—in the small group activities during the course, during the community survey activities in Sessions 5 and 9, and in the sanitation education practice exercises in Session 13.

### Procedures

**1. Introduction** *10 minutes*

Begin this session by asking,

- What are the possible consequences of not understanding excreta disposal practices when starting a new program?

Expect answers such as having latrines people do not use; only a few people using latrines; poor latrine maintenance; and continued fecal-borne disease.

Say that in this session they are going to work on some specific skills that will help them effectively "clarify the problem," as discussed in the previous session.

Present the session objectives, Flipchart A: "Session 4 Objectives," and provide an overview of the session.

## 2. Skills in Observing Excreta Disposal Practices — *25 minutes*

Discuss the advantages of collecting information by "informal" means, such as observation, rather than informal meetings and interviews, especially as an initial approach to a community. Use the main points from Handout 4-1: "Using Observation to Collect Information" to highlight these advantages. Distribute Handout 4-1.

Then distribute Handout 4-2: "Case Example: Observing Excreta Disposal Behavior." Ask the participants to read the case. Then ask the following questions:

- What are the proper excreta disposal behaviors?

  [Answer: Sweeping the courtyard; washing herself and child with soap.]

- What are the improper excreta disposal behaviors?

  [Answer: Disposal of feces into the drainage ditch; washing pants without soap; discarding dirty water near cooking area.]

- Why is the mother behaving in this way?

  [Answer: She is perhaps too busy first thing in the morning making breakfast; it is a habit; she doesn't think about it; and so on.]

- How much of this information can be obtained through observation?

  [Answer: All.]

- Any reactions to the questionnaire survey results?

  [Answer: The mother may have good intentions, and mostly follow through, but may also get distracted by the many things she is trying to manage; or perhaps the survey was insensitively administered.]

Emphasize again that observation can be a very powerful data-gathering technique, depending on how good one's "lenses" are. Surveys are only as good as the survey taker.

Ask (on flipchart),

*Flipchart B: Key Considerations in Using Observation*

- What are key considerations in using observation as a technique for gathering information on excreta disposal practices in a community?

Record responses. Say that in a few minutes they will have a chance to use their observer "lenses" when they practice facilitative skills.

## 3. Lecturette: Facilitative Skills *30 minutes*

Tell participants that facilitative skills are the basic skills that are needed in conducting community meetings, interviews, sanitation education lessons, and training sessions. They are the skills that will help participants effectively elicit information and encourage the participation and interaction of their audiences.

Explain that these skills are being introduced here to help with the data collection in the next session and in Session 9. But perhaps most important, they are being introduced here on Day 2 of the course to give participants ample opportunity to practice these skills over the next two weeks and to become very good "facilitators." In many respects, their role in developing an excreta disposal management program will be one of a facilitator.

Tell participants that in this course, facilitative skills will be important in the team leader and team member roles they take on in the different course assignments. They will also be important in delivering the community sanitation education sessions toward the end of the course.

Present the facilitative skills on Flipchart C:

*Flipchart C: Facilitation Skills*

- Paraphrasing
- Summarizing
- Asking questions
- Using encouragers

Explain that everyone uses these skills to some extent, but that as facilitators they will have to be extra good at them, and much more aware of thinking about when to use them.

Focus on the key points highlighted on Handout 4-3: "Facilitative Skills." Those key points should be outlined on a flipchart.

Make the following key points:

*Paraphrasing*

- Demonstrate the process of paraphrasing by asking for a volunteer to discuss a subject of your choosing, for example, How is the work going in your region? As you talk with the participant, make a conscious effort to paraphrase at appropriate times using the phrases noted in Handout 4-3.

- Ask participants to identify the phrases you used to introduce paraphrasing and write them down on a flipchart. Ask them for other examples of introductory phrases.

*Summarizing*

- Ask the group to define *summarizing*. Draw out a definition from the group and write it on a flipchart: "Summarizing is...."
- Be aware that every group may define summarizing using slightly different words. It is important for the group to try to come up with its own definition. It may be something like, "Summarizing is recalling and stating in a few words the essence or most important points in a conversation." Explain the contrast with paraphrasing, which is reflecting one statement in your own words.
- Provide examples of two or three starter phrases, such as
  - ☐ These seem to be the key ideas you have expressed....
  - ☐ If I understand you, you feel this way about the situation....
- Ask them to add their own examples of starter phrases and write them on a flipchart.

*Asking Questions*

- Explain the difference between closed and open-ended questions, and then ask them to share briefly some of their own experiences with each type of question. Then ask for suggestions of ways that could help them remember to ask open-ended questions. Some examples might be: writing them down before asking them; thinking about question words before asking someone a question; and deciding what kind of answer they want, and whether the question will elicit the desired response.

*Using Encouragers*

- Explain that encouragers are verbal and nonverbal expressions, such as those listed in Handout 4-3, that help to keep a discussion going.

### 4. Demonstration: Facilitative Skills — *20 minutes*

Explain that you and your co-trainer will conduct a brief demonstration of facilitative skills.

**Trainer Note**: In modeling facilitative skills, as such, you should be well prepared. The survey questions found in Handout 5-1 may be helpful in preparing for this demonstration.

Tell participants that they will be practicing their observer skills by noting the use and impact of all the facilitative skills you have been discussing: asking questions, paraphrasing, summarizing, and using encouragers. Point out that the use of facilitative skills is a *behavior*. They are now being asked to make behavioral observations.

- Have one trainer play the role of a development agent asking a community person for information about hygiene practices. The second trainer plays the role of the community member.
- The community person should be a bit resistant at first, but open up as the development agent asks open-ended questions and uses the other facilitation skills.
- The answers given by the community person should be brief and a bit vague in order to give the development agent the opportunity to use all of the facilitation skills.
- The entire demonstration should last no longer than five or six minutes.

After the demonstration, ask participants:

- What were some of your thoughts as you observed this demonstration? Were questions about hygiene and sanitation asked in a sensitive way? Why or why not?
- Which facilitative skills did you observe being used? Examples? What was the impact of their use on the conversation?

In the discussion, highlight the importance of being neutral when paraphrasing and summarizing in order to reflect accurately what the other person has said. Warn that adding your own opinion or asking leading questions can contaminate the information you collect by changing it from its original intent.

### 5. Individual Task: Preparation for Facilitative and Observational Skills — *15 minutes*

Explain that you want to give them an opportunity to practice their facilitative skills and their observational skills.

This situation is one in which they will be trying to convince a community committee president that the survey they want to conduct in his community is worthwhile. Although the practice session will not be an interview, say that it is one they are likely to encounter before doing interviews and that it will put their skills to the test.

Distribute Handout 4-4: "Extension Agent Role Play Sheet." Give them the following individual task on Flipchart D:

*Flipchart D: Individual Task*

- Read the extension agent role description.
- Decide what your strategy will be in approaching the committee president. For example, what open-ended questions will you ask?
- Review Handout 4-3, and think about how you will paraphrase and summarize in the conversation.

- Take 10 minutes.

## 6. Practicing Facilitative and Observational Skills *50 minutes*

Break the participants into two groups with an equal number of participants in each group, preferably in different rooms, one group per trainer. Take a short break before the two subgroups convene.

During the break, identify one participant per subgroup who can play the role of the committee president, and give those two people Handout 4-5: "Committee President Role Play Sheet." Give them time to read the role, and then explain that they should act as naturally as possible without trying to trap the other person.

Begin the role play in each subgroup by asking for a volunteer to play the role of the extension agent.

Ask those not playing the roles to be observers and to take notes on all the facilitative skills used. Remind the person playing the role of the extension agent that the goal of the activity is to practice facilitative skills.

Allow the role play to last about five minutes, then conduct a brief feedback session, asking the observers which skills they saw and what their impact was on the conversation. Ask the role players for their reactions. Add your own observations, stressing the positive as much as possible.

Repeat for a second volunteer and, if possible, for a third volunteer.

## 7. Debriefing Practice *20 minutes*

Bring the entire group together and briefly share your observations, and those of your co-trainer, on how the facilitation practice session went. Use this discussion as an opportunity to reinforce the points made in the earlier presentation about effective communication. Say again that these skills are key skills in their role as facilitator.

Then ask,

- For those of you who were observers, how successful were you at observing others? How did it feel observing others?
- For those of you who were observed, how did it feel to be observed?
- How might being observed have changed behavior?
- What will be important to do or keep in mind in preparing your observation protocol? (Add responses to Flipchart B list.)

## 8. Wrap-Up *10 minutes*

Pass out Handout 4-6: "Facilitative and Observational Skills," and ask participants to jot down some of their thoughts regarding the questions for future reference.

Review the session goals and ask if they were met. Tell participants that in the next session they will have a chance to apply some of the skills they have just learned.

### Materials

Handout 4-1: Using Observation to Collect Information

Handout 4-2: Case Example: Observing Excreta Disposal Behavior

Handout 4-3: Facilitative Skills

Handout 4-4: Extension Agent Role Play Sheet

Handout 4-5: Committee President Role Play Sheet

Handout 4-6: Facilitative and Observational Skills

Flipchart A: Session 4 Objectives

Flipchart B: Key Considerations in Using Observation

Flipchart C: Facilitative Skills

Flipchart D: Individual Task

## Using Observation to Collect Information

Information collection by observation can prove as valuable as more formal means of information collection—meetings and interviews, for example—especially as an initial approach to a community.

Using observation to collect information is important, for the reasons outlined below.

- Observation can easily be carried out during initial visits while you are getting to know the community and they are getting to know you.
- Information gathered will help to direct a more formal survey to be carried out at a later date.
- Observation may yield information that people are reluctant to give if asked formally.
- Observation gives "true" information. In more formal meetings and interviews, people sometimes respond to questions with answers that they think the questioner wants to hear, or with information about what they indeed sometimes do when the situation is right—for example, when they are close to a latrine, when they have time, when they're not occupied doing something else.

  For these reasons, especially, observation is important in determining children's behaviors and mothers' behaviors with small children.
- Observation allows you to see the community interacting and to see who is respected and influential.
- Because observation provides "true" information on practices, it can give a starting point for modifying excreta disposal behaviors.

## Case Example: Observing Excreta Disposal Behavior

A development worker collecting data on the disposal of children's feces paid an early morning visit to the young mother of a one-year-old child. She has visited with the young mother in the past, and they have had general discussions on infant care.

Arriving just after dawn, the development worker found that the mother had already lit the fire and swept the terrace in front of the house. When the mother noticed that her child had defecated on the ground, she covered the feces with sand, swept them up, and threw them in the dry drainage channel behind the courtyard.

The mother then dressed the child in a pair of light cotton pants, in which the child again defecated. The mother rinsed off the child with plain water and rinsed the pants in plain water, as well. The dirty water was then thrown on the ground in a corner close to the cooking area. The mother then went to wash herself with soap, dressed herself in clean clothing, and bathed the child with medicinal soap.

The same mother, in an earlier questionnaire survey, had responded to a question about children's feces disposal by saying that the child defecated in a pot, whose contents were thrown in a latrine.

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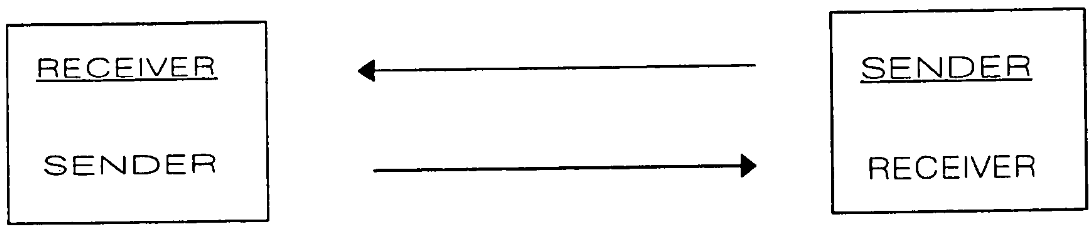
Note: This case example is based on an actual occurrence. From WASH Technical Report No. 72, *Rethinking Sanitation: Adding Behavioral Change to the Project Mix*. Prepared by May Yacoob, Barri Braddy, and Lynda Edwards. July 1992.

# Facilitative Skills

## A. Introduction

Communication seems like a simple process of sending and receiving information among people:




But it is one of the more complex things that humans do. We may think we are sending a clear message, but the person who receives it hears it differently from the way it was intended. Sometimes we are distracted and do not "hear" or listen very carefully. One way to ensure that effective communication is really taking place is to use the skills of paraphrasing, summarizing, and question asking—facilitative skills.

## B. Facilitative Skills Contribute to Effective Meetings

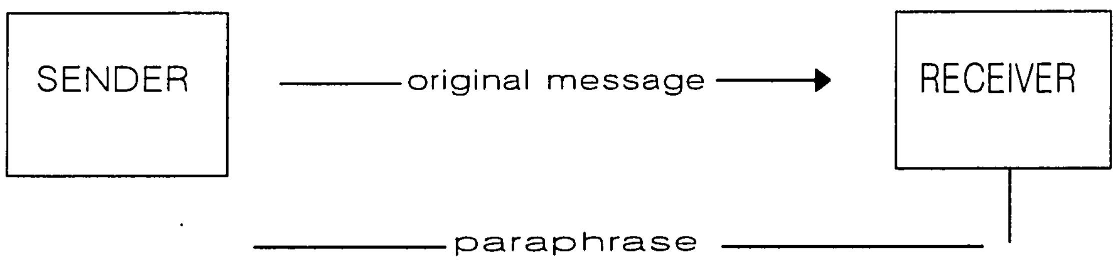
Meetings can be called for a variety of purposes. Some are held simply as a means to pass information. But, when held for the purpose of planning or problem solving, or whenever group participation is required, meetings need special leadership. For such meetings, development agents must be able to use facilitative skills competently. In addition to encouraging participation, using facilitative skills ensures that communication will be clearer and more accurate.

When a meeting leader or chairperson uses facilitative skills well, people contribute, meetings are productive, and the leader's work appears effortless. It looks natural. Because it looks so natural, people often assume that meeting leaders are born and not made. Although there is some truth in this, certain meeting leadership skills can be learned, and those skills will significantly improve your ability to lead meetings.

There are three very important facilitative skills that a meeting leader must use effectively: paraphrasing, asking questions, and summarizing. These skills are simple in concept and simple to understand, but they are not necessarily simple to carry out. With continued practice, one can become very adept in their use, however.

### C. Paraphrasing

Paraphrasing is "capturing the meaning of a statement and saying it back to the other person in your own words":




Paraphrasing usually begins with such phrases as,

> "You are saying ..." [then say in your own words what has been said]
>
> "In other words ..."
>
> "I gather that ..."
>
> "If I understood what you are saying ..."
>
> "You mean ..."

The best way to paraphrase is to listen very intently to what the other person is saying. If, while the other person is talking, you worry about what you are going to say next or are making mental evaluations and critical comments, you are not likely to hear enough of the message to paraphrase it accurately.

It is helpful to paraphrase, so that you develop a habit of doing so. You can even interrupt to do so, since people generally don't mind interruptions that co icate understanding. For example, "Pardon my interruption, but let me see if I understand what you are saying...."

Example:

Person A — *It seems the basic problem is that some of the people don't know how to use the survey worksheet.*

Person B — *In other words, you see the problem as lack of know-how.*

Another example:

Person A — *I think the most important thing is to help people understand clearly how current practices are contributing to the problem.*

Person B — *So you are saying it's important to tell the people directly what kind of impact their behavior is having on the problem.*

## D. Asking Questions

Asking questions is a critical facilitative skill. Questions can be asked in two ways—as closed questions and as open-ended questions.

### *Closed Questions*

Closed questions generally result in yes/no or other one-word answers. They should only be used when you want precise, short answers. Otherwise, they tend to inhibit discussion. The closed question can be answered with one word.

Example:

Meeting leader: *Do you think that recommendation will work?*

Participant: *No.*

### *Open-Ended Questions*

The open-ended question requires elaboration. Asking, "What do you like about that recommendation?" seeks information. How? What? Why? are words that often begin open-ended questions.

Examples:

| | |
|---|---|
| Meeting leader: | *What did you like about that recommendation?* |
| Participant: | *I think it is a good strategy for resolving the issue, one that can be implemented without expending a lot of resources.* |
| Meeting leader: | *What kind of progress are you making against your financial goals for this quarter?* |
| Participant: | *Let's consider the first one a minute ... our numbers are as follows....* |

## E. Summarizing

The purpose of summarizing is to

- pull important ideas, facts, or data together;
- establish a basis for further discussion, or to make a transition;
- review progress; or
- check for clarity and agreement.

By using summarizing in a meeting, you can encourage people to be more reflective about their positions as they listen for accuracy and emphasis.

Summarizing requires that you listen carefully so you can organize and present information systematically. Summarized information ensures that everyone in the meeting is clear about what transpired in the just-completed portion of the discussion.

For example, as a meeting leader, you may summarize to ensure that participants remember what has been said or to emphasize key points made during a group discussion. Or, perhaps most important, you may use summarizing as a way to reach a decision or bring closure to a topic and move the meeting on to the next agenda item. In these instances, summarizing is very useful. The following are some starter phrases to help you begin a summary:

- *There seem to be some key ideas expressed here....*
- *If I understand you, you feel this way about the situation ...*
- *I think we agree on this decision—what we are saying is that we intend to....*

An important value of summarizing is that it gives you the opportunity to check for agreement. If people do not agree, it is better for you to know during the meeting than to find out later when a task is not completed or a deadline is missed. One of the most common meeting complaints is that some meeting participants think an agreement has been reached, yet later things do not occur as planned. In many instances that is because there was not really agreement during the meeting.

As an example of summarizing, assume that someone named Joseph has talked for three or four minutes, and you summarize as follows:

*Let me see if I have it straight, Joseph. First, you say the work is behind schedule, not carefully supervised, and finally, you are concerned about the number of hours laborers are taking to do the work, correct?*

As another example, the meeting discussion has gone on for several minutes and you summarize as follows:

*In talking about this issue, we have come up with three main points....*

In summary, this facilitative skill is a deliberate effort on the part of a meeting leader to pull together the main points made by the person or persons involved in the discussion.

### F. Other Facilitative Skills

There are a number of other helpful facilitative skills, some verbal, some nonverbal. Examples are

- nodding one's head
- picking up on the last word or two of someone else's sentence
- repeating a sentence, or part of a sentence
- saying, "That's good—anybody else have anything to add?"
- saying, "Uh-huh"

## Extension Agent Role Play Sheet

You are an extension agent from the Community Development Agency of the Ministry of Public Health. One of the communities where you work is Koulika, where the Community Sanitation Committee has worked very hard to promote the construction of family latrines. You want to begin a sanitation education program in Koulika to make sure that people in the community will maintain the new latrines and make proper use of them.

You think that it is very important to carry out a survey of current excreta disposal practices in the community in order to plan appropriate sanitation education activities. The committee president thinks he knows that information already; you think he is not in touch with many parts of the community, and do not trust the information he claims to have. You think the survey should be conducted in a very organized manner, and you have specific ideas about what should be done and who should help you do it.

You want to do this survey next week, starting on Tuesday. It will take five days. On each of these days you will need two people to accompany you to translate and take notes, two to inspect existing family latrines for general maintenance and cleanliness practices, and two to spend time observing excreta behavior practices in each section of the community. You have to conduct the survey on these days because you are committed to work in another community the following week.

You are about to meet with the committee president to gain his support for the survey.

## Committee President Role Play Sheet

You are the president of the Community Sanitation Committee in Koulika. You and others on the committee have worked very hard to promote the construction of family latrines in your community. You are one of the elders in the community, and your role as president has made you very popular with other people in the community.

You have been working with a young extension agent from the Ministry of Public Health to prepare for sanitation education activities. He is well intentioned, but his suggestions always seem unnecessarily complicated. For example, before receiving approval for ministry funding to support some of the latrine construction costs, he insisted on meeting not only with your committee, but with several other individuals in the community. He asked these people a lot of questions you thought were not important. In any case, you could have given him all of the information he needed, saving everyone a lot of time and trouble.

Now, this extension agent wants to start some kind of an educational program. You do not see the need to educate people about latrines, since they obviously know how to use them—they have been very excited about the new latrines. But you are willing to let him organize a few sessions, just to keep him happy. After all, it is important to maintain good relations with the Ministry of Public Health. However, he insists on talking to several people once again, even before he starts the educational program.

You are annoyed with this insistence, and you plan to talk him out of bothering more people in the community with a bunch of questions. You would be willing to give him all the information he needs yourself, since, after all, you represent the community, and they trust you.

You are about to meet with the extension agent to discuss your views on what he wants to do to prepare for the educational program.

# Facilitative and Observational Skills

## Reflection Questions

1. What do you want to especially remember to do or keep in mind when using observational techniques?
2. What are the important things you want to remember about using facilitative skills in this course and in your work?

## Session 5

# CONDUCTING A SURVEY OF EXCRETA DISPOSAL PRACTICES

*6 hours*

### Objectives

By the end of the session, the participants will be able to

- develop an observation and interview protocol to identify specific excreta disposal practices in a community, by both children and adults, and
- apply observational skills and facilitative skills to gather information about community excreta disposal practices and the perceived needs of people.

### Overview

This session provides participants the opportunity to prepare for and conduct a community survey.

Collecting and analyzing information in a community prior to designing an excreta disposal management program will enable development agents to understand better important factors in the community. These factors include prevalent high-risk behaviors; beliefs, norms, and other potential barriers; and the perceived needs and interests of people. The combination of these and other factors will influence the interventions selected to address the problem.

Participants involve community members in this process by working with local counterparts. The counterparts contribute to information collection as informants and also benefit from the activity by discovering problems and seeing the human and physical habits in their community in a new light.

Participants travel to a nearby community to conduct the survey with the assistance of community counterparts. When they return to the classroom, participants report on their initial findings. The next session, Session 6, helps participants draw conclusions about sanitary practices in the community.

## Procedures

### 1. Introduction *5 minutes*

Start by asking participants for some ideas about what they would like to know about a community before starting an excreta disposal management program. Review the key elements of problem clarification, Part 1 of the three-step model for developing an excreta disposal management program.

Discuss the importance of collecting information from the community by focusing on the need to avoid making too many assumptions about beliefs and practices; to base activities on realities; to establish baselines against which to measure improvements in excreta disposal practices; and to help community members discover problems on their own.

Present the objectives on Flipchart A, "Session 5 Objectives," and ask if they are clear.

Explain that this session has three major parts:

- Preparation for the field exercise — 1 hour
- Field exercise — 3 hours
- Debriefing the field exercise — 2 hours

### 2. Large Group Discussion: Observation and Question-Asking Protocol

*20 minutes*

Explain that participants now have some time to prepare for gathering information on excreta disposal practices in a nearby community. Say that this activity will require a combination of observation and informal questioning.

Ask participants,

- What are your experiences in conducting community interviews or surveys?
- What approaches have you found to be effective?

Emphasize (if not already mentioned) the delicacy of asking questions about topics that are personal and private.

Distribute Handout 5-1: "Information Collection Worksheet on Human Excreta Disposal Practices" and Handout 5-2: "Sample of Completed Page of Information Collection Worksheet." Ask participants to read them. Explain that when planning to collect information in a community, one must decide

- what type of information to collect
- from whom

- which method of data collection to use

Ask them to take a few minutes to review the first column in the sample worksheets: "What information to collect." Answer any clarifying questions. Then ask them to review the other column in the worksheet: "From whom/where." Answer any clarifying questions.

Say that the items on this worksheet are not meant to be exhaustive. Ask,

- What are some different ways to get the information identified in the worksheet?

Challenge participants as to the pros and cons of the various ways to get information. Stress that the three hours they will have in the community to gather information are for practicing observational and facilitative skills—that is, in their own communities they might collect the information over several months. The key is getting the right information.

Explain that they will be conducting the survey in three-person teams. Discuss the best way to approach people—introductions, greetings, politeness, friendliness, and explaining what they are doing in the community. Add that each team will work with a community counterpart, who will help guide the team members through the community.

Ask which facilitative skills will be most important in this activity. [All of them are important!]

## 3. Team Task: Preparing an Observation and Question-Asking Protocol

***40 minutes***

Ask each team to do the following (Flipchart B):

*Flipchart B: Preparation for Information-Gathering Task*

- Review with your teammates the information you will collect.
- Discuss how you will approach and interact with your community counterpart.
- Prepare for your field exercise:
  - What questions might you ask?
  - What might you try to observe, and where?
  - Who might you try to ask questions of, and how?
  - What problems might you expect to encounter?
- Agree among the team members who will take the lead for each question area. Try to memorize the questions and avoid note-taking during the field exercise.
- Take 35 minutes.

Divide the participants into teams of three people each. Move among the teams to answer questions and provide assistance.

## 4. Set Up and Conduct Field Exercise *3 hours*

Describe each step in the field exercise and the amount of time allotted. Explain where each team will be in the community and how it can get there (or how it will get there if transportation is needed and provided). Travel time to the site should be estimated at 15 to 20 minutes.

Once at the site, each team will spend about 15 minutes reviewing its proposed approach with the community counterpart who will be accompanying it. At this point, the trainers are still available for last-minute questions or comments.

The time allotted for collecting the information is 2.5 hours.

**Trainer Note**: It will be important that participants visit market areas, churches and mosques, and taxi stations. These sites offer good opportunities for observation.

**Trainer Note**: It is suggested that you break for the day here at the conclusion of the field exercise.

## 5. Debriefing the Exercise *1 hour, 30 minutes*

Give each team 30 minutes to record the information they collected. Then ask each group to share one answer from its list. Write their answers on Flipchart C: "Worksheet Grid" (Handout 5.1 on flipchart). Go around again until the grid is filled with as much information as is reasonable.

Discuss the following:

- How did it feel to ask people these kinds of questions?
- What was easy/difficult about carrying out the observation?
- Where does there seem to be agreement in the information collected?
- Which kind of data are easier to collect? Which are more difficult? Why?
- Where are the gaps in information, and what are the best ways of filling them?
- What were the advantages/disadvantages in working with a community counterpart?

## 6. Conclusions *15 minutes*

Ask the participants to review the flipcharts generated by the teams and think about what they learned from the field exercise about collecting sanitation information in a community. Ask the following question:

*Flipchart D: Conclusions*

- What are the most important things you learned about methods for collecting information in a community?

### 7. Wrap-Up *10 minutes*

Summarize what the participants learned about the field exercise. Then ask,

- How might you apply what you learned in this exercise in your own community?

Say that information gathering is a process; survey taking is just part of it. Before deciding on any solutions, there's additional information to collect, which they'll have a chance to gather in Session 9.

Return to the session objectives and ask if they were reached. Say that in the next session, "Determining Appropriate Interventions," participants will analyze their data further, and in particular identify the high-risk behaviors related to excreta disposal that they observed during the field exercise.

Tell participants that they will also review their data in Session 15, "Monitoring and Evaluation," so they should save their notes.

**Trainer Notes**

Prior preparation of the community for this field exercise is essential. The community should understand the purpose and structure of the field exercise and what is expected of them. Six to eight members of the community (if possible) should be designated to work with the teams, one per three-member team.

Given the tight schedule of the field exercise, it is recommended that a representative of the training staff visit the community the night before the field exercise to remind people of the exercise and when it will start. It would also be helpful for the same person to return to the community an hour before the scheduled start of the field exercise.

**Materials**

Handout 5-1: Information Collection Worksheet on Human Excreta Disposal Practices

Handout 5-2: Sample of Completed Page of Information Collection Worksheet

Flipchart A: Session 5 Objectives

Flipchart B: Preparation for Information-Gathering Task

Flipchart C: Worksheet Grid

Flipchart D: Conclusions

## Information Collection Worksheet on Human Excreta Disposal Practices

| What Information to Collect | From Whom/Where | How to Collect It | Data Collected |
|---|---|---|---|
| 1. *Accepted Behavior** | | | |
| a. Places where people defecate | | | |
| ■ Men | | | |
| ■ Women | | | |
| ■ Children | | | |
| ■ Infants | | | |
| b. Places where infant diapers/feces are disposed of | | | |

*The word *accepted* implies that the behavior is a general community norm.



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| What Information to Collect | From Whom/Where | How to Collect It | Data Collected |
|---|---|---|---|
| c. Methods for cleaning excreta from | | | |
| ■ infants (following defecation) | | | |
| ■ in infant clothing/diapers | | | |
| ■ in house or courtyard | | | |
| d. What is done with water used in cleaning excreta in the above situations? | | | |
| 2. *Other Question Areas* | | | |
| a. Presence of feces | | | |
| ■ near water sources | | | |
| ■ in house/courtyard | | | |
| ■ on exposed paper or other anal cleansing material | | | |

| What Information to Collect | From Whom/Where | How to Collect It | Data Collected |
|---|---|---|---|
| b. Types of anal cleansing materials | | | |
| c. Existing sanitation facilities/systems | | | |
| d. What do people describe as good sanitation practices? | | | |
| e. What do people say they need? | | | |
| f. What do people believe regarding the danger of feces?<br>■ adult feces<br>■ child/infant feces | | | |

## Sample of Completed Page of Information Collection Worksheet

| What Information to Collect | From Whom/Where | How to Collect It | Data Collected |
|---|---|---|---|
| 1. *Accepted Behavior* | | | |
| a. Places where people defecate | | | |
| ■ Men | Men/children | Ask/observe | In farm fields<br>In special area by river |
| ■ Women | Women/children | Ask/observe | In farm fields<br>In special area by river |
| ■ Children | Women/children/men | Ask/observe | In trash heaps |
| ■ Infants | Mothers/children | Ask/observe | In courtyard |
| b. Places where infant diapers/feces are disposed of | Mothers/children | Ask/observe | In trash heaps |

Session **6**

# DETERMINING APPROPRIATE INTERVENTIONS

***4 hours, 20 minutes***

## Objectives

By the end of this session, the participants will be able to

- analyze excreta disposal practices observed in a community survey and clarify
  - high-risk behaviors that are difficult and less difficult to change,
  - indicators of adequately modified behaviors, and
  - barriers that keep people from modifying their behavior;
- describe the difference between a problem and a need;
- list the potential interventions and combinations of interventions that can help reduce the incidence of high-risk behaviors in a community; and
- identify the additional information needed in choosing the appropriate intervention(s).

## Overview

This session presents Part 2 of the three-part model for excreta disposal management introduced in Session 2. Part 2 of the model, determining appropriate interventions, builds on the effort initiated in Part 1, problem clarification—that is, once development agents or planners know what the current excreta disposal practices are in a community or peri-urban area, they are ready to determine what it will take to modify those practices in ways that reduce the high-risk behaviors associated with excreta disposal.

This session begins with further analysis of the community survey conducted in the previous session. The survey teams meet to identify the high-risk behaviors they discovered in the community, the specific indicators that would suggest that a particular high-risk behavior has been modified, and the barriers to modifying those high-risk behaviors.

Next, participants explore the possible "bridges" over some of the barriers they previously identified. The trainers introduce additional possibilities for "bridges"—that is, appropriate interventions, including latrines, sanitation education, and policy changes. Participants then clarify the additional information that would help them determine the appropriate interventions for the community they surveyed.

## Procedures

### 1. Introduction *10 minutes*

Begin by referring participants back to Flipchart E in Session 2, "Three-Part Model of an Effective Excreta Disposal Management Program." Say that in this session they will be focusing on the second part of the three-part model for excreta disposal management: determining appropriate interventions.

Stress that Part 2 builds on the work of Part 1. If Part 1 were not well executed, however, Part 2 of the model will likely not result in the best interventions for the right problems.

Ask participants for some examples of instances in the past in which the intervention introduced did not appropriately match the problem. Solicit several examples, including examples from other sectors, such as agriculture and energy.

Tell participants that the purpose of this session is to explore how best to match the problem and the interventions—an essential capability in developing an appropriate excreta management program in a community.

Present a brief session overview in your own words and present the objectives on Flipchart A: "Session 6 Objectives." Ask if the objectives are clear.

### 2. Survey Team Task I: Identifying High-Risk Behaviors *35 minutes*

Explain that in this activity participants will further analyze their data from the community surveys conducted in Session 5. In particular, they will try to clarify the following (Flipchart B):

*Flipchart B: Analyzing the Survey Data*

Your survey information should help you clarify

- the high-risk behaviors prevalent in the community,
- the indicators that high-risk behaviors have been modified or eliminated, and
- some of the barriers to modifying high-risk behavior.

Remind participants that high-risk behavior associated with excreta disposal is defined as *behavior that allows exposure to excreta*. Review the definition of *behavior*.

