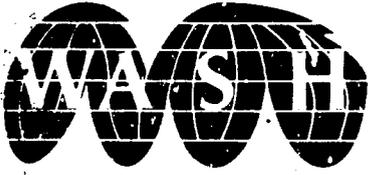


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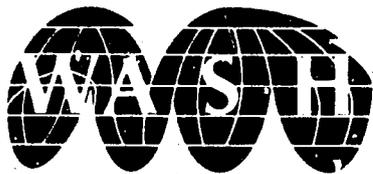
**A WORKSHOP ON SANITATION
IN BAKEL, SENEGAL
APRIL 20-MAY 3, 1983
AND AN ASSESSMENT OF
ENVIRONMENTAL HEALTH
CONDITIONS**

WASH FIELD REPORT NO. 91

JUNE 1983

Prepared For:
USAID Mission to the Republic of Senegal
Order of Technical Direction No. 147

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FOR HEALTH PROJECT**



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June 17, 1983

Mr. David Shear, Director
USAID Mission
Dakar, Senegal

Attention: Ms. Mary Diop

Dear Mr. Shear:

On behalf of the WASH Project I am pleased to provide you with 10 (ten) copies of a report on A Workshop on Sanitation in Bakel, Senegal, April 20-May 3, 1983 and an Assessment of Environmental Health Conditions.

This is the final report by Fred Rosensweig and Thomas Talbot and is based on their trip to Senegal from April 15 to May 13, 1983.

This assistance is the result of a request by the Mission on December 22, 1982. The work was undertaken by the WASH Project on March 7, 1983 by means of Order of Technical Direction No. 147, authorized by the USAID Office of Health in Washington.

If you have any questions or comments regarding the findings or recommendations contained in this report we will be happy to discuss them.

Sincerely,

Dennis B. Warner

Dennis B. Warner, Ph.D., P.E.
Director
WASH Project

cc. Mr. Victor W.R. Wehman, Jr., P.E., R.S.
AID WASH Project Manager
S&T/H/WS

DBW:cdej

FIELD REPORT NO. 91

A WORKSHOP ON SANITATION IN BAKEL, SENEGAL,
APRIL 20 - MAY 3, 1983
AND AN ASSESSMENT OF ENVIRONMENTAL HEALTH CONDITIONS

Prepared for the USAID Mission to the Republic of Senegal
under Order of Technical Direction No. 147

Prepared by:

Fred Rosensweig
and
Thomas Talbot

June 1983

TABLE OF CONTENTS

Chapter	Page
EXECUTIVE SUMMARY.....	iii
ACKNOWLEDGEMENTS.....	v
1. INTRODUCTION.....	1
2. PLANNING.....	2
2.1 Bakel Rural Health Project.....	2
2.2 Initial Planning.....	2
2.3 Materials Preparation.....	2
2.4 Bakel Preparation.....	3
3. WORKSHOP.....	4
3.1 Workshop Goals.....	4
3.2 Participants.....	4
3.3 Training Staff.....	5
3.4 Logistics.....	5
3.5 Schedule.....	6
3.6 Methodology.....	6
4. WORKSHOP ASSESSMENT.....	9
4.1 Trainer Assessment.....	9
4.1.1 Workshop Goals.....	9
4.1.2 Schedule.....	9
4.1.3 Staff.....	9
4.1.4 Methodology.....	10
4.1.5 Support.....	10
4.1.6 Participants.....	10
4.2 Participant Assessment.....	10
4.2.1 Methodology.....	10
4.2.2 Latrine Construction.....	11
4.2.3 Planning a Sanitation Project.....	11
4.2.4 Methods of Working with the Village.....	11
4.2.5 Documents.....	11
4.2.6 Wastewater.....	11

Chapter	Page
5. SANITARY ASSESSMENT OF THE VILLAGES.....	12
5.1 Introduction.....	12
5.2 Geography.....	12
5.3 Village Visits.....	13
5.4 Excreta Disposal.....	13
5.5 Wastewater Disposal.....	16
5.6 Solid Waste Disposal.....	19
5.7 Water Supply.....	19
5.8 Schistosomiasis and Irrigation.....	25
5.9 Dispensaries and Hospitals.....	27
6. RECOMMENDATIONS.....	28
6.1 Workshop Recommendations.....	28
6.2 Recommendations for Follow-up to the Workshop.....	28
6.3 Environmental Health Recommendations.....	29
6.3.1 Improvement of Hygienic Conditions in the Dispensaries and Hospital.....	29
6.3.2 Improved Solid Waste Disposal.....	29
6.3.3 Provide a Sanitarian to the Project Area.....	29
6.3.4 Improve Excreta and Wastewater Disposal.....	30
6.3.5 Provide Health Education in Sanitation and Hygiene....	30
6.3.6 Improve Drinking Water Quality.....	31
 APPENDICES	
A. Order of Technical Direction.....	32
B. Itinerary.....	36
C. List of Workshop Participants.....	37
D. Evaluation Form.....	38
E. Design of Excreta and Solid Waste Disposal Systems Used in the Workshop.....	39
F. Copy of Certificate of Participation.....	49

EXECUTIVE SUMMARY

A workshop on rural sanitation was held in Bakel, Senegal April 20-May 3, 1983 for 16 participants. Twelve of these participants were nurses running rural health posts in the project area of the health component of the USAID Small Irrigated Perimeters Project. The overall purpose of the workshop was not only to give participants the necessary technical skills and knowledge, but also to give them skills to plan village level sanitation projects. The three main aspects of sanitation in the workshop were latrine construction, solid waste disposal, and wastewater disposal. The workshop was conducted by a two-person team, one person skilled in environmental health and the other in workshop design and delivery.

The workshop goals represented a balance between the three technical areas and the planning and educational skills needed to put the technical skills into practice. This balance was particularly appropriate since most of the participants were more likely to be involved in planning and education than in actual project implementation because of their multiple responsibilities.

The training methodology was highly participatory. The emphasis was on practical aspects, and participants were actively involved in all field and classroom tasks. The participants carried out such tasks as constructing three latrines, carrying out a sanitary survey and analyzing the data, examining the role of a village health committee, planning an education program, designing improvements for existing latrines, and planning a solid waste disposal system. The technical solutions proposed are detailed in Appendix E.

The participants felt that the workshop achieved its objectives. They cited the following as the most salient aspects:

- The participatory training approach
- The focus on project planning
- The technical aspects of latrine construction.

Following the workshop, the WASH technical consultant visited all the nurses in the project area in order to begin the follow-up process to the workshop and to do a general assessment of environmental health conditions. These visits resulted in developing work plans for the nurses and in a general assessment of sanitary conditions in the villages.

The recommendations fall into two main areas, workshop follow-up and environmental health. Regarding the workshop follow-up the WASH team recommended the following:

1. For project nurses to hold a two-day meeting in 4 to 6 months to share their experiences since the workshop.
2. For time to be devoted at the regular monthly meetings of the nurses to discuss progress in planning and implementing sanitation projects.
3. For trips to be organized to the Sine Saloum Health Project.

4. For the project coordinator to make regular site visits to monitor progress in planning and implementing sanitation projects.
5. For the nurses to receive more technical information.

The major recommendations for improving environmental health were as follows:

1. That hygienic conditions be improved in the dispensaries and hospital as a prelude to planning village sanitation projects.
2. That villagers be sensitized to the health hazards of solid waste and that they be mobilized to start regular village clean-up days.
3. That a sanitarian be assigned to the project area to encourage, coordinate, and supervise sanitation activities of the nurses.
4. That new latrines be constructed and existing latrines be improved through soakage pits to improve excreta and wastewater disposal.
5. That health education be provided in sanitation and hygiene.
6. That drinking water quality be improved through examining the feasibility of constructing wells and, if feasible, combining a wells project with an education component to teach villagers about well maintenance, water storage, and proper use of water in the home.

ACKNOWLEDGEMENTS

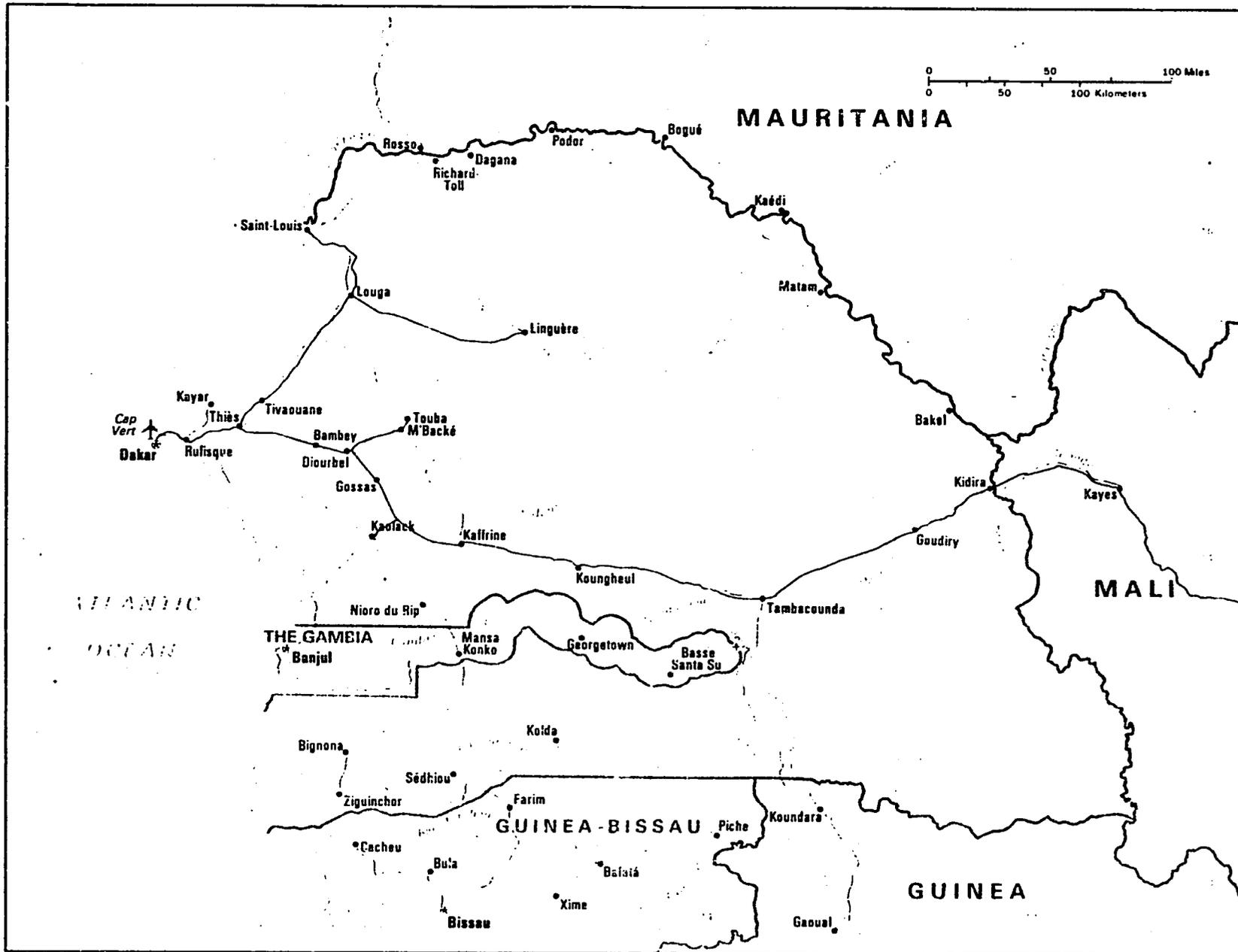
Conducting a workshop such as the one described in this report requires a high degree of local involvement and commitment. Both Dr. N'Diaye and Amady Fofana more than ably performed this role. Dr. N'Diaye showed great enthusiasm for the workshop and did everything possible to make the workshop a success. Amady Fofana took care of all administrative and logistic needs with great skill and was critical in making the workshop come off without a hitch.