Emphasize that securing this information, and being confident that it is accurate, can sometimes require several excursions into the community.

Explain that this activity will involve three consecutive team tasks, following which teams will have an opportunity to display the results of their analysis.

Say that now they will return to their survey teams to first identify the high-risk behaviors prevalent in the community. Present the following team task (Flipchart C):

*Flipchart C: Survey Team Task I*

- Review your team's data.
- List on a flipchart all high-risk behaviors that you discovered in the community—either through observation or interviews.
- Circle those behaviors you think will be very difficult, if not impossible, to change.
- Underline what you see as the three most serious high-risk behaviors. (Be prepared to say why they are the most serious.)
- Take 30 minutes.

After 25 minutes, bring the teams back together to say that next you are going to ask them to determine indicators of changed behavior.

**Trainer Note**: It will be necessary to circulate among the teams to ensure that all participants understand the definition of a high-risk behavior and that they are listing human behaviors. For example, "smelly latrines with flies" is not a behavior; it is a barrier that discourages people from using latrines. Barriers are discussed in Procedure 4 below.

### 3. Team Task II: Identifying Indicators of Modified Behavior — *35 minutes*

Remind participants that in Session 3 they had a chance to identify some indicators of modified behavior. Review the definition of an *indicator* (Flipchart D).

*Flipchart D: Indicators of Modified Behavior*

An observation or a verbal response that would prove or suggest that a high-risk behavior has been modified or eliminated.

Ask for an example. One example, for instance, of an indicator of modified behavior would be seeing people use the soap dish and water provided at the latrine. Another example would be seeing a parent accompanying a child to the latrine.

Say that now they will return to their survey team to identify indicators of modified behavior (Flipchart E).

*Flipchart E: Team Task II*

For the three most serious high-risk behaviors identified in Team Task I,

- Discuss what you would have to see or learn in a future community visit to *indicate* that these high-risk behaviors have been modified or eliminated.
- List on a flipchart "indicators" for each of the three high-risk behaviors.
- Take 30 minutes.

Trainers should circulate among the teams to assist with any difficulties of understanding.

After 30 minutes, say that they will now look at barriers to changing behavior.

## 4. Team Task III: Barriers to Modifying Behavior *30 minutes*

Remind participants that in Session 3 they had a chance in the AIDS prevention activity to explore some of the barriers to changing behavior. Review the definition of a *barrier* from Handout 3-1.

> *Flipchart F: Barriers to Changing Behavior*
>
> A belief, a norm, an attitude, or a condition that either reinforces the high-risk behavior or limits the modified behavior. These barriers can be religious, cultural, social, economic, or technological in nature, and they may not be readily observable.

Say that now they will return to their survey team to identify barriers to modifying behaviors (Flipchart G).

> *Flipchart G: Team Task III*
>
> For the three most serious high-risk behaviors identified in Team Task I:
>
> - Discuss the possible barriers to modifying these high-risk behaviors.
> - List on a flipchart "barriers" for each of the three high-risk behaviors.
> - Take 25 minutes.

Trainers should circulate among teams to assist with any difficulties of understanding.

After 25 minutes, ask teams to post their flipcharts around the room.

## 5. Team Reports *30 minutes*

Tell participants to take a few minutes to go around the room and read the displayed flipcharts.

**Trainer Note**: Trainers should also review the flipcharts to take note of (1) any listed behaviors that are not behaviors, (2) the differences among the teams, especially in the high-risk behaviors circled or underlined and the indicators and barriers identified, and (3) any points with which you disagree.

After 10 minutes, bring the participants back together.

Lead a discussion of the team results by asking the following questions:

- What were some of the accepted behaviors you determined to be low-risk behaviors? Why is it important to know the low-risk behaviors prevalent in a community?

[Two reasons: to capitalize on those behaviors in developing an excreta management program; and to know what you don't need to emphasize in sanitation education sessions.]

- Compare and contrast circled behaviors among the teams. Challenge circled responses if you or others disagree. Why do people see them as impossible behaviors to change?
- Compare and contrast underlined responses among the teams. Why did teams see different high-risk behaviors as more serious?
- Compare and contrast the indicators of modified behavior identified by the teams. Are any indicators missing from the team reports?
- Compare and contrast the barriers identified by the teams. Which barriers will be more difficult or less difficult to bridge?

Emphasize that overcoming barriers or changing conditions is no guarantee that behaviors will be changed as a result.

Say that they'll be going back to this question of "overcoming barriers" when they move into the discussion of appropriate interventions.

Ask participants as a group to summarize briefly the results of Part 1, Problem Clarification, for the community they've just surveyed.

## 6. Small Group Task: Distinguishing Problems and Needs — *30 minutes*

Tell the participants that the above analysis of their survey data has helped to clarify the problem, which is a key requirement in moving to Part 2 of the model, determining appropriate interventions. Before they move to Part 2, however, you want them to discuss the distinction between problems and needs and to compare the needs people expressed during the survey with their clarification of the problem.

Briefly highlight the differences between problems and needs. Stress that *problems* are always complex situations; they have more than one cause or are affected by several conditions and therefore have several possible solutions. *Needs* express a solution to an underlying problem. "We don't have enough latrines" is not a problem, but more latrines is a possible solution to the underlying problem of exposed human excreta in the community.

Explain that development agents must help communities understand the difference between problems and needs before they start identifying their problems. Say that this next activity will give them a chance to practice distinguishing between problems and needs.

Distribute Handout 6-1: "Problems and Needs Exercise." Present the small group task on Flipchart H.

*Flipchart H: Instructions for Problems and Needs Exercise*

In your table group,

- Read Handout 6-1: "Problems and Needs Exercise."
- Complete the task as a group and as described in the handout.
- Take 25 minutes.

### 7. Large Group Discussion: Problems and Needs ***30 minutes***

Display Flipchart I: "Problem and Need Statements"; the numbers of all the problem and need statements from Handout 6-1 should be listed on the left. Go through the list of statements on the handout one at a time and ask each group to state whether they thought it described a problem or a need. Reach agreement on each one and write "P" or "N" next to that number.

The first few statements are relatively simple and most groups will probably get them right. The rest are more difficult and there may be a difference of opinion. Use Handout 6-2: "Distinguishing Problems from Needs" to discuss each statement that is unclear to participants.

Ask,

- How do you distinguish between a problem and a need?
- What were some of the needs that were expressed to you during the community survey?

Record responses to the second question on a flipchart. Stress that

- The high-risk behaviors identified in the community constitute the *problem*.
- Development work is aimed at addressing the problems.
- Responding to a need may or may not solve the problem.

Ask,

- How well do people's perceptions of their needs match our clarification of the problem?

Emphasize that mismatches often suggest the need for education. Then ask participants why it is important for a community to be able to distinguish between a problem and a need.

At the end of this discussion, distribute Handout 6-2.

## 8. Large Group Discussion: Determining Appropriate Interventions *40 minutes*

Now that high-risk behaviors—the *problem*—have been clarified, we're ready to determine appropriate interventions, including interventions that help "overcome" barriers.

Briefly review the elements of Part 2 of the model from Handout 2-1 on Flipchart J.

*Flipchart J: Determining Appropriate Interventions*

- What is the problem(s)?
- What do people say they need? What are they interested in?
- What has been done before?
- What local or national policies affect sanitation practices or latrine choices?
- What interventions would help reduce or eliminate high-risk behaviors associated with excreta disposal?
  - latrines
  - sanitation education, referring specifically to isolation of human excreta
  - local and national policy changes
- What are the technological options?
- What interventions would help bridge religious or other barriers to changing behavior?
- What human and organizational resources are available to ensure program sustainability?

Tell participants that two of the interventions—latrines and sanitation education—will be the focus of the remainder of this course. Refer to the course schedule.

**Trainer Note**: Keeping school latrines locked on weekends is an example of a local policy that affects sanitation practices. Children playing on the school soccer field over the weekend might defecate in an adjacent area as a result of this policy.

Ask participants for which of the above questions do they still lack information on for the community they surveyed. Discuss how they could go about getting that information. For example,

- Who could they interview to find out what's been done before?
- How can they determine what human and organizational resources are available to ensure program sustainability?

Point out that Session 9, "Information Collection Field Exercise," will provide them with an opportunity to gather this information.

Say that you now want them to look more closely at the question, What interventions would help overcome religious or other barriers to changing behavior?

Refer to one of the circled examples from the team flipcharts on high-risk behaviors that would be difficult to modify. Ask,

- What are possible ways to overcome or sidestep this barrier?

Take one of the uncircled examples of high-risk behaviors that would be less difficult to change. Ask the same question. Repeat this procedure as time permits.

Emphasize in closing the discussion that if one is creative and searches hard enough, there are usually bridges over most barriers.

## 9. Conclusions *10 minutes*

Summarize the key points for the session and ask participants to reflect for a few minutes on the following question (Flipchart K):

*Flipchart K: Conclusions*

What insights did you gain from this session?

Then ask for responses to the question. Record the responses and read back through them once all responses have been volunteered.

## 10. Wrap-Up *10 minutes*

Ask,

- What do you especially want to remember to do when you return home?

Take a few responses. Review the session objectives and ask if they were achieved. Link this session to the next one by saying that next participants will be looking at latrines as a possible appropriate intervention.

### Materials

Handout 6-1: Problems and Needs Exercise

Handout 6-2: Distinguishing Problems from Needs

Flipchart A: Session 6 Objectives

Flipchart B: Analyzing the Survey Data

Flipchart C: Survey Team Task I

Flipchart D: Indicators of Modified Behavior

Flipchart E: Team Task II

Flipchart F: Barriers to Changing Behavior

Flipchart G: Team Task III

Flipchart H: Instructions for Problems and Needs Exercise

Flipchart I: Problem and Need Statements

Flipchart J: Determining Appropriate Interventions

Flipchart K: Conclusions

## Problems and Needs Exercise

Development agents must to be able to distinguish between community problems and needs so that they can help the community identify its real problems and not just its needs. Review the following list of statements and write "P" next to the problems and "N" next to the needs.

____ 1. Eighty percent of the adults in our community defecate in the community woodlot, leaving feces exposed.

____ 2. Most of the children 10 years old and under defecate indiscriminately in the community.

____ 3. There is no health professional in the community.

____ 4. We need one latrine for each family in the community to improve sanitary conditions.

____ 5. Twenty-five percent of the children in the community die before they are five years old. We need better health care.

____ 6. There is no place to buy oral-rehydration solution (ORS) in the community, so children suffer from diarrhea.

____ 7. Our children die of measles because the immunization team did not come to vaccinate the babies last year.

____ 8. Women are collecting drinking water from the swamp during the rainy season, and they do not boil it. We need clean water in the community. The closest good water is 5 kilometers away.

____ 9. We do not eat enough meat to stay healthy.

____ 10. Latrines attract flies and snakes. That is why some families don't want latrines near their homes.

**Distinguishing Problems from Needs**

Here are some answers to the problems and needs exercise.

The first four statements are easy to distinguish. The first two are problems and the next two are needs. That 80 percent of adults defecate in the community woodlot and that children defecate indiscriminately within the community are clearly problems. Both can have several causes and several solutions. The lack of a health professional in the community is a need that can be met by getting a health professional to work in the community. The lack of sanitary conditions in the community may be a generalized problem, but the need for a latrine for each house can be met by building one for each house. Whether this solution will provide sanitary conditions for the community depends on all the other reasons for the unsanitary conditions of the community.

The remaining statements are less clear and may be open to different points of view. In the opinion of the author,

- Statement 5 is a consequence of one or more problems—one of which may be improper excreta disposal. Possible solutions cannot be identified until the problem is further clarified—that is, why children are dying before they are five years old.
- Statement 6 is a need because the situation can be improved by having someone sell oral-rehydration solution (ORS) in the community. Even if ORS is available in the community, children will still suffer from diarrhea, because using ORS is only one of the things that people can do to resolve the prevalence of diarrhea. The lack of ORS is not a problem.
- Statement 7 is also a need because it focuses on the absence of the immunization team as a cause of the problem of measles.
- Statement 8 is a problem. The high-risk behavior identified is that women collect drinking water from the swamp and do not treat or boil it to make it safe for drinking. The statement describes a problem, for which the solution is to eliminate or modify the behavior—getting people to boil or treat the water before drinking it or bringing clean water closer to the community.
- Statement 9 is a need because all that has to be done is to provide more meat in people's diet. The statement that they need meat to stay healthy is not describing the problem that people are not healthy. Eating more meat may not in fact result in healthier people if the people are exposed to excreta and consequently suffer from dysentery, typhoid, and other diseases.

- Statement 10 describes a barrier to proper excreta disposal. The issue is not the location of latrines near the family home, but the perception that latrines attract flies and snakes. The presence of flies and snakes is caused by a number of situations that can be addressed; ways can be found to keep flies and snakes away from latrines.

## Session 7

## LATRINE CONCEPTS *5 hours, 15 minutes*

### Objectives

By the end of this session, the participants will be able to

- explain the purpose of latrines,
- identify four basic variations of latrines and how they work,
- list the important siting considerations, and
- identify slab preparation variations.

### Overview

This session provides an introduction to the most important concepts pertaining to latrines. The primary purpose of latrines is to isolate excrement in order to interrupt disease transmission routes. Latrines should be built so that leaching into water sources is kept to a minimum and to allow decomposition to take place.

The basic types of latrine described in this session are the following: a simple latrine with cover, a ventilated improved pit (VIP) latrine, a waterseal/pour flush latrine, and a raised platform pit latrine. The slab preparation variations discussed in this session are reinforced concrete, ferrocement, Sanplat, wooden, and waterseal trap. The importance of siting, including knowledge of soil types, is also highlighted, both in the classroom and in a field visit to the latrine construction site.

It will be important to complete Procedure 3 by the end of Day 3, although doing so will mean a longer day than usual—approximately 7.5 hours of session time as opposed to 7 hours on most other days.

### Procedures

**1. Introduction** *10 minutes*

Ask participants what types of latrines they know and what types are most commonly found in their communities. Then ask what they know about the siting of latrines. Do not try to explain siting considerations at this point. Instead, this discussion will give you an idea of how much participants already know and enable you to use examples from their responses during your presentations in this session.

Present a brief session overview in your own words, and present the objectives on Flipchart A: "Session 7 Objectives."

## 2. Lecturette: Purpose of Latrines and How They Work *20 minutes*

Ask participants,

- What is the purpose of latrines?

After getting some answers from participants, focus on the primary purpose of *isolating* excreta. Refer to the discussions in Session 3 and Session 6 and to page 1 of Handout 3-5: "Problems of Sanitation," the points under "contact with excreta."

Other purposes are privacy, comfort, and convenience. Explain that these other purposes create a suitable environment for ensuring that the primary purpose is met. These other purposes may well be the primary motivating factor behind the individual desire for a latrine.

Ask,

- What happens to the excrement inside the pit?

Explain the need for isolating the excreta and that it should remain untouched, without the addition of fresh excreta, for an extended period of time. This time period is a function of the latrine technology used, climatic conditions, and pathogens present in the excreta. All pathogens, with the possible exception of helminth eggs, will be inviable after an undisturbed period of one year. This concept is especially important so that people understand the process fresh excreta must undergo before it is considered "safe."

Display Flipchart B: "Latrine Diagram," drawn from the simple latrine with cover on page 1 of Handout 7-2. Use it to explain the following points:

- *The Leaching Process*

  Infiltration of soil surrounding the pit by the liquid of the interior. Leaching, along with decomposition, will reduce the volume of the pit contents.

- *Extensive Leaching*

  Allows pathogens to travel into the soil surrounding the pit; they can travel much farther in saturated soil.

- *Preventing Leaching*

  Leaching will not occur in latrines that are watertight, and it will be significantly reduced if the bottom of the pit is an impermeable layer; decomposition does take place.

Distribute Handout 7-1: "Leaching Problems" and discuss. Explain that placing a latrine at a lower elevation than a water source will reduce the probability of contamination. Then, distribute Handout 7-2: "Basic Types of Latrines."

## 3. Lecturette: Basic Variations of Latrine — *40 minutes*

Make the following key points:

- Several variations of common latrine types exist.
- The components of the latrine types can be similar.
- Construction of the slab is usually the most challenging technical aspect of the overall latrine construction.

Distribute Handout 7-3: "Basic Variations of Latrines" and introduce the basic variations of latrines, using sketches on Flipchart C: "Basic Variations of Latrines" for reference. Point out the differences in the components each system. The handout is organized with key points for each of the following latrines:

I. Simple Latrine with Cover

II. VIP (Ventilated Improved Pit)

III. Waterseal/Pour Flush

IV. Raised Platform Pit Latrine

Explain the components of latrines: All of the latrines have some common aspects (or components). Understanding the similarities will allow the participants to devote more time to understanding the differences of latrine technologies.

**Trainer Note**: The discussion of the slab component will be more detailed because it will include the differences in slab types. The reason for emphasizing slab types and construction in this session is that the slab for the demonstration latrine must be constructed at this phase of the training to give it sufficient time to cure so the latrine can be completed by the end of the training course.

Tell the participants that latrines have some basic components in common:

- shelter
- pit
- slab and fixtures

Distribute Handout 7-4: "Latrine Components" and ask participants to read it. Discuss and clarify.

Conclude the day, and tell the participants that tomorrow they will start with a small group activity comparing different latrines.

## 4. Small Group Activity: Comparing Different Latrines *1 hour, 10 minutes*

Ask the participants to form three or four groups, and assign each one a different latrine variation to study. Use four groups if you choose to study all latrines presented above. Ask them to do the following (Flipchart D):

*Flipchart D: Small Group Task—Studying Latrine Types*

- Study the diagram assigned to your group and read the description.
- What are its principal advantages and disadvantages?
- What would be the difficulty in building certain slab types in your community?
- Choose a spokesperson for your group.
- Take 35 minutes for this task.

Ask each group to make a brief presentation of no more than three or four minutes.

Distribute Handout 7-5: "Advantages/Disadvantages of Latrine Types" after the discussion. Ask participants to read it and then answer any questions they have.

## 5. Large Group Discussion: Siting Considerations *25 minutes*

Refer to the previous discussion and mention the question of leaching. If the groups included leaching in their presentations of advantages and disadvantages, reinforce their points; if not, remind them that it is an important consideration. If the pit is at or near the water table, there is a greater chance of contaminating a nearby well, especially a well located below the gradient of the pit.

Display Flipchart E: "Siting," drawn from the map that shows the siting of a latrine in relation to a well, river, house, slope, and so on (Handout 7-6). Explain that waterborne systems must be located farther from a groundwater source than "dry" latrines since the pathogens will travel farther.

Ask what the important concerns are in siting latrines. Answers:

| | |
|---|---|
| ■ *Water Table* | Infiltration of the water table by leachate, which could contaminate the water. |
| ■ *Water Sources* | Location in relation to groundwater sources. For example, wells—leachate could contaminate water source. |
| ■ *One's House, Neighbor's House* | Latrine pit could undermine house foundations; disagreeable smell. |
| ■ *Soil Type* | Locate latrine in an area where the soil can be excavated and does not cause a leaching problem. |
| ■ *Land Availability* | In crowded peri-urban areas, land availability may be so limited that it could affect the latrine type, and even whether latrines are an appropriate intervention. Latrines are usually not feasible at population densities above 350 people per hectare, and most peri-urban areas have more than 350 people per hectare. |

Explain why these siting considerations are important using the information in Handout 7-6:" Siting of Latrines."

Soil type has perhaps the most significant impact on siting. The following soil types cause problems in the functioning and the ease of construction of a latrine. Soil suitability will be discussed in more detail in Session 8.

| | |
|---|---|
| ■ *Rocky Soil* | Difficult/impossible to excavate. |
| ■ *Clay Soil* | Will not allow the liquid contents of the pit to infiltrate into the surrounding soil, which will cause the latrine to fill faster. |
| ■ *Sandy Soil* | Allows the liquid contents of the pit to infiltrate to surrounding soil too quickly and too far, which could contaminate a water source. |

Discuss the distances that are involved in siting. How far should the latrines be located from the wells, rivers, houses, and so on? Why? Why does the distance vary for some latrine types?

Distribute Handout 7-6.

6. **View Latrine Demonstration Site** ***1 hour, 40 minutes***

Explain that participants will now go to the latrine demonstration site. The purpose of this visit is to learn what is involved in site preparation and to view the actual slab construction.

Distribute Handout 7-7: "Latrine Site Observation Questions" and ask participants to be prepared to answer the questions.

Organize participants in trios and ask that only one person per trio ask questions of the builder. Explain that they do not want to overwhelm the builder by having several people asking questions at once.

**Trainer Note**: The preparation for the slab construction will have to be managed to ensure that participants are able to see the actual construction during this activity.

7. **Large Group Discussion: Siting a Second Latrine** ***30 minutes***

Explain to participants that you want them to practice recognizing the variables and constraints that are involved in siting based on what they learned in this session.

Take participants to a second nearby site and say that you have chosen the site for a latrine. Ask why they think you picked the site. Repeat for an additional site if time permits.

8. **Conclusions** ***15 minutes***

Review key points for the session.

Ask,

- What are the most important insights you gained in the session?

9. **Wrap-Up** ***5 minutes***

Summarize participants' conclusions and the session objectives. Ask if the objectives were reached. If there are additional questions at this point, write them down and plan to address them later if appropriate. Make a transition to the next session on factors in latrine choices.

Return to the classroom.

**Trainer Note:** The latrine should be located in such a manner that some/all siting criteria are well manifested. Construction of the slab should be planned for this session. All materials should be made ready and the builder notified.

**Materials**

Handout 7-1: Leaching Problems

Handout 7-2: Basic Types of Latrines

Handout 7-3: Basic Variations of Latrines

Handout 7-4: Latrine Components

Handout 7-5: Advantages/Disadvantages of Latrine Types

Handout 7-6: Siting of Latrines

Handout 7-7: Latrine Site Observation Questions

Flipchart A: Session 7 Objectives

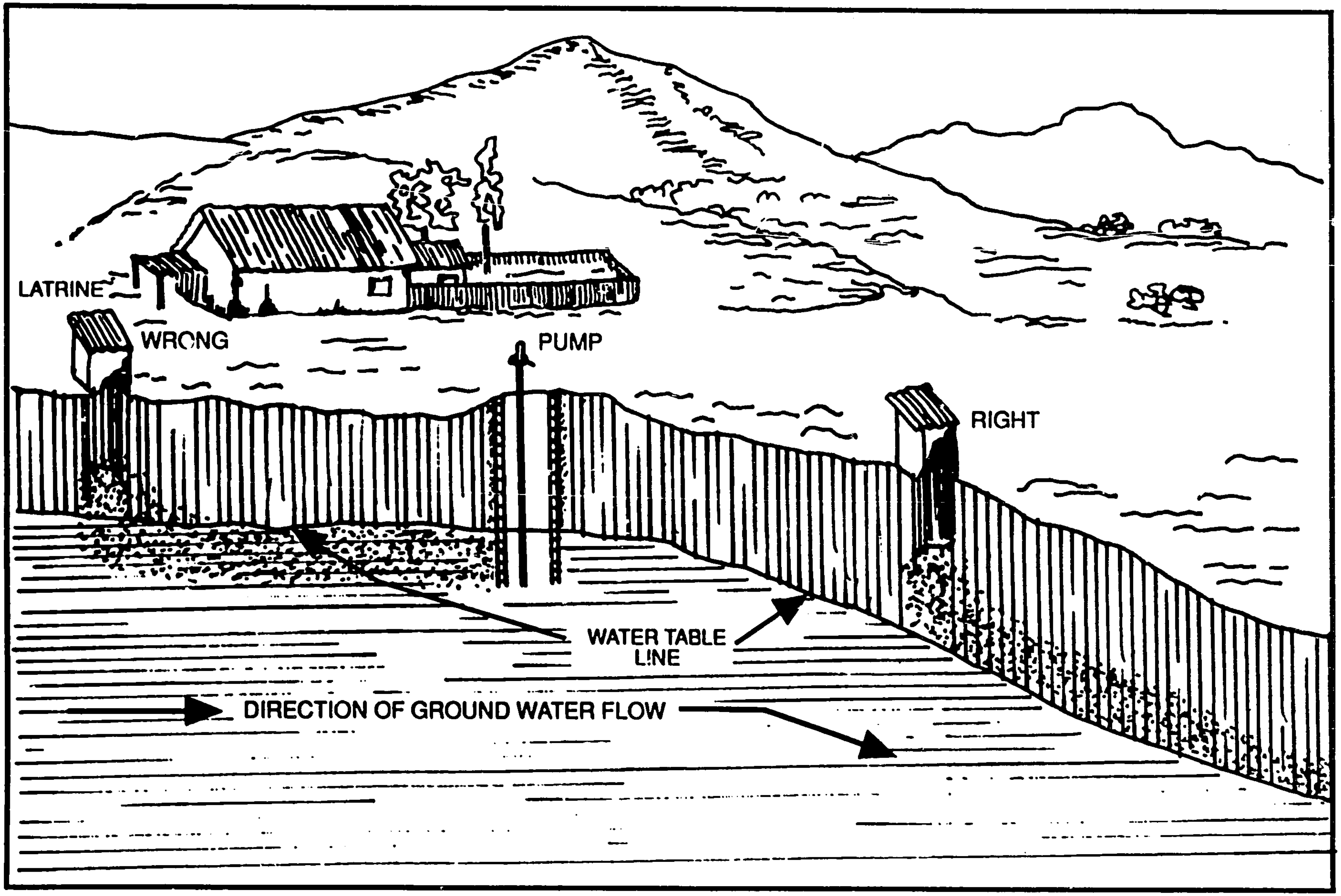
Flipchart B: Latrine Diagram

Flipchart C: Basic Variations of Latrines

Flipchart D: Small Group Task—Studying Latrine Types

Flipchart E: Siting

# LEACHING PROBLEMS



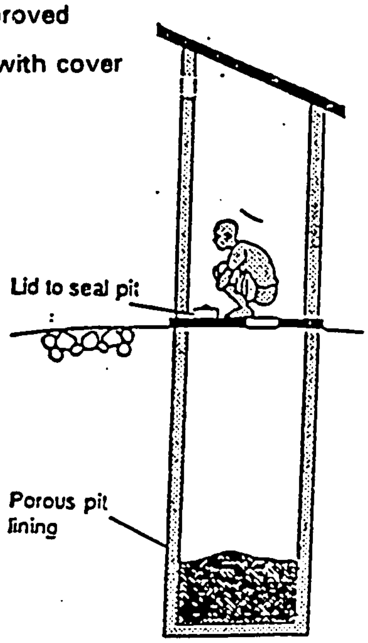



Handout 7-1

# Basic Types of Latrines

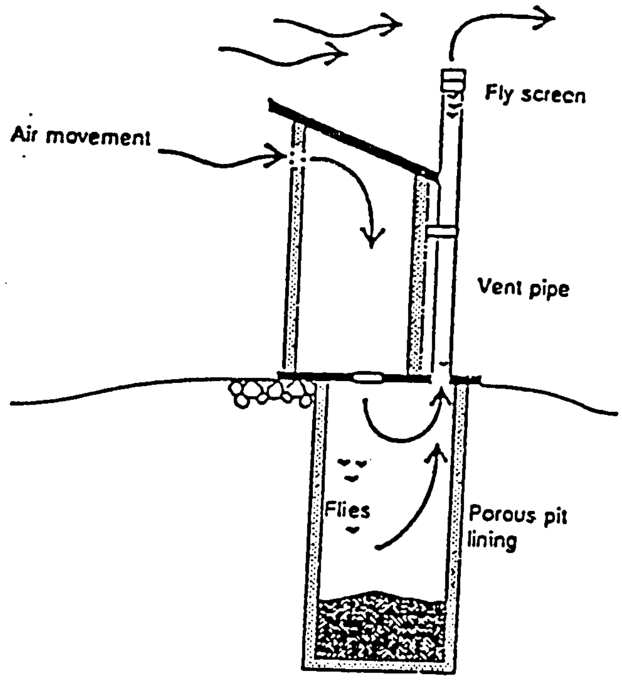
Handout 7-2

Simple improved pit latrine with cover



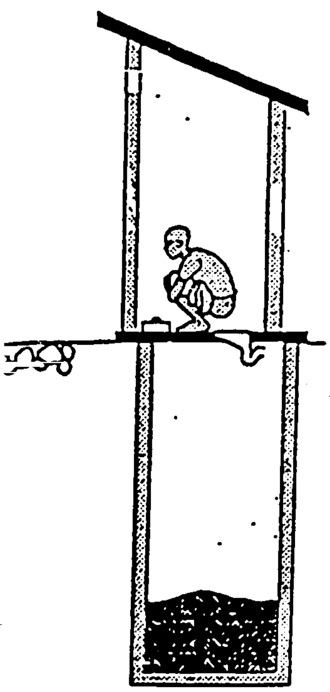

Type I

Ventilated improved pit latrine (VIP)

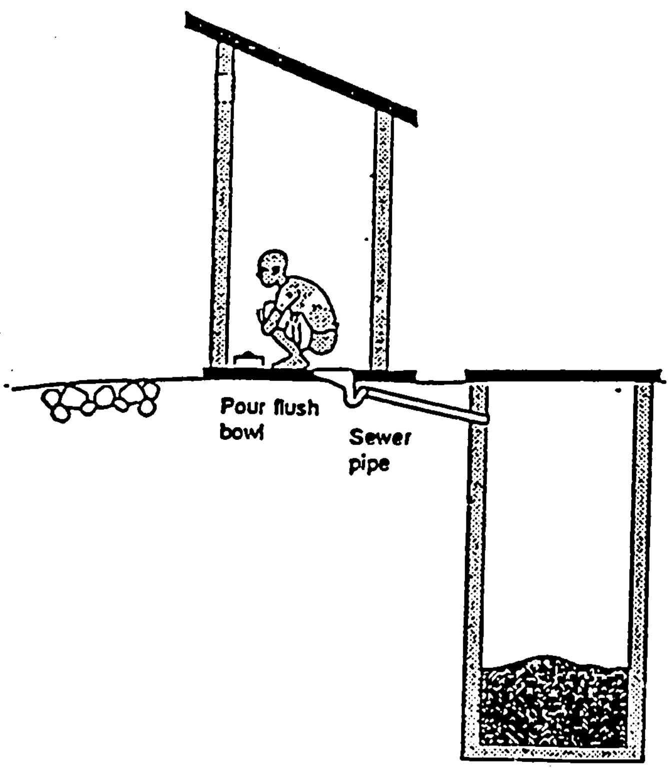



Type II

Simple pourflush latrine

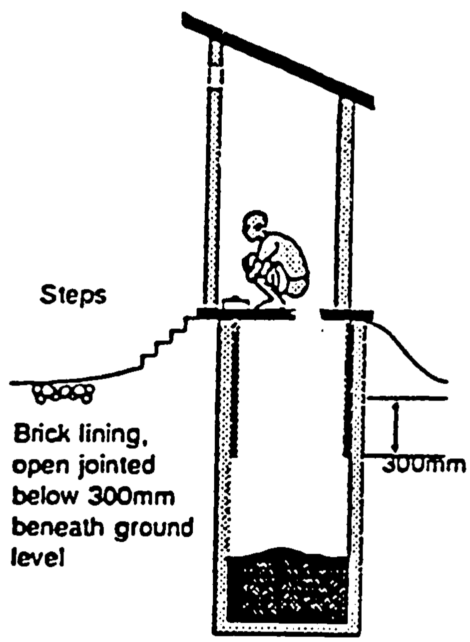


Offset pour flush latrine




Type III

Raised platform latrine




Type IV

# Basic Variations of Latrines

## I. Simple Latrine with Cover

- This is the most basic and inexpensive of sanitary latrines. It consists of a slab, which can be built as described below, with a cover.
- The cover is frequently molded on the slab opening to form an effective seal when the pit is covered. The cover prevents access by insects and reduces the smell when the latrine is used. However, the cover is frequently forgotten or underestimated as an important aspect of the design, partially due to the added inconvenience of having to replace it after each use.
- The superstructure is frequently built without a roof.