The AID mission, particularly Mary Diop and Janine Aubry, deserve thanks for their support, interest, and guidance that helped the consultants immeasurably. Special thanks to Omar N'Dow who was our driver during the assignment.

Joan Bordman and Barry Karlin, who prepared the training materials, also made a critical contribution. Their care and professionalism helped produce the instructional materials which were the basis for the workshop.

Finally, we would like to thank the participants for their active participation in the workshop and for their great hospitality during the village visits. Their enthusiasm was essential to the workshop.

Senegal



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Chapter 1

INTRODUCTION

In March 1983 the WASH Project was requested to conduct a workshop for 16 to 18 participants on latrine construction, solid waste disposal, and wastewater disposal in Bakel, Senegal. Most of the participants are nurses running rural health posts in the Health component of the AID Bakel Small Irrigated Perimeters Project. The workshop was conducted from April 20 to May 3 in Bakel.

A reconnaissance visit to Bakel in order to plan the workshop was made from November 30 to December 4, 1982. Based on this visit a plan was developed for the workshop, and roles and responsibilities were agreed upon. In addition, it was agreed that following the workshop the WASH technical consultant would visit all the nurses in the project area. This would serve not only as follow-up to the workshop but also to conduct a general environmental health assessment of the project area. The details of the planning visit can be found in WASH Interim Report No. 127-1.

The overall purpose of the workshop was to give participants skills in planning and supervising village level sanitation projects. The focus was not only on training them in the required technical skills but also on using that technical knowledge and these skills to plan projects.

WASH Order of Technical Direction (OTD) No. 147 was issued on March 7, 1983 to carry out this assignment (see Appendix A).

Chapter 2

PLANNING

2.1 Bakel Rural Health Project

The Health Component of the Small Irrigated Perimeters Project consists of two aspects: Health Surveillance and Health Services Improvement. The purpose of the surveillance component is to obtain baseline data concerning disease prevalence and to test the effectiveness of treatment programs. The purpose of the health services component is to organize village health huts to provide primary health care for villagers and easy access to medicines. Financing for the health component is \$402,000 over a five-year period, of which \$183,000 is allocated for the health services component.

The project area consists of 23 villages, 15 of which are Soninke and Toucouleur. There are 11 health posts, each staffed by a male nurse. The project originally envisioned the training of all nurses as health trainers for village health workers. These village health workers (secouristes) are complemented by maternal and child health workers (matrones) and village hygienists. These workers are unpaid and are now in place in most villages in the project area. Both the secouristes and hygienists are potential resources to the nurses in carrying out sanitation projects in the village. Further resources are the village health committee and other village groups such as the association of mothers and youth groups.

2.2 Initial Planning

Based on the December visit to Bakel by WASH Senior Training Officer Fred Rovensweig, a work plan was developed which detailed all tasks leading up to the workshop. The local project staff in Bakel was responsible for such tasks as informing participants, making arrangements for visits to the villages during the workshop, and a myriad of logistic and administrative details. AID/Dakar agreed to backstop Bakel project staff in purchasing supplies and materials and in inviting participants outside the Bakel area. WASH's primary task was to prepare all necessary training materials and to provide the trainers for the workshop.

In addition to establishing the overall goals of the workshop, the planning visit served to clearly lay out what was needed to conduct the seminar. All the concerned parties had a clear idea of what they were responsible for and carried out those responsibilities in a timely and efficient manner. By the time of the consultant's arrival in Senegal in April, all arrangements had been made.

2.3 Materials Preparation

In order to prepare the training materials for this workshop, WASH hired two consultants, Barry Karlin and Joan Bordman. Based on the planning visit to Bakel, these consultants prepared a draft set of training materials to serve as a basis for the workshop. Although these materials were specifically

designed for the Bakel workshop, countries with similar environmental health conditions could make use of the materials. A number of modifications were made during the workshop, but in general they provided a solid foundation for the workshop sessions. Chapter 3 will detail the specific content of the workshop. For the technical aspects of the excreta and solid waste disposal systems presented in the workshop see Appendix E.

2.4 Bakel Preparation

The training team arrived in Senegal about a week prior to the workshop. After a short but productive briefing with the AID Mission, the consultants travelled to Bakel to make final preparations. Since all prior arrangements had been carried out, there was little to do but prepare flip-charts, organize the training room, and get settled. One day was also spent visiting several villages so that the technical trainer could get a first-hand look at the environmental health conditions. This proved invaluable as it pointed out the need for some fine tuning of the course materials. By the start of the workshop, there were no major outstanding issues.

Chapter 3

WORKSHOP

3.1 Workshop Goals

The overall workshop goals were for participants to learn:

1. The relationship between sanitation and health.
2. How to construct and maintain a latrine.
3. How to estimate and secure resources needed to carry out a sanitation project.
4. How to demonstrate skills in planning a latrine project.
5. How to select the appropriate location for a latrine.
6. How to construct and maintain a solid waste disposal system.
7. How to improve wastewater disposal methods and improve existing latrines.
8. How to collect and analyze data describing community attitudes and customs about environmental sanitation.
9. Selected aspects of community organization and education in the context of environmental health.
10. How to design an environmental sanitation plan for back home application.

The workshop goals represented a balance between the more technical aspects of latrine construction, wastewater disposal, and solid waste disposal and the planning and educational skills needed to put the technical skills into practice. This balanced approach was particularly appropriate in this workshop since most of the participants would subsequently be more involved in planning projects and getting communities interested in projects than in actual project implementation. This is due to the fact that the nurses have a multitude of responsibilities only one of which is environmental health. It is hoped that they will be catalysts and advisors, but it is unlikely to expect that they will routinely take lead responsibility for implementation.

For a detailed description of the technical content of this workshop, see Appendix E.

3.2 Participants

There were 16 participants in the workshop with the following breakdown:

- 12 nurses from the Bakel health project zone
- 1 nurse from the Bakel Department outside the project area.
- The health educator for the Department of Bakel.

- An environmental health teacher from the St. Louis School of Sanitary Agents.
- The regional supervisor for sanitary agents in the Sine Saloum Project area.

A list of the participants' names is included in Appendix C.

The participants had varying backgrounds in environmental health. Most of the nurses had a sound understanding of the relationship between health and sanitation but little practical experience. Some participants, however, had quite a bit of background in sanitation. This included the two sanitarians from the Sine Saloum project and the St. Louis school as well as three of the nurses who had had training at the Khombole sanitarian school. The nurses with prior education in environmental health had never put into practice their training since they were given posts which required them to provide health care. This mix of backgrounds proved to be an asset since those with more experience turned out to be valuable resources during the workshop.

3.3 Training Staff

The staff consisted primarily of two individuals, one knowledgeable in environmental sanitation and the other a trainer skilled in workshop design and delivery. The trainer had also made the planning visit in December, thus providing a high degree of continuity between the planning and implementation phases. The technical trainer took lead responsibility for the construction as well as other technical sessions. The trainer took a lead role in the sanitary survey and community organization sessions as well as providing overall coordination for the workshop.

In addition to the core training staff, a local mason assisted in the construction aspects. His responsibilities included the supervision of local workers who did much of the manual labor and working with the participants during the construction sessions. Had the mason not been available, the training staff would have been deprived of valuable training time, and would have been forced to supervise the work force. The mason was also extremely helpful because of his familiarity with local methods and materials.

3.4 Logistics

The training site was the medical center (hospital) in Bakel. A room in the center had recently been renovated and outfitted as a classroom. Since the latrines were constructed at the medical center, there were no problems of daily transport. Several sessions required field work in the villages in the project area. This was easily arranged, and transport was provided both by AID/Dakar and the Bakel Medical Center. AID provided a vehicle and driver during the entire workshop, which contributed considerably to the progress of the workshop. Logistics were not a problem since the planning prior to the workshop had been carried out so efficiently.

3.5 Schedule

The workshop schedule is presented in Figure 1 in block calendar form. This schedule represents what actually occurred, although there were very few changes from the final training design that was done immediately prior to the workshop. It should be noted that the first day of the workshop was on a Wednesday. Due to the heat, classes went from 7:30 to 11:30 in the morning and 4:30 to 6:30 in the afternoon. Where a session involved hands-on construction, the word "practice" is included in parenthesis, and where a session took place in the villages the word "field" is used. All other sessions took place in a classroom or workshop setting.

3.6 Methodology

The training was experiential and participatory in nature. Participants were given opportunities to practice construction skills since three latrines were built at the training site. They also had several sessions on planning various aspects of sanitation projects including community involvement, estimating resources, educational activities, and technical issues. The emphasis throughout was on the practical aspects of environmental sanitation. Specific activities included construction practice, field visits, small group tasks, role-playing, and full group discussion.

Two aspects of the methodology deserve particular attention. First, the approach used for construction sessions did not involve any demonstration. These sessions were done in the following ways. The technical trainer gave a short (20-25 minute) explanation of the various steps involved, including drawings when necessary. Next the participants, who worked in the same groups of three for all the construction sessions, carried out the task. During this phase, the technical trainer and mason observed and made suggestions when necessary. Finally, after completing the task, a short review session was held to discuss problems that the participants had and to articulate lessons learned for the future.

This approach worked very well and avoided the need for time-consuming, passive demonstrations. With careful monitoring, none of the groups made any serious errors that affected the quality of their work projects.

Second, the workshop emphasized the project approach throughout. Participants were not taught simply what was involved in building one latrine, but to plan for 10, 20, or more latrines. All steps of the project cycle including initial assessments, community involvement, planning, implementation, and follow-up were covered so that the participants would see their roles in the broadest sense and not only in a limited technical way.

Figure 1

Schedule

Week One

	Wednesday	Thursday	Friday	Saturday	Monday	Tuesday
7:30	<p>Welcome</p> <p>Expectations Goals Schedule</p> <p>Relationship between Sanitation and Health</p>	<p><u>Latrines</u></p> <p>Project Cycle</p> <p>Estimation of Resources</p> <p>Siting Latrines</p> <p>Staking (Practice)</p>	<p><u>Latrines</u></p> <p>Mold (Practice)</p> <p>Rebar (Practice)</p> <p>Mixing Concrete</p>	<p><u>Latrines</u></p> <p>Lining</p> <p>Mixing and Pouring Concrete for the Riser (Practice)</p> <p>Construction of the Base and Soakage Pit Border (Practice)</p>	<p><u>Sanitary Survey</u></p> <p>Principles</p> <p>Introduction to Questionnaire</p>	<p><u>Sanitary Survey</u></p> <p>Inspection</p> <p>Interviews (Field)</p>
4:30	<p>Exchange of Experiences with Latrines</p> <p>Latrine Design "Bakel Model"</p>	<p>Riser Form (Practice)</p>	<p>Mixing and Pouring Concrete (Practice)</p>	<p>Free</p>	<p>Practice of Interview Skills</p>	

Week Two

Wednesday	Thursday	Friday	Saturday	Monday	Tuesday
<u>Sanitary Survey</u> Analysis of Findings Presentations	<u>Community Organization</u> Working with the Village Health Committee	<u>Wastewater</u> Wastewater and Improvement of Existing Latrines (Field)	<u>Solid Waste Disposal</u> Methods Planning Solid Waste Disposal Programs	<u>Latrines</u> Review of Construction Steps Installing the Slab Connecting the Drainage Pipe Superstructure	<u>Individual Planning</u> Workshop Follow-up Evaluation Closure
<u>Community Organization</u> Principles Group Roles	<u>Community Organization</u> Educational Activities	<u>Community Organization</u> Managing Beliefs and Customs	Free	<u>Maintenance</u> Communal Latrines Role of the Hygienist	

Chapter 4

WORKSHOP ASSESSMENT

4.1 Trainer Assessment

4.1.1 Workshop Goals

The workshop goals detailed in Section 3.1 proved to be on target for the participants' needs. As mentioned previously, the balance between hard technical content and planning and community participation was appropriate.