## II. VIP (Ventilated Improved Pit)

- The basic improvement of a vent differentiates this dry pit latrine from the pit latrine with cover. Wind passing over the top of the vent creates suction, which pulls air out of the pit.
- The vent can be made from different materials, although a rounded cross section and smooth interior are the most efficient (e.g., plastic pipe).
- The efficiency also increases with the diameter, or cross-sectional area, and the height of the vent, so the determining factor in choosing a vent is striking a balance between efficiency and cost. The top of the vent is screened to prevent the escape of flies after they have come in contact with the excrement.
- The superstructure should be constructed in such a way as to enhance the airflow through the vent pipe. That is, if the ventilation (screened window), or access way, of the superstructure is situated toward the incoming wind, the efficiency of the latrine vent will be increased.
- The interior of the latrine should be kept dark to ensure that flies try to escape toward daylight through the latrine vent instead of remaining in the superstructure.
- The slab and pit can be constructed as above without the cover, which actually prevents the flow of air. This design is efficient in reducing smells and the presence of flies in and around the superstructure (flies do tend to congregate around the outside of the screened vent, attracted to the escaping odorous vapors).

- The VIP is more expensive than the basic pit latrine due to the added cost of the vent pipe and the probable difference in superstructure.

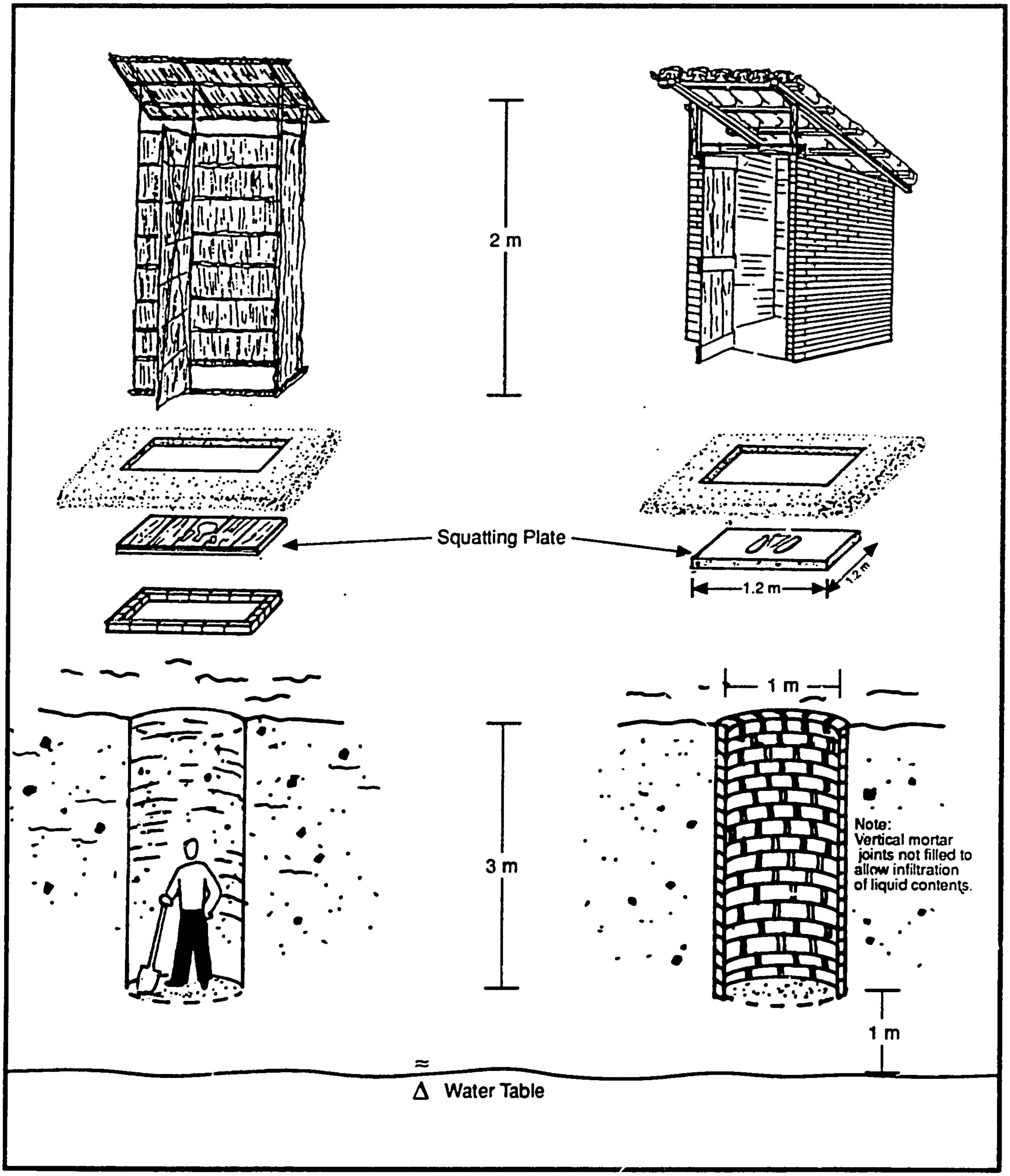
## III. Waterseal/Pour Flush

- The waterseal latrine differs from the above "dry" latrines in the integral waterseal trap of the latrine slab.
- The waterseal forms a barrier to insects (from entering) and smells (from leaving) the latrine pit. It can be made of plastic, fiberglass, reinforced cement, or ceramic, and it is usually made separately from a larger slab that is designed for it.
- It permits a greater range of pit designs because the water flow can carry the excrement to offset pits. That is, pits can, but do not have to, be directly under the latrine slab.
- User preference for this design is usually high due to its similarity to conventional sewerage. It does require that a household have excess water, however, and in areas where this technology is not used, it requires more initial effort and resources to build the waterseal traps.
- It is sometimes more expensive than the VIP latrine, depending on the cost of the trap and the fact that all waterseal latrine pits should be lined.

## IV. Raised Platform Pit Latrine

- The raised platform latrine is not a truly independent latrine type. It can be either a basic latrine with a cover or a VIP latrine. Because of its importance, however, the raised platform design is classified separately.
- The main use for this latrine is in areas with a high water table or rocky soil, that is, soil that is difficult to excavate.
- This latrine is generally more expensive than the other types because more materials are required to build up the pit walls to the specific height necessary.
- The pour flush design is rarely used in conjunction with the raised platform pit latrine because it would partially offset one of the main purposes of this design, which is to limit the leaching of wastes into a groundwater source.

# LATRINE COMPONENTS



## A. Shelter

The major differences among the latrine types will be the slab and pit design. The shelter can be made of any material that provides privacy and is structurally sound, feasible, and acceptable to the users. The shelter can also limit access by vectors that would otherwise come into contact with the excreta.

The shelter can be made of a variety of materials, such as wood, wood and thatch, mud bricks, concrete block, brick, and so on. The cost in labor and material is thus widely variable, but the shelter is frequently the most costly latrine component.

The resources devoted to shelter construction also depend on the expected life of the latrine. A latrine that is designed to last for 10 years is usually built of more substantial and costly materials than one designed to last 3 years.

## B. Pit

The pit is dug in permeable soil and holds the excreta. The bottom of the pit should be at least 1 meter above the groundwater level in the wet season. (In places where the groundwater level is high, the raised platform latrine could be used.) The size of pit will vary depending on the number of users, permeability of the soil, type of anal cleansing material used (if thrown into the pit), and the desired lifetime of the pit. It could be either round or square in cross section, but a round pit is more efficient and slightly more stable than a square pit.

The upper edge of the pit has a base or ring beam, which supports the slab and superstructure; it is generally slightly elevated to prevent water from entering the pit. A seal is formed with clay or concrete between the base and slab to prevent insects from gaining access to the pit contents. A lining for the pit walls may be needed, depending on the stability of the soil, to prevent the walls from collapsing.

In areas where the water table rises close to the bottom of the pit, the bottom can be lined with an impermeable material, such as clay. This will inhibit the process of leaching directly below the latrine.

## C. Slab and Fixtures

Four basic slab types will be covered in this section. They are reinforced concrete, ferrocement slab, concrete without reinforcement (Sanplat), and a wooden slab. All latrine types have one of these slab types or a variation of them. The pour flush latrine requires a specialized fixture—the waterseal trap—as an integral part of the latrine slab.

The slab covers the pit and has a hole near the center through which to defecate. The slab can vary significantly for the different latrine types. Variations are also possible when dealing with a single latrine type (e.g., a simple slab with cover can be built of concrete or wood). Latrine slabs have either a squatting hole or a pedestal and seat for upright sitting during defecation; this depends on local preference. The slab is generally made of reinforced concrete, but it can be made of concrete without reinforcement if a specialized design is used. Another alternative is wood. In all cases, the slab should be smooth for ease of cleaning.

*Reinforced Concrete Slab*

The reinforced concrete slab is the most widely used slab type. It consists of cement, gravel, sand, water, and reinforcing material. The reinforcing material is usually iron bars, but other materials can be used, such as bamboo.

This slab has the following advantages over the other slab types:

- It can be easily produced "on site" by someone with basic experience in building with concrete.
- It is easy to keep clean because it can be made very smooth.
- It can be customized to individual preferences, such as by the addition of a pedestal or foot pads.

There are also disadvantages:

- It is heavy, making it difficult to transport.
- It is subject to breakage during transport.
- It is not as efficient in use of materials as the ferrocement slab or the Sanplat (see below).

The reinforced concrete slab can also be used in conjunction with latrine types other than the simple pit with cover and the VIP latrine. The slabs for a waterseal or compost latrine frequently involve reinforced concrete construction. In systems with specialized fixtures, such as the waterseal latrine, the reinforced slab is the base that holds the fixture.

A reinforced concrete slab can be built to smaller dimensions to make it lighter and allow it to be more easily moved from a slab-making center to the place where it will be installed. It can then be mounted on a pit with an extended base.

The fact that the slab must overlap the sides of the pit is frequently overlooked. As a result, an unplanned expense is incurred to either make the latrine slab larger or to move the ring beam toward the pit in order to make the slab fit.

*Ferrocement Slab*

A ferrocement slab is very similar to the reinforced concrete slab and is, in fact, a type of reinforced concrete slab. The difference involves the type of reinforcement used and the amount of cement and sand needed (this slab does not require gravel).

This slab utilizes two layers of a wire screen instead of the iron bars mentioned above. Materials are conserved in this design because the slab can be built with less than half the thickness of the above design. Since it requires less material than the reinforced concrete slab, it is lighter. It does require more attention in construction, however, because it is more sensitive to construction flaws.

*Sanplat*

The Sanplat is a concrete slab that does not need reinforcing material. Its arched design gives it sufficient strength to withstand the same pressures as the more common reinforced slabs.

The main benefit of the Sanplat is that it is very economical in the use of materials; it uses less cement than the reinforced concrete slab and no reinforcing material. It is therefore lighter. The Sanplat can also be used as a slab for the VIP latrine*.

The difficulty encountered with the Sanplat is in its design. A mold must be made to give the slab its shape. It may be difficult to convince a local builder to undertake the project if he is not used to building without reinforcement. If this is a problem, it may first be necessary to build and test a demonstration slab to alleviate the builder's concerns.

*Wooden Slab*

Slabs can also made of wood or bamboo. Wooden slabs are easily built on-site by local craftsmen when raw materials are available. They are usually constructed over the pit so there is no need to transport them. However, care must be taken because wood decomposes rapidly in tropical climates. The use of pretreated material is recommended to give the slab longer life. (NOTE: A pretreated material is recommended, but the cost of the pretreating often exceeds the cost of a reinforced concrete slab.)

A wooden slab should be covered with an impervious material such as a coat of mortar or clay, to reduce the presence of pathogens that can exist in a porous slab.

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*For additional information on Sanplat design, contact Björn Brandberg, General Manager, SBI Consulting International; Rattaregarden, Box 217, S-53030, TUN, Sweden, Tel: +46-(0)510 80050 and Fax: +46-(0)510 80434.

*Waterseal Trap*

The waterseal trap can be built of many materials, such as concrete, ceramic, galvanized metal, or fiberglass. The trap usually consists of two parts, a bowl and a waterseal. The trap should be made as smooth and as nonporous as possible for the easy passage of excreta.

A latrine with a waterseal trap is more difficult to make because a specialized mold is needed when building it from concrete or ceramic. The initial costs are also higher than for the other choices. The mold can be manufactured by an individual who is highly skilled in working with these materials. However, the waterseal is well suited for mass production. It can be manufactured at a central location and, because it is light, it can be transported much more easily than the reinforced concrete slab.

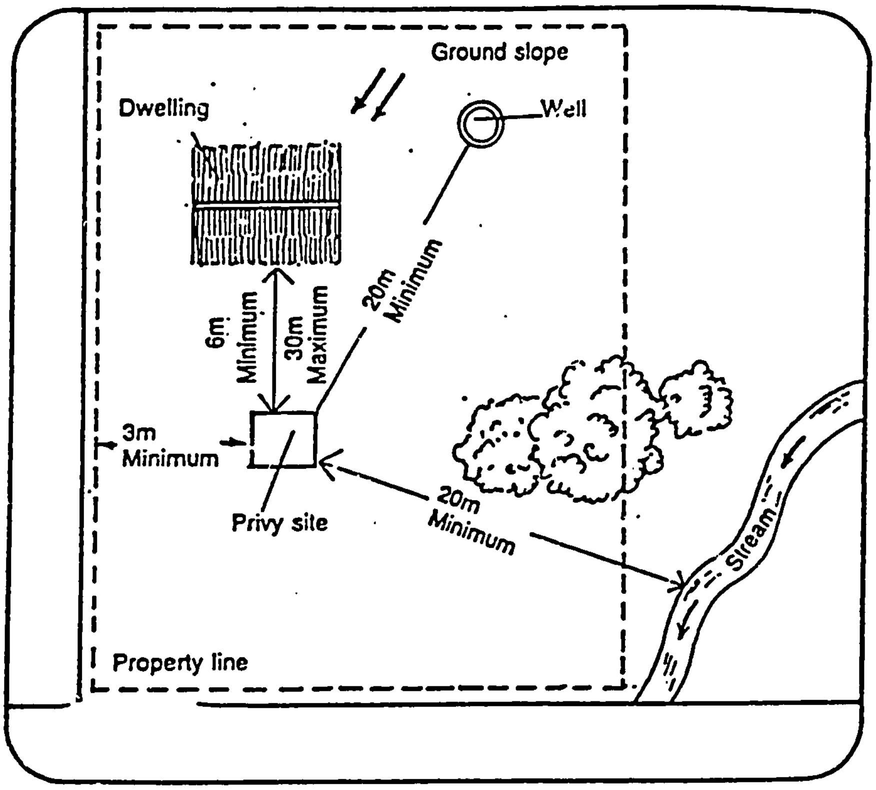
The waterseal does have difficulty passing solid anal cleansing materials. Thus, if the waterseal is used in an area where this type of material is employed, the users should dispose of this material outside the latrine; it should then be burned or buried.

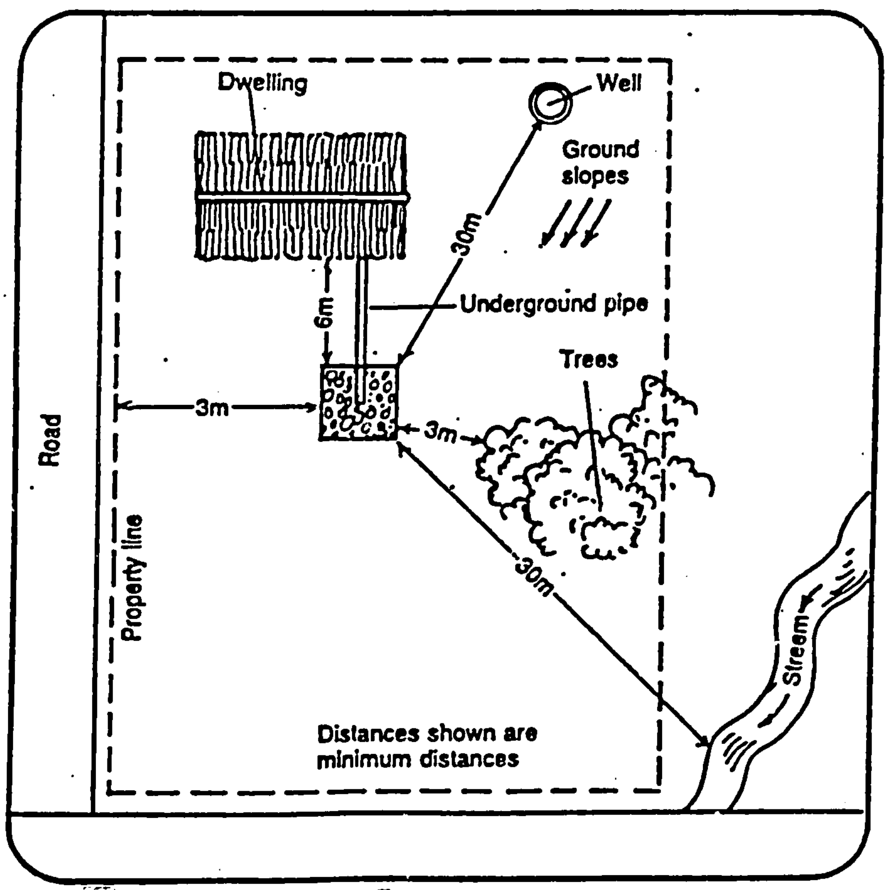
The slab, commonly of reinforced concrete, for the waterseal trap is usually made on or near the site where the latrine is being installed.

**Advantages/Disadvantages Of Latrine Types**

| *Latrine Types* | *Advantages* | *Disadvantages* |
|---|---|---|
| 1. Basic Latrine with Cover | - Inexpensive<br>- Does not require water | - Disagreeable smell |
| 2. Pour Flush Latrine | - Does not require permanent superstructure<br>- Small land requirement on plot<br>- Control of fiies and cockroaches if cover is used | - Requires reliable water supply<br>- Difficulty in passing solid wiping material<br>- Increase in cost due to need to line pit |
| 3. Raised Platform Latrine | - Inexpensive<br>- Does not require water<br>- Control of flies<br>- Less smell in latrine<br>- Small land requirement on plot | - Higher cost of pit lining and steps ding to elevated platform |
| 4. Ventilated Improved Pit Latrine | - Absence of smell in latrine<br>- Control of flies<br>- Contents of pit not visible<br>- Most closely resembles conventional sewerage<br>- Control of insects with cover or vent<br>- Small land requirement on plot<br>- Can be built in areas of rocky soil or high water table | - Extra cost of vent pipe and superstructure<br>- Darkened interior inhibits use by some groups, especially children |

**Siting of Latrines**



**A. Water Sources and Water Table**

The water table is the distance between the ground level and the level at which water is encountered. Simply digging a hole and measuring this distance will give the depth of the water table. One must be cautious, however, because the water table depth will probably not be the same in every area in the community; it could also vary in the same area depending on the season. (In the rainy season it will be higher.)

The water table is frequently "tapped" by using a well for a community or individual water source. By incorrectly siting the latrine, a water source could be polluted by the latrine contents. Therefore, it is recommended that the latrine not intrude on a water table that people are using as a water source.

The latrine should also be sited at a safe distance from a water source such as a well. The "safe" distance will be different for the different latrine types.

Due to gravity, the leachate will flow a greater distance vertically down from the bottom of the pit than laterally from the pit walls. Therefore, the distance from the water table below the latrine has more relative importance than the distance from a well.

**B. One's House, Neighbor's House**

The following siting considerations are also important:

- A large excavation in close proximity to the house could undermine the foundation of the house.
- The opposing argument is that the latrine should be close enough to be considered convenient, thus enhancing its use.
- In the case of a wet system, the increased water content of the soil around the pit will have an adverse effect on the stability of the soil.
- A hand-washing facility should be located between the latrine and house to make hygienic practices more convenient. However, this convinience should not override the recommended siting distance from a groundwater source.

**C. Soil Type**

Soil type influences where and what kind of latrine is built. Soil type can vary within a relatively small area. Some soils will prevent the installation of certain latrine types.

However, the soil type can change with depth. For this reason, experimentation involving the excavation of test holes should be tried before installing a latrine, or before looking for an area with a more appropriate topsoil. For example, some areas have a very sandy topsoil, but beneath the topsoil a suitable soil type may be found.

## D. Land Availability

In crowded peri-urban areas, land availability may be so limited that it could affect the latrine type, or even whether latrines are an appropriate intervention. Latrines are usually not feasible at population densities above 350 people per hectare, and most peri-urban areas have more than 350 people per hectare.

## Latrine Site Observation Questions

1. What aspects of siting are involved in the demonstration latrine?
2. Were all the criteria of good siting followed?
3. What could have been improved in the siting? How?
4. What type of slab is being prepared?
5. How much/what kind of material is being used?
6. What steps are involved in slab construction?
7. What is the soil type?
8. Who are the users of the latrine?
9. Do the users know the importance of latrines? Do they know how to use latrines? Do they like the design of the latrine?
10. Are there hand-washing facilities in the area?
11. Is there evidence of human excreta in the area? Animal excreta?

## Session 8

## FACTORS IN LATRINE CHOICES *2 hours, 50 minutes*

### Objectives

By the end of this session, the participants will be able to

- identify factors involved in the choice of latrines,
- explain the effect of cultural factors on the choice of aspects of latrine design, and
- identify methods of financing latrines.

### Overview

Appropriate siting and construction of a latrine will not guarantee that people will use it or maintain it properly. It is critical to consider user preference and personal behavior so that the individual user becomes an integral part of the sanitation program. Instead of being just a beneficiary, this person becomes an implementer of the sanitation program.

This session examines the factors involved in personal choice, and it stresses the importance of taking those factors into consideration in selecting a latrine. The factors are status, current behaviors, aesthetics, ease of use, privacy, and other cultural aspects. However, designs still must meet physical requirements, as described in Session 7. In addition, cost is an important consideration: what the costs are, what people can afford, how costs can be reduced, who is going to pay, and who is going to be paid for undertaking the work.

After discussing user preferences, participants study case examples of four situations in which development agents encountered challenges related to choice factors.

### Procedures

1. **Introduction** *15 minutes*

Ask participants if they know of situations in which latrines exist, but people do not use them. Ask if they know why people do not use those latrines.

Possible answers include the following:

- They are too far from the house (therefore inconvenient).

- Too many people use them (community latrines).
- They are too dirty or smelly.
- There is no privacy.
- People prefer to dispose of their excreta by other methods than using the latrine, such as in the field, because they have always done so.
- They were imposed from outside the community.
- The seat holes are too large for children and they are afraid they will fall in.
- The latrines are too dark and children are afraid.
- Latrines draw snakes and rats.

Give a brief session overview in your own words and present the objectives on Flipchart A: "Session 8 Objectives."

## 2. Lecturette: Identifying Factors — *35 minutes*

Present the following factors on Flipchart B:

*Flipchart B: Factors in Latrine Choices*

- User preferences
- Design feasibility
- Cost/financing

Ask what issues are involved with each of the three factors. Ask what factors would be inappropriate in selecting a latrine. (Possible responses include the following; when the program drives the choice. When people are told what their choice will be.)

Use Handouts 8-1, 8-2, and 8-3 for a lecturette on latrine choice. (Distribute each handout as you discuss it.) Make the following key points:

- *User Preferences (Handout 8-1)*
  - *Status*: increases the family's standing within a community
  - *Aesthetics*: appeals to the eye; has minimal odor
  - *Quality*: better-built latrines foster great acceptance
  - *Ease of Use*: requires the least amount of care
  - *Privacy*: limits the visibility of the user
  - *Behavioral*: considers the defecation behaviors of the user

- *Cultural:* latrine design and siting are culturally acceptable

- *Design Feasibility (Handout 8-2)*
  - Potential users understand the advantages and constraints of the different options.
  - Physical conditions have been considered. (Cite the limiting factors from Handout 8-2.)
  - The ability of the available skilled labor has been considered.
  - Emphasize that soil suitability has the greatest impact on design feasibility. Remind them that in Session 7 the unsuitable soil types were mentioned.
  - Distribute Handout 8-4: "Determining Soil Suitability." Discuss the information and answer any questions.
  - Continue the lecturette with the following additional key points:

- *Cost/Financing (Handout 8-3)*

  Who covers the costs/provides the materials?

  *Individual*
  - How much can people afford?
  - What are they willing to pay?

  *Implementing Agency*
  - How much will it provide?
  - What are its costs?
  - What are its constraints?

  *Government*
  - Is there a subsidy?
  - Does it provide materials?
  - Does it provide technical assistance?

  *Private enterprise*
  - What is available?
  - What is the quality of materials and labor?

### 3. Small Group Activity: Case Examples *1 hour, 40 minutes*

Explain that you have some case examples that will help them find ways of addressing factors affecting choices. Briefly go over all cases with the large group, then divide participants into four groups and assign a case to each group. Distribute Handout 8-5: "Case Examples—Latrine Choices" and give them the following task on Flipchart C:

*Flipchart C: Case Example Task*

- Read the case assigned to your group.
- Answer the questions.
- Be prepared to make a verbal report to the large group.
- Take 40 minutes for this task.

Lead the reporting discussion by asking each group to present briefly its answers to the questions listed in its case example. (The participants should be given a few minutes to read each group's case study before it is presented and discussed.)

Distribute Handout 8-6: "Solutions to Case Examples" and discuss.

### 4. Conclusions *10 minutes*

Ask the participants what they have learned about factors in latrine choices. Write their answers on a flipchart.

### 5. Wrap-Up *10 minutes*

Ask what they think they will need to do differently in their own communities as a result of this session. Take a few examples from the group. Then, review the session objectives and ask if they were reached. Say that in the next session they will have an opportunity to gather additional information that is important in determining the appropriate intervention.

### Materials

Handout 8-1: Factors in Latrine Choices—User Preferences

Handout 8-2: Factors in Latrine Choices—Design Feasibility

Handout 8-3: Factors in Latrine Choices—Cost/Financing

Handout 8-4: Determining Soil Suitability

Handout 8-5: Case Examples—Latrine Choices

Handout 8-6: Solutions to Case Examples

Flipchart A: Session 8 Objectives

Flipchart B: Factors in Latrine Choices

Flipchart C: Case Example Task

## Factors in Latrine Choices—User Preferences

Satisfying user preferences greatly increases the proper use and maintenance of the latrine. In satisfying this factor, the users become an integral part of the sanitation program. They become more than the beneficiary: They become the implementer and owner.

Some of the factors involved in personal choice are included below.

### A. Status

An individual will want a latrine that is seen as increasing his or her standing in the community. Frequently, however, the preferred personal choice is not feasible or affordable to the individual or the implementing agency.

The role of the development agent is to explain the possibilities and the difficulties in the application of various technologies. Rather than make the choice, the development agent can assist the community members in making the appropriate choice.

### B. Aesthetics

Most people will want a latrine that is appealing to the eye and that emits minimal odor. A latrine design can be altered superficially without affecting its operation; this allows individuals to personalize their latrine. The development agent should be ready to make some suggestions to enhance the aesthetics of a latrine choice.

### C. Quality

A single latrine design can be built to many different standards. In general, however, a well-built latrine will have greater acceptance and proper use than one of inferior construction.

### D. Ease of Use

The design that requires the least amount of care is a vital aspect in personal choice. Ease of cleaning, time of operation, problems encountered in operation—all are important considerations. Moreover, because the abilities and concerns of individual family members differ, the "ease of use" to one family member is not necessarily the same throughout the household. An effort should be made to make all family members comfortable.

**E. Privacy**

In most cultures, it is an embarrassment to be seen using the latrine. A latrine will have greater acceptance if it is designed and sited to limit the visibility of the user on entering the latrine and once inside.

**F. Behavioral**

The latrine design should consider the defecation behaviors of the user. Do those behaviors constitute a health risk? How can the behaviors be addressed in the latrine design and the latrine still be acceptable to the user? Can they be changed? These questions constitute an important aspect in ensuring continued and proper use of the latrine.

**G. Cultural**

A design must be appropriately presented, constructed, and sited based on culturally accepted practices. For example, in some cultures, men and women use different latrines. In this case, two latrines could be built for a household, and they could be built to satisfy the preferences of the gender using them.

## Factors in Latrine Choices—Design Feasibility

Designs that are feasible should be presented, and in a way that potential users understand the advantages and constraints of the different options.

Physical conditions generally rule out certain types of latrines. The following are limiting factors:

- Presence of a nearby well or the water table may prevent the use of a leeching latrine.
- Rocky soil is difficult to excavate, which could make a latrine design with a deep pit impractical.
- Soils that are mostly or all clay inhibit the flow of liquids through them. Thus, fluid from a leeching latrine will infiltrate the clay around the latrine very slowly, which reduces the latrine's life.
- Materials for a latrine must be either locally available or transportable.
- The siting criteria must be observed, that is, proximity to houses, distance from a water source, depth of water table, and so on.

A design must also be chosen based on the abilities of the available skilled labor.

**Factors in Latrine Choices—Cost/Financing**

## A. Introduction

Basic cost criteria in making the right latrine choice are as follows:

- What are the costs?
- How do you reduce them?
- Who is going to pay them?
- Who is going to be paid?
- What is the payoff period for the investment?

There are several perspectives to consider in responding to these questions, including those of the individual, agency, government, and private enterprise. The combination of all the factors discussed below will influence the choice of design. The necessary information should be quantified and itemized before implementing a sanitation program.

## B. Individual

The following questions should be addressed when considering the cost to the individual:

- How much can people afford?
- How much are they willing to pay, and in what ways (their time or other resources)?
- Can the amount they pay be spread over time (credit)?

To answer these questions, it is helpful to examine some of the basic motivations of individuals with respect to the allocation of personal resources. These motivations revolve around cost versus benefits, awareness of benefits, and easing costs.

*Cost Versus Benefits*

The relationship between cost and benefit is a vital one. Because the extent of a person's resources is limited and must cover a variety of personal needs, the individual must choose his or her expenditures carefully.

The priority associated with an expenditure is based on the perceived benefits gained from the expenditure. The benefits can be either short term, such as food and clothing, or long term, such as housing.

Any new activity that requires resources necessitates a shifting of priorities. Spending resources on an improved sanitation facility will reduce resources for other activities. Thus, the benefit gained or the value placed upon a sanitation facility must be greater or equal to that of the activity that must be given up or reduced. Often a community member's resources are already stretched to the limit, so the introduction of an additional cost may be untenable.

As the benefits of a certain activity increase, the resources allocated to that activity also increase. This linkage relates to the difference between ability to pay and willingness to pay.

*Ability to pay* is based on the measure of an individual's resources, whereas *willingness to pay* involves the measure of resources as well as the individual's willingness and decision to part with them. The transition from ability to pay to willingness to pay involves an increase in the user's awareness of benefits. An increase in an individual's willingness to pay may be accomplished by increasing his or her perception or awareness of benefits associated with the expenditure.

For example, an individual may be more willing to make a larger investment in an activity if the benefits are correspondingly greater. If this individual has a choice between two latrines, one priced at $500 that will last 10 years, and one that costs $300 but will only last 3 years, what should he or she consider in making the choice? While the $300 latrine costs more initially, its cost divided over its period of operation would be $100 a year, versus $50 a year for the $500 latrine.

*Awareness of Benefits*

One of the major obstacles to getting an individual to allocate resources for a personal excreta disposal system is the difficulty of quantifying the benefits gained from such a system. In comparison, the benefits of a water system, which supplies a readily accessible supply of water, are clearly evident in the everyday life of a community member.

While improving individual sanitation on a community-wide basis can be seen as a public benefit, the initial expenditure required to build a latrine is largely carried by the user. Therefore, there must be a personal benefit associated with an improved sanitation facility.

The development agent can overcome this obstacle by building awareness of the more obvious benefits, as outlined in the section above on user preferences. These benefits include privacy, convenience, and status, as well as the less apparent benefits of public health—for example, costs for medicines and the loss of productivity due to illness can be reduced by improved sanitation, including the addition of a sanitary latrine. The cost of treatment is much greater than the cost of prevention. The benefit is a reduction of other costs borne by the individual.

*Easing Costs*

A high initial investment is required for the installation of a sanitary excreta disposal system, which can make it unattainable to individuals. In contrast, the installation of a community water supply system is generally spread out among all community members over time, which results in affordable monthly payments.

This difference necessitates a higher degree of individual commitment in building a latrine than does a community water supply. It is for this reason that a self-help approach is applied by many agencies. The agency may supply the basic building materials, slabs, and technical assistance to offset the individual's costs, but the individual is expected to provide the remainder of the materials and the labor involved, such as for pit excavation and shelter construction.