4.1.2 Schedule

Only one of the planned sessions proved to be inappropriate. This was the session on identifying and managing taboos that were obstacles to an effective latrine program. Essentially, the participants objected to the use of the word "taboo," especially the difficulty in defining it. When defined as practices with a superstitious overtone, the participants felt that there were no taboos. The trainers thought that underneath their objection was their feeling that "taboo" has a pejorative sense. The participants felt that the problem was rather one of habits and practices. Fortunately, their concerns were raised at the outset, so the focus of the sessions was shifted to overcoming habits that are obstacles to a successful latrine program.

Another issue that arose was the planning focus. As discussed earlier, a number of sessions involved planning activities. The trainers discovered that most of the participants had limited experience in program planning and had some difficulty in developing detailed focused plans. Participant's plans certainly improved during the workshop as they did more planning activities, but this could have been even more effective if the lack of experience in this area had been anticipated.

The daily schedule of 7:30 to 11:30 in the morning and 4:30 to 6:30 in the afternoon worked very well. Anything much different would have presented problems due to the heat.

4.1.3 Staff

The combination of a technical specialist and the training specialist was very effective. The technical trainer paid attention to the technical content and making sure that the latrines were being constructed properly while the trainer made sure that each session was well designed and that the overall flow of the workshop was sound. This constant attention to both content and process is essential in any workshop and both trainers felt that the team approach worked well in this case.

4.1.4 Methodology

The participants responded enthusiastically to the participatory training methodology. The use of small group work was important in that some of the quieter ones did not participate in full group discussions, but did in small groups. The construction sessions proved to be very effective as shown by the fact that the tasks were all completed successfully.

4.1.5 Support

The backup support for the workshop was virtually flawless. Dr. N'Diaye, the Chief Medical Officer in Bakel, and Anady Fofana, the Project Coordinator, did everything that was asked of them in a timely and efficient manner. Dr. N'Diaye showed a keen interest in the seminar, stopping by each day to see how things were going and to ask if anything was needed. USAID/Dakar was also very supportive, especially in the area of logistics.

4.1.6 Participants

For the workshop to be judged a success, the participants will have to expand their roles from curative ones to ones which also include preventive activities. During the workshop, the participants did not seem to question the need to expand their roles. In fact, it was evident that some had already taken on somewhat expanded roles. The participants all had a general understanding of sanitation, but it was clear they had never focused on it in their roles as nurses. Finally, it was valuable to have the two outside participants. Not only did they participate actively, but they also added a measure of diversity and variety of experience that contributed to fuller discussions.

4.2 Participant Assessment

The participants' assessment is based on a short written opinionnaire (Appendix D) and an oral evaluation at the conclusion of the workshop. In general, the assessment was quite positive. The participants felt that the workshop goals were on target and had been met. They all expressed confidence in their ability to plan and implement sanitation projects in their villages. A summary of the most significant comments is provided below.

4.2.1 Methodology

The participants felt that the participatory methodology used in the workshop was very effective. They cited the small group work both for construction sessions and for classroom tasks as being more effective than the traditionally used large group lectures. Several stated that it was a workshop model that they hoped to follow in the future.

4.2.2 Latrine Construction

Almost all participants cited the construction sessions as being useful. At the end of the workshop the participants thought they were sufficiently knowledgeable and had the necessary skills to plan and, if necessary, supervise latrine construction in their villages. This was not something they felt they could do prior to the workshop.

4.2.3 Planning a Sanitation Project

As this was one of the major focuses of the workshop, it is particularly significant that the participants thought it was of great value. The identification of needs, estimation of resources, elaboration of a work plan, and monitoring of the plan were all cited as important steps in the planning of a project. The planning aspect of the workshop was considered to be perhaps the most useful.

4.2.4 Methods of Working with the Village

This aspect, particularly working with a health committee and planning educational programs, was thought to be valuable. Many of the nurses had had only limited exposure to educational approaches and appreciated this aspect of the workshop.

4.2.5 Documents

Several participants expressed the desire for more information. They would like to have received more information to use at their posts.

4.2.6 Wastewater

Several participants said they would have liked to have spent more time on the problem of wastewater disposal. Although this was covered, it was felt that more aspects of the subject could have been treated.

Chapter 5

SANITARY ASSESSMENT OF THE VILLAGES

5.1 Introduction

This chapter describes the sanitary conditions in the Bakel region of Senegal and is based on direct observation, and discussion with villagers, nurses, secouristes, and hygienists in villages visited over the course of three weeks from April 18 to May 19, 1983. The following villages were visited by one or both of the WASH consultants:

4/18/83: Villages visited prior to the workshop: Sebou, Yafera.

4/25/83 and 4/30/83: Villages visited during the workshop: Sebou, Yafera, Tuabu, Galade, Yelingara.

5/4-9/83: Villages visited during follow-up visits: Senadebou, Kidira, Ballou, Djimbe, Yafera, Golmi, Tuabu, Diawara, Moudery, Gande, Galade, Bakel, Yelingara.

5.2 Geography

There are 23 villages involved in the health component of the USAID Small Irrigated Perimeters Project. The project area has an estimated population of 30,000. The villages extend from Gande which is north of Bakel to Senadebou which is south of Kidira. All the villages are located along the Senegal River or the Faleme River.

The area is semi-arid with an annual rainfall of about 500 mm, which occurs during the rainy season from June to October. The soils along the river banks consist of a surface layer of permeable clay loam of varying depth below which is found layers of sand. A few hundred meters inland from the river banks are thick layers of impervious montmorillonite clay. This clay expands when wet and therefore has a very low infiltration rate. For this reason the irrigated farms and fish ponds are located in this area. This impermeable soil causes large pools of water to form during the rainy season which provide a favorable habitat for mosquito breeding.

From Senadebou north to Sebou the villages consist of sedentary Fulbe called Toucouleur while villages north to Gande are composed of Soninke.

The Soninke villages are very compact with narrow streets with each compound surrounded by mud or cement block walls. Each compound contains an extended family which consists of a man, one to four wives, children, and often grandparents or other relatives. The compounds have often been in the family for generations. Though the compounds and villages are crowded there is usually plenty of available space outside the village for expansion. The inhabitants are reluctant to give up their traditional homes for more spacious living conditions. These crowded living conditions probably lead to increased risk of respiratory disease and intestinal disease along with posing problems for solid waste disposal and latrine siting. The Toucouleur villages visited appeared to be less compact with fewer walls separating the compounds.

5.3 Village Visits

Following the workshop the WASH technical consultant visited 11 of the nurses in their project villages in order to assess the sanitary conditions within the communities and help the nurses develop a work plan for their villages.

Each day two or three villages were visited. Upon arrival in the village the nurse accompanied the WASH technical consultant in a walk around the village in order for him to assess the sanitary conditions in the villages. In each village particular attention was given to the disposal systems for solid wastes, human wastes and wastewater. The water sources of each village were also inspected. The nurses were asked to point out the sanitary problems and discuss possible solutions.

Following the tour of the village the WASH consultant and nurse met with the secouriste, hygienist, village leaders, or members of the health committee. The nurse would discuss the existing sanitary risks and propose solutions to the village leaders. Following would be an interactive discussion between the leaders and the nurse. The WASH consultant maintained a low profile during the discussion allowing the nurse and villagers to express the community needs and develop possible solutions to the problems.

From the visual inspection of sanitary conditions and the discussions with village leaders, the nurse was asked to develop a simple plan of action for the community. The WASH consultant discussed with the nurse the feasibility and completeness of the plan and made suggestions when appropriate.

In two of the villages, Yafera and Galade, the villagers had dug latrines for the dispensaries. Latrine slabs which had been constructed during the training program were then transported to these villages during the village visits of the consultant.

The individual site visits were in general felt to be useful by the nurses and consultants. They helped the nurse plan sanitary projects within their own communities. Unfortunately, the site visit to Gabou had to be cancelled, and four of the village visits had to be abbreviated due to the lack of an available USAID vehicle.

5.4 Excreta Disposal

Several latrines were visited in each village to determine how existing latrines were constructed and maintained, who uses the latrines, and where the latrines are located. In the Soninke villages there were usually several latrines per compound. In polygamous households each wife had one or two rooms in which she lived with her children. There was usually a walled-in area (about 10 m²) directly behind the bedroom where the latrine was located and water and food were often stored. In some cases cooking also took place in this area close to the latrine drop holes as shown in Figure 2. The parents would often sleep in this open-air area during the warmer months of the dry season.

Figure 2



In Soninke villages water is often stored and food prepared near the latrine drop hole.

In the Toucouleur villages where the houses were not as crowded together the latrines were often separate from the house. In some cases the latrines had straw roofs.

In all villages the opening of the latrine pits are about one square meter and range from four to five meters deep in stable clay soils to two meters deep in unstable sandy soils. The pits were seldom lined according to the villagers and only rarely were cave-ins a problem. The exception to this was in Moudery where the soil was sandy and the pit walls frequently caved in. It was suggested in this case that the pits could be lined with wood or cement blocks.

With traditional latrines the pits are first covered with wood cut from the branches of trees. The wood is then covered with packed clay. The packed clay along with the area around the slab is then covered with a thin coat of cement or cow dung to provide a smooth surface which is easy to clean. The covering of some of the traditional latrine slabs had cracks or holes in the surface formed as the clay settled. This makes them difficult to clean. The latrine slabs often have a small mound in the middle with the drop hole in the center of the mound. In other cases instead of a mound there is a U-shaped concrete riser similar to the design taught in the workshop. In many of the latrines visited people urinated on the slab, not in the drop hole. A gully is formed in the slab which drains urine and wastewater from cooking and washing away from the drop hole out the back of the latrine into the street or soakage pit. The latrine pit serves as a receptacle only for feces and anal washing. Some of the latrine slabs were found to have insufficient slopes and wastewater would remain stagnant on the floor. Some latrines, however, were designed to accept urine along with feces.

The drop holes were covered by metal pot covers or bowls. Often times there was either a space between the cover and the hole or the drop hole was left uncovered and flies could be seen leaving and entering the drop hole. The latrines were usually kept clean because this area was also often used for cooking, bathing, and sleeping. There was little or no odor from latrines visited. Charcoal or ashes were periodically thrown into the latrine to reduce odor and aid in decomposition of the excreta.

When the latrine is filled it is sealed for 6 to 9 months while the excreta in the pit is allowed to decompose and dry. The latrine hole is then uncovered and excreta is compacted with a long pole and the same pit can be used again without emptying. In one case where the squatting slab had caved in the latrine was opened and bleach was poured into the pit in an attempt by the user to disinfect the contents before the pit was emptied. This method poses a health risk to the person that excavated the pit contents since it is unlikely the bleach would have completely disinfected the excreta.

The suggested method is to wait for 9 to 12 months until the pathogens in the excreta have died off before emptying the pit. Digging a new pit is often difficult in Soninke villages since most households have a limited amount of space for latrine construction.

The question of who and how often the latrines are used is difficult to answer without spending a longer period of time interviewing villagers and observing village life. It is reasonable to assume villagers do not use the latrines when they are away from the household cultivating fields or herding livestock.

It was noted that children do not use latrines while in school since few of the primary schools had functioning latrines. Several of the nurses also felt the household latrines are used less frequently by children. Latrines are often reserved for the adults since they are often connected to adults' bedrooms. Small children were, however, noted using potties in a few of the compounds visited, as shown in Figure 3.

Under-utilization of latrines by children presents a significant health hazard since children are highly susceptible to and important carriers of intestinal infections.

The village of Yafera was different than the other villages visited in that the majority of the households had no latrines at all. According to the nurse stationed there latrines were usually only used by invalids who had difficulty leaving the compound. The rest of the population defecated on the outskirts of town.

5.5 Wastewater Disposal

The wastewater and urine as mentioned above flows out the back of the latrine directly into the street or soakage pit. The volume of the soakage pits is about one cubic meter or less. These pits were often unlined and contained no gravel. The pits were covered with logs which are then covered with scraps of metal roofing or packed earth. The soil covering often eroded away leaving open wastewater in the soakage pit available for insect breeding. In one case phenolic disinfectants were used to prevent insect breeding.

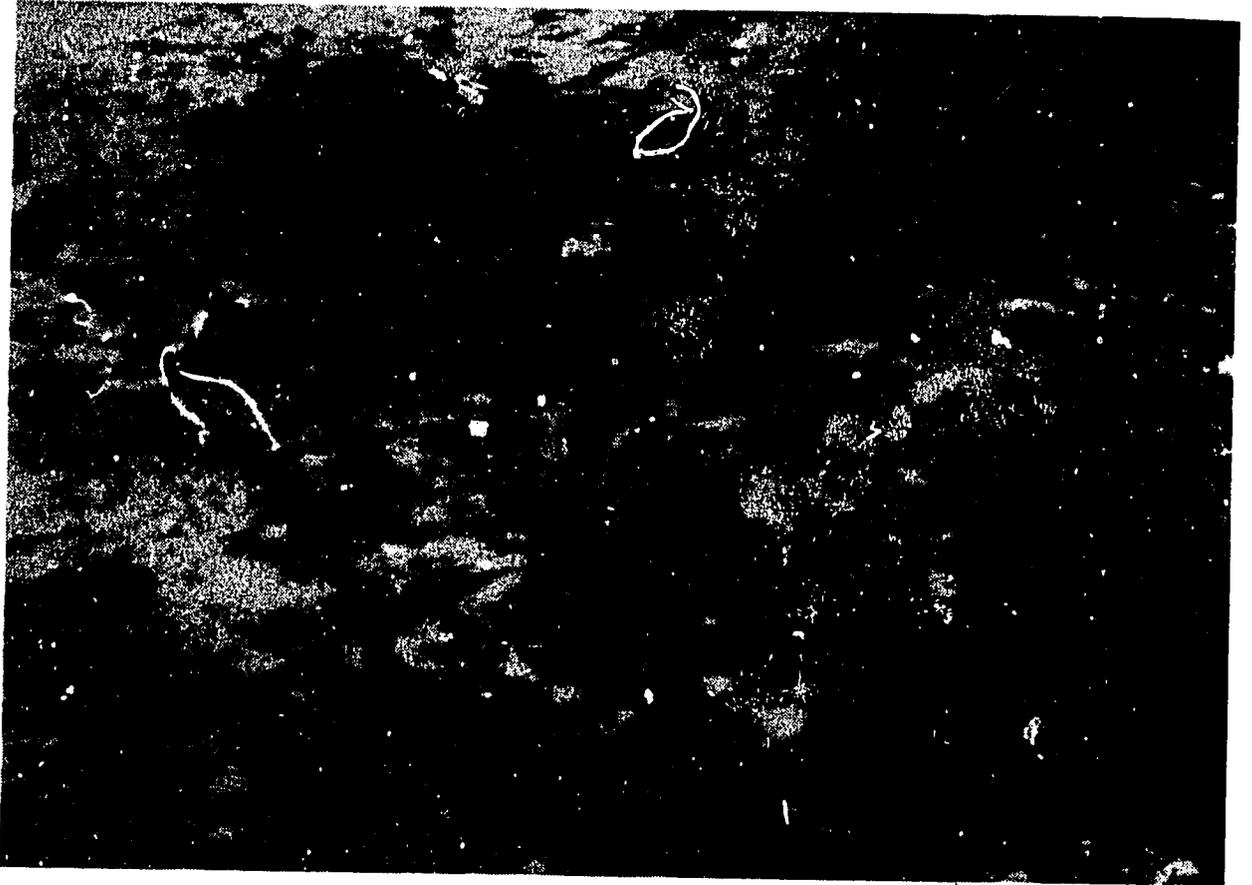
Flies and cockroaches can carry small quantities of excreta on their bodies when they come in contact with open soakage or latrine pits. These insects can then later contaminate food and water. Mosquito breeding also can be a problem in these wastewater systems. Recent entomological surveys in the Bakel area have found the larvae of Culex fatigans, the vector of Bancroftian filariasis, to be breeding in open poorly drained soakage pits.

The pipes or gutters connecting the squatting slab to the soakage pits are often poorly connected. In many cases the waste waters completely by-pass the soakage pit. In other cases the soakage pits are located on low ground and are flooded during the rainy season.

Problems are often encountered with soakage pits which have been lined. These pits are often lined with cement blocks or 200 liter oil drums, as shown in Figure 4. These linings are often impermeable, therefore allowing water only to filter through the floor of the pit. This causes many of the soakage pits to overflow. In Kidira all the soakage pits which drain the wastewater from the public standpipes were found to be overflowing due to impermeable cement linings.

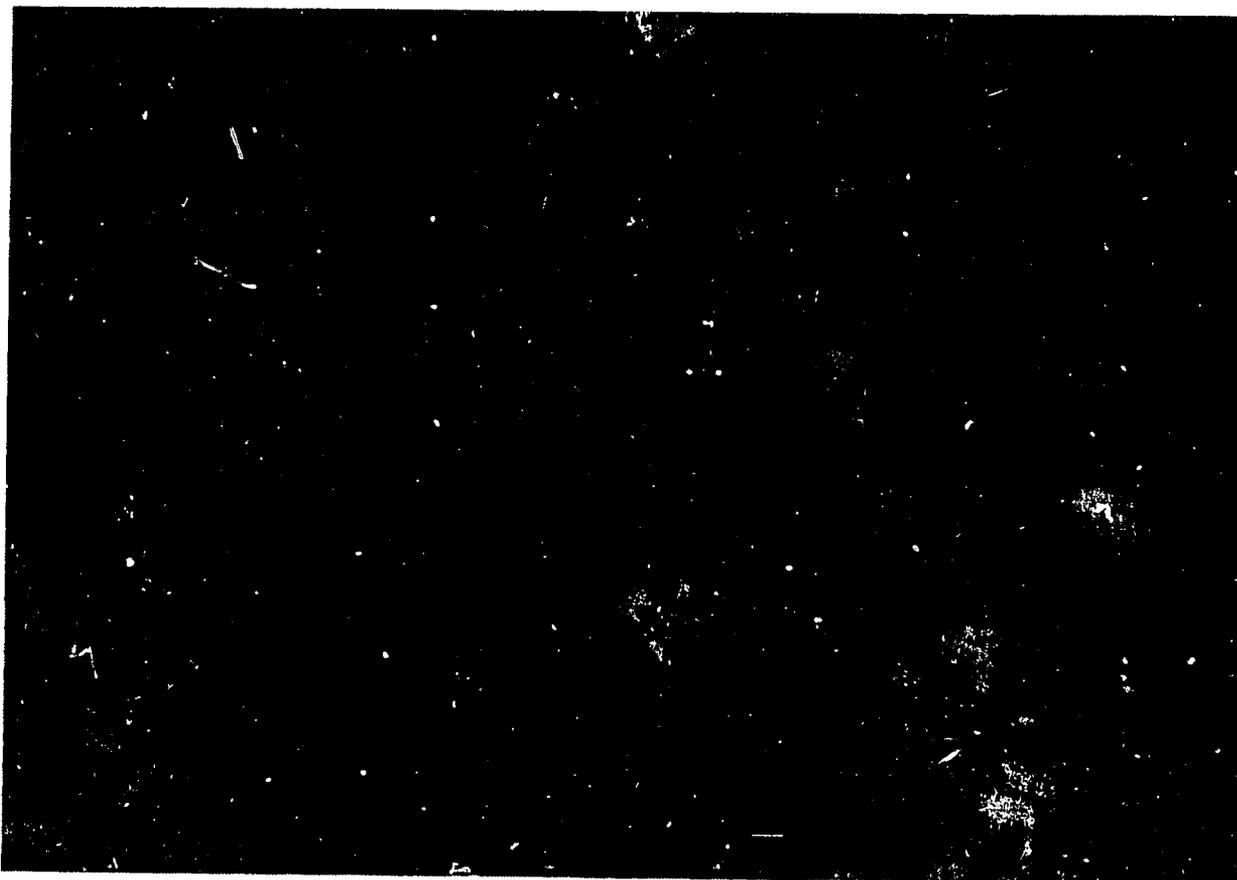
If cement blocks are used for lining, the blocks should not be mortared together and a space should be left between each block to allow for filtration. When oil drums are used as a lining the sides of the steel drums should be perforated.

Figure 3



Child defecates in a potty. According to the mother, the excreta will be dumped into a latrine.

Figure 4



Wastewater and urine in an unprotected sump along the street is an obvious health hazard.

Many of the latrines visited had no soakage pits. Urine and wastewater drained directly into the street. Though fewer pathogens are excreted in the urine compared with the feces, improper disposal of urine aids in the transmission of Schistosoma haematobium, typhoid fever, and other bacterial and viral infections.

5.6 Solid Waste Disposal

Villagers in the project area have an increased purchasing power to buy manufactured and canned goods. This is a result of the higher personal income from improved agricultural and animal husbandry techniques along with money received from relatives working in France. The generation of solid wastes in the villages can therefore be expected to expand with increased income.

The village wastes presently consist of animal wastes, tin cans, broken pots, animal carcasses, food scraps, paper, etc. The wastes are littered throughout the village in the streets, behind compounds, and along the river banks where drinking water is obtained. Often times much of the waste is deposited in large pits which are the result of excavation for brick making. The family compounds on the other hand are kept neat and well swept although chickens and goats often freely enter the compounds.

Children are often seen playing in the areas littered with garbage, and livestock browse freely in the village dumping areas. The potential hazard of this refuse in the community is readily apparent. Children are often cut on sharp objects while the putrescible vegetable and meat wastes attract disease vectors such as flies, rodents, and cockroaches. Snakes are attracted to the refuse area by the abundance of small animals to prey on. Mosquitoes breed in discarded cans and tires which fill with water. The wastes often have a foul odor and are unsightly.