However, the usual self-help approach is limiting. While it does reduce the individual's costs, it assumes that the user not only has the time to provide this labor but also the ability and knowledge of certain techniques of construction to carry it out effectively. Because most users are unskilled in these techniques, it is an inefficient use of their time. Moreover, the time they spent working on their latrine results in an opportunity cost—while they are working on their latrine, they do not make money nor are they able to devote time to their families. Hiring a builder, therefore, tends to be a more efficient use of their resources than building it themselves.

Another way to reduce the high initial expenditure for a latrine would be to spread the cost out over time, as is done for a water system. A system of credit could be developed for affordable monthly payments. This would increase the attainability of the latrine for those unable to afford the installation cost in one lump payment.

In convincing community members to part with resources in order to improve their sanitation system, it would be helpful to present them with a proven design. This proven design would increase their understanding and confidence in the system, and thereby reduce the perceived risk involved in making the investment. This reduction in perceived risk could lead to an increase in the resources that an individual is willing to devote to the new construction.

With the right combination of lowered costs and increased user's awareness of benefits, the development agent will boost the access of community members to improved methods of sanitary excreta disposal.

## C. Agency

The parameters of the implementing agency must be understood by the development agent and community members.

- How much is the implementing agency going to provide?
- What are its costs and constraints?
- How is the project going to be implemented, and who is going to do it? It is in the interest of the agency to keep the costs as low as possible in order to reach the largest number of beneficiaries. At times, an agency's resources are spread too thin in an attempt to encompass all of the perceived needs of a community. As a result, the effects are difficult to sustain and project failure is common. With limited resources, the projects must be targeted more narrowly and with an emphasis on sustainability.

*Effective Demand*

To target the assistance, the agency must first find the effective demand in any particular community. The *effective demand* is a combination of individual demand and all available or attainable resources that allow the implementation and sustenance of a project. The box on the next page illustrates effective demand. By targeting the effective demand, the project's agency can narrow the project's scope and make the project's goals more attainable.

*Associated Costs*

The cost of the material and technical assistance that an agency may provide for a sanitation program is usually far less than the total cost it bears. The agency also bears the costs associated with the provision of materials, such as transportation and storage. In addition, the agency also incurs indirect costs, that is, costs associated with the program that do not fall into the above categories, such as administrative overhead, personnel (salaries of technical agents as well as support staff, drivers, and program managers), training, and monitoring and evaluation.

*Cost of the Development Agent's Time*

The cost of the time a development agent spends on community education and supervising of a sanitation program is borne by the agency. Most agencies have a variety of development programs, and the development agent's time is split among them. Spending more time with one program, such as sanitation, reduces the time he or she is able to spend on the other programs. Thus, the development agent must utilize time efficiently in order to accomplish various tasks. The cost of the development agent's time is a vital concern to the agency.

## An Example of "Effective Demand"

An assessment is made in a community to determine the members' sanitation needs. This assessment is made by development agents associated with a public health agency. The assessment is based on the level of diarrheal disease associated with poor sanitation, the sanitation practices in the community, and the general condition of sanitation facilities in the community. In the resulting report, based on this information, 80 percent of the homes need a new or improved sanitation facility. This is the NEED.

The agency has a limited budget and cannot afford to supply the materials and labor required for the construction of latrines for 80 percent of the homes in the community, so the assessment team is again sent to the community. This time team members go to each house to ask community members if they are interested in improving their latrine or building a new one. The majority of the responses are affirmative. Many of the community members say they would like a new latrine but they are unable to afford one. The resultant report from the team is that 80 percent of the households need latrines and 60 percent of them want latrines. This 60 percent is the DEMAND.

This demand percentage would still require too great an expenditure for the meager resources of the agency. The agency decides on a plan of action whereby it will provide increased education to the community in general and set up a technical assistance program. This program will provide the services of a skilled latrine builder to all community members who decide to improve their latrine or build a new one with their own resources.

The team again goes into the community, this time to explain the different latrine options, including rehabilitation and upgrades, and the costs associated with the different options that the community members would be expected to pay. After the team members discuss the options, they write down the households whose members are willing to bear the cost associated with their choice—20 percent of the community. This percentage represents the EFFECTIVE DEMAND.

*Cost of Community Self-Help Labor*

The utilization of community self-help labor has a direct and negative impact on the time of the development agent.

In comparison to having a skilled builder constructing the latrines, an unskilled community member will require much more supervision in executing the same tasks. This impact is especially noticeable when the construction is in a community different from the one where the supervisor lives because since each time supervision is needed the supervisor must travel to that community.

*Example:*

A skilled builder may take three days to build a latrine, due to his technical skills and ability to spend the entire day working on it as he is contracted to do. On the other hand, an unskilled community member could take three weeks, because he or she must juggle time between constructing the latrine, making money, and other concerns.

The supervision required for the construction is also an issue. The skilled builder should be supervised during the important steps of construction, such as slab construction, but that supervision is confined to the three-day period. The unskilled community member will need considerably more supervision for the same important steps, as well as supervision for the less important construction steps, due to his or her lack of proficiency.

## D. Government

Is there a government subsidy? Does the government supply materials?

Governments face the same resource limitations as do agencies. Their programs and concerns are much larger in scope and complexity, however.

Many of the government's program objectives may coincide with those of agencies, but due to the necessity of covering the wide range of other programmatic concerns, the government ministry is perhaps less able to commit the amount of resources needed. Even so, the government ministry involved with sanitation should be consulted in the planning of any program. While the material resources available may be limited, this ministry would have invaluable information based on past experience. Reviewing this information would undoubtedly ease the job of development agents in finding out why projects succeeded or failed in the past.

Other resources provided by the government may be in the form of personnel such as teachers, health workers, extension workers, and clinic staff. Such personnel see many people in the course of their work, and thus they form an important network for development agents.

If the development agents are informed about the sanitation program and are brought into the planning process, the amount of time they have to spend on promotion or education can be reduced.

The key is to seek out and identify the resources that are available and to determine how they can be most efficiently utilized.

## E. Private Enterprise

What is available from the private sector?

An effective demand will create an incentive for the involvement of private enterprise. The private sector is very efficient at low-cost production, but it may be unaware of the effective demand in a community. Contacting the market/private enterprise sector, informing them of the specific needs, and discussing payment options will often be all that is needed to involve the sector in filling the effective demand. At times, more education may be needed in order to accomplish the task.

Some of the latrine components are ideally suited for the involvement of small enterprises, such as slab, seat, or waterseal trap manufacture. Finding out what the market will offer is a necessary step in determining the most economical latrine choice.

Apart from materials (cement, bricks, rebar), the market will also supply skilled labor for the construction of the latrine. As mentioned before, hiring a good local builder will save time and money.

Quality control will be an issue in utilizing the private sector, because private enterprises will attempt to fill the demand as cheaply as possible. Their materials can sometimes be inferior.

## Determining Soil Suitability

Determining soil suitability for disposal of excreta is important because some soils cannot safely be used for disposal systems. Systems in unacceptable soils can cause serious health hazards, including contaminated drinking water.

Determining soil suitability involves (1) evaluating soil types, (2) locating bedrock and groundwater levels, and (3) determining soil permeability.

### A. Evaluating Soil Types

An important question concerning soil is how fast it will allow waste liquid to percolate or flow into it. If the waste liquid percolates too quickly, the soil will not have a chance to treat it by removing disease-causing substances or agents, and the waste liquid may seep into and contaminate the groundwater. If the waste liquid does not percolate quickly enough, it may overflow to the ground surface, causing serious health hazards.

Different types of soils percolate waste liquid at different rates. Some types of soil are acceptable for disposal systems; others are not.

### B. Identifying Soil Types

The six basic types of soil are

- sand
- sandy loam
- loam
- silt loam
- clay loam
- clay

They can be identified by sight and feel. When testing soil by feel, test it both when dry and moist.

*Sand*

Individual grains are easily seen and felt. A handful of sand squeezed when dry will not hold its shape; squeezed when moist, it will barely hold its shape, crumbling when touched.

*Sandy Loam*

Contains a large percentage of sand, so sand grains can be seen and felt. Squeezed when dry, a handful of sandy loam will not hold its shape; squeezed when moist, it holds its shape and forms a cast that will not break when handled carefully.

*Loam*

Has a fairly smooth, yet slightly gritty feel; clods crumble easily. Squeezed when dry, loam forms a cast that can be handled carefully without breaking; squeezed when moist, the cast can be handled freely without breaking.

*Silt Loam*

Feels soft and floury; clods are easily crumbled. Squeezed when dry or wet, silt loam forms a cast that can be handled freely without breaking. A small ball of moist soil pressed between thumb and finger will not form a ribbon.

*Clay Loam*

Fine-textured; clods are hard. Moist clay loam is plastic and, when squeezed, forms a cast that can withstand considerable handling without breaking. A small ball of moist clay loam pressed between thumb and finger forms a thin ribbon that barely sustains its own weight.

*Clay*

Fine-textured; clods are very hard. Wet clay is plastic and usually sticky. A small ball of moist clay pressed between thumb and finger forms a long ribbon.

Sandy loams, loams, and silt loams are suitable soils for disposal systems. Sands, clay loams, and clays are unsuitable.

Note that soil at depth is almost always heavier than at the surface. For example, a sandy topsoil will very likely have a sandy loam beneath it, making it suitable for a latrine. Conversely, a silt loam topsoil may well have a clay loam or clay beneath it, rendering it unsuitable for a latrine.

Soil testing should be carried out at the surface and when the test hole is about 1 meter deep.

## C. Locating Bedrock Levels and Groundwater

Most disposal systems require a minimum of 1 meter of pervious soil below the bottom of the system and above the highest bedrock, impervious layer, or groundwater level. The most direct method of locating bedrock, impervious layers, and the groundwater is to dig a test hole. The hole should be 1 meter deeper than the bottom of the proposed pit.

*Bedrock*

Bedrock or impervious layers are easily identified in a test hole because they become extremely difficult to dig and the soil consists mostly of rocks, shale, or tightly packed, consolidated material.

If bedrock or impervious layers are reached before the test hole reaches the proper depth, the proposed system cannot be constructed as designed. There are three choices: (1) select another site; (2) redesign the proposed system, if possible, to make it shallower but still with its bottom 1 meter above bedrock or impervious layers; or (3) select and design an alternative system that can be used at this site.

*Groundwater*

The same hole used to test for bedrock can be used to find the groundwater level. Groundwater is easily located in a test hole. After a few hours, the hole will fill with water to the groundwater level. Since the highest yearly groundwater level must be found, and since groundwater levels fluctuate throughout the year, test for groundwater during the wettest season.

If the highest groundwater level is encountered before the test hole reaches the proper depth, the proposed system cannot be constructed as designed. There remain the three choices noted above.

If soil type, bedrock layer, and groundwater level are all acceptable, and the proposed system is a pit or VIP latrine, the system can be constructed on the site without further testing.

## Case Examples—Latrine Choices

### Case I

A latrine program was implemented in the small community of Maltopo. The lead agency involved provided all material components of a VIP latrine and expected the community to provide for the manual labor needed for the construction. The agency also provided technical assistance for the construction phase of the project, but very little formal promotion of the benefits associated with the latrines. The latrines were well built, but they were misused and became soiled and unsanitary.

The following were some of the problems:

- Users did not like the darkness associated with the latrine. Some did not use it. Others made openings in the walls, without screening, to let in more light, which also allowed flies to enter.
- Several women covered the screened windows to ensure privacy. This inhibited the flow of air through the latrine, which increased the odors inside the latrine.
- The fly screen on the vent was removed and used for other purposes. This allowed flies to leave the pit after coming in contact with the contents.
- People did not properly dispose of their anal cleaning material, which posed a health risk.
- Some of the men considered the latrine as a status symbol to such an extent that they did not allow other members of the family to use it.

*Questions*

1. Why did the program suffer these problems?
2. What should the agency do to improve its procedures in future projects?
3. How could a development agent have promoted the program more successfully?
4. What are some possible solutions to the problems that these community members face?
5. How could these solutions be implemented?

**Case II**

A development agency approached the community of Rincon with the intent to help the community address its public health problems through the formation of a sanitation program. The agency attempted to find the most efficient way of increasing user participation and proper use of latrines.

The agency offered technical assistance to explain the range of feasible choices to the community and to educate the community on the importance of proper excreta disposal. The choices of latrines offered ranged from an inexpensive pit latrine to a $900 septic system.

Community members were to decide which type of latrine they wanted, provided they pay one-third of the total cost; the agency provided two-thirds of the cost. For example: (1) For a latrine that cost $100, $66 would be supplied by the agency and $34 would be supplied by the community member. (2) If the individual desired a $200 pour flush latrine, the agency would pay $133 and the individual would pay $67. The agency required that the community member raise his or her portion of the investment before the agency allocated its portion.

This approach proved very successful in providing very expensive latrines. People realized that the more resources they devoted to their latrines, the higher the subsidy they received from the agency, thereby increasing the value of their facility.

The major problem was that a great majority of community members chose the highest priced latrine, which quickly depleted project funding before all community sanitation needs and desires were addressed.

*Questions*

1. How did the agency avoid the implementation of a design that was not culturally acceptable?
2. How did the approach used by the development agency ensure the community's participation in the sanitation program?
3. What effect might this approach have on the proper use and maintenance of the latrine?
4. How could the problem be rectified?

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*Adapted from Final Evaluation of the CARE/Bolivia Child Survival and Rural Sanitation Project by Andrew Karp, Patricia Martin, and Sharon Guild. WASH Field Report No. 312, August 1990.

**Case III**

The community of Sanae has mainly an urban setting. People live in multistory housing; livestock are kept on the first floor and the living quarters are above. A squatting slab is located on the second floor. The excreta falls to an excavated area at the level of the foundation.

An agency tried to implement a sanitation program that promoted use of the VIP latrine due to its proven success in reducing odors and controlling disease vectors. The latrines were built close to each house and worked as designed.

However, the community members found the VIPs unacceptable and therefore did not use them. They had several complaints:

- The latrines were located outside the homes, which made them inconvenient compared with their previous systems.
- The outside location enabled people in the surrounding houses to see who was using the latrines, which embarrassed the users.
- Some of the latrines faced east, which was sacrilegious in the Sanae culture.

*Questions*

1. Why did the program suffer these problems?
2. What should the agency do to improve its procedures in future projects?
3. How could a development agent have promoted the program more successfully?
4. What are some possible solutions to the problems that these individuals face?
5. How could the solutions be implemented?

**Case IV**

An agency was involved in the building of pit latrines in the community of Nuhud. The agency provided the materials necessary for construction and technical assistance to the community. It also provided public health education, which increased the community members' desire for a sanitary latrine.

The community members were responsible for the labor involved in the construction of the facility. The latrine was designed with a wall between two squatting slabs, using the same pit, for use by the different sexes, as was generally accepted.

The construction went well, but several problems became evident when people started to use the latrines:

- The people of Nuhud were accustomed to using large quantities of water for anal cleansing and for washing after defecation. The soil around the pit was unable to absorb this quantity of water. It filled quickly with fluid.
- The community members were embarrassed to be seen walking to the latrine by members of the opposite sex, so they only used the latrine when someone of the opposite sex was not present.

*Questions*

1. How was the program successful?
2. What did the agency neglect to consider?
3. What could be done to upgrade the system?
4. How would the upgrades be implemented?
5. What would be the development agent's role in improving the existing situation?

## Solutions to Case Examples

### Case I

Each of the problems experienced has a solution. The steps to rectifying the situation begin with the community. What don't people like about the latrines and what can be done to address their dislikes? What current behaviors can be accommodated; which ones should be changed; which ones cannot be changed? The community members must be invited into the sanitation program and be able to feel confident that it will address their needs. They must be able to consider themselves participants rather than recipients.

### Case II

Because the community members were able to choose which type of latrine they wanted and could afford, the question of a culturally acceptable latrine type did not surface. The facility was viewed and presented as an investment so that the participants would take pride in their latrines. This led to proper use and maintenance of the facility. Possible solutions to the major problem include the following:

- A set subsidy could be offered that would not change with differences in latrine choice. This approach would force those that desire a higher cost system to pay a greater percentage of the cost.
- The percentage subsidy could change based on the price level of the system. For example, if the agency offers to pay two-thirds the cost of the inexpensive latrine, it might offer to pay only one-half the cost of the next level of technology. The level of subsidy for the highest priced system might be only one-fourth or one-fifth of the total cost.
- In areas where the effective demand for improving sanitation facilities is great, a form of competition for the limited agency funding can be used to achieve the widest coverage.

  The agency could base the provision of its services on priority. Those community members who are willing to pay the greatest portion of the expense would be taken care of first. Thus, the first priority would be given to those people who need technical guidance only and are able to provide all other resources themselves. This approach would also increase the status of the sanitation systems by providing them first to those who most desire them.

**Case III**

A solution was provided after an in-depth study of the culture, which included personal preference. The indoor facilities were altered by combining certain aspects of the VIP latrine with the existing facility. The solution provided an upgraded and more desirable latrine without changing the people's cultural habits.

**Case IV**

After a study of the problems, the agency came up with the following solutions:

- To avoid overflowing of the pit by the quantity of wash water, a separate enclosure was constructed, at some distance from the latrine, with a sand and gravel bed. This enclosure was used for washing after defecation. The water was introduced more slowly to the soil by first passing through the sand and gravel bed.
- The separation walls inside the latrine were extended on the outside to prevent individuals from being seen as they approached the facility.

# Session 9

## INFORMATION COLLECTION FIELD EXERCISE

***7 hours, 10 minutes***

### Objectives

By the end of the session, participants will be able to

- collect information from a community, including
  - physical data,
  - human and organizational resources, and
  - material and financial resources;
- use appropriate methods for collecting this information, including interviewing techniques; and
- analyze collected information.

### Overview

This session builds on the information collected in Session 5, "Conducting a Survey of Excreta Disposal Practices," and the information needs identified in Sessions 7 and 8, "Latrine Concepts" and "Factors in Latrine Choices."

In Session 5 it was emphasized that collecting and analyzing information in a community prior to designing an excreta disposal management program enables development agents to understand better important factors in the community. In the Session 5 field activity, the factors that were focused on included the prevalent high-risk behaviors; beliefs, norms, and other barriers; and the perceived needs and interests of people. In this session, the important community factors focused on will include human and physical factors, such as physical data upon which to base latrine type and siting; human and organizational resources available to ensure program sustainability; and availability on the local market of labor and materials for the construction of latrines.

As in Session 5, participants involve community members in this process by working with local counterparts. The information collection worksheet used in this session follows the same format as that used in Session 5. Prior to the review of the worksheet, however, participants learn to distinguish quantitative data and qualitative data. They also discuss interviewing techniques.

**Procedures**

1. **Introduction** ***10 minutes***

Refer to the observation and question asking field activity in Session 5, and ask for examples of information collected and for some ideas of what they would still like to know about the community before starting a latrine project.

Present the objectives on Flipchart A: "Session 9 Objectives," and ask if they are clear.

Explain that this session is divided into three parts:

1. Preparation for the field exercise - 2 hours
2. Information collection field exercise - 3 hours
3. Analysis of the field exercise - 2 hours

2. **Large Group Discussion: Information Needed** ***25 minutes***

Pick up on the discussion in the introduction of information participants would still like to have. List some of their ideas on a flipchart, and ask for more ideas. Write down all the ideas they identify for 5 to 10 minutes using the brainstorming technique of not evaluating any of their contributions.

Distribute Handout 9-1: "Quantitative and Qualitative Data," and explain the differences between qualitative and quantitative data by asking the participants to read and discuss the items in the handout.

Ask for some examples of qualitative data from their brainstormed list on the flipchart and highlight them. Then, ask for examples of quantitative data and highlight them as well. Say that both types of data are important in understanding a situation.

3. **Team Task: Preparation for Field Activity** ***45 minutes***

Explain that participants now have some time to prepare for gathering information in the nearby community. Say that this activity will require a combination of observation, informal question asking, and more formal interviewing.

Distribute Handout 9-2: "Information Collection Worksheet on Human Excrete Disposal Practices." Ask participants to read through the questions. Ask which questions involve quantitative data, and which questions involve qualitative data. Emphasize that these are key questions. Ask how they should go about getting the information, and to whom they should be posing particular questions.

Tell participants the questions on this worksheet are not meant to be exhaustive, and ask them which questions they would propose to add. Write the additional questions on the flipchart and discuss how much of this information can be collected.

Explain that participants will be conducting the survey in three-person teams, as in Session 5, but that the teams will be different. Add that each team will work with a community counterpart, who will help guide them again through the community.

**Trainer Note**: The role of the counterpart is to be a resource to the teams and to accompany the teams in the community. The counterparts should be coached to let the participants ask the questions.

Ask each team to do the following (Flipchart B):

*Flipchart B: Information Gathering Preparation Task*

- Review with your teammates the information you will collect.
- Discuss how you will approach and interact with your community counterpart.
- Prepare for your field exercise.
  - Decide what information you will collect by observation, informal questioning, and interviewing.
  - Agree among the team members who will take the lead for each question.
- Take 30 minutes.

Emphasize that one needs to collect data from those directly involved with the activity of interest (women, men, children, grandmothers). However, one must be careful to ask the appropriate people about tasks that concern them. For example, it is not appropriate to ask men about latrine-cleaning routines if women have the sole responsibility for carrying them out.

Divide the participants into teams of three people each. Move among the teams to answer questions and provide assistance.

**4. Lecturette: Conducting Interviews** ***30 minutes***

In a plenary group, remind participants that in Session 4 they practiced observation and facilitative skills, two essential skills in collecting information. In this session, they will still be relying on those skills, but they will also be using the interview technique to gather information.

Ask how many have had experience with interviews, and what to keep in mind when interviewing people. Then distribute Handout 9-3: "Principles for Conducting an Interview." Explain the principles and ask participants to share their reactions and ideas.

Remind participants of the importance of using facilitative skills in conducting an interview.

## 5. Set Up and Conduct Field Exercise *3 hours*

Describe each step in the field exercise and the amount of time allotted. Explain that each team will have an assigned area of the community. Explain where each team will be in the community, and how the teams can get there (or how they will get there if transportation is needed and provided). Travel to the site is estimated at 15 to 20 minutes.

Once at the site, each team will spend about 15 minutes meeting with its community counterpart to verify the appropriateness of its proposed approach before beginning to gather information. At this point, the trainers are still available for last-minute questions or comments.

The time allotted for collecting the information is 2 hours. Each team should have a more formal interview with at least one person. Estimate 30 to 45 minutes for each interview.

**Trainer Note**: These interviews should be arranged in advance with key people in the community, such as the mayor, the school principal, the chairperson of the water committee, and so on. Ideally, at least two interviews should be scheduled for each team.

## 6. Analysis of the Exercise *1 hour, 40 minutes*

Once everyone has returned to the classroom, ask each team to meet to discuss the questions outlined on Flipchart C:

*Flipchart C: Analysis of the Exercise*

- What did you do that was successful? Why?
- What problems did you encounter? How did you overcome them?
- Write down one example of information you collected for each area of your inquiry (physical data, human and organizational resources, and materials and financial resources).
- Why do think this information is important?
- Take 35 minutes for this task.

Prepare in advance a flipchart outline of Handout 9-2. Use this flipchart with the full group to record data the participants gathered. For example, ask each group to share responses to question 1.a. Then repeat for 1.b., and so on; then move on to questions 2 and 3 in the same manner. In the discussion, focus on

- major points of agreement among the groups

- significant points made by one group but not the others
- points that need clarification
- additional information they might need in order to draw conclusions

Keep the discussions brief. Ask the following questions if they have not already been addressed:

- What soil types did you encounter in the area surrounding the houses? Was the soil type different at different houses? What are the implications if the soil types are different?
- What type of water sources are the people using? What problems might they cause in siting a latrine?
- Do people have enough space for the installation of all latrine types? What latrine types could not be built due to space problems, presence of trees, high water table?
- Who is already doing what in the community? What relevant community committees exist? Who are the key community leaders?
- How willing are people to put resources into improving their sanitation? What materials are locally available? How much skilled labor is there in the community, and what type? What are peoples' priorities with their money?

Then ask how they felt overall about the field exercise. Was the exercise useful? What was the most difficult information to collect and why?

### 7. Conclusions *20 minutes*

Ask the participants to review the flipcharts generated by the teams and think about what they learned from the field exercise about collecting sanitation information in a community. Ask some of the following questions (Flipchart D):

*Flipchart D: Conclusions*

- What are the most important things you learned about methods for collecting information in a community?
- What were the advantages and disadvantages in working with a commmunity counterpart?

Write their answers on a flipchart.

## 8. Wrap-Up *20 minutes*

Summarize what the participants learned about the field exercise. Then ask how they might collect data in the communities where they work.

Return to the session objectives and ask if they were reached. Briefly review highlights of Week 1 of the training course and say that Week 2 of the course will begin with more detailed work on latrines. Pass out Handouts 10-1 and 10-2 for weekend reading.

**Trainer Notes:**

1. As in Session 5, preparing the community for this field exercise is essential. The community should understand the purpose and structure of the field exercise and what is expected of them. As in Session 5, six to eight members of the community (if possible) should be designated to work with the teams, one per three-member team.
2. Again, it is recommended that a representative of the training staff visit the community the night before the field exercise to remind people of the exercise and when it will start. If possible, the individuals to be interviewed should be identified in advance. It would also be helpful for the same person to return to the community an hour before the scheduled start of the field exercise.

### Materials

Handout 9-1: Quantitative and Qualitative Data

Handout 9-2: Information Collection Worksheet on Human Excreta Disposal Practices

Handout 9-3: Principles for Conducting an Interview

Handout 10-1: Making Good Concrete

Handout 10-2: Key Design Components

Flipchart A: Session 9 Objectives

Flipchart B: Information Gathering Preparation Task

Flipchart C: Analysis of the Exercise

Flipchart D: Conclusions

## Quantitative and Qualitative Data

### Quantitative Data

- to quantify/count certain things (latrines, pumps, etc.)
- the frequency of certain practices (times per week that latrine is cleaned)
- percentage of people's knowledge (16 percent know that dirty water can cause diarrhea)
- percentage of people's practices (22 percent do not use their latrines; 44 percent wash their hands before eating)
- usually a large sample but information is superficial rather than in depth
- method: usually a survey
- survey instrument is rigid; must be used in same fashion by all interviewers

### Qualitative Data

- to explain certain practices, beliefs in detail:
  - why the latrine is cleaned once every two weeks; how it is cleaned
  - explanations of the causes of diarrhea
  - why 22 percent of the people do not use their latrines
  - why 44 percent of the people wash their hands before eating; why 56 percent do not
- usually a small sample but information is in depth
- methods: observations, individual or group interviews
- Methods are flexible. Initial questions and points to observe are defined by interviewer/observer. He/she must be alert and use creativity to ask additional questions or observe additional points as work proceeds.
- Typical qualitative questions:
  - why...?
  - how does...?
  - what are the advantages and disadvantages of...?
  - what is your opinion as to...?

## Information Collection Worksheet on Human Excreta Disposal Practices

| What Information to Collect | From Whom/Where | How to Collect It | Data Collected |
|---|---|---|---|
| 1. *Physical Data* | | | |
| a. What is the predominant soil type in the community? | | | |
| b. Where in the community might the soil type cause a problem in the installation of latrines? | | | |
| c. Where would space for installation of latrines be a problem? | | | |
| d. How high is the water table?<br>- in dry season<br>- in wet season | | | |
| e. Which water sources would affect latrine siting? | | | |

| What Information to Collect | From Whom/Where | How to Collect It | Data Collected |
|---|---|---|---|
| 2. *Human and Organizational Resources* | | | |
| a. Who is already doing what in the community? | | | |
| b. What relevant community committees exist? | | | |
| c. Who appear to be key leaders or influential people? | | | |
| d. What other community service groups exist? | | | |
| 3. *Materials and Financial Resources* | | | |
| a. How willing are people to put resources into improving their sanitation? | | | |

| What Information to Collect | From Whom/Where | How to Collect It | Data Collected |
|---|---|---|---|
| b. What materials are available in the market for latrine construction? | | | |
| c. What community, government, or other groups are willing to provide a subsidy or materials for latrine construction? | | | |
| d. How much skilled labor is there in the community, and of what type? | | | |
| e. What are peoples' priorities with their money? | | | |

## Principles for Conducting an Interview

| Basic Steps in Interviewing | Examples of Interviewer Actions |
| --- | --- |
| 1. Establish contract, set the climate and try to put person at ease. | ■ Greetings<br>■ Welcoming<br>■ Ask person how he or she is doing. |
| 2. Establish the purpose of the interview. Explain that the interview will be confidential and tell the person what will happen. | ■ Review why you are interviewing.<br>■ Tell the person that you want to find out information that relates to sanitation programs.<br>■ Explain that you will ask some questions, and that he or she will have an opportunity to ask questions as well. |
| 3. Gather information about the person by asking questions related to the interview purpose. | ■ Ask open-ended questions where appropriate.<br>■ Put the person in a situation and ask what he or she would do. |
| 4. Give the person a chance to talk about himself or herself. | ■ Answer questions (these are a key to the way the person thinks). |
| 5. Conclude the interview. | ■ Tell the person what will happen next.<br>■ Thank the person for his or her time. |

Session **10**

## DETAILS OF LATRINE DESIGN *7 hours*

### Objectives

By the end of this session, the participants will be able to

- identify differences in the design of latrine components,
- describe the details of design for the four variations of latrines, and
- deliver a design presentation with visual aids for one latrine type.

### Overview

The primary purpose of this session is to help participants understand the details of the design of four types of latrines. A secondary purpose of the session is to provide participants with an opportunity to prepare and deliver a presentation to their peers.

This session opens Week 2 of the training course. It begins with a quick review of the overall course purpose and goals, identifying the goals already covered and those yet to be covered.

The procedures for the session itself begin with a lecturette on key design components. Participants are then divided into four small groups, and each group is assigned one of the four latrine types. Their task is to discuss in detail the design characteristics of one latrine type and to make a presentation to the full group on their assigned latrine's specific characteristics and design considerations. This activity draws on what they have learned about design components in previous sessions.

The session ends with a visit to the site of the demonstration VIP latrine and a discussion of design and construction issues.

### Procedures

**1. Opening and Climate Setter for Week 2** ***15 minutes***

Go back to the overall workshop purpose and goals (Handout 1-1). Discuss goals already covered and identify the goals that will be met in Week 2 of the program. Review the schedule and mix of field and classroom time for the second week. Discuss preparations for returning home and applying learning, citing in particular the back-home action-planning activity in Session 16.

Refer back to participants' expectations, identified on Day 1, and give participants an opportunity to talk about how well those expectations are being met. Be sure to keep the expectations posted in the group meeting room. This is a good time to have individuals reflect on their learning so far and review what they want to accomplish by the end of the workshop.

Ask if there are any questions, ideas, or feedback from last week not yet discussed. Allow time for any unresolved issues or problems to be discussed.

**2. Introduction** ***5 minutes***

Present the objectives on Flipchart A: "Session 10 Objectives" and rationale for the session.

**3. Lecturette: Latrine Designs** ***1 hour***

Present on a flipchart the key design components. Handout 7-4: "Latrine Components" can be used here as well to show the relationship of the components. The components that were not included in Session 7 can be pointed out.

*Flipchart B: Key Design Components*

- base
- pit
- pit lining
- slab
- ventilation
- superstructure (shelter)

Say a few words about each component and ask for examples the participants have seen in their communities. Ask what they think the reasons were for utilizing a particular component.

Say that the designs can be customized to existing physical conditions, personal preferences, materials available, and level of skilled labor. An integration of the designs is also possible.

Emphasize that upgrading an existing latrine is much cheaper than constructing a new latrine, and it may be the best option, based on the latrine's condition, user preferences, and funding availability.

Highlight key points from Handout 10-2 on the following flipcharts:

*Flipchart C: Base*

- prevents erosion
- provides support
- prevents access by insects
- prevents runoff from entering the pit
- can be made of brick, concrete block, poured concrete, wood
- can expand the volume of a latrine, such as a raised platform latrine

*Flipchart D: Pit Design*

- a round shape is the most stable and efficient
- storage capacity should last several years
- should be built in permeable soil
- should not intrude on a drinking water source

*Flipchart E: Pit Lining Design*

- can shore up the pit walls in unstable soils
- used in waterborne or sealed system
- adds support in unstable soil
- requires spaces in the lining
- should last for the design life of the pit

Ask,

- What percentage of pits in your communities is lined?
- How common are fallen latrines? What is the perceived cause?