Some male village leaders expressed a concern about the refuse problem but felt it was the women's role to keep the compound clean and dispose of the garbage properly. In several villages the Comite de Jeunesse had organized village clean-up days. The refuse was dumped in existing holes in or near the village. These clean-up days were organized on a sporadic basis. In most villages visited they had not had a village-wide clean-up for several months. In Moudery, however, there were regular clean-up days on Monday when the women swept their compounds and areas in front of their compounds. The refuse was burned in the streets. The non-combustible wastes, however, often remained on the streets. Ballou had set aside an area for disposal of solid wastes, and a sign is posted to instruct the villagers where to dispose of their refuse. There was no effort, however, to control the site and the wastes were neither burned nor buried. The population of Ballou continued to dump refuse along the river banks.

5.7 Water Supply

All the villages in the project area are located along the banks of the Faleme or Senegal rivers. Women obtain water directly from the river and carry the water in plastic or metal pails and tubs. In the same general area that women

obtain water, children swim, livestock drink, villagers bathe, and clothes are washed as shown in Figure 5.

Water is stored in large unglazed ceramic jars which remain moist to keep the water cool. The jars are usually kept covered with round metal trays. In the Soninke village each wife stores the water in the latrine area behind her bedroom. The water is then readily available for bathing, anal washing, and cooking, all of which take place in the latrine area. Storing the water in such close proximity to the latrine drop hole provides a possible source of water contamination by insects emerging from the latrine.

At the end of the dry season the Faleme River stops flowing and the Senegal River flows very little. Stagnant pools form in the river bed. During this season the river water is perceived by the population as being of poor quality. To avoid drinking water directly from the river during these months water is obtained from holes dug in the sand next to the river as shown in Figures 6 and 7. This water is naturally filtered by the sand. These water sources can easily become contaminated after several women use the same water hole.

The villagers of Moudery, Diawara and Yelingara used wells to obtain some of their water. The wells, however, provide only a minor portion of the total water consumed in each village. The wells are cement lined, usually about 15 meters deep and often protected by a covering made from metal roofing sheets as shown in Figure 8.

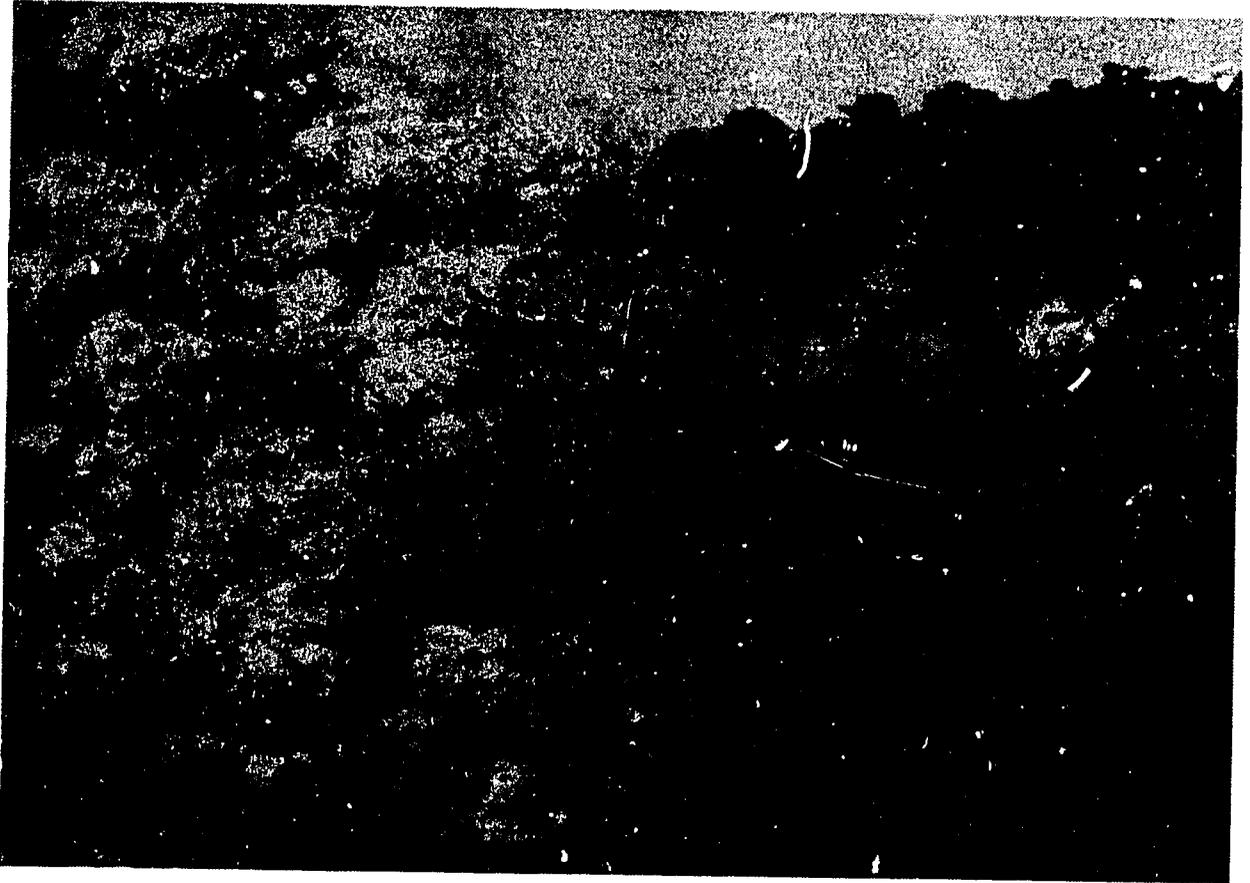
At the end of the dry season several of these wells had dried up and needed to be dug deeper. At two of the wells visited in Yelingara and Diawara the women interviewed said they only used the well water for cooking and not for drinking because the water had a salty or bitter taste. They preferred river water for drinking. The WASH consultant tasted the water from the well in Diawara and found no noticeable taste or odor. The well at the dispensary in Yelingara was felt to provide good quality water and was used for drinking.

The town of Bakel pumps water directly from the Senegal River to a sedimentation tank. The water then flows to a storage tank where the water is distributed by gravity to public standpipes or private household connections. The water is sporadically chlorinated with calcium hypochlorite. Due to the poor quality of the water source, lack of filtration, inconsistent chlorination and at times low water pressure, the Bakel water supply probably presents a significant health risk. Kidira also has a similar water system taking water from a nearby marigot (pond). The WASH consultant did not have time to visit this water source.

Bleach is sometimes used as a disinfectant in households where a member of the family is well educated (teachers, nurses). The general population does not, however, treat their water in any way.

It can be concluded that, due to the poor quality of many of the village water sources, lack of water treatment, and the use of water storage vessels which can become contaminated, water is probably a major mode of transmission of excreta related diseases in the project area.

Figure 5



Women and children bathing and washing clothes in the Senegal River

Figure 6



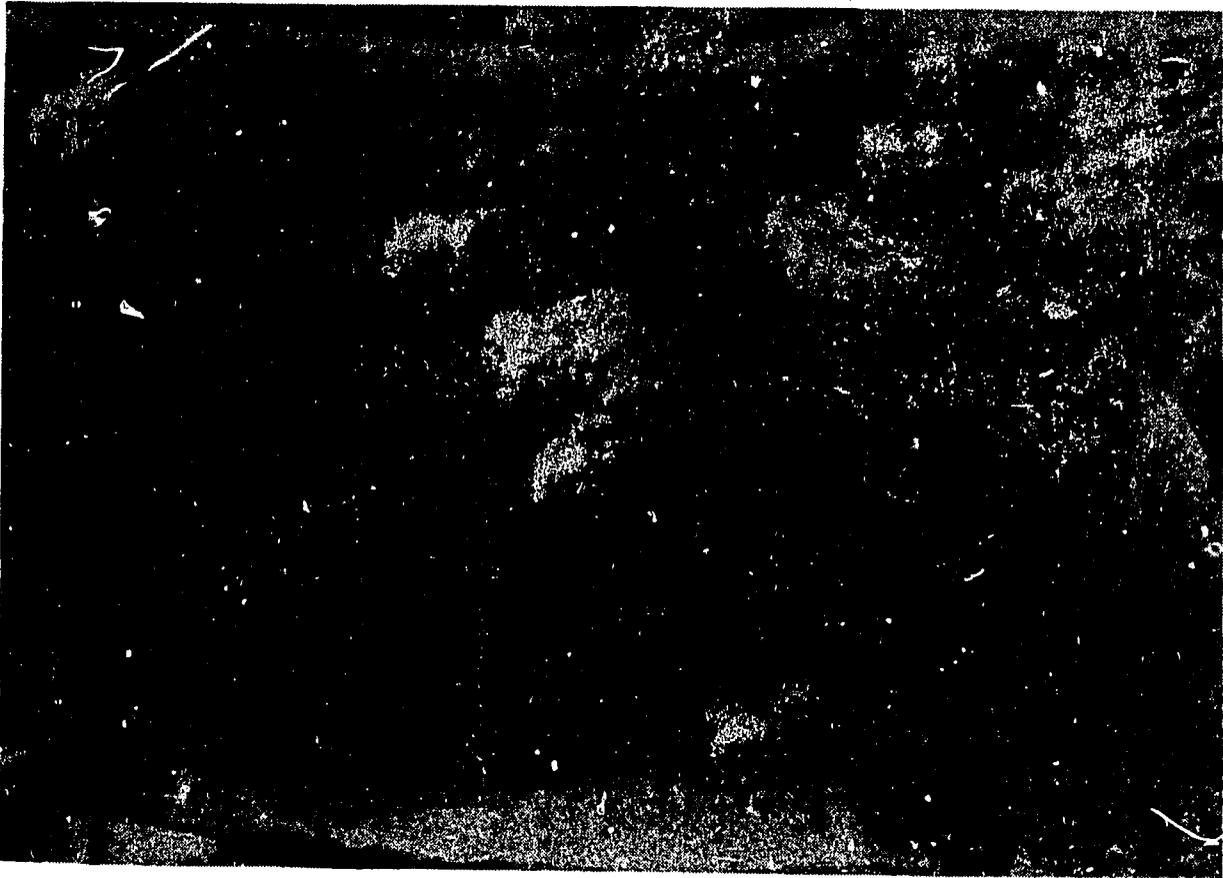
Women collect and carry water from the saturated sands in the Senegal River bed.

Figure 7



Water collected from the dry river bed

Figure 8



Women obtain water from a protected well at the Yalingara dispensary

5.8 Schistosomiasis and Irrigation

Irrigation projects in Africa often times have the potential to increase the morbidity caused by schistosomiasis. The disease morbidity and incidence might rise in endemic areas, or schistosomiasis might spread to other villages which were previously spared.

The health surveillance component of the irrigation project was added in an attempt to detect possible increases in levels of schistosomiasis, malaria, onchocerciasis, and intestinal parasites as a result of the irrigation project. As with all epidemiological studies a causal relationship will be difficult to prove or disprove.