*Flipchart F: Latrine Slab*

- can use various materials
- cement is most common material
- should be smooth and nonporous for easy cleaning
- can have different components (e.g., a smaller seat for children)
- clay or cement can form seal between the slab and base
- slab fixtures (e.g., waterseal trap) may require a skilled local craftsman

*Flipchart G: Ventilation*

- decreases odors
- keeps latrine dry
- screening prevents access by insects

For VIP vent:

- a smooth rounded cross section, such as plastic pipe, is the most efficient
- the larger the cross-sectional area of the vent, the better it will work
- should extend from the pit to a height above the surrounding buildings to reduces odors
- orient the ventilation toward the prevailing incoming wind
- equip with a fly screen (stainless steel or aluminum)

*Flipchart H: Superstructure*

- can be constructed from any material
    - structurally sound,
    - enough space,
    - acceptable to the user
- should provide protection from the elements, privacy, and a pleasant atmosphere (encourages proper latrine use)

For VIP latrine:

- interior should be dark so that flies collect in the vent pipe rather than the superstructure

Ask,

- What type of superstructure is most prevalent in your communities?
- From what material are they made? What are some advantages and disadvantages of the various materials or the superstructure design used in their communities?

**Say that there are situations in which the most basic designs will not work or are not desirable. Ask,**

- **What are some possibilities for altering any of the basic designs?**

Give examples of some situations in which designs would be altered. Make the point that a hybrid design can be formed of the different latrine types to increase the options available and user acceptance.

If participants raise how-to questions on making cement, refer them to Handout 10-1: "Making Good Concrete," which was distributed at the end of Session 9. It is a reference they might find helpful back in their communities. Emphasize that skill in making cement should be part of their criteria in hiring a master builder.

Tell participants they may want to refer to Handout 10-2: "Key Design Components," also distributed at the end of Session 9, during the next activity.

**4. Presentation Preparation: Small Group Activity** ***1 hour, 40 minutes***

**Trainer Note**: This activity requires reference to Handout 7-2: "Basic Types of Latrines" and 7-3: "Basic Variations of Latrines."

Explain that participants will now have the opportunity to discuss in detail the design characteristics of one type of latrine. Say that they will be working in four small groups, that each group will be assigned one latrine type, and that each group will be making a presentation on the latrine design assigned to them.

The four latrine types to be presented by the groups are as follows (on flipchart):

*Flipchart I: Latrine Types*

Group 1: Basic Latrine with Cover

Group 2: VIP Latrine

Group 3: Waterseal Latrine

Group 4: Raised Platform Pit Latrine

Present the following group task on a flipchart:

*Flipchart J: Presentation Preparation*

For the latrine type and components assigned to your group:

- Reach agreement on the following questions:
  - What are the basic design components? What specific compoonent(s) in this design is unique or particularly important?
  - What would seem to be the key cost considerations?
  - What's your perception of this latrine's cultural acceptability?

- What required materials might not be readily available? What could be built or manufactured locally?
- What would be your argument in support of this latrine type?

- Be prepared to make a presentation to the group using a diagram of the latrine.
- Record key points on a flipchart.
- Take 1 hour and 30 minutes.

Refer participants to the drawings in Handout 7-2 and to the information provided in 7-3. Ask them to draw on all the information they have learned thus far about various design components.

**Trainer Note**: It may be best to allow participants to self-select for this small group activity. In this way, they can choose to work with the latrine that they're most interested in. To ensure that groups are of equal size, however, you may have to ask some participants to work with their second-choice latrine. Also, a leader for each group should be assigned by the trainers—someone who hasn't yet had a chance to be a group leader.

**Trainer Note**: Remind the team leaders that they have an opportunity to apply their facilitative skills in order to achieve results as efficiently as possible.

## 5. Small Group Presentations — *2 hours, 15 minutes*

Explain that each group has 20 minutes for its presentation and that 10 minutes will be allowed following each presentation for questions and comments.

After each presentation, ask,

- What clarifying questions do you have?
- What did you like about the group's presentation?
- What reactions do you have to the key cost considerations identified by the group?
- To what extent do you agree with their perception of the latrine's cultural acceptability?
- In your region of the country or your community, what required materials might not be readily available? What could be built or manufactured locally?
- What reactions do you have to their argument in support of this latrine type?

**Trainer Note**: The second question is intended to elicit positive feedback for the group on its flipchart presentation. The trainers should also give positive feedback where warranted on the group's visual aids, delivery style, completeness of their content, and so on.

After all four groups have presented, ask—

- What is the most difficult aspect to understand about a particular design?
- What did you find out that you did not know before?
- What facilitative skills did the group leader use to help the group be effective?

## 6. Field Activity: Demonstration Latrine Site *1 hour*

**Trainer note**: If a concrete slab was built during Session 7, briefly describe the process of curing cement before the field activity.

*Curing* -- a process whereby the slab hardens over time until it attains the strength to support itself over the pit. The strength of the slab is improved if it is allowed to cure slowly. This can be accomplished by keeping it wet for several days after it is poured. Different methods for accomplishing this are to cover it with wet sand, straw, or empty cement bags and apply water as it dries.

**Trainer Note**: The pit walls (if needed) should be built or in the process of being built during this session.

Before sending participants to the demonstration site, ask them to jot down in their notebooks the following questions:

*Flipchart K: Demonstration Site Questions*

- What is the purpose of curing? What is being used to cure the cement? Is the material keeping the slab damp? What other methods could you use for curing?
- What design components are included in the construction of this latrine?
- What materials are being used? What would have been some other options?
- How many workers are there? Skilled? Too many/not enough?
- What if anything might you have done differently?

Say that they will discuss these questions in one hour when they return from the demonstration site.

**Trainer Note**: The next two procedures could be conducted at the demonstration site as well.

## 7. Large Group Discussion: Field Activity *30 minutes*

Participants discuss their responses to the above questions.

## 8. Conclusions *15 minutes*

Review the highlights of the session and present the following question on a flipchart:

*Flipchart L: Conclusions*

- What conclusions did you draw during this session about latrine design?

After a few moments, record a few participant responses on a flipchart, and read back over them when no additional responses are volunteered.

Then ask,

- What are some things that you especially want to remember to do when you're working in your own program?

Review session objectives and ask if they were met. Pass out Handout 10-3: "Estimating for Construction" and ask participants to read it as their evening homework assignment. Say a few words about Session 11.

**Trainer Note:** It is recommended that the stage of construction for the demonstration site visit in this session be as follows:

- pit lined
- slab built and curing
- superstructure half built

### Materials

Handout 10-1: Making Good Concrete

Handout 10-2: Key Design Components

Handout 10-3: Estimating for Construction

Flipchart A: Session 10 Objectives

Flipchart B: Key Design Components

Flipchart C: Base

Flipchart D: Pit Design

Flipchart E: Pit Lining Design

Flipchart F: Latrine Slab

Flipchart G: Ventilation

Flipchart H: Superstructure

Flipchart I: Latrine Types

Flipchart J: Presentation Preparation

Flipchart K: Demonstration Site Questions

Flipchart L: Conclusions

# Making Good Concrete

## A. Introduction to Cement

Cement is one of the most useful materials in construction. It can easily be mixed with sand and water to make mortar or with gravel, sand, and water to make concrete. Mortar and concrete are among the strongest and most durable materials used for all types of construction around the world. Mortar is normally used as the bonding agent between bricks or rocks, and concrete is normally reinforced with steel bars and molded to the desired size and shape.

Cement is available in almost every country in the world. Sand and gravel are usually available locally. Occasionally it will be difficult to get cement for latrine construction either because there are other higher priority demands for the cement or because it is too expensive. It is impossible here to say how or even whether cement can be obtained in such a circumstance.

Of the two cement compounds, mortar and concrete, concrete is the stronger. This is because the rock that makes up the gravel itself is stronger than the concrete and so contributes to its strength. Sometimes the two can be used interchangeably where lack of materials or working conditions demand it. Remember that concrete is the stronger product and should be used whenever possible.

Note: The rest of this discussion deals specifically with concrete. The same procedures can and should be followed if mortar is used instead.

## B. Ingredients of Concrete

Concrete is made from cement, sand, gravel, and water. These ingredients are combined in certain proportions to achieve the desired strength. The amount of water used to mix these ingredients is by far the most important factor in determining the final strength of the concrete. Use the least amount of water that will still give you a workable mix. Sand and gravel, which are sometimes referred to as fine and coarse aggregate, respectively, should be clean and properly graded. Cement and water form a paste, which when mixed, acts as a glue to bind the aggregates together in a strong, hard mass.

*Proportions*

- As noted above, there are four major ingredients in concrete: cement, sand, gravel, and water.

- Dry ingredients are normally mixed in certain proportions and then water is added. Proportions are expressed as follows: 1:2:4, which means that to one part cement you add two parts sand and four parts gravel. A "part" usually refers to a unit of volume. Example: A 1:2:4 concrete mix could be obtained by mixing 1 bucket of cement with 2 buckets of sand and 4 buckets of gravel.
- Proportions are almost always expressed as cement: sand: gravel, and they are usually labeled that way.
- There are many minor variations in the proportions used for mixing concrete. The most commonly used are 1:2:4, 1:2:3, 1:2.5:5.

Note: a 1:2:4 mix will go a little farther than the 1:2:3 mix and allows for using less then the best grade of sand or gravel than a 1:2.5:5 mix.

- Normal range for amount of water used to mix each 50 kg bag of cement is between 20 and 30 liters (for a 94 lb bag of cement, the range is between 4.5 and 7 gal).
- The watertightness of concrete depends primarily on the water/cement ratio and the length of moist curing. This is similar to concrete strength in that less water and longer moist-curing promote watertightness.

*Choice of Ingredients*

- Cement: The descriptions and properties given in this handout are specifically of Portland cement. This is the type most commonly used and hereafter will be referred to only as cement.

When used, cement should be dry, powdery, and free of lumps. When storing cement, try to avoid all possible contact with moisture. Store it away from exterior walls, off damp floors, and stacked close together to reduce air circulation. If it could be kept completely dry it could be stored indefinitely. Even exposed to air it will gradually draw moisture, thus limiting even the covered storage time to between 6 months and 1 year depending on conditions.

- Water: In general, water fit for drinking is suitable for mixing concrete. Impurities in the water may affect concrete setting time, strength, and shrinkage and promote corrosion of reinforcement.
- Aggregates: Fine and coarse aggregates together occupy 60 to 80 percent of concrete volume.
- Fine aggregate: Sand should range in size from less than .25 mm to 6.3 mm. Sand from seashores, dunes, or river banks is usually too fine for normal mixes. (You can sometimes scrape about 30 cm of fine surface sand off and find coarser, more suitable sand beneath it.)

- Large aggregate: Within the recommended size limits mentioned later, the larger the gravel you use the stronger and more economical the concrete will be.
- The larger the size of the gravel the less water and cement will be required to get the same strength concrete.
- The maximum gravel size should not exceed:
    - one-fifth the minimum dimension of the member;
    - three-fourths the clear space between reinforcing bars or between reinforcement and forms. (Optimum aggregate size in many situations is about 2.0 cm.)

The shape and surface texture of aggregates affect properties of freshly mixed concrete more than they affect hardened concrete. Rough textured or flat and elongated particles require more water to produce workable concrete than do rounded or cubical aggregates, and more water reduces the final strength of the concrete.

It is extremely important to have the gravel and sand clean. Silt, clay, or bits of organic matter, even in low concentrations, will ruin concrete. A very simple test for cleanliness makes use of a clear wide-mouthed jar. Fill the jar about half full of the sand and small aggregate to be tested and cover with water. Shake the mixture vigorously, and then allow it to stand for three hours. In almost every case there will be a distinct line dividing the fine sand suitable for concrete and that which is too fine. If the very fine material amounts to more than 10 percent of the suitable material, then the concrete made from it will be weak.

This means that other fine material should be sought, or the available material should be washed to remove the material that is too fine. This can be done by putting the sand (and gravel if necessary) in some container, such as a drum. Cover the aggregate with water, stir thoroughly, let stand for a minute, and pour off the liquid. One or two such treatments will remove most of the very fine material and organic matter.

Another point to consider in the selection of aggregate is its strength. About the only simple test is to break some of the stones with a hammer. If the effort required to break the majority of aggregate stones is greater than the effort required to break a similar-sized piece of concrete, then the aggregate will make strong concrete. If the stones break easily, then you can expect that the concrete made of these stones will only be as strong as the stones themselves.

In very dry climates several precautions must be taken. If the sand is perfectly dry, it will pack into a smaller space. If 20 buckets of dry sand are put in a pile and 2 buckets of water are stirred in, you could carry away about 27 buckets of damp sand. If your sand is completely dry, add some water to it or else measure by weight instead of volume. The surface of the curing concrete should be kept damp. This is because water evaporating from the surface will remove some of the water needed to make concrete properly. Cover the concrete with building paper, burlap, straw, or anything that will hold moisture and keep the direct sun and wind from the concrete surface. Keep the concrete moist by sprinkling as often as necessary; this may be as often as three times per day. After the first week of curing, it is not necessary to keep the surface damp continuously (see "Curing Concrete" below).

*Estimating Quantities of Materials Needed*

1. Calculate the volume of concrete needed (length x width x depth).
2. Multiply the volume of concrete needed by 1.5 to get the total volume of dry loose material needed. The cement and sand do little to add to the volume of the concrete because they fill in the air spaces between the gravel.
3. Add 10 percent (1/10) for losses due to handling.
4. Add the numbers in the volumetric proportion 1:2:3 = 6 that you will use to get a relative total. This will allow you later to compute fractions of the total needed for each ingredient.
5. Determine the amount of cement needed by multiplying the volume of dry material needed (from step 2) by the cement's proportional amount of the total mix (e.g., amount cement needed = 1/6 x volume of dry materials).
6. Divide by the unit volume per bag, 33.2 liters per 50 kg bag of cement, or 1 cubic foot per 94 lb bag of cement. When figuring the number of cement bags, round up to the nearest whole number.

Note: This calculation, even with the 10 percent addition for handling losses, rarely leaves any extra concrete, particularly for small jobs requiring fewer than five hand-mixed bags of cement.

## C. Construction with Concrete

*Outline of Concrete Work*

- build forms
- place rebar
- mix concrete
- pour concrete
- remove forms
- finish surface

- cure concrete

Each step in the process is described below.

*Materials for Forms*

The following materials are used to construct interior forms:

- Steel: Forms made of steel are durable and strong but are heavy, awkward, and expensive.
- Sheet metal: With a simple triangular interior support, forms made of sheet metal have proved to be successful. They are lighter and more maneuverable than steel forms but are not as strong and durable.
- Wood: This material is commonly used because it is lightweight and strong. It must be carefully bent, waterproofed, and reinforced.

  By using boards as wide as possible, form construction is made easier and quicker. It also reduces the number of lines on the concrete surface that form at the junction of two boards. Plywood is excellent, especially if it has a special high-density overlay surface. This allows for a smoother concrete finish, easier form removal, and less wear on the forms.

  If unsurfaced wood is used for forms, oil or grease the inside surface to make removal of the forms easier and to prevent the wood from drawing too much water from the concrete. Do not oil or grease the wood if the concrete surface will be painted or stuccoed.
- Earth: Any earth that can be dug into and still hold its shape can also be used as a form. Carefully dig out the desired shape and fill it with concrete. Once the concrete has set and cured it can be dug up and used where needed. A new form will have to be dug out for each piece of concrete poured.
- Other materials: Plastics and fiberglass are also occasionally used and continue to be experimented with as form materials. Fiberglass is much lighter than steel and, if handled carefully, lasts for a long time. Its cost and availability in developing nations seem to be the only factors limiting more widespread trials.

*Concrete Reinforcement (Rebar)*

Reinforcing concrete will enable it to bear much greater loads. Design of reinforced concrete structures that are large or must carry high loads can become too complicated for a person without special training.

Concrete alone has great compression strength but little tensile strength. Concrete is very difficult to squeeze (compression), but breaks relatively easily when stretched (put in tension). Reinforcing steel has exactly the opposite properties; it is strong in tension and weak in compression. Combining the two results in a material (reinforced concrete) that is strong in both compression and tension and therefore useful in a large number of situations.

Concrete is best reinforced with specially made steel rods that can be imbedded in the concrete. Bamboo has also been used to reinforce concrete with some success, although it is liable to deteriorate with time.

- Reinforced concrete sections should be at least 7.5 cm thick, although 10 cm is preferable.
- The reinforcing bar (rebar) usually comes in long sections of a given diameter.
- Exactly how much rebar is needed in a particular pour will depend on the load it will have to support. For most concrete work, including everything discussed in this manual, rebar should take up 0.5 to 1 percent of the cross-sectional area.
- Reinforcing bars should also have clean surfaces free of loose scale and rust. Bars in poor condition should be brushed thoroughly with a stiff wire brush.
- When placing rebar in a form before the concrete is poured, it should be located
  - at least 2.5 cm from the form everywhere.
  - in a plane approximately one-third of the way into the thickness of the pour from the bottom of the structure or slab.
  - in a grid so that there is never more than three times the final concrete thickness between adjacent bars.
  - no closer than 3 cm to a parallel bar.
- Rebar strength is approximately additive according to cross-sectional area. Four 4-mm rebars will be about as strong as one 8-mm rebar. The cross-sectional area of four 4-mm rebars equals the cross-sectional area of a one 8-mm rebar.
- The rebars should be arranged in an evenly spaced grid-type pattern with more and/or thicker rebar along the longest dimension of the pour.
- All intersections where rebars cross should be tied with thin wire.
- When one rebar is tied onto another to increase the length of the rebars, the overlap should be 20 times the diameter of the rebar and be tied twice with wire.

| Rebar Size | Overlap |
|---|---|
| 6 mm | 12 cm |
| 8 mm | 16 cm |
| 10 mm | 20 cm |
| 12 mm | 24 cm |

- Larger sizes of rebar often have raised patterns on them, which are designed to allow them to be held firmly in place by the concrete. Smaller sizes of rebar are generally smooth. When using smooth rebar, always make a small hook at the end of each piece that will be in the concrete. Without the hook, temperature changes may eventually loosen the concrete from the rebar, thereby destroying much of its reinforcing effect.
- Rebar should be carefully prepared so that the rebar is straight and square. Sloppy rebar work will result in weaker concrete and waste rebar.
- For particularly strong pieces or where small irregular shapes are being formed, the rebar can be put together in a cage-like arrangement. Use small rebar for the cross sections and larger rebar for the length. This system is used to reinforce pieces like a cutting ring, with its irregular shape, or perhaps a well cover, which may have many people standing on it at one time.
- Where possible, it is usually best to assemble rebar inside the form so that it will fit exactly.
- The proper distance from the bottom of the pour in a slab can be achieved by setting the rebar on a few small stones before the concrete is poured or simply pulling the rebar grid a couple of centimeters up into the concrete after some concrete has been spread over the whole pour.

*Mixing Concrete by Machine or by Hand*

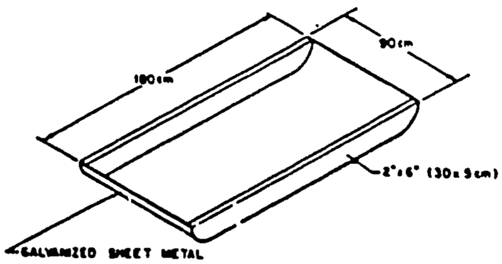
Mixing by Machine

**Concrete must be thoroughly mixed to yield the strongest product. For machine mix, allow 5 or 6 minutes after all the materials are in the drum. First, put about 10 percent of the mixing water in the drum. Then add water uniformly with the dry materials, leaving another 10 percent to be added after the dry materials are in the drum.**

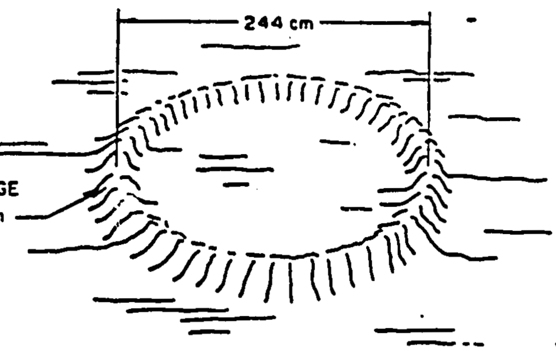
Mixing by Hand

On many self-help projects, the amount of concrete needed may be small or it may be difficult to get a mechanical mixer. If a few precautions are taken, hand-mixed concrete can be as strong as concrete mixed in a machine.

The first requirement for mixing by hand is a mixing area that is both clean and watertight. This can be a wood and metal mixing trough or simple round mixing floor, as shown below.




Wood and Metal Mixing Trough




Mixing Floor

Use the following procedure:

1. Spread the fine aggregate evenly over the mixing area.
2. Spread the cement evenly over the fine aggregate and mix these materials by turning them with a shovel until the color is uniform.
3. Spread the mixture out evenly, spread the coarse aggregate on it, and mix thoroughly again. All dry materials should be thoroughly mixed before water is added.

A workable mix should be smooth and plastic—neither so wet that it will run nor so stiff that it will crumble. If the mix is too wet, add small amounts of sand and gravel, *in the proper proportion*, until the mix is workable. If a concrete mix is too stiff, it will be difficult to place in the forms. If it is not stiff enough, the mix probably does not have enough aggregate, thus making it an uneconomical use of cement.

When work is finished for the day, be sure to rinse concrete from the mixing area and the tools to keep them from rusting and to prevent cement from caking on them. Smooth shiny tools and mixing surfaces make mixing surprisingly easier. The tools will also last much longer.

*Pouring Concrete Into Forms*

To make strong concrete structures, it is important to place fresh concrete in the forms correctly.

The wet concrete mix should not be handled roughly when it is being carried and put in the forms. It is very easy, through joggling or throwing, to separate the fine aggregate from the coarse aggregate. Do not let the concrete drop freely for a distance greater than 90 to 120 cm (3 to 4 ft). Concrete is strongest when the various sizes of aggregates and cement paste are well mixed.

Properly proportioned concrete will have to be worked into place in the form. Concrete that would on its own flow out to fill in a form completely would be too wet and therefore weak.

When pouring concrete structures that are over 120 cm high, leave holes in the forms at intervals of less than 120 cm through which concrete can be poured and which can later be covered to permit pouring above that level. Alternatively, a slide could be used through which concrete could flow down to the bottom of the form without separating. Any "U"-shaped trough wide enough to facilitate pouring concrete into it, narrow enough to fit inside the form, and long enough so that the concrete can slide down the chute without separating will work.

As the concrete is being placed, it should be compacted so that no air holes, which would leave weak spots in the concrete, are left. This can be done by tamping the concrete with some long thin tools or vibrating the concrete. Tamping can be accomplished with a thin (2 cm) iron rod, a wooden pole, or a shovel.

The concrete will be compacted to some extent as it is moved into its final position in the form. However, special attention must be paid to the edges of the pour to make sure that the concrete has completely filled in against the form. If the forms are strong enough, they can be struck with a hammer on the outside to vibrate the concrete just enough to allow it to settle completely in against the forms. Too much vibration can force most of the large aggregate toward the bottom of the pour, thus reducing the overall strength of the concrete.

*Finishing*

Once the concrete is poured into the forms, its surface should be worked to an even finish. The smoothness of the finish will depend on what the surface will be used for. Where more concrete or mortar will later be placed on this pour, the area should be left relatively rough to facilitate bonding. Where the surface will later be walked on, as for example, the floor of a latrine, it should be somewhat rough to prevent people from slipping on the concrete when its surface is wet. This somewhat rough texture can be achieved by finishing with a wooden float or by lightly brushing the surface to give it a texture. A very smooth finish can be made with a metal trowel. Overfinishing (repeated finishing) can lead to powdering and erosion of the surface.

*Curing Concrete*

After the forms are filled, the concrete must be cured until it reaches the required strength. Curing involves keeping the concrete damp so that the chemical reaction that causes the concrete to harden will continue for as long as is necessary to achieve the desired strength. Once the concrete is allowed to dry the chemical hardening action will gradually taper off and cease.

The early stage of curing is extremely critical. Special steps should be taken to keep the concrete wet. Once the concrete dries, it will stop hardening; after this happens it cannot be rewetted in the field to restart the hardening process.

Covering the exposed concrete surfaces is usually easier than continuously sprinkling or frequently dousing the concrete with water, which would otherwise be necessary to prevent the concrete surface from becoming dry. Protective covers often used include canvas, empty cement bags, burlap, plastic, palm leaves, straw, and wet sand. The covering should also be kept wet so that it will not absorb water from the concrete.

Concrete is strong enough for light loads after 7 days. In most cases, forms can be removed from standing structures, like bridges and walls, after 4 or 5 days, but if they are left in place they will help to keep the concrete from drying out. Where concrete structures are being cast on the ground, the forms can be removed as soon as the concrete sets enough to holds its own shape (3 to 6 hours) if there is no load on the structure and measures are taken to ensure proper curing.

The concrete's final strength will result in part from how long it is moist cured. As can be seen from Figure 10-1, concrete will eventually reach about 60 percent of its design strength if not moist-cured at all, 80 percent if moist-cured for 3 days, and almost 100 percent if moist-cured for 7 days. If concrete is kept moist, it will continue to harden indefinitely.

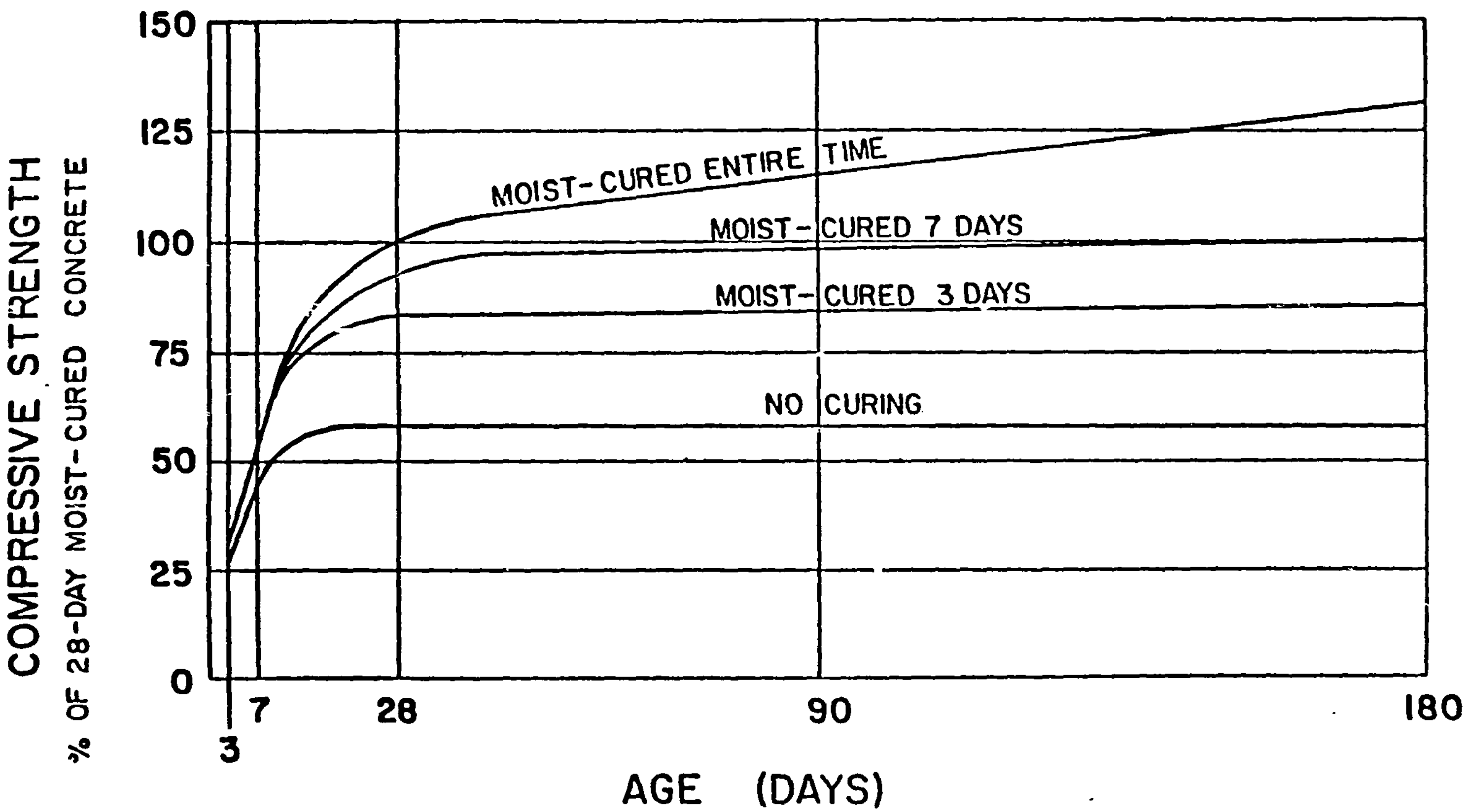



**FIGURE 10-1**

Compressive strength of concrete

## Key Design Components

### A. Base

- Prevents erosion around the slab.
- Supports the slab and superstructure.
- Prevents access by insects (if a seal is formed with the slab).
- Prevents runoff from entering the pit (if the base is raised).
- Can be made of any durable material that can be sealed with the slab (e.g., brick, concrete block, poured concrete, wood).
- Can be built up to form a wall to expand the volume of a latrine as for a raised platform pit latrine.
- Functions also as foundation of superstructure in certain cases.

### B. Pit Design

- Can be made of any cross-sectional shape (although a round shape is the most stable and efficient).
- Should be made with a large enough storage capacity to last several years.
- Should be built in reasonably permeable soil.
- Should not intrude on the water table that is utilized as a drinking water source. (In areas of high water table, a raised platform pit latrine can be used. An impermeable layer of clay can also be placed on the pit bottom to inhibit leaching into the water table.)

### C. Pit Lining Design

- Used in unstable soil to shore the pit walls.
- Used in waterborne or sealed system (although not needed in all cases).
- Adds support to the base, slab, and superstructure in unstable soil.
- Requires spaces in the lining to allow the liquids to infiltrate into the surrounding soil.
- Should be built to last for the design life of the pit.

**D. Latrine Slab**

- Can be made of various materials (e.g., reinforced concrete, wood) and in various or different shapes to fit the pit (e.g., round or square).
- Cement is the most common slab construction material; it can be used to form different slabs: reinforced concrete, ferrocement, and Sanplat.
- Some slab or slab fixtures are better suited to mass manufacturing processes.
- Must be made smooth and nonporous for easy cleaning and to reduce the transmission of diseases.
- Can have different components, such as a pedestal seat, foot pads, or a customized component for a specific user (e.g., a smaller seat and drop hole for children).
- A seal between the slab and base can be formed of cement or clay.
- Slab fixtures, such as the waterseal trap, can be built of concrete, ceramic, or sheet metal, and should be manufactured by a skilled local craftsman.

**E. Ventilation**

- Will decrease the odors of the latrine.
- Will keep the latrine interior dry.
- Must be screened to prevent access to insects.

For VIP vent:

- Can be made of many materials, but a smooth, rounded cross section is the most efficient, such as plastic pipe (must be without curves).
- The larger the cross-sectional area of the vent, the better it will work; a minimum of 15 cm is recommended for round cross sections and a minimum of 23 cm per side of a square one.
- Must extend from the pit to a height above the surrounding buildings to reduce the odor; should not be placed in an area near trees, which would inhibit the flow of wind across the top of the vent.
- The ventilation of the superstructure should be oriented toward the prevailing incoming wind; this will increase the efficiency of the vent in reducing the odors of the pit.
- Must be equipped with a fly screen—stainless steel or aluminum is recommended.

**F. Superstructure**

- Can be constructed from any material that is structurally sound, has enough space, and is acceptable to the user.
- Must provide protection from the elements, privacy, and a pleasant atmosphere.
- A comfortable atmosphere encourages proper latrine use.

For VIP latrine,

- The interior should remain dark to prevent flies from escaping from the superstructure after coming into contact with the pit contents. If this factor inhibits its use by small children, an adjustment should be made to make it comfortable for all family members.

## Estimating for Construction

### A. Base Design

A base can be made out of poured concrete, wood, brick, and other material. It must be wide enough to support the concrete slab. (See Figures 10-2 and 10-5 at the end of this handout.)