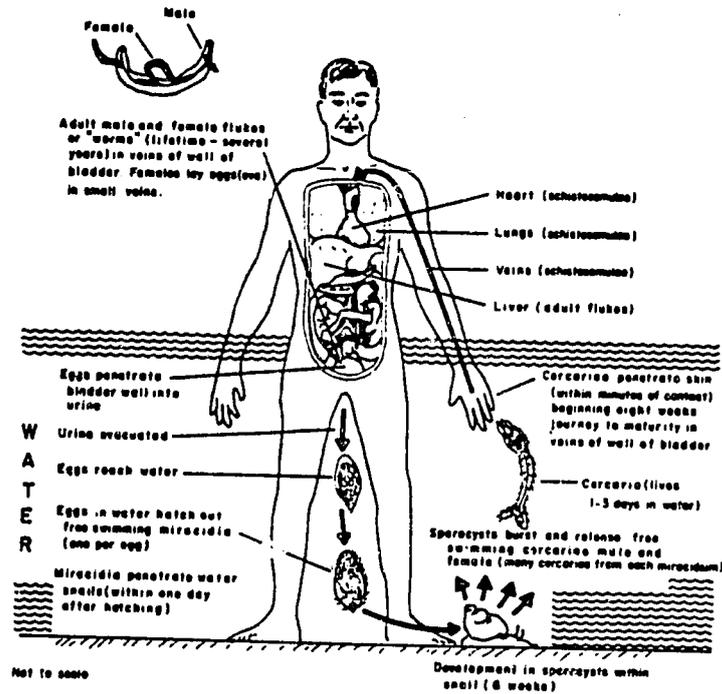
Snail surveys have been conducted in Ballou, an area of high S. haematobium (urinary schistosomiasis) prevalence by Dr. Diallo's team which is doing the regional survey. The team found the snail vector Bulinus Jousseaumei in irrigation canals, a large marigot (pond), and in temporary pools in excavated holes near the village. A high proportion of these snails were found to shed bifurcated cercaria, a larval form of schistosomes. Almost 40 percent of snails collected in the marigots and 25 percent of the snails in the rice paddies were shown to be infected. These larvae were thought to be the common agent which led to the 46 percent prevalence rate of urinary schistosomiasis in Ballou.

The nurse in the Ballou was very concerned about the high incidence of hematuria (blood in urine) in the village as a result of schistosomiasis. S. haematobium has, however, long been a problem in Ballou, even before the irrigation project. It is difficult to show to what extent the irrigation project has aggravated the problem. With year round irrigation it is reasonable to assume that a new focus of transmission has been added to the area. In the three other villages surveyed (Gande, Senadebou and Dialiguel) the prevalence rate for schistosomiasis was below 10 percent.

The Senegal River is not thought to be a favorable habitat for the snails because of shifting sands and strong currents. The river, however, can passively carry the vector snails to the intake pipes of downstream irrigated perimeters.

Most of the fields in the Small Irrigated Perimeters Project are only irrigated during the wet season and are dry during the rest of the year. It is uncertain whether these conditions can support active schistosomiasis transmission in the irrigated areas. Where year-round irrigation occurs, such as in Ballou and the demonstration farm outside Bakel, stagnant water is left in the canals creating a greater potential for snail breeding and schistosomiasis transmission. If the farmers urinate in or near the fish ponds, canals, or flooded rice paddies it is easy to see how the disease cycle is completed if the vector snail is present. The life cycle of S. haematobium is shown in Figure 9.

Figure 9



Life Cycle of *Schistosomiasis haematobium*

From F.E. McJunkin, Water, Engineers, Development and Disease in the Tropics, Chapel Hill, 1975 (Prepared for the U.S. Agency for International Development).

5.9 Dispensaries and Hospitals

Most of the dispensaries and the hospital of Bakel are in poor hygienic condition, with refuse and filth on the walls and floor. Piles of septic dressings are exposed to the air and insects. Drugs are scattered everywhere. Often times containers of creams, lotions, pills and other medications are left open.

The refuse from these facilities, including used syringes, outdated medication, and septic dressings is discarded haphazardly on the grounds behind the dispensaries and hospitals along with the wastes of the health care attendant's household. The hospital has recently taken steps to remedy this problem by digging a large pit to dispose of the hospital refuse. The pit as yet is not being fully utilized, and refuse is still scattered about the grounds.

What will the hygienist, secouriste, and villagers learn when the nurse attempts to educate them in hygiene and sanitation? It seems unlikely the nurses will be able to motivate the community to improve sanitation as long as the inadequate hygiene in their dispensaries remains.

Most dispensaries and the hospital have no excreta disposal facilities for the patients. In some of the dispensaries flush toilets had been constructed. Because there is no water system in these villages, water has to be carried from the river, which is at some distance from the dispensaries. These toilets, therefore, had long ago become clogged and are no longer in use.

An exception to the above comments was found in Yelingara where Birame Sall, the nurse, has proven a dispensary can be well maintained. This dispensary stood out above the others. It is kept clean and organized with a functioning clean bathroom, properly stored medications and a protected well on the dispensary grounds.

The Bakel hospital had a fairly extensive system of flush toilets and showers hooked up to the city water supply. These facilities had been abandoned long ago according to the hospital director due to broken handles and clogged drains. The director also said that the patients from rural areas were unaccustomed to such bathroom facilities and often misused them. In the past there were probably also a lack of maintenance on the part of the hospital staff and a lack of spare parts which aided in the demise of the system. The flush toilets and showers which continue to function are reserved for the hospital staff. The patients were seen to be urinating, defecating, and washing on the open hospital grounds. It was for this reason that three latrines were built at the hospital during the training course.

Chapter 6

RECOMMENDATIONS

6.1 Workshop Recommendations

In order to build on the most important factors that contributed to this workshop's success, the following is recommended:

1. Planning visits similar to the one made for this workshop should be continued. This visit was critical in learning the local conditions, in deciding on the most appropriate type of latrine to construct, and in making all administrative arrangements.
2. Future training staffs for similar workshops should continue to consist of a balance between technical and training skills. This blend of skills allowed the workshop to focus equally on both content and process. This made the co-training more effective than if both trainers were only technically oriented.
3. Careful advance preparation of materials should be continued. Although modifications to the materials were made prior to the workshop, the training materials served as a solid basis for the course.

6.2 Recommendations for Follow-up to the Workshop

In order to maximize the benefits from the workshop over the medium and long terms, the following is recommended:

1. A two-day meeting should be held in 4 to 6 months to share experiences in planning and implementing sanitation projects. Problems could be identified and solutions proposed during this meeting.
2. Trips should be organized to visit the Sine Saloum Health Project in order to exchange experiences and see how another project is addressing its rural sanitation problems.
3. Time should be devoted at the regular monthly meetings of the nurses to discuss progress in planning and implementing sanitation projects.
4. The project coordinator should do regular site visits and monitor progress towards implementation of sanitation projects.
5. Nurses assigned to nearby villages should visit each other periodically to discuss common problems and generally act as a sounding board for each other.
6. Technical documents should be provided to the nurses as reference material.

6.3 Environmental Health Recommendations

6.3.1 Improvement of Hygienic Conditions in the Dispensaries and Hospital

Before any sanitation projects are launched in the community the nurses should first clean up their own dispensaries and hospital. Cleaning materials including brushes, sponges, disinfectants, soap, and garbage cans along with paint and brushes, where needed, could be provided in an attempt to get nurses to clean up the dispensaries. Cement and rebar could also be provided for the construction of latrines for the patients at each dispensary.

All dispensary and hospital refuse should be disposed of in a hole or trench and routinely covered with soil. The village health committee can provide a part-time housekeeper who cleans the dispensary and latrine and disposes of the dispensary refuse. The nurse must, however, store medications properly, sterilize medical instruments, and keep counters and examining tables disinfected.

The dispensaries and hospital should be routinely inspected by either the project coordinator or project director. The cleanliness of the dispensary should be one of the criteria used to assess a nurse's professional competence.

It is probably fruitless to continue training the nurses in other environmental health areas if they are unable to maintain basic hygiene within their dispensaries and hospital.

6.3.2 Improved Solid Waste Disposal

The nurse and hygienist need to sensitize the population concerning the health hazards of solid waste. The population can be mobilized through the village health committee to start regular village clean up days and create a sanitary landfill. The hygienist should have the main responsibility of supervising waste disposal in the village.

6.3.3 Provide a Sanitarian to the Project Area

The Bakel area greatly needs a trained sanitarian. A sanitarian would encourage, coordinate, and supervise the sanitation activities of the nurses and hygienists along with providing technical advice to the communities. The sanitarian could also play an important role in training village hygienists.

At present, there is very little structure in the training of the hygienist whose primary role would be in the sanitation area. Only a few hygienists have gone through a one-month training program. Others have only been trained by the nurses on an ad hoc basis. Since the nurses have several other roles to play at the same time including providing health care, conducting health education, and supervising the secouristes and matrones, it is doubtful that the nurses have enough time and expertise to properly train the hygienists. A

sanitarian who has greater technical skills in the sanitation field could spend more time to provide in-depth practical training to the hygienists. The nurse would still continue working with the hygienist and the health committee in designing village sanitation projects.

The sanitarian could also play an important role in the early detection of schistosomiasis vectors in the newly constructed irrigation projects. Vector surveillance consists of snail collection and identification. If the vector species are present the snails can be observed to determine if they are infected with schistosome larvae.

If the irrigation projects are found to be a potential health hazard an expert in schistosomiasis control could also be called in to work with the sanitarian, agricultural engineers, and farmers in the Small Irrigated Perimeter Project in designing practical solutions to prevent schistosomiasis transmission in the fields and canals. Screens could be used at canal intakes; canals could be lined and dried out periodically. Aquatic weeds, a primary food source for the snails, could be cleared from canals periodically. Farmers could be encouraged not to urinate in or near the flooded fields and canals.

6.3.4 Improve Excreta and Wastewater Disposal

The hygienist under the supervision of the nurses should be responsible for inspecting latrines and soakage pits. When appropriate the hygienist can provide technical advice to villagers to improve their latrines. Since traditional earthen slabs were generally found to be clean, where villagers cannot afford concrete slabs the earthen slabs can continue to be encouraged. Most primary schools had no sanitary facilities. This helps reinforce poor sanitary habits and under-utilization of latrines by children. All primary schools should have latrines, which can be maintained by the students.

When latrines are located within private households, wastewater and urine drains either directly into public streets or into soakage pits next to the street. Inadequate wastewater disposal must therefore be considered a public nuisance. The village government should require each household to provide an adequate wastewater system which does not overflow into the street or provide a site for insect breeding.

6.3.5 Provide Health Education in Sanitation and Hygiene

Many of the nurses have received some training and practical experience in health education. A component of hygiene and sanitation as discussed during the training course can easily be added to the health education programs which nurses develop for their villagers. The Bakel departmental health educator and the sanitarian could develop ideas to be incorporated into the nurses health education efforts.

6.3.6 Improve Drinking Water Quality

The water used in the project villages in general can be considered of sufficient quantity but of poor quality. The poor water quality is the result of the contaminated river water sources and unhygienic water storage practices. A feasibility study needs to be conducted to determine if wells can provide a sufficient quantity and quality of drinking water to the villagers at a reasonable cost.

Improvements of the water sources, however, will have a minimal impact on the health of the population if the wells are not maintained by the villages or if the water is continually contaminated during transport and storage in the home.

Any drinking water improvement project should be coupled with an education component which teaches villagers about well maintenance, sanitary water storage and proper use of water in the home. The nurses, with further training, could incorporate these topics into a program of health education.

APPENDIX A

WATER AND SANITATION FOR HEALTH (WASH) PROJECT
ORDER OF TECHNICAL DIRECTION (OTD) NUMBER 147
March 7, 1983

TO: Dr. Dennis Warner, Ph.D., P.E.
WASH Contract Project Director

FROM: Mr. Victor W. R. Wehman Jr., P.E., R.S. *VWW*
AID WASH Project Manager
AID/S&T/H/WS

SUBJECT: Provision of Technical Assistance Under WASH Project
Scope of Work for USAID/Senegal

REFERENCES: A) Dakar 02385, dated 4 Feb 1983
B) Dakar 11706, dated 22 Dec 1982
C) WASH Project Interim Report No 127-1, Dec 1982

1. WASH contractor requested to provide technical assistance to USAID/Senegal as per Ref A., para 1-8 and Ref B., para 2-4.
2. WASH contractor/subcontractor/consultants authorized to expend up to 62 person days of effort over a four (4) month period to accomplish this technical assistance effort.
3. Contractor authorized to expend up to 56 person days of international and/or domestic per diem to accomplish this effort.
4. Contractor to coordinate with AFR/DR/HN (J. Shepperd), AFR/DR/ENG (J. Snead), Senegal Desk Officer and should provide copies of this OTD along with any ETA information or interim reports as may be requested by S&T/H/WS, AFR/DR or USAID staff.
5. Contractor authorized to provide up to two (2) international round trips from consultants home-base through Washington D.C. to Senegal and return to consultants home base through Washington D.C. during life of this OTD.
6. Contractor authorized local travel for consultants in Senegal NTE \$1100 without the written approval of the AID WASH Project Manager.
7. Contractor authorized to obtain secretarial, graphics, reproduction or piecework assistance (mason, carpenter, workmen, etc.) services in Senegal or WASH CIC as necessary and appropriate to accomplish tasks. These services are in addition to the level of effort specified in para 2 and 3 above and NTE \$ 900 without the prior written approval of the AID WASH Project Manager.
8. Contractor authorized to provide for car or vehicle(s) rental as necessary and appropriate to facilitate effort. USAID/Senegal and Government of Senegal strongly encouraged to provide local vehicle support to consultants if at all possible and if available and appropriate.

(2)

9. Contractor authorized to expend up to \$700 for the development or printing of the training materials and support services associated with Ref B, para 2.B and 2.d.
10. WASH contractor will adhere to normal established administrative and financial controls as established for WASH mechanism in WASH contract.
11. WASH contractor should definitely be prepared to administratively or technically backstop field consultants and subcontractors.
12. New procedures regarding subcontractor cost estimates and justification for subcontractor/consultants remain in effect.
13. Contractor report on overall progress of activity to be made in writing in the field after conclusion of effort. A draft coordinated report in English and French is to be left at USAID/Senegal. Final report of activity to be due to S&T/H/WS within 30 days of return of consultants to the U.S. Final report to be in English and French and will be edited and printed by WASH CIC.
14. USAID/Senegal and persons identified in para 4 above should be contacted immediately and technical assistance initiated as soon as possible and appropriate.
15. Appreciate your prompt attention to this matter. Good luck.

E M U S A I N T E R N A T I O N A L

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9. WE WILL KEEP YOU INFORMED OF ANY NEW DEVELOPMENTS. BRAY

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E.O. 12356: N/A
SUBJECT: WORKSHOP ON SANITATION FOR BAKEL HEALTH
PROJECT (885-0238).

REF: WASH INTERIM REPORT NO. 127-1 DECEMBER 1982

1. AS PER REFERENCE, CLARIFICATION ON VARIOUS
PRINTS IS NECESSARY: 1) THE BEST DATES FOR TRAIN-
ING ARE FROM APRIL 28 - MAY 4, 1983. THE MCH
TRAINING WITH HALDER TERMINATES MARCH 30 AND
WE WANTED THREE WEEK INTERVAL BEFORE BEGIN-
NING W.A.S.H.'S PROGRAM. PLEASE CONFIRM AVAILABI-
LITY.

2. THE PARTICIPANTS WILL INCLUDE 12 PROJECT
NURSES, 4 NON-PROJECT NURSES, 1 SANITATION
AGENT FROM SINE SALOUM RURAL HEALTH PROJECT,
A PROFESSOR FROM ST. LOUIS'S SANITATION SCHOOL
AND AN OBSERVER, MR. TOURE, REGIONAL COORDINATOR
FOR PRIMARY HEALTH CARE.
THE INVITATION TO ST. LOUIS SCHOOL PARTICIPANT
WAS INITIATED TO HAVE AN IMPACT ON THE LARGER
VIEW OF DEVELOPMENT PROGRAM, I.E. POSSIBILITY
OF CURRICULUM CHANGE AT THE SCHOOL.

3. WILL AVANTANG BE AVAILABLE? IF NOT, WHO
WILL REPLACE HIM? PLEASE SEND CURRICULUM VITAE.

4. A LOCAL TRAINER WITH CONSTRUCTION SKILLS WILL
BE RECRUITED. HOWEVER, THE PROJECT DOES NOT DEEM
NECESSARY A SPECIALIST IN COMMUNITY PARTICIPATION/
HEALTH EDUCATION.

5. TWO VEHICLES WILL BE MADE AVAILABLE FOR THE
PLANNED SURVEY.

6. HOUSING AND FOOD FOR OUTSIDE PARTICIPANTS
WILL BE ARRANGED AT BAKEL'S ONE AND ONLY HOTEL.

7. AID/DAKAR RECEIVED THE LIST OF NECESSARY
MATERIALS FOR THE SEMINAR. WE ARE IN PROCESS OF
PRICING THEM. THERE IS NO PHOTOCOPIER IN BAKEL
BUT THERE IS A DUPLICATOR. THEREFORE, IF PHOTOCOPY-
ING NEEDS TO BE DONE, WE CAN DO IT IN DAKAR BEFORE
THE WORKSHOP. EVERY THING ELSE WILL HAVE TO
BE PUT ON STENCIL.

8. FOFANA AND N'DIAYE ARE CHOOSING THE VILLAGES
TO BE USED IN THE SURVEY. THE NAMES WILL BE FORTH-

*Mc Junkin
Austin
Witten
~~WEHMAN~~ JWW*

*Received ST/H/WS (Wehman) 2-8-83
Passed to WASH 2-8-83*

*WASH
Proj.
Dir.*

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Department of State

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AIDAC
SECSTATE FOR AFR/DR/HEALTH, ST/HEALTH, PASS TO W. A. S. H.
V. WEHMAN
ABIDJAN FOR REDSO
BAMAKO FOR SOPT

AUSTIN

E. O. 12356: N/A
SUBJECT: REQUEST FOR W. A. S. H. ASSISTANCE IN BAKEL,
SENEGAL FOR APRIL SEMINAR.

Why do we
need this
project? *tkm*

REF: A) TELEX NO. 474 FROM W. A. S. H.

1. USAID/DAKAR WOULD LIKE TO REQUEST THE W. A. S. H.
PROJECT TO DESIGN AND DELIVER A WORKSHOP ON LATRINE
CONSTRUCTION AND SOLID WASTE DISPOSAL FROM APRIL 20
TO MAY 4 INSTEAD OF APRIL 11-22.

THE WORKSHOP WILL BE CONDUCTED IN BAKEL WITHIN THE
ACTIVITIES OF THE BAKEL HEALTH COMPONENT OF THE SMALL
IRRIGATED PERIMETERS PROJECT.

2. THE SCOPE OF WORK FOR THIS REQUEST IS AS FOLLO:

- A) TO PLAN A TWO WEEK WORKSHOP FOR NO MORE THAN
-- 20 PARTICIPANTS ON LATRINE CONSTRUCTION AND
-- SOLID WASTE DISPOSAL.
- B) TO DEVELOP ALL NECESSARY TRAINING MATERIALS FOR
-- THE WORKSHOP.
- C) TO PROVIDE A LIST OF ALL LOGISTIC REQUIREMENTS.
- D) TO CONDUCT THE WORKSHOP.
- E) TO PROVIDE ONE WEEK TECHNICAL ASSISTANCE TO DO
-- INDIVIDUAL FOLLOW-UP WITH THE PARTICIPANTS FROM
-- BAKEL PROJECT.
- F) TO SUBMIT A FINAL REPORT INCLUDING A SUMMARY OF
-- THE PLANNING ACTIVITIES, WORKSHOP CONTENT, RESULTS,
-- AND FUTURE RECOMMENDATIOO

Wehman
W. A. S. H.

Copy to WASH
12.27.82

3. A TWO PERSON TRAINING TEAM IS REQUESTED. ONE A
TRAINER WITH SKILLS IN DESIGN AND DELIVERY OF WORK-
SHOPS AND THE OTHER A TECHNICAL TRAINER WITH IN-DEPTH
EXPERIENCE IN THE SUBJECT MATTER. BOTH SHOULD HAVE
LEAST FSR-3 FRENCH WITH EXPERIENCE IN WEST AFRICA

4. IT IS ANTICIPATED THAT THE TRAINER SHOULD SPEND
APPROXIMATELY 3 WEEKS IN SENEGAL (ONE WEEK FOR
PREPARATION AND TWO WEEKS FOR THE WORKSHOP) AND THE
TECHNICAL TRAINER 4 WEEKS (INCLUDING A FOURTH WEEK
FOR INDIVIDUAL FOLLOW-UP).

5. HAPPY HOLIDAYS. BRAY

UNCLASSIFIED

APPENDIX B

Itinerary

15 April 1983	WASH team arrives in Dakar
17 April 1983	Team arrives in Bakel
20 April-3 May 1983	Workshop
4 May 1983	Rosensweig departs Bakel
6 May 1983	Rosensweig departs Dakar
4-9 May 1983	Talbot conducts village visits
10 May 1983	Talbot departs Bakel
13 May 1983	Talbot departs Dakar

APPENDIX C

List of Workshop Participants

Amady Fofana

Daouda Diallo

Mamadou Danfakha

Diaguily Koita

Abdoulaye Camara

Birame Sall

Fadjima Diakhate

Alassame Diop Pouye

Alioune Aw

Yokh Fall

Djiby Sow

Sidy Djigo

Mamadou Wade

Khaly Dia

Arona Djigo

Joseph N'Diaye

APPENDIX D

EVALUATION FORM

1. The important knowledge I have gained from this program was the following:

2. The most important skills which I learned were:

3. In this program, I would like to have had more:

4. In this program, I would like to have had less:

5. I would like to say to the training staff:

6. Any other comments you would like to make:

APPENDIX E

DESIGN OF EXCRETA AND SOLID WASTE DISPOSAL SYSTEMS USED IN THE WORKSHOP

1. Introduction

This chapter discusses the design considerations for solid waste and excretal disposal systems for the Bakel region. The latrine design described in this report was actually used by the nurses to build latrines at the Bakel Hospital during the training course. The costs of the latrines are estimated from this practical exercise.

2. Bakel Latrine Design

2.1 Design Considerations

In an attempt to develop an appropriate latrine design to be used in the Bakel region the following factors were considered:

- The cost of the latrine is easily affordable by the population.
- The construction materials are readily available within the community.
- Excreta is isolated to avoid contamination of food, water, and the general human environment.
- The design minimizes insect breeding in the latrine.
- The latrine is adapted to existing habits wherever possible.
- The design is simple enough so that the villagers are able to construct the latrine with little or no outside help.

The latrines constructed during the workshop (see Figures 1 and 2 below) were very similar to latrines already being used in the villages. The feces are deposited in the latrine pit while the urine and wastewater flow across a gully in the squatting slab via a pipe to a soakage pit. The latrine drop hole is kept covered to prevent insect breeding in the pit.

One improvement to the traditional design was the selection of a concrete slab instead of the traditional packed earth slab. A concrete slab is more durable and easier to clean. The slab can also be removed when the pit is filled and transferred to a new latrine site.