The quantity of materials needed to construct the base depends on the type of material and the size of the pit. One way to estimate the quantity for a brick, concrete block, or concrete base is to calculate the distance around the top of the pit. This distance is called the periphery; it is equal to twice the length plus twice the width.

*Base Made of Brick or Concrete Blocks*

When constructing a base made of bricks or concrete blocks, place them side to side, around the pit.

*For example,*

- If a pit is 1.2 m long and 1 m wide, the perimeter (P) equals:

  $P = (2 \times 1.2) + (2 \times 1) = 4.4$ m

If the width of one concrete block is equal to 20 cm, how many blocks would it take to make a two-layer base?

If the concrete block width is 20 cm, it will take five of them to make a meter. Multiply the number of blocks per meter by the number of meters in the periphery by the number of layers:

Number of blocks $= 5 \times 4.4 \times 2 = 44$ blocks needed.

*Base Made of Poured Concrete*

The quantity of poured concrete needed is the area of the outer base trench minus the area of the pit cross section multiplied by the depth of the base.

*For example,*

- A base is 15 cm wide and 7.5 cm thick and the cross-sectional dimensions of the pit are 1 m by 1 m.

Since the width of the base extends to both sides of the pit, the outer area is $1.3 \times 1.3 = 1.69$ m$^2$; subtracting the 1 m$^2$ of the pit gives you the cross-sectional area of the base, which is 0.69 m$^2$. This number is then multiplied by the thickness (7.5 cm = 0.075 m) to get the volume of concrete needed—0.052 m$^3$ of concrete.

A poured concrete base should be reinforced. Iron bars or bamboo can be used.

**B. Pit Design**

Common limitations when considering pit designs are the presence of a high water table or rocky soil. Some solutions to these problems follow (also see Figure 10-3):

- Elevate the pit by extending the pit base above ground level and adding steps up to the latrine slab, as for a raised platform latrine.
- Build pits that are shallower in such a way that the materials used can be readily recycled because the pit will fill more quickly.
- Use an above-ground system.

Other major points:

- A pit should have a large enough storage capacity to last several years.
- It should be built in a reasonably permeable soil (see Handout 8-4 on "Determining Soil Suitability").
- It should not intrude on the water table that is utilized as a drinking water source (the bottom of the pit should be at least 2 m above the water table).

Decisions regarding pit design and size should be based on the following factors:

- latrine technology (wet or dry system)
- number of users
- design life of the pit
- whether anal cleansing solids will be thrown into the pit

The design life of the pit is the time it takes for the latrine to fill, after which the latrine has to be emptied or rebuilt. The design life depends on the size of the pit, type of latrine, number of users, and type of solid anal cleansing material used (if thrown into the pit).

As a general rule, it is more economical to dig a deeper pit to increase the volume than to increase the cross section. It the cross section is increased, the base and slab dimensions must also be increased.

To calculate the pit size, the following formula can be used:*

$V = 1.33 \times C \times P \times N$

where,

$V$ = the volume of the pit in $m^3$,

$C$ = the pit design capacity in $m^3$/person-year,

$P$ = the number of users, and

$N$ = the design life in years.

$C$ is the amount of excrement from a single person that is left in the pit after a year, along with cleansing material used. The value of $C$ depends on whether it is a dry or wet pit (see see Table 10-1).

The factor of 1.33 is incorporated to ensure a clear space above the remains of the excreta at the end of the design period.

TABLE 10-1
The Value of Pit Design Capacity ($m^3$ per person per year)

| Wet Pit | | Dry Pit | |
|---|---|---|---|
| Anal Cleansing Water | Anal Cleansing Solids | Anal Cleansing Water | Anal Cleansing Solids |
| 0.04 | 0.06 | 0.06 | 0.09 |

## Pit Design and Size: An Illustration

A family of four wants a waterseal latrine that will last for 10 years. They use a solid cleansing material but dispose of it outside the latrine by burying it. The soil at the selected latrine site will readily absorb the water used in flushing the latrine.

In this example,

$C = 0.04$ m$^3$/person-year

$P = 4$ people

$N = 10$

$V = 1.33$ zero $\times 0.04 \times 4 \times 10 = 2.1$ m$^3$.

The volume of the pit should be 2.1 m$^3$.

For a rectangular pit,

$V = H \times L \times W$

where,

$H$ = height,

$L$ = cross-sectional length, and

$W$ = cross-sectional width.

If we choose to make a square pit, $L$ and $W$ will be equal. If $L$ and $W$ equal 1 m, how deep does the pit have to be to provide a volume of 2.1 $m^3$?

$2.1 = H \times 1 \times 1$

We find that $H$ is equal to 2.1 m.

## C. Pit Lining

There are variety of ways and materials for lining a pit: concrete blocks, timber (wood), bamboo, brick, and so on. (See Figures 10-3 and 10-4.) If the soil is unstable, any of these materials can be used to shore the pit walls.

The criteria for selecting a material are strength and cost. The material must be strong enough to last the design life of the pit yet inexpensive enough to be affordable.

To determine the quantity of material needed for lining, you must calculate the overall area of each side of the pit walls. This is done by multiplying the depth by the width of each wall, and adding them together. If the walls are extended above the ground level, as in a raised platform latrine, the area of the extension must be included to obtain total material requirements.

*Example 1*

If a pit is 2.5 m deep and has a rectangular cross section of 0.8 m by 1 meter, the quantity of material needed would be calculated as follows:

Wall surface area = $2.5 \times (0.8 \times 2 + 1 \times 2) = 6.5$ $m^2$.

If there are 100 bricks per square meter, then

6.5 $m^2$ x 100 bricks/$m^2$ = 650 bricks needed.

If one-third the bag of cement is needed to provide mortar to build a 1 $m^2$ section of wall, approximately one-half of the quantity would be needed when constructing a pit wall.

In a pit wall, mortar is not used in the vertical spaces between the bricks to allow the liquids in the pit to soak into the surrounding soil.

How much cement is required to build the pit walls?

Bags of cement = 1/2 x 1/3 x 6.5 = 1.1 bags.

*Example 2*

If the pit design is used as in Example 1, but the walls are each raised 1 m to accommodate a raised platform latrine, the quantity of materials needed would be calculated as follows:

Wall surface area = 3.5 x (0.8 x 2 + 1 x 2) = 12.6 $m^2$.

Bricks required:

12.6 $m^2$ x 100 bricks/$m^2$ = 1,260 bricks needed.

Cement required:

The calculation for cement required would be slightly different because the wall above the ground level would be built with mortar in all the spaces, as for a house. The amount of cement required for the wall portion below the ground level would be the same as in Example 1, 1.1 bags, so only the mortar needed for the above-ground portion needs be calculated.

Above-ground wall surface area = 1 x (0.8 x 2 + 1 x 2) = 3.6 $m^2$.

Total cement required:

Bags of cement = 1.1 bag + (1/3 x 3.6) = 2.3 bags.

The quantity of any material needed for lining the pit can be calculated in the same manner. An easy method for doing this is to measure a square meter of a building made of the same material as the lining will be, then determine the amount of the material in that square meter. Remember that spaces must be left in the lining to enable the liquids in the pit to infiltrate into the soil surrounding the pit. If no spaces are left, the latrine will fill more quickly.

### D. Latrine Slab Design

Slabs can be made of many materials (see Figures 10-6 through 10-9). Concrete is the most common, strongest, and most versatile of these materials. For this reason, this discussion focuses on latrine slabs made of concrete.

All slabs should overlap the latrine base by 10 cm on each side to form a good seal.

*Reinforced Concrete Slab* (Figure 10-7)

- Consists of the following materials: cement, sand, gravel, water, and reinforcing material (usually steel bars).
- A common thickness for reinforced concrete slabs is 10 cm. The width and length may vary (or the slab may be round), but they are usually not more than 1.5 m.

Concrete is mixed in different ratios:

1:2:3 indicates 1 part cement:2 parts sand:3 parts gravel

1:2:4 indicates 1 part cement:2 parts sand:4 parts gravel

Constructing a reinforced concrete slab involves the following steps:

1. build forms
2. place reinforcement
3. mix concrete
4. pour concrete
5. remove forms
6. finish surface
7. cure concrete

See Handout 10-1: "Making Good Concrete" for a discussion of each step.

*Ferrocement Slab* (Figure 10-8)

The ferrocement slab is slightly different from the reinforced concrete slab. The material components of the concrete do not include gravel as in the reinforced concrete slab; the reinforcement is a large mesh screen (chicken wire) cut to the dimensions of the slab. Two layers of screen are required, and sometimes three are used.

With ferrocement construction, less material is required because the wire mesh forms a stronger bond with the other material components. Thus, the ferrocement slab weighs less.

A ferrocement slab can be made with a thickness of only 2.5 cm and will be as strong as a reinforced concrete slab. The ratio of cement to sand in a slab is 1:2.

## Calculating the Materials Needed for a Reinforced Concrete Slab: An Illustration

What are the material requirements of a slab that is 10 cm thick and 1 m square if a 1:2:4 mixture is used? How much rebar is needed if the reinforcement is placed every 20 cm along both axes of the latrine slab?

1. Volume of slab = thickness x length x width

   $0.10 \times 1 \times 1 = 0.1\ m^3$

2. The sand and cement add little to the volume of the slab because they fill the spaces (air pockets) within the gravel.

   Based on this, $0.1\ m^3$ gravel is needed.

3. Since the ratio of sand to gravel is 2:4, the sand needed is half as much as the gravel, or $0.05\ m^3$.

4. The volume of cement needed is one-fourth of the volume of gravel, or $0.025\ m^3$.

5. How many bags of cement is this?

   It depends on the size of the bag (they can be different from one country to another).

   What if we assume that a bag is 50 kg?

   A 50 kg bag has a volume of 33.2 liters ($1\ m^3 = 1{,}000$ liters) or $0.0332\ m^3$. Comparing this number with that in step 4, a little less than one-third of the bag will be left over after the slab is made.

6. What is the rebar requirement?

   If rebar is placed every 20 cm, four pieces will be needed along each axis for a total of eight. They are cut to approximately the same length of the slab, so 8 m of rebar are needed.

## Calculating the Materials Needed for a Ferrocement Slab: An Illustration

Calculate the material requirements of a ferrocement slab to fit over a square pit with dimensions of 1 m by 1 m.

1. If the pit is 1 m square, the slab should be 1.2 m by 1.2 m in order to overhang the edges of the pit.
2. Volume of the slab: 1.2 x 1.2 x 0.025 (thickness) = 0.036 $m^3$.
3. How much of this volume is sand and how much is cement?

   Since the sand does not form air pockets to the extent of the gravel in the reinforced concrete slab, it will amount to two-thirds of the volume of the slab.

   2/3 x 0.036 $m^3$ = 0.024 $m^3$ sand.

   The volume of cement required is half of the sand volume given the 1:2 ratio, or 0.012 $m^3$.
4. How many bags of cement are needed if we use 50 kg bags of cement?

   We use the same calculation as in the previous example. A 50 kg bag of cement has a volume of 33.2 liters or 0.0332 $m^3$. We can see by comparing this amount with the amount of cement required (0.012 $m^3$) that the ferrocement slab will use about one-third of the bag.
5. How much chicken wire is required?

   This is calculated by multiplying the area of the slab by 2, because two layers of screen are involved.

   2 x (1.2 x 1.2) = 2.88 $m^2$.

*Sanplat*

Sanplat is a name for a particular latrine slab that does not require reinforcement (see Figure 10-9). The unique arch design gives it sufficient structural stability to support itself without reinforcement. It also requires less cement than a reinforced concrete slab of the same dimensions.

It can be built as above in terms of the concrete mixture, but a specialized form is required to create the arch.

*Waterseal Trap* (Figures 10-8 and 10-10)

The waterseal trap can be made of different materials by a skilled artisan. The basic design of the traps depends on whether they are to be used for an offset pit or a pit directly under the slab. Examples of each type (with corresponding latrine diagram) are shown in Figure 10-10.

## E. Ventilation

Sufficient ventilation will help reduce the bad odors in the latrine superstructure. A screened window can easily be located between the superstructure walls and the roof. All openings should be screened to prevent flies from entering the latrine superstructure. (See Figures 10-11 and 10-12).

VIP latrines have a vent pipe. This pipe can be made of local materials, and can be built—just as the latrine superstructure—by a local builder. The alternative is to make it from plastic piping. It is generally recommended that the pipe be 15 cm in cross section or larger; however, a 10 cm pipe has been shown to work in an area with a consistent wind. The junction of the pipe (of whatever material) and the latrine slab must be sealed to prevent the escape of flies. A common problem in the operation of the VIP latrine vent pipe is that the latrine is located near tall buildings or trees. These objects block the flow of wind around the vent pipe, which can reduce or nullify the air circulation in the latrine.

The function of the fly screen is vital in preventing flies from escaping the pit. It must be maintained after installation if it is to work effectively.

## F. Superstructure

The superstructure should be built by a local house builder—someone who is familiar with local materials (see examples in Figures 10-13 and 10-14). This builder should be contacted to assist with calculating the materials needed. He or she should also be a good resource to identify where different materials can be obtained.

Great care should be taken in choosing the materials, as well as the builder, for the superstructure because it not only provides privacy for the user but is also the most visible component of the latrine. As such, the proper and continued use of the latrine can depend on the quality of the structure.

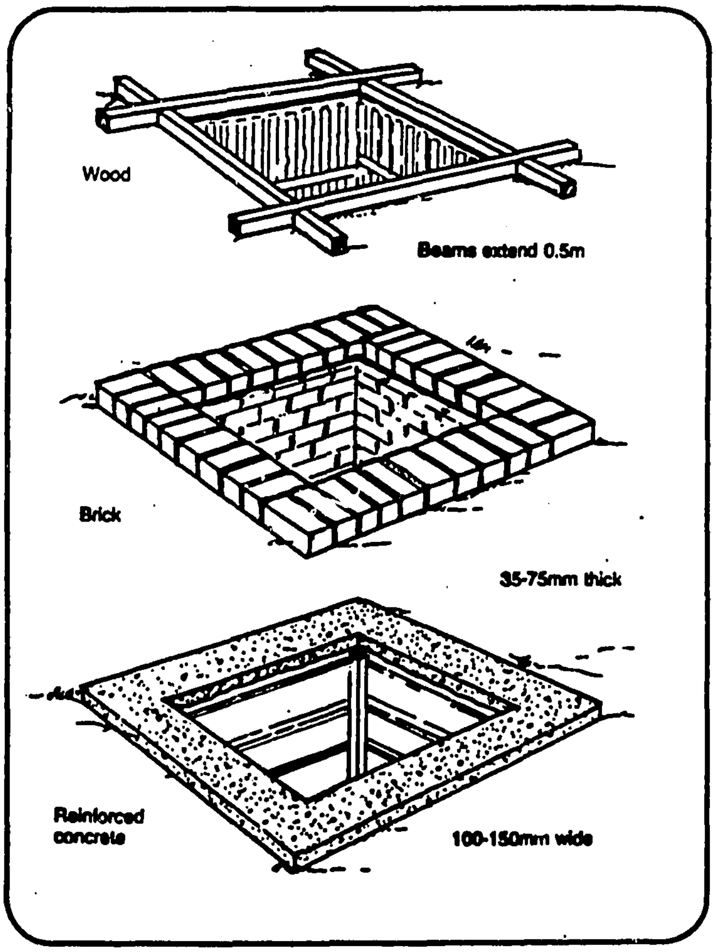



**FIGURE 10-2**
Diagrams Showing Bases Made of Various Materials

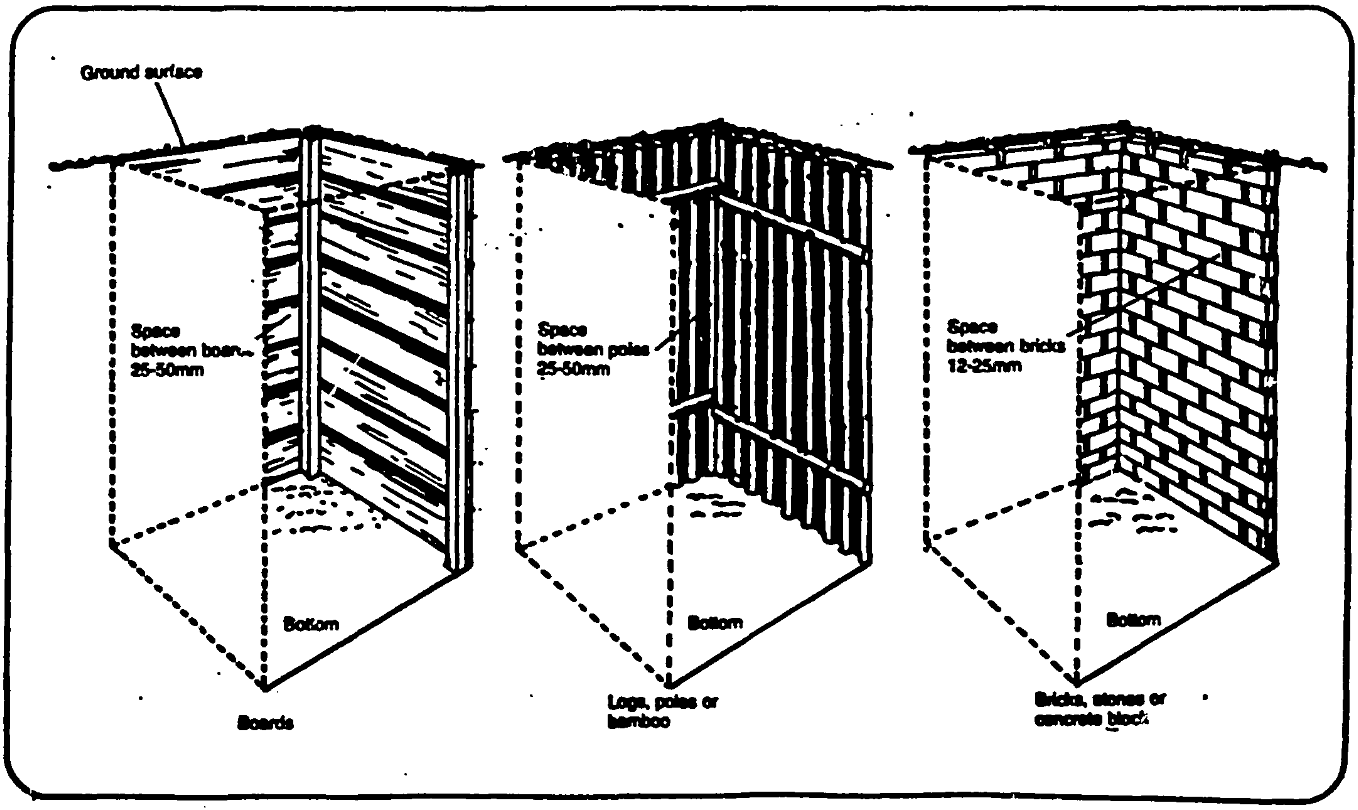
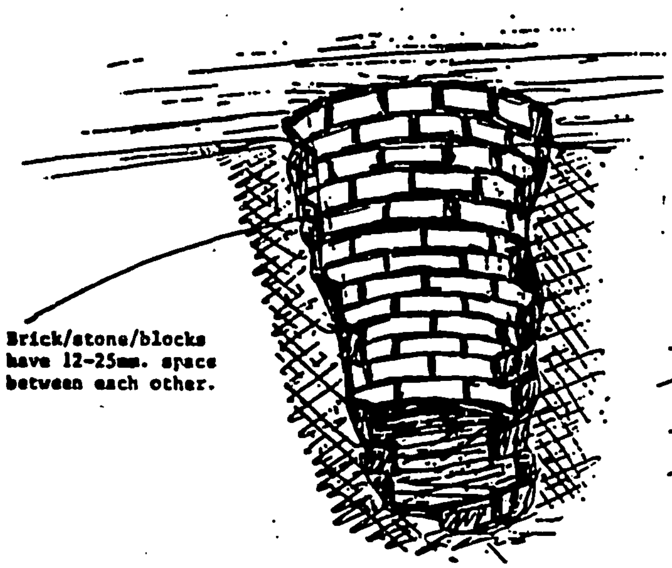
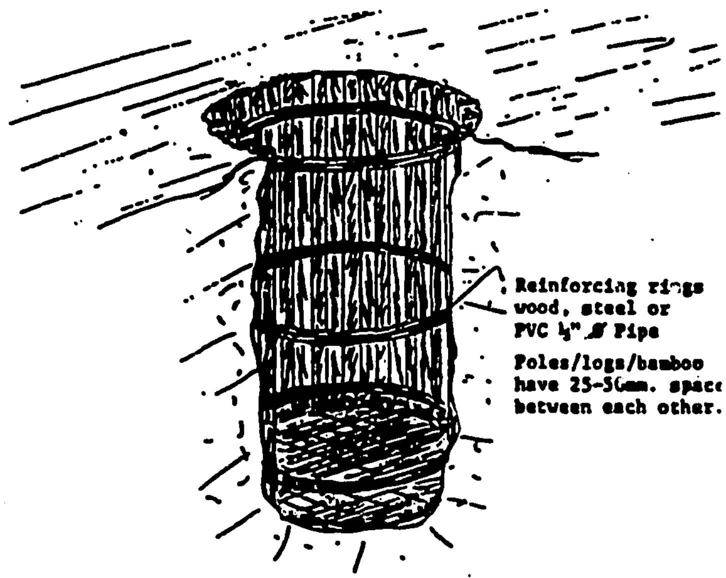



**FIGURE 10-3**
**Pit Linings Made of Various Materials**

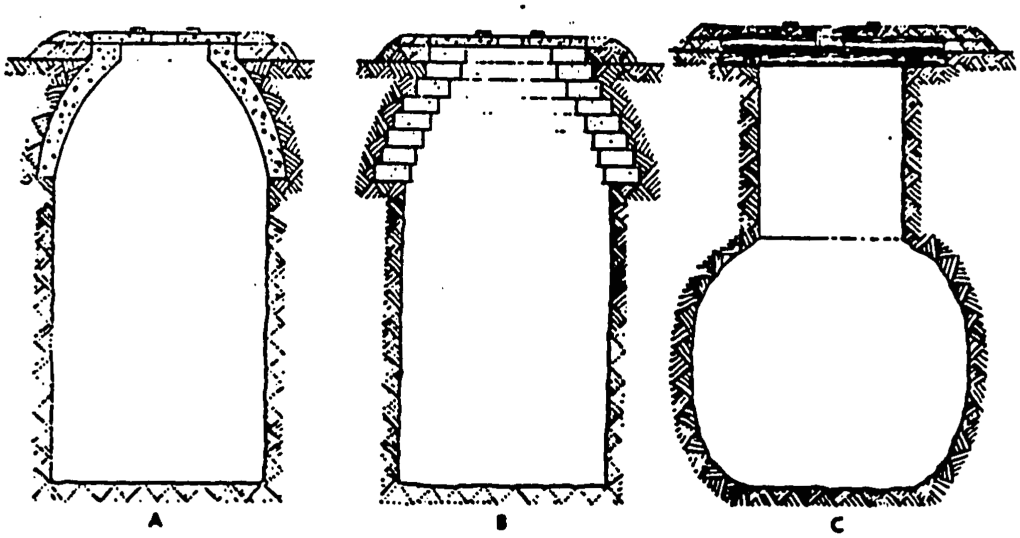



Cutaway View of Completed Pit



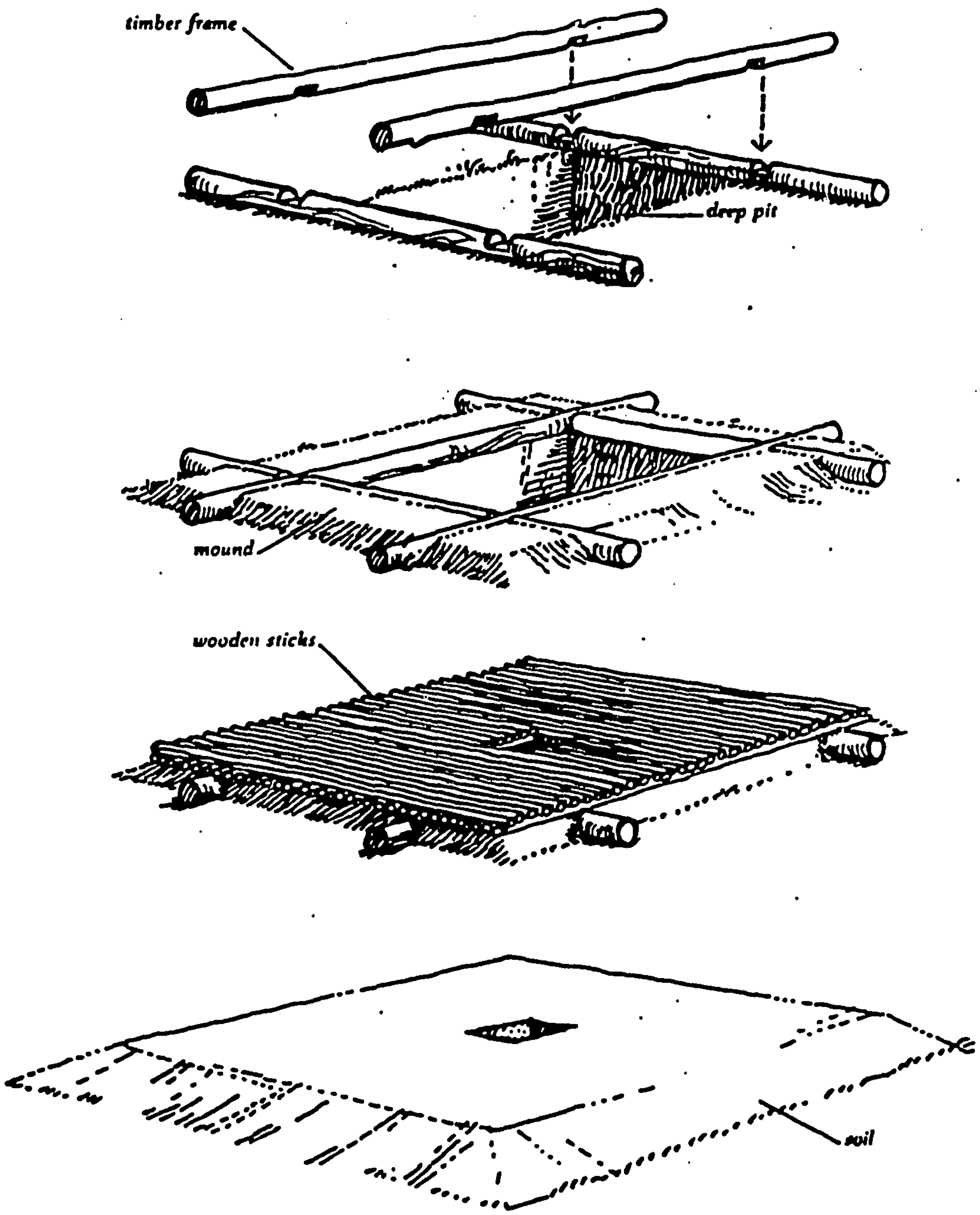

Cutaway View of Completed Pit

**FIGURE 10-4**
**Pit Linings for Round Latrine Pits**




*Large-volume pits with small floors and superstructures*

**FIGURE 10-5**
**Base and Pit Variations**

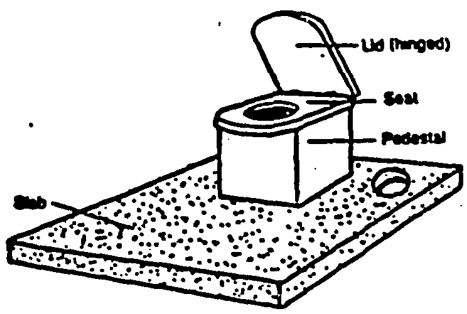



A squatting slab made of timber and soil

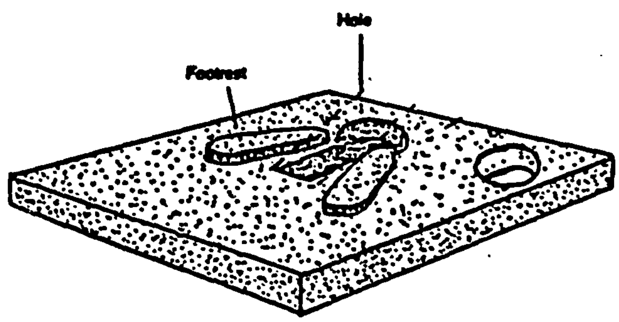
**FIGURE 10-6**
**Example of Wooden Slab**

*Concrete Squatting Plate*

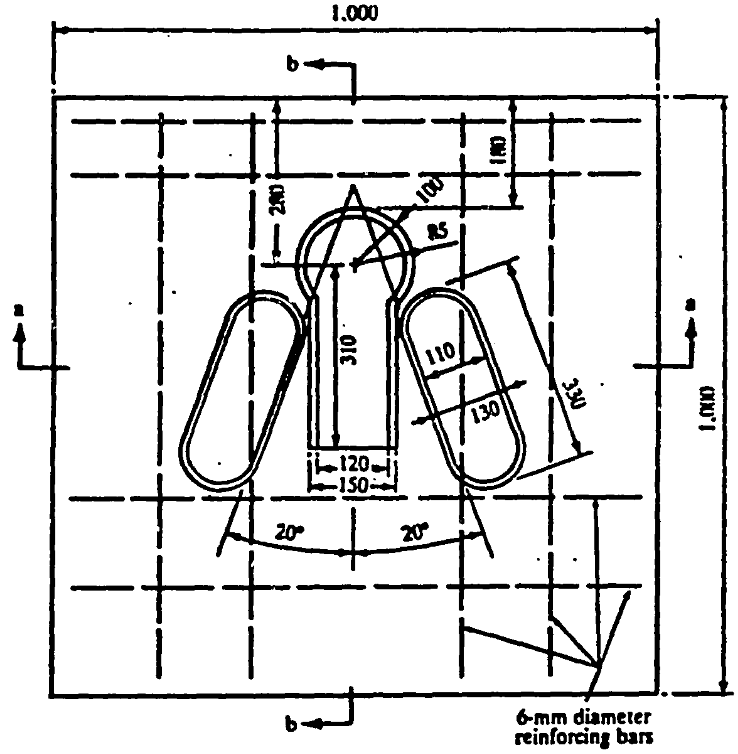
(millimeters)



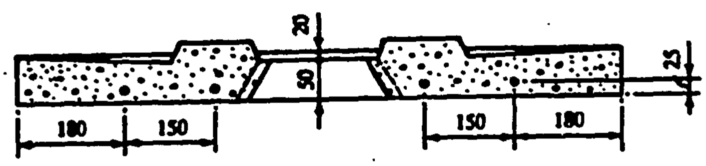

Sitting Slab with Pedestal, Seat and Lid



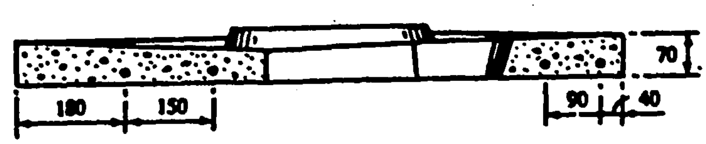

Squatting Slab




Plan




Section a-a

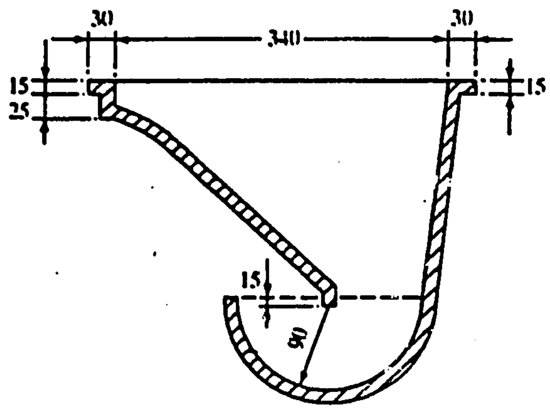



Section b-b

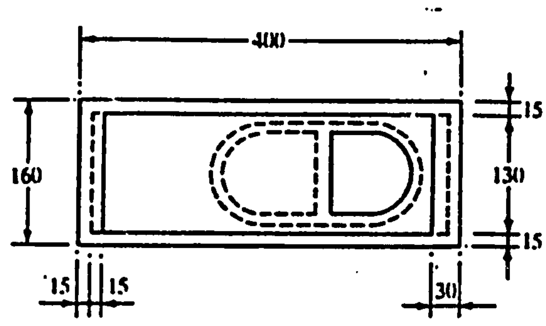
**FIGURE 10-7**
**Reinforced Concrete Slab with Optional Pedestal Seat**

*Water-seal Squatting Plate for PF Toilets Located Immediately above the Pit*

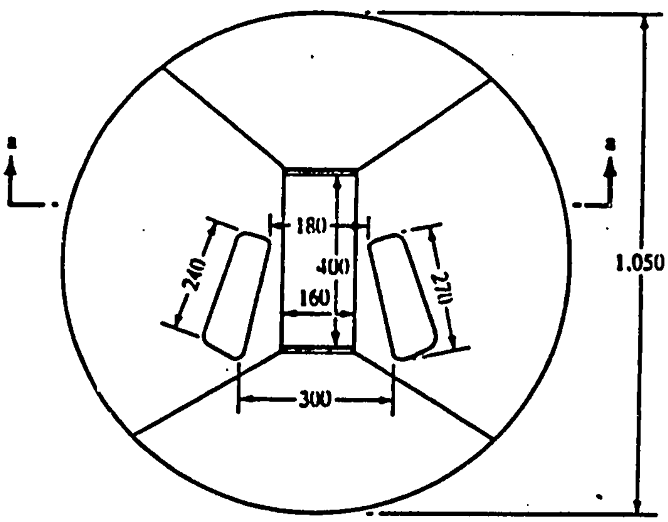
(millimeters)



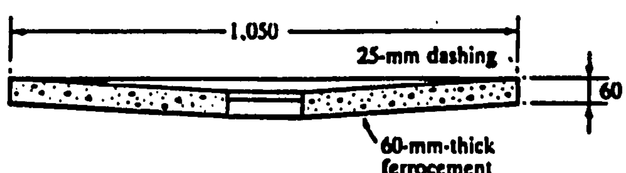

Sectional elevation




Plan of water seal




Details of squatting plate




Section a-a

**FIGURE 10-8**
Ferrocement Slab and Waterseal Trap

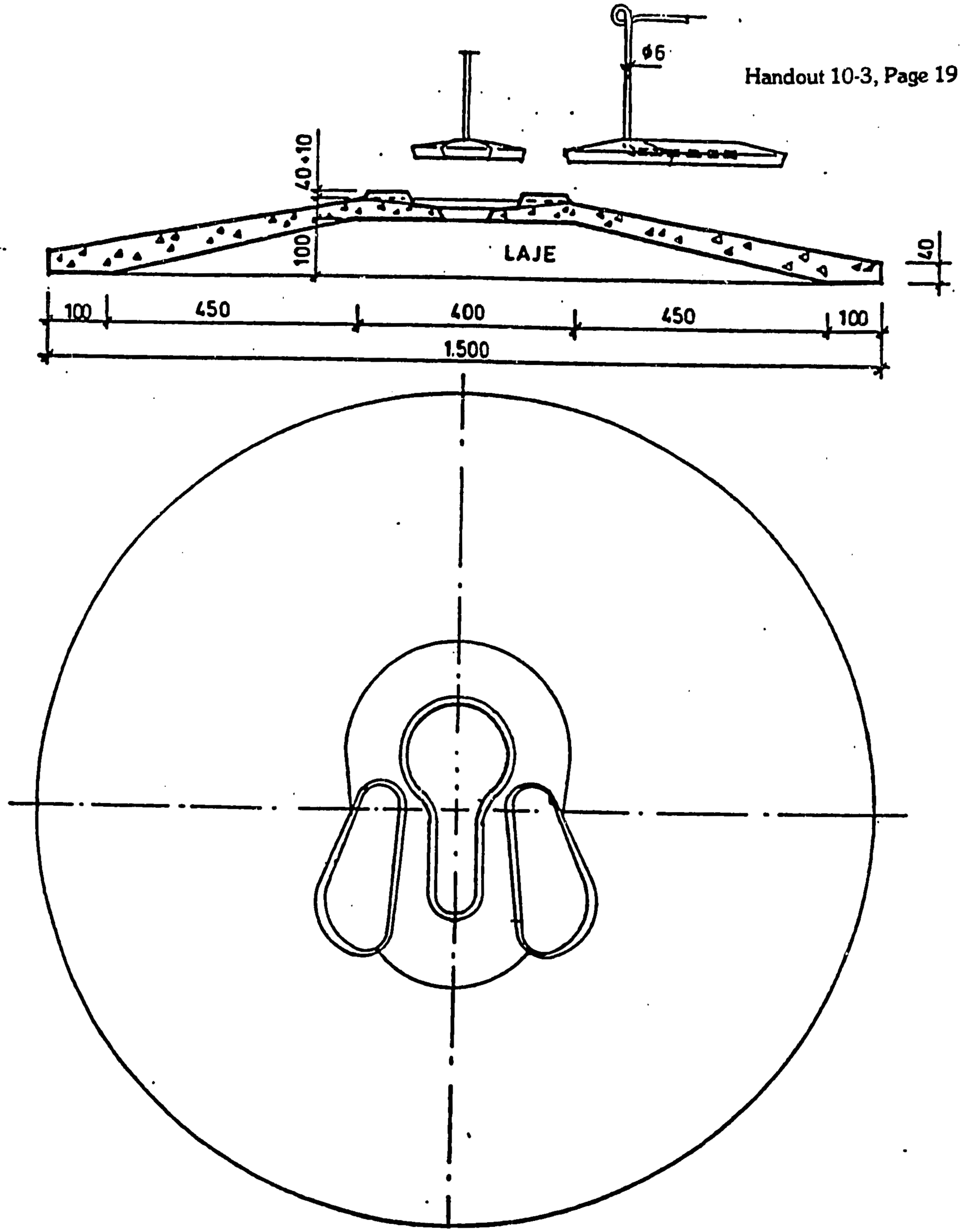
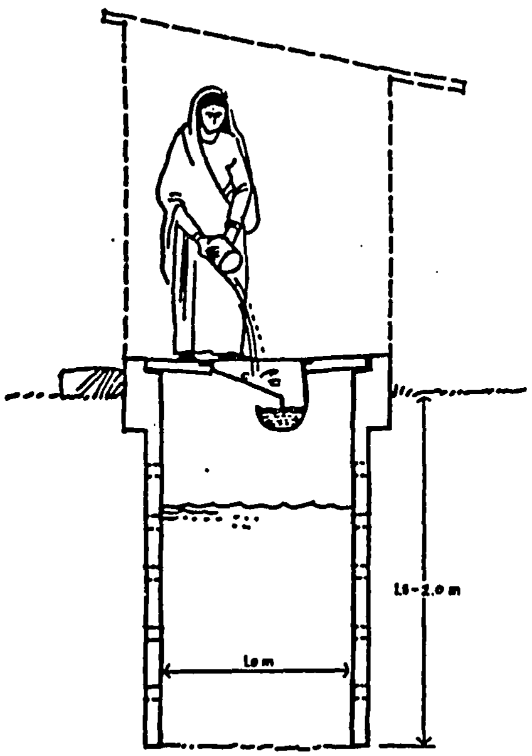
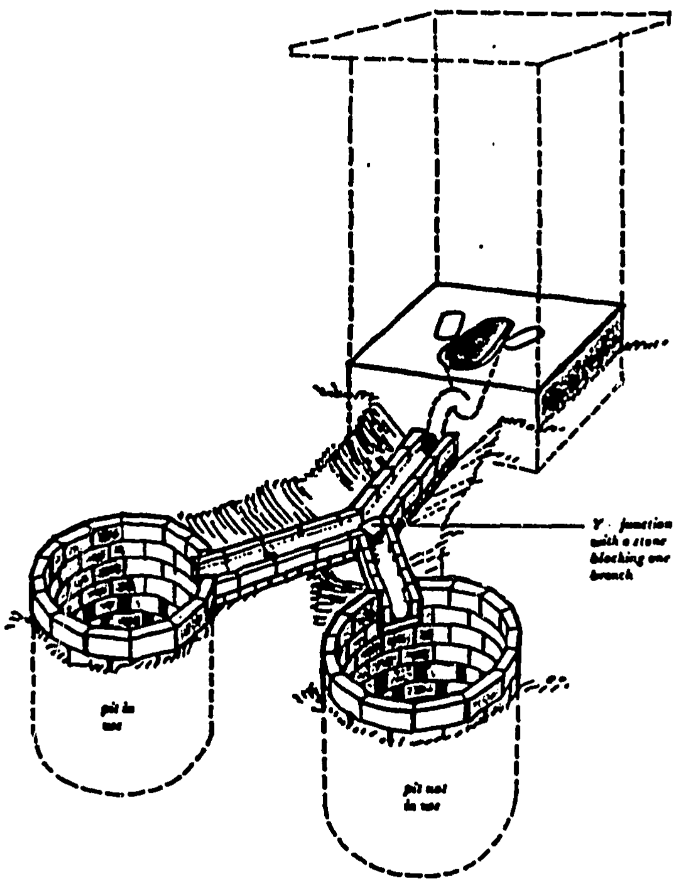



**FIGURE 10-9**
Sanplat Latrine Slab

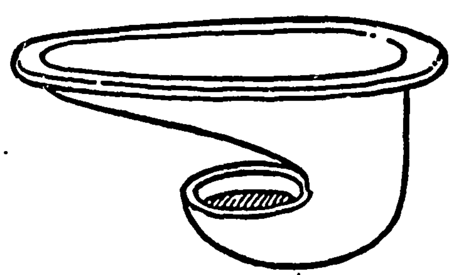
A pour-flush latrine with pan and water-seal trap directly above the pit. Dimensions are in meters.

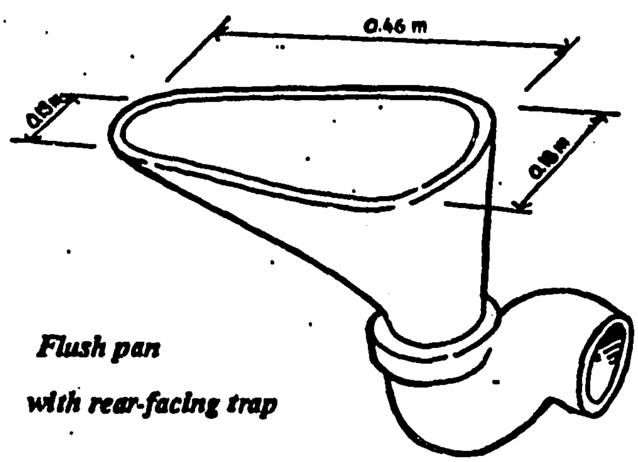





A pour-flush latrine with two pits. Drains and receptacles still to be covered.

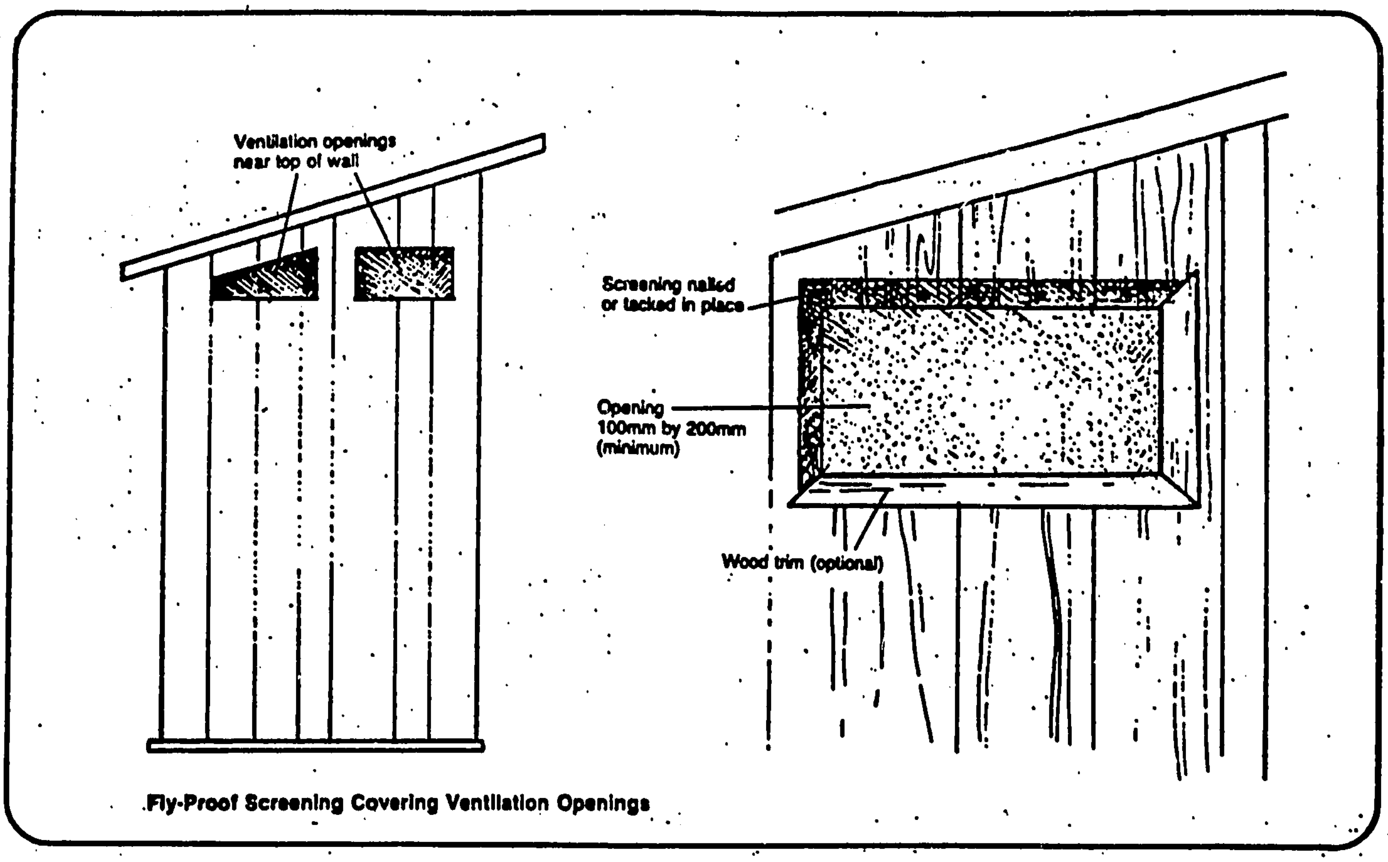
*Flush pan with forward-facing trap*





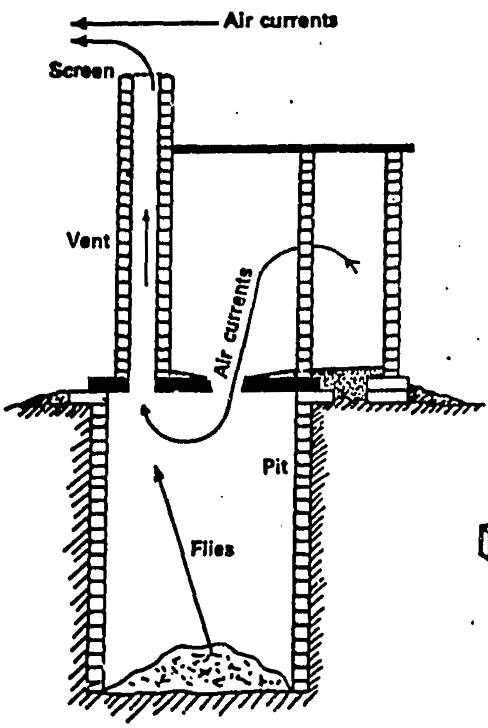

*Flush pan with rear-facing trap*

**FIGURE 10-10**
Diagrams of Latrines with Waterseal Trap



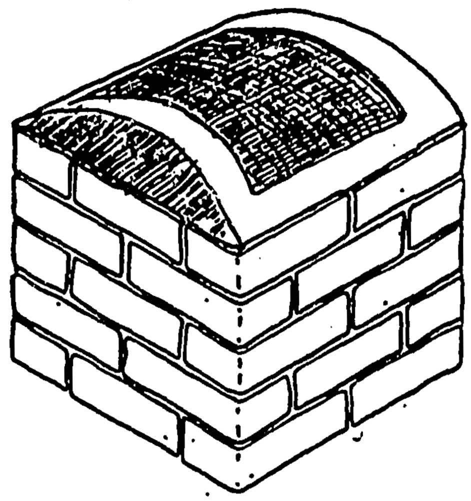

Fly-Proof Screening Covering Ventilation Openings

**FIGURE 10-11**
**Examples of Superstructure Ventilation**




Blair Latrine.

Brick vent pipe with arched flyscreen.



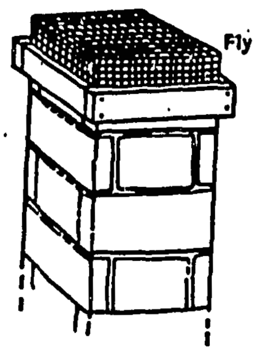



**FIGURE 10-12**
**Vent Pipe Variations**

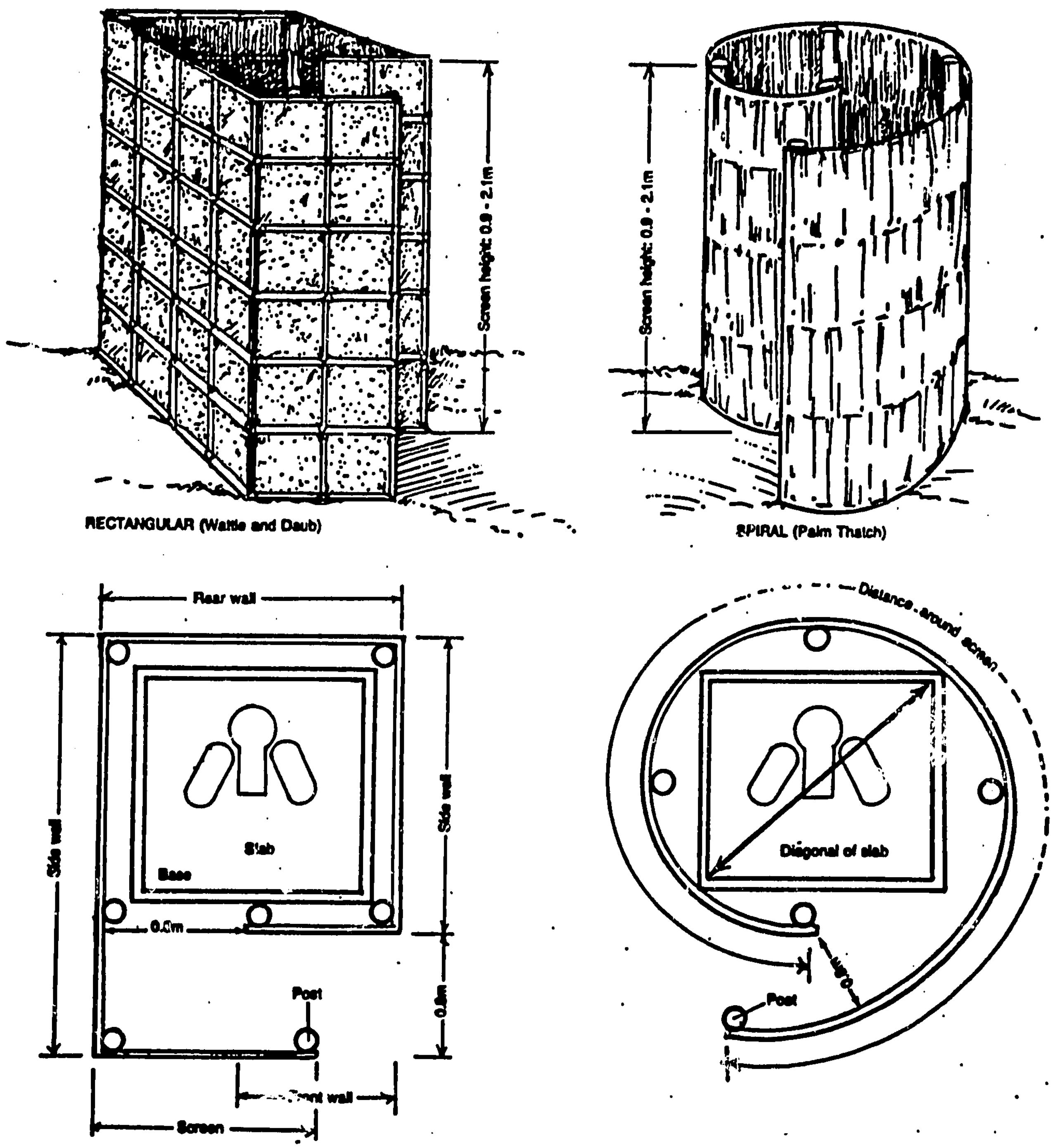
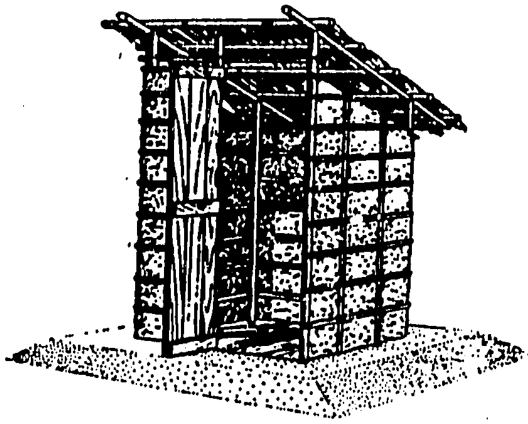
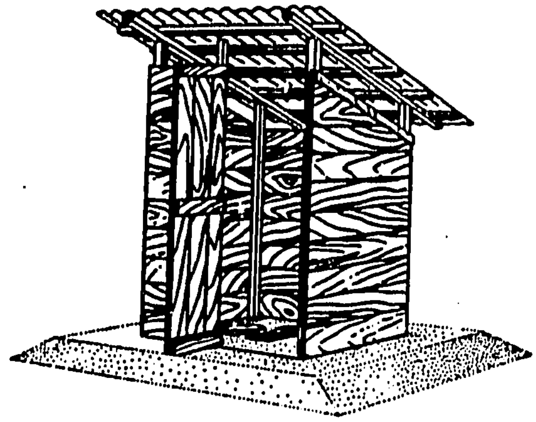


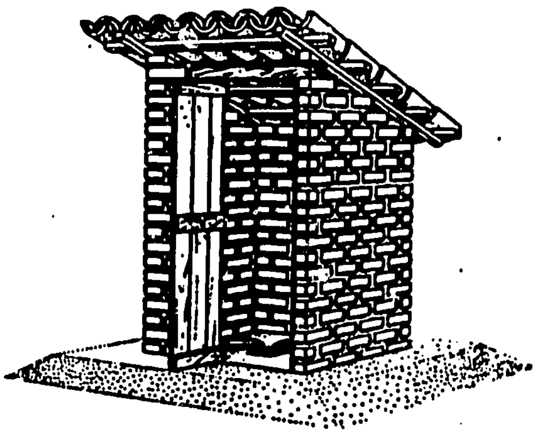

**FIGURE 10-13**
Simple Superstructures



. Mud and wattle walls and palm-thatch roof

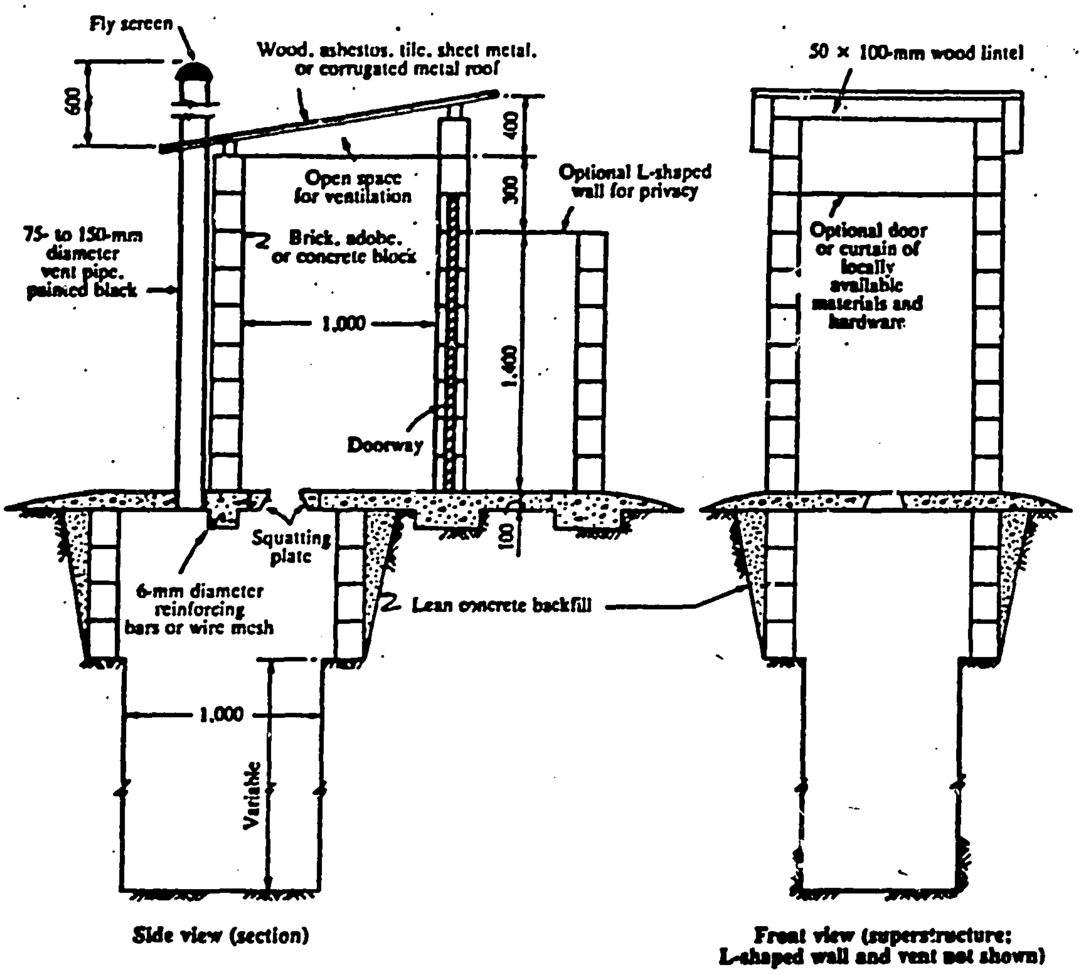


. Timber walls and corrugated iron or asbestos-cement roof



C. Brick walls and tile roof (an alternative is concrete block walls and corrugated iron or asbestos-cement roof)

**FIGURE 10-14**
Superstructures Built of Various Materials




*Note:* In the side view, a pedestal seat or bench may be substituted for the squatting plate. An opening for desludging may be provided next to the vent. Dimensions of the bricks or concrete blocks may vary according to local practice. Wooden beams, flooring, and siding may be substituted for concrete block walls and substructure.

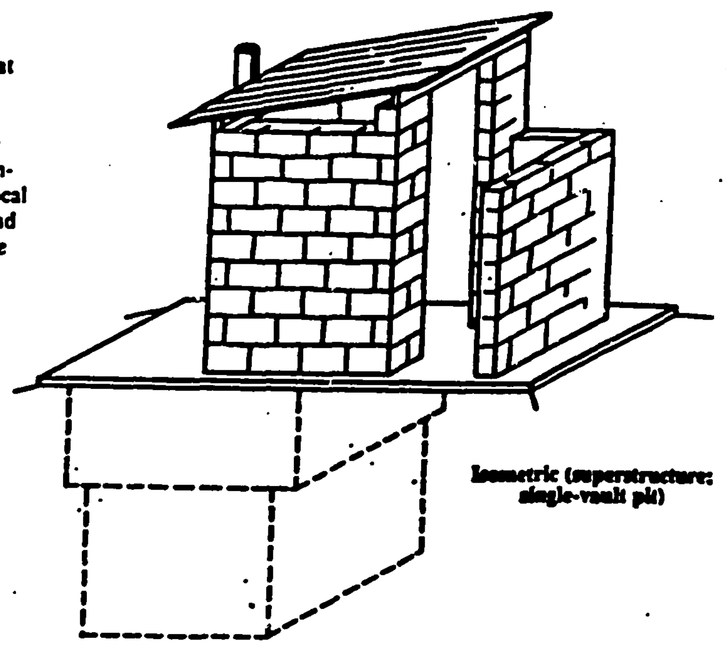



**FIGURE 10-15**
**VIP Latrine Design**

Session **11**

## PLANNING A LATRINE CONSTRUCTION PROGRAM *7 hours*

### Objectives

By the end of this session, participants will be able to

- quantify material, transport, and labor requirements and identify potential sources,
- develop a material, transport, and labor plan for a latrine program that encompasses more than one type of latrine, and
- identify key planning considerations.

### Overview

In the previous session, participants learned the design details for four types of latrine. In this session, participants will plan for the construction of those four types of latrine. This planning process will not only further clarify for participants the labor and material costs and requirements for each latrine type, but it will also give them a better understanding of the planning considerations for a program that could require any number of latrines of various types.

There are several aspects to planning a latrine program. Once it is determined that the latrine is the deserved sanitation intervention, however, identifying cost factors and deciding what materials are needed are frequently the most demanding aspects in the process. Thus, this session stresses these aspects of a latrine program.

The session begins with a lecturette that explains how to calculate the costs for latrine construction—material transport, labor, and indirect cost. Participants then practice calculating materials and costs for a latrine, working in the same small group and with the same latrine type that they worked with in Session 8.

The next activity in the session requires participants to plan for the construction of several latrines as part of a latrine program. After a discussion of the critical points in planning construction, each small group is given a case scenario of a latrine program for which it must plan the construction. The groups present to the full group their plans for the case scenario assigned to them.

The session ends with a large group discussion of key planning considerations and a review of the insights gained in this session.

**Procedures**

1. **Introduction** *5 minutes*

Introduce the objectives of the session on Flipchart A: "Session 11 Objectives" and give the session overview.

Explain that this session will give participants an additional opportunity to work in detail with the four types of latrine introduced in the last session.

2. **Lecturette: Material, Transport, Labor, and Indirect Costs** *40 minutes*

Begin the lecturette by making the following key points on a flipchart:

*Flipchart B: Cost Calculations*

- The total cost of a latrine is composed of material, transport, labor, and indirect costs.
- Total cost = material cost + transport cost + labor cost + indirect costs.

Say that these cost calculations can be further broken into subcategories.

**Trainer Note**: Tell participants that a handout covering the key points of this lecturette will be passed out at the conclusion.

Pass out Handout 11-1: "Material, Transport, and Labor Requirements and Costs." Ask participants to take five minutes to look it over.

Present on a flipchart key points from Handout 11-1 on each of the subcategories. Also draw on Handout 10-3, which participants read as their homework assignment the evening before.

*Flipchart C: Material Cost Calculations*

- Calculate the amount of materials needed for each latrine component.
- Add together the quantities of each material needed for all the components.
- Determine the unit cost of each material.
- Multiply the unit cost of the material by the quantity needed.
- Add all the material costs together for the total cost.

Walk through an example of material cost calculation. See Handout 11-2: "Example of Material Cost Calculations."

*Flipchart D: Transport Cost Calculations*

- Determine where the necessary building materials are located.
- Contact transporters to determine rate of transport, combining the materials available in that area.
- Add the individual transport costs to determine total transport cost.

Walk through an example of a transport cost calculation. See Handout 11-3: "Example of Transport Cost Calculations."

*Flipchart E: Labor Cost Calculations*

- Define the work that needs to be done on each component.
- Estimate the number of days it will take to accomplish the work.
  - It is advisable to consult with a skilled builder to estimate the days.
- Estimate the number of workers needed, skilled and unskilled, to accomplish the task.
- Multiply the wage rate of each worker by the number of days that the worker will be needed to complete the component.
- Add the labor cost for each component.
- The total labor cost will be the sum of the labor cost for each component.

Note: At times a skilled builder will have a crew of assistants who do the work, and the price quoted will be the combined cost of their labor.

Walk through an example of a labor cost calculation. See Handout 11-4: "Example of Labor Cost Calculations."

*Flipchart F: Indirect Cost Calculations*

The indirect cost is perhaps the most difficult to calculate and plan for because it can be composed of several different/unrelated costs. This activity can be presented as a short brainstorming subsession in which participants think of the possible costs that would go into indirect costs (from section on agency cost in Handout 8-3).

Some possible responses are

- training costs
- program management
- personnel costs (e.g., development agent's time spent in supervision, etc.)

The training costs may differ for the different latrine options; this is a function of the complexity of the option as well as the user's familiarity with it.

For the purpose of this exercise, indirect costs are not included, but the importance of the participants' consideration of them should be stressed.

### 3. Small Group Activity: Calculating Materials and Costs for One Latrine — *1 hour, 30 minutes*

Explain to participants that they are now going to practice calculating the materials and costs for a latrine. Say that they will be working in the same small group and with the same latrine type they worked with in Session 8 (for the presentation of a detailed latrine design).

Pass out Handout 11-5: "Small Group Activity—Material Requirements and Costs," which includes the dimensions and materials to be used in this practice activity for each latrine type. Explain that they should assume that every type of material they need is on the handout. Say that for the purposes of this exercise, the latrine superstructure is not included. Say that the dimensions and materials have been selected to make the time requirement for the small group work about equal among the four groups.

Pass out Handout 11-6: "Cost Sheet."

**Trainer Note**: If possible, it is recommended that the trainers and participants have calculators for this session.

**Trainer Note**: Assign a new team leader for each group of four participants; choose participants who haven't yet had a chance to be a group leader (Sessions 5 or 8).

Present the following small group task on a flipchart:

*Flipchart G: Small Group Task—Calculation of Materials and Costs*

- For the latrine type assigned to your group:
  - Respond to the questions on Handout 11-5 (for your group only).
  - Use the unit cost price list (Handout 11-6).
  - Record responses on flipchart.
  - Take 50 minutes.

Remind participants that their flipcharts should also include their calculation steps.

Distribute and discuss Handout 11-7: "Solutions to Handout 11-5" at the conclusion of the activity. Ask each group to check its answers. Ask the participants to read the background on the latrines assigned to other groups and clarify their questions. The groups themselves can clarify questions on the specific latrine they were assigned.

**Trainer Note**: It is suggested that participants take a 15-minute break before they check their answers. The trainers then can review the group product, and identify problem areas or miscalculations.

Once participants have had the opportunity to raise questions and clarify points, ask,

- What did you find most difficult in calculating the material requirements? Why?
- What did you find most difficult in calculating the estimated material costs? Why?
- How did the leader divide the work? What did the leader do that helped?

## 4. Large Group Discussion: Construction Planning Logistics *30 minutes*

Stress that typically in planning, program developers

- build community excitement, but
- don't plan well enough to get essential materials, and on time.

Tell participants that they have had a chance to calculate costs for one latrine in the last activity, and that now you want them to look at some critical points in construction planning.

Say that construction can be delayed for many unavoidable reasons, but that it is usually the avoidable ones that hold it up. It is necessary to make a detailed construction plan to limit the delays.

Present the following flipchart:

*Flipchart H: Construction Planning Logistics*

- Critical points in construction planning that must be observed:
    - timely ordering of materials
    - following on transporters
    - establishing timeline for hiring skilled and unskilled workers
    - locating of storage facility for materials

Ask the group to add other critical points. Call their attention to some of the critical points and ask,

- What could happen if this critical point is not observed?

Say that in the next activity they will have an opportunity to plan a construction program that involves more than one latrine.

## 5. Small Group Activity: Planning for Materials, Transport, and Labor for a Construction Program — *1 hour, 35 minutes*

**Trainer Note**: This activity begins with a 15-minute introduction by the trainers. The introduction will consist of

- four case scenarios (see Handout 11-8)
- reference to the unit cost sheet used in the previous small group activity (see Handout 11-6)

Explain that participants will be forming new small groups, and that each new small group will include at least one representative from each of the four previous small groups to bring in the knowledge of the particular latrine type that each worked with in Session 8.

Pass out the Handout 11-8: "Small Group Activity—Planning for Materials, Transport, and Labor in a Construction Program" and briefly talk about each of the case scenarios. Pass out Handout 11-9: "Small Group Activity—Information Common to All Scenarios" and discuss. Explain that each scenario consists of different numbers of latrines to be built in a community. Refer to the cost sheet they used in the previous activity, and ask if there are any questions about it.

Present the following small group task on a flipchart:

*Flipchart I: Small Group Task—Planning for Latrine Construction*

- Discuss the case scenario assigned to your group.
- Calculate material, labor, and transport requirements and costs for your scenario.
- Record key points on a flipchart.
- Take 1 hour and 30 minutes.

**Trainer Note**: It is suggested that you select the new group members and group team leaders and present a flipchart with the new assignments. The new groups should include at least one representative of the Session 8 small groups and should also be balanced as much as possible in terms of participant strengths and weaknesses. Check in with the groups and assist them as needed. You may have to suggest that the groups subdivide to work on different pieces of their case scenario.

## 6. Group Presentations: Latrine Construction Plan — *1 hour, 55 minutes*

Explain that each group will briefly report out on its latrine construction plan. Participants should hold comments and questions until a group has completed its presentation.

**Trainer Note**: Some groups may not be finished with their task work, but ask them to report what they have completed.

Tell participants that presentations will be integral to their efforts to communicate with individuals and community members. This presentation is not only to acquaint the other groups with the different options but also to provide practice in presentation skills.

After each group's presentation, ask,

- What would you like the group to clarify?
- What might you have done differently?

After all the presentations have been made, ask,

- What was the least expensive latrine to build? Did it vary in the different scenarios? Why?
- What were the difficulties in completing the task? Why?
- What did the leader do to facilitate the process of planning?

Distribute and discuss Handout 11-10: "Solutions to Handout 11-8."

## 7. Large Group Discussion: Key Planning Consideration *30 minutes*

Ask participants to brainstorm key planning considerations, now that they've had a chance to do a practice planning exercise. Record their responses on a flipchart.

Add the following considerations if participants do not mention them:

- issue of choice of latrine
- value of labor
- individual/agency contribution
- impact that the season has on construction
- benefits of standardization/economies of scale

After the brainstorming, ask participants to elaborate on some of their responses. Point out the considerations that you don't agree with or that you see as lower priority. Make the following points about the above considerations:

- *Issue of Choice of Latrine*

  The issue of choice was not a factor in the case scenarios. Remind participants that in real life it is an important factor.

- *Value of Labor*

  It is necessary to give real value to an individual's labor. A typical assumption is that an individual's time is free. The amount of time community members spend working on latrines reduces the time they can spend making money, and, therefore, it represents a real cost to them. The cost for time may vary with the season. For example, an individual's time is much more valuable at harvest time, when his or her livelihood depends on the quality and quantity of the harvest.

- *Individual/Agency Contribution*

  The contribution that each entity is able to make to a latrine program will determine the viability of the program.

- *Impact of the Season*

  Certain seasons are typically suited for construction. They tend to be the more temperate, drier months. Planning a program to start at the beginning of this "construction season" will enhance the program's chances of success.

- *Benefits of Standardization*

  When the materials for latrine construction are purchased in bulk, the price is usually lower than when they are purchased one at a time. For example, if you are paying a daily rate for transport, increasing the amount of a certain item will lower the transport cost for that item because the same price is spread out over a greater number of units of that item.

## 8. Conclusions *15 minutes*

Review highlights from the session. Ask participants to reflect on the following question:

- What were the most important insights that you gained in this session?

After participants have reflected for a few moments, ask for responses to the question. Record responses on a flipchart. Read back through the flipchart after all responses have been recorded.

Then ask,

- What do you especially want to remember to do when you return home and plan for construction?

Take a few responses as a way to give others some ideas to think about.

Review the session objectives and ask if they were met. Tell participants that in the next session they will be discussing ways to supervise construction.

**Materials**

Calculators for trainers and participants

Handout 11-1: Material, Transport, and Labor Requirements and Costs

Handout 11-2: Example of Material Cost Calculations

Handout 11-3: Example of Transport Cost Calculations

Handout 11-4: Example of Labor Cost Calculations

Handout 11-5: Small Group Activity—Material Requirements and Costs

Handout 11-6: Cost Sheet

Handout 11-7: Solutions to Handout 11-5

Handout 11-8: Small Group Activity—Planning for Materials, Transport, and Labor in a Construction Program

Handout 11-9: Small Group Activity—Information Common to All Scenarios

Handout 11-10: Solutions to Handout 11-8

Flipchart A: Session 11 Objectives

Flipchart B: Cost Calculations

Flipchart C: Material Cost Calculations

Flipchart D: Transport Cost Calculations

Flipchart E: Labor Cost Calculations

Flipchart F: Indirect Cost Calculations

Flipchart G: Small Group Task—Calculation of Materials and Costs

Flipchart H: Construction Planning Logistics

Flipchart I: Small Group Task—Planning for Latrine Construction

## Material, Transport, and Labor Requirements and Costs

### A. Key Points in Cost Calculations

- The total cost of a latrine is composed of material, transport, labor, and indirect costs.
- Total cost = material cost + transport cost + labor cost + indirect costs.

### B. Calculating Material Costs

- The total value of all materials that go into the making of the latrine.
- To calculate the material cost,

1) Calculate the amount of materials needed for each latrine component by
   - making a list of all materials involved in that component (e.g., a reinforced concrete slab is made of cement, sand, gravel, water, and reinforcing material),
   - calculating the volume or area of the component, and
   - calculating the amount of each material needed to fill that volume or area.
2) Add the quantities of each material needed for all the components (e.g., all the gravel needed for the components).
3) Determine the unit cost of each material.
4) Multiply the unit cost of the material by the quantity needed.
5) Add all the material costs to get the total cost.

Keep in mind that,

- **Each component of a latrine is made from a variety of materials, and different components could involve the same material, such as wood or cement. Therefore, it is easier to focus on an individual component, calculate the requirements for a particular material, and then add the requirements of all the components for that material.**
- **In the best of programs, there is some unavoidable waste of material or unforeseen need for additional material. To avoid delays at crucial construction steps, an extra amount of each material is usually ordered. An excess of 10 percent of each material should provide a sufficient safety factor.**

## C. Calculating Transport Costs

- The total cost for bringing all materials to the construction site.
  - If centralized manufacturing of components is done, there will also be transport costs after manufacturing.
- Transport usually involves both local and external transport costs.
  - Transport is often needed for locally available materials, such as gravel and sand.
  - Transport is often needed for materials not available locally, such as cement or brick.
- Another factor in transport costs is the loading and unloading cost.
- To calculate the transport cost,
  1) Determine where necessary building materials are located.
  2) Contact transporters to determine the rate of transport, combining the materials available in that area.
  3) Add the individual transport costs to determine the total transport cost.

## D. Calculating Labor Costs

- Labor can be split into two general categories: skilled and unskilled.
  - The time requirements of each category will differ.
  - There are also levels within a category, for example skilled labor for latrine construction could consist of a foreman, mason, and a carpenter.
- To determine the labor cost,
  1) Define the work that needs to be done on each component.
  2) Estimate the number of days it will take to accomplish the work.
     - It is advisable to consult with a skilled builder to estimate the days.
  3) Estimate the number of workers needed, skilled and unskilled, to accomplish the task.
  4) Multiply the rate of each worker by the number of days that worker will be needed.
  5) Add the labor cost for each component.
  6) The total labor cost will be the sum of the labor costs for each component.

## Example of Material Cost Calculations

1. How much would 300 bricks cost if the unit price is $40 for 500 bricks.

   To find the cost, multiply the unit price by the ratio of the number of bricks needed to the number of bricks per unit.

   Cost = $40 x 300/500 = $24.

2. If 30 m of rebar are needed at a cost of $1.50 per meter, the cost of 30 m would be

   Cost = 30 m x $1.50/m = $45.

3. If 1.6 $m^3$ of cement are needed and the price of a 50 kg bag is $20, how many bags are needed and what will they cost?

   The volume of a 50 kg bag is 0.0332 $m^3$; to calculate the number of bags, divide the total amount needed by the volume in one bag.

   Volume of cement = 1.6 $m^3$/0.0332 $m^3$ = 48 bags.

   Cost = 48 x $20 = $960.

## Example of Transport Cost Calculations

1. A town is located three days travel from an urban center where building supplies are available. A total of 1,750 bricks is needed for the construction of latrine shelters. If one truck costs \$60/day for transport and can haul 500 bricks in one load, what is the total transport cost?

   First, find the number of loads necessary by dividing the total number of bricks needed by the number of bricks per load.

   Number of loads = 1,750/500 = 3.5.

   The transporter must make four trips to carry all the bricks to the town. The transport cost is the number of trips multiplied by the number of days per trip and then by the daily rate of transport.

   Total transport cost = 4 x 3 days x \$60/day = \$720.

2. Gravel and sand are needed at a construction site. The quantities needed are 1.5 $m^3$ of gravel and 0.75 $m^3$ of sand. The materials are locally available, and transport (a horsecart) costs \$3 per load. If the transporter can move 0.5 $m^3$ in a single load, how many trip will he have to make? What will be the transport cost?

   These items should be moved separately, so divide the volume of each material by the amount the transporter can move in one trip.

   Number of trips

   1.5/0.5 = 3 trips for gravel

   0.75/0.5 = 1.5 trips for sand

   The total number of trips is five.

   Total transport cost = 5 x \$3 load = \$15.

## Example of Labor Cost Calculations

1. If an unskilled laborer can excavate 0.8 $m^3$ of soil for a pit latrine in one day at a rate of \$7/day, how long will it take him to dig a hole 1.2 m by 1.3 m by 4 m deep? How much will he be paid?

   First, calculate the volume of the pit.

   Volume = 1.2 x 1.3 x 4 = 6.24 $m^3$.

   Then, divide the pit volume by the amount the laborer can dig in a day in order to find the number of days it will take.

   No. of days = 6.24/0.8 = 7.8 days.

   To calculate his pay, multiply the number of days by his daily rate.

   Total pay = 7.8 x \$7/day = \$54.60.

2. If a skilled builder and two unskilled laborers can build 3 latrine bases in a day, how many days will it take them to build 17 bases? If the daily pay rate of the skilled builder is \$20/day and that of the unskilled laborers is \$8/day, how much will the total labor cost be?

   To find the number of days it will take them to build the bases, divide the total number of bases by the number they can build in a day.

   Total number of days = 17/3 = 5.7 days.

   To find the total labor cost, multiply the total number of days by the daily rates of each of the workers, then add them together.

   Total labor cost = 5.7 x [(2 x \$8) + \$20] = \$205.20.

## Small Group Activity—Material Requirements and Costs

The following information is to be used for the calculation of material requirements and costs for the latrine type assigned to your group.

Given for all assignments:

- Cement comes in 50 kg bags (33.2 liters or 0.0332 $m^3$).
- Reinforced concrete ratio to be used is 1:2:4 (cement:sand:gravel).
- Ferrocement ratio to be used is 1:2 (cement:sand).
- Material requirements for the superstructure will not be included.

### Group 1: Basic Latrine with Cover

*Given:*

- Latrine base: bricks that are 10 cm wide; two layers needed.
    - Base to be made by lining the bricks side by side in two layers.
- Pit dimensions: 2.5 m deep, 1 m wide, 1.2 m long
- Lining needed: brick lining that has 65 bricks/$m^2$.

  The cement required to make the mortar for the lining is one-sixth of a bag per $m^2$ of lining surface area.
- Slab: ferrocement and chicken wire.

*Questions:*

1. How many bricks in the base?
2. How many bricks in the pit lining wall?
3. How much cement is needed for the mortar in the lining?
4. How much cement, sand, and chicken wire are in the latrine slab?
5. What are the total material requirements and their cost?

**Group 2: VIP Latrine**

*Given:*

- Latrine base of poured concrete: 15 cm wide, 10 cm deep.
  - Reinforcement of one rebar around the latrine base.
- Pit dimensions: 2 m deep, 1 m wide, 1.4 m long.
- Lining: not needed.
- Slab: reinforced concrete (10 cm thick) with rebar; rebar is placed every 20 cm in both directions of slab.

*Questions:*

1. How much cement, sand, gravel, and rebar is needed in the base?
2. How much cement, sand, gravel, and rebar is needed in the slab?
3. What are the total material requirements and their cost?

**Group 3: Waterseal/Pour Flush**

*Given:*

- Pit base: poured concrete, 15 cm wide and 7 cm deep with rebar around circumference.
- Pit dimensions: 1.4 m deep, 1 m wide, 1 m long.
- Lining needed: concrete blocks—15 blocks/m$^2$. Assume no mortar needed.
- Slab: reinforced concrete slab (thickness of 10 cm) with reinforcement every 20 cm along both axes.

*Questions*

1. How much gravel, sand, cement, and rebar is needed in the base?
2. How many concrete blocks are required for the lining?
3. How much gravel, sand, cement, and rebar is needed in the slab?
4. What are the total material requirements and their cost?

**Group 4: Raised Platform Latrine**

*Given:*

- Latrine base: no real base because lining is continued from pit bottom, up through the ground surface to support the raised platform.
- Pit dimensions:

  Cross section: 1 m wide, 1.2 m long

  Depth below ground = 1 m

  Height of walls extending above ground = 1 m.

- Material needed for lining and exposed wall: brick is used for both—65 bricks/$m^2$ of wall surface area.

  The cement required to make the mortar for the portion of the wall below ground level is one-sixth of a bag per $m^2$ of lining surface area. For the above-ground portion, one-third of a bag per $m^2$ of wall surface area is needed.

- Slab: ferrocement and chicken wire.

*Questions:*

1. How many bricks are needed in the lining and the wall above ground level?
2. How much cement is required for the lining and wall?
3. How much cement, sand, and chicken wire is needed in the latrine slab?
4. What are the total material requirements and their cost?

## Cost Sheet

| Item | Unit | Cost/Unit | Transportation Required |
|---|---|---|---|
| **Local Materials** | | | |
| - Gravel | 1 $m^3$ | $ 2 | 2 loads/$m^3$ |
| - Sand | 1 $m^3$ | $ 2 | 2 loads/$m^3$ |
| - Locally made vent (3m) | 1 | $15 | --- |
| **External Materials** | | | |
| - Cement (50 kg) | bag | $20 | 15 bags/load |
| - Concrete blocks | 100 | $60 | 200/load |
| - Bricks | 100 | $40 | 500/load |
| - Rebar | 100 | $ 6 | -- |
| - PVC pipe (15 cm) | 6 m | $30 | -- |
| - Screen (1 cm) | 1 $m^2$ | $ 3 | -- |
| - Screen (2 mm) | 1 $m^2$ | $ 5 | -- |
| - Waterseal trap | 1 | $10 | -- |
| **Labor** | | | |
| - Skilled builder | day | $20 | |
| - Unskilled laborer | day | $ 6 | |
| **Transport** | | | |
| Local | load | $ 4 | |
| External | day | $60 | |

Note: Some materials that are located in the urban centers do not require much space for transport, so they can be included with other items that are being transported. However, if no other items are being transported from these centers, they must be transported at the standard daily rate.

Materials can be combined to make up one load if there is sufficient room for all the materials.

This same cost sheet is used in the next small group task. The prices of these items could reflect the costs in the country where the workshop is being given. The costs of some items may be negligible, such as fractions of a cubic meter of sand, and transport costs should not be included. Some fractions of materials should be rounded up, for example, cement bags and rebar.

Note that in all cases, the participants will calculate only a portion of the material requirements (costs) of their latrine. The calculations will focus on the most critical or hard-to-calculate components.

## Solutions to Handout 11-5

### Group 1: Basic Latrine with Cover

1. Perimeter = 2 x 1 + 2 x 1.2 = 4.4 m

   Number of bricks = 2(4.4 x 0.1) = 88 bricks.

2. Pit wall area = 2.5 [(2 x 1) + (2 x 1.2)] = 11 $m^2$

   Number of bricks = 65 x 11 = 715 bricks.

3. Cement required for mortar in lining = 1/6 x 11 $m^2$

   = 1.8 bags.

4. Slab volume = 0.025 x 1.2 x 1.4 = 0.042 $m^3$

   Two-thirds of volume is sand, so 2/3 x 0.042 = 0.028 $m^3$ sand

   Cement = 1/2 sand or 0.014, almost 1/2 bag

   Chicken wire = area of slab x 2 = 1.2 x 1.4 x 2 = 2.4 $m^2$ chicken wire.

5.

| | | |
|---|---|---|
| Bricks | 803 | $321.20 |
| Sand | 0.028 $m^3$ | --- |
| Cement | 2.3 bags (3 bags) | $60.00 |
| Screen | 2.4 $m^2$ | $7.20 |

Total cost: $ 388.40.

### Group 2: VIP Latrine

1. Calculate the outer area of the latrine base and subtract the inner area of the pit. This area is multiplied by the thickness to find the base volume:

   Area of base = [1 + 2(0.15)] x [1.4 + 2(0.15)] - (1 x 1.4) = 0.81 $m^2$

   Volume = 0.81 x 0.1 = 0.081 $m^3$

   The gravel fills the volume, so 0.081 $m^3$ of gravel is needed.

Volume of sand = 1/2 gravel = 0.04 $m^3$

Cement = 1/4 gravel = 0.02 $m^3$ (under 2/3 of a bag).

The rebar for the base is simply the measure of the perimeter, or 4.8 m.

2. Volume of slab = 0.1 x 1.6 x 1.2 = 0.192 $m^3$

   Gravel volume = 0.192 $m^3$

   Sand volume = 0.096 $m^3$

   Cement volume = 0.045 $m^3$ or 1 1/3 bags

   Length of rebar = 6 x 1 + 4 x 1.4 = 11.6 m.

3.

| | | | |
|---|---|---|---|
| 3. | Gravel | 0.0273 $m^3$ | -- |
| | Sand | 0.0136 $m^3$ | -- |
| | Cement | 2 bags | $40.00 |
| | Rebar | 16.4 m (18 m) | $18.00 |

Total cost: $ 58.00.

**Group 3: Pour Flush/Waterseal**

1. Area of base = [1 + (2 x 0.15)] x [1 + (2 x 0.15)] - 1$m^2$ = 0.69 $m^2$

   Volume of base = 0.69 $m^2$ x 0.07 = 0.048 $m^3$

   Volume of gravel = 0.048 $m^3$

   Volume of sand = 0.024 $m^3$

   Volume of cement = 0.012 $m^3$ or over 1/3 bag

   Length of rebar = 4 m.

2. Area of lining = 1.4[2 x 1 + 2 x 1] = 5.6 $m^2$

   No. of blocks = 5.6 $m^2$ x 15 blocks/$m^2$ = 84 blocks.

3. Volume of slab = 0.10 x 1.2 x 1.2 = 0.144 $m^3$

   Volume of gravel = 0.144 $m^3$

   Volume of sand = 0.072 $m^3$

   Volume of cement = 0.036 $m^3$ or just over 1 bag

Length of reinforcement = 4 x 1 + 4 x 1 = 8 m.

| | | | |
|---|---|---|---|
| 4. | Gravel | 0.192 $m^3$ | -- |
| | Sand | 0.096 $m^3$ | -- |
| | Cement | 1.5 bags (2 bags) | $40.00 |
| | Rebar | 12 m | $12.00 |
| | Concrete blocks | 84 | $34.00 |
| | Waterseal trap | 1 | $10.00 |

Total cost: $ 96.00.

**Group 4: Raised Platform Latrine**

1. Pit wall surface area

   Height of wall = height below ground + height above ground
   = 1 m + 1 m = 2 m.

   Therefore, wall area = 2 [(2 x 1) + (2 x 1.2)] = 8.8 $m^2$

   Number of bricks = 65 x 8.8 = 572 bricks.

2. Cement requirement in lining and wall:

   Because the cement requirement is different depending on whether it is above or below ground, the surface areas should be calculated separately.

   Surface area of lining = 1 [(2 x 1) + (2 x 1.2)] = 4.4 $m^2$

   Surface area of wall = 1 [(2 x 1) + (2 x 1.2)] = 4.4 $m^2$

   Cement requirement for lining = 1/6 x 4.4 $m^2$ = 0.73 bags

   Cement requirement for wall = 1/3 x 4.4 $m^2$ = 1.45 bags

   Total cement requirement for lining and wall is 2.2 bags.

3. Slab volume = 0.025 x 1.2 x 1.4 = 0.042 $m^3$

   Two-thirds of volume is sand, so 2/3 x 0.042 = 0.028 $m^3$ sand

   Cement = 1/2 sand or 0.014 $m^3$, almost 1/2 bag

   Chicken wire = area of slab x 2 = 1.2 x 1.4 x 2 = 2.4 $m^2$ chicken wire

| | | | |
|---|---|---|---|
| 4. | Bricks | 572 | \$228.80 |
| | Sand | 0.028 $m^3$ | --- |
| | Cement | 2.7 bags (3 bags) | \$60.00 |
| | Chicken wire | 2.4 $m^2$ | \$7.20 |

Total cost: \$ 296.00.

## Small Group Activity—Planning for Materials, Transport, and Labor in a Construction Program

All of these scenarios are set in the country of Taganis. They involve mainly small communities located in different parts of the country and with different needs. Each small group is in charge of a sanitation program for a particular community in Taganis.

The monetary unit is the Tagani dollar.

Examples of necessary calculations are included in Handout 11-9.

### Scenario I

The community of Taduli is about to begin its first sanitation program. It is a small community of 20 houses and is quite a distance from the urban center in which certain building materials can be located.

The program will be initiated with 5 latrines, which will be built at the school, at the community center, and at houses of community members who expressed an interest in improved sanitation and were able to make a contribution toward the cost of the latrine.

New latrine construction will consist of

- 2 basic latrines with cover
- 2 VIP latrines
- 1 pour flush (or waterseal) latrine

Taduli is located 5 days' travel from an urban center where nonlocally made materials can be purchased; transport time is 5 days.

### Scenario II

The large town of Mibalu is upgrading many of its latrines due to the increased affluence of the community. It is located quite near an urban center, and all construction materials are readily available there. The community has recently upgraded its water supply to enable the use of pour flush latrines, which had been previously impractical.

New latrine construction will consist of

- 1 raised platform latrine

Upgrades will consist of

- 5 basic pit latrines to become 5 VIP latrines
- 5 VIP latrines to become 5 pour flush latrines

Mibalu is located 1 days' travel from an urban center where nonlocally made materials can be purchased; transport time is 1 day.

**Scenario III**

In the rural community of Sinkan, the sanitation program is being initiated with some upgrading and new latrine construction because there are very few latrines in the community. The community is located at a relatively short distance from the capital, but the roads are very rough and the trip takes 3 days' travel.

The community had formed an agricultural cooperative for the purpose of sharing farm equipment and loans for the purchase of seed hybrids. It has recently expanded its program to include latrines. The latrine "buyers" pay a monthly loan payment toward the full cost of the latrine. Because it is a generally poor community, the loan payments are spread over two years.

New latrine construction will consist of

- 2 VIP latrines
- 2 basic latrines with cover

Upgrades will consist of

- 2 basic pit latrines to become 2 VIP latrines

The community is located at 3 days' travel from an urban center where nonlocally made materials can be purchased; transport time is 3 days.

**Scenario IV**

In the village of Malaro, a latrine program has been initiated with the assistance of the government on a pilot basis. The cost and success of the pilot will be evaluated by the Department of Health to determine if such a program is viable.

The government is providing 25 VIP slabs and fly screens for use in the program; 5 of the latrines require elevated platforms because they are to be built in areas with a high water table. New construction will consist of

- 20 VIP latrines, with government assistance
- 5 raised platform latrines with vent pipe, with government assistance

This community is located 2 days' travel from an urban center where nonlocally made materials can be purchased; transport time is 2 days. Transport of the slabs and screens is not provided. Ten slabs can be transported (with screens) from the urban center in one load.

**Small Group Activity—Information Common to all Scenarios**

## A. General

- All latrines have a pit directly below the slab.
- Compost latrines have two above-ground compartments.
- Cement comes in 50 kg bags with a volume of 0.0332 $m^3$ or 33.2 liters.
- Reinforced concrete mix of 1:2:4 (cement:sand:gravel) to be used.
- Ferrocement and mortar mix of 1:2 (cement:sand).
- Bricks: 15 cm long, 10 cm wide, 6 cm high; for a wall of brick, 65 bricks/$m^2$ of surface area are needed.
- Concrete block: 38 cm long, 18 cm wide, 18 cm high.
- All upgrades require the time of one skilled builder and one unskilled laborer for one day, plus one-half bag of cement, in addition to the specific material requirements.

## B. Latrine Bases

- Basic latrine with cover: base to be built of one layer of concrete block.
- VIP: base to be built of two layers of brick.
- Pour flush/waterseal: base to be built of poured concrete (dimensions: 15 cm wide and 7 cm thick) with two lengths of reinforcing rebar along each side.
- Raised platform latrine: no real base.

## C. Material Estimating Requirements for Materials in Base

Brick

- For a base, bricks are to be laid side by side (with the 10 cm by 6 cm end facing the pit). If a 2 cm mortar joint is used, the brick width (for calculation purposes) would be 12 cm.

- To find the number of bricks that would be needed around the perimeter of the pit, first find the number of bricks for each meter. This number can be calculated by dividing 1 m by the width of the brick plus mortar, or 12 cm.
- Assume that 8.3 bricks will make 1 m.
- To calculate the total amount of mortar required, the mortar required for 1 brick can be multiplied by the number of bricks needed. In this case, the amount of mortar required for a single brick is the thickness of the mortar joint (0.02 m) multiplied by the length (0.2 m), multiplied by the width, plus the depth. In this case the mortar required for 1 brick is 0.00072 $m^3$. To calculate the amount of mortar needed for each meter of base, multiply this by the number of bricks in each meter.

  8.3 x 0.00072 $m^3$ = 0.0060 $m^3$.
- If the mortar used is like that used in the ferrocement ratio, 1:2, the amount of sand required for each meter would be 0.004 $m^3$.
- The cement required for each meter would be approximately 0.002 $m^3$, or 0.06 bags.
- To calculate the amount of bricks, cement, and sand required for a base, multiply the amount of each needed for 1 m by the number of meters in the perimeter of the base. For a base of two layers, double the figure.

Concrete Block

- Due to the larger size of the concrete block, 1 course will be laid for the base, with its long side (38 cm by 18 cm) facing the pit. Making the same calculations as above,
  - The area of 1 block face = 0.072 $m^2$
  - The length of a block with a 2 cm mortar joint = 40 cm
  - The number of blocks per meter = 1 m/0.4 m = 2.5 blocks
  - The amount of mortar required for 1 block = 0.0021 $m^3$
  - The amount of mortar required for each meter = 0.0021 $m^3$ x 2.5 = 0.0053 $m^3$
  - The amount of sand required for each meter = 0.0035 $m^3$
  - The amount of cement required for each meter = 0.00175 $m^3$, or 0.05 bags.
- To calculate the amount of blocks, sand, and cement for a base, multiply the amount of each needed for 1 m by the number of meters in the perimeter of the base.

Poured Concrete

- To calculate the amount of cement, sand, and gravel in a poured concrete base, first find the volume of the base. This volume can be calculated by finding the area of the base and then multiplying it by the thickness. The area of the base is the area of the outer edge of the base minus the inner area of the pit.

  Example:

  If a square pit has dimensions of 1 m by 1 m and a base that is 20 cm wide and 10 cm thick, how much gravel, sand, and cement is needed?

  The area of the base's outer edge is

  $(1\text{ m} + 0.4\text{ m}) \times (1\text{ m} + 0.4\text{ m}) = 1.96\text{ m}^2$.

  The inner area is $1\text{ m}^2$.

  The area of the base $= 1.96 - 1 = 0.96\text{ m}^2$.

  The volume of the base $= 0.96 \times 0.1 = 0.096\text{ m}^3$.

- The amount of gravel needed would be the same as the volume, because the other components take up the volume of the spaces between the gravel.
  - Volume of gravel $= 0.096\text{ m}^3$
  - Volume of sand $= 1/2 \times 0.096 = 0.048\text{ m}^3$
  - Volume of cement $= 1/4 \times 0.096 = 0.024\text{ m}^3$
  - No. of bags of cement $= 0.024/0.0332 = 0.72$ bags, or almost 3/4 bag.

## D. Labor Requirement and Labor Cost for Base

- Three bases/day require 1 skilled, 1 unskilled laborer.

  Three bases, of any type, can be built in 1 day by a skilled and unskilled laborer.

- To calculate the labor cost,
  - divide the number of bases needed by three to obtain the number of days needed to construct all the bases;
  - multiply the number of days needed by the daily rate for skilled labor and unskilled labor separately.
- Add the amounts to obtain the total labor cost for base construction.