Sand and gravel for the concrete and soakage pit are usually available within a short distance from the village. Cement and re-bar can be purchased locally. The materials are affordable to the general population and are already widely used in house construction. In general, most villagers expressed a preference for a concrete slab. The design of the slab is shown in Figure 3 below.

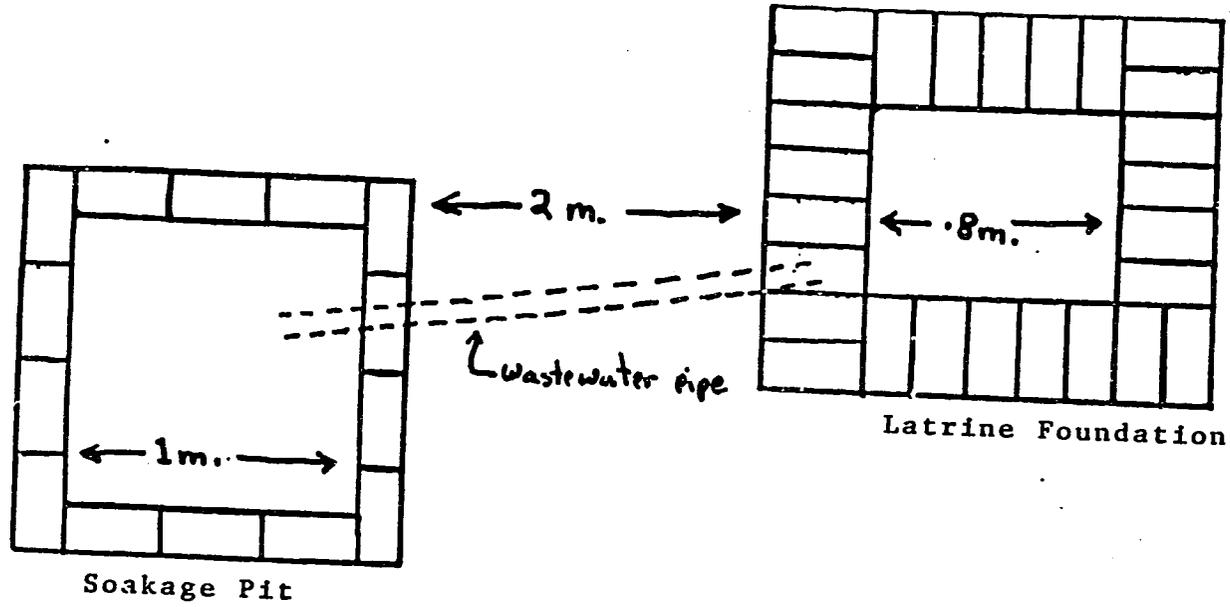


Figure 1. Soakage Pit Border and Latrine Foundation

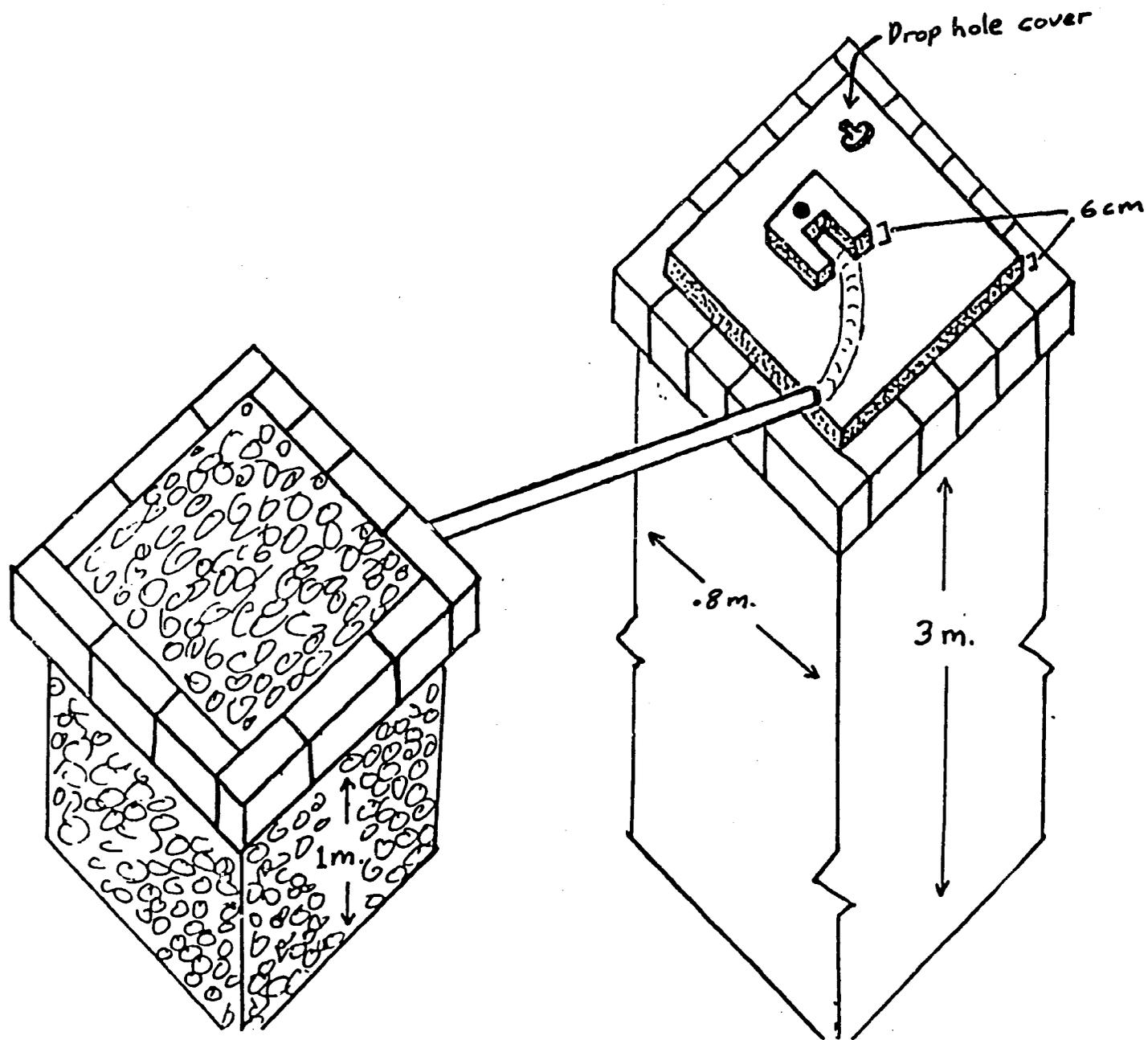


Figure 2. Bakel Latrine Design

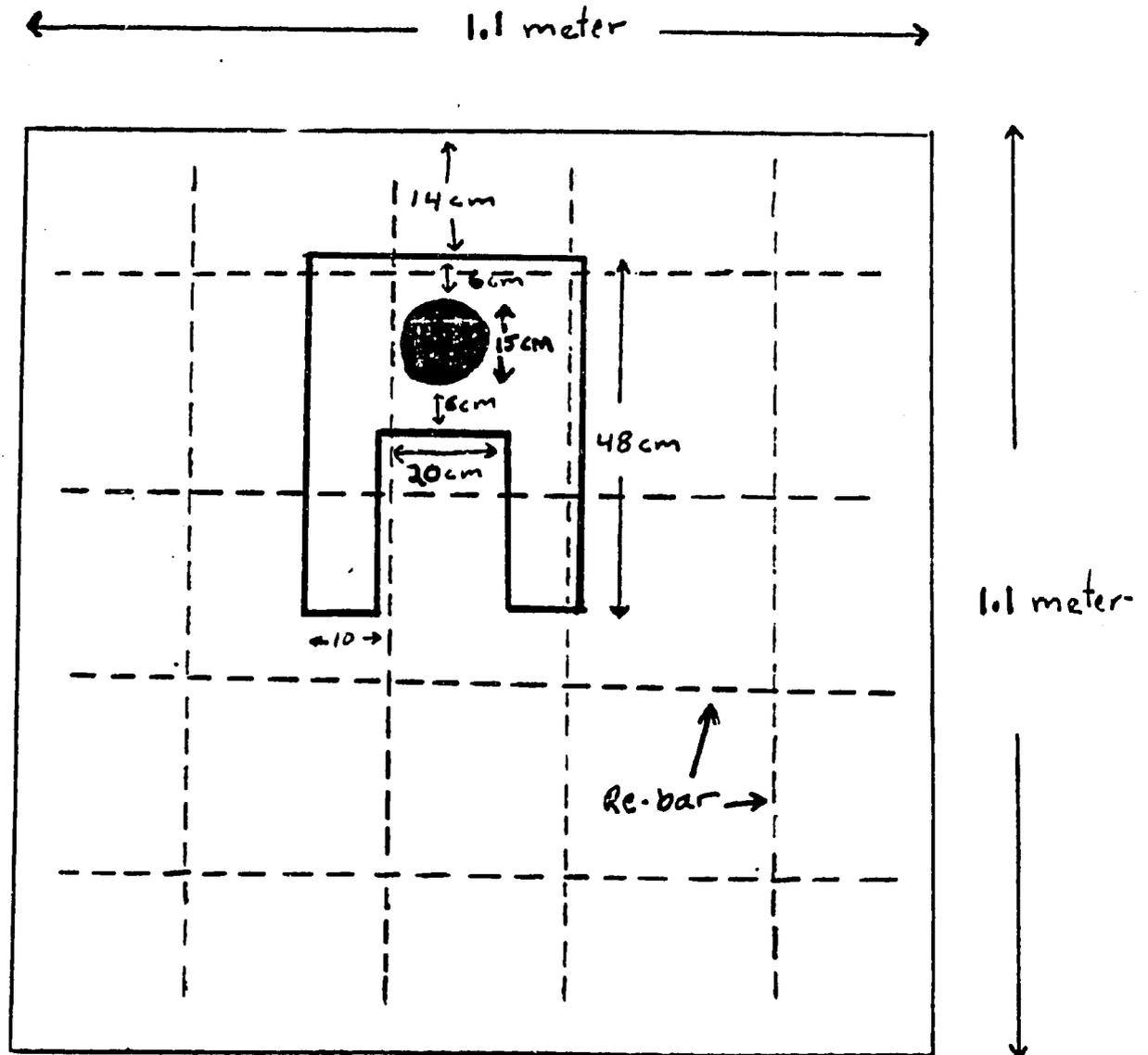


Figure 3. Plan of Bakel Latrine Slab

2.2 Latrine Slab Construction

To eliminate the cost of using wooden molds, the slabs were poured directly on the ground using earthen molds. A small wooden form was needed for the riser. An empty tomato can 15 cm in diameter was used as a mold for the drop hole.

A 1:2:3 concrete mixture was used for the slab. Each slab required the following quantities of material:

8 mm diameter rebar	8 meters
1/2 bag of cement	14 liters
sand	28 liters
gravel	42 liters
water	14 liters

A thin coat of one part cement to one part sand was applied to the slab to give the slab a smooth impermeable surface which would be easy to clean.

The slab was kept wet for five days, but this was difficult due to the high evaporation rates in the hot dry climate of Bakel. The slab had to be watered at least three times a day.

Estimated to weigh 170 kg, the slab had handles made from rebar which were placed in the corners to aid in lifting it. Handles, however, become a nuisance and are easy to trip over if the latrine is to be placed in a general living area.

2.3 Latrine Base

Cement blocks mortared together were used as a base for the slab and as a border of the soakage pit as shown in Figure 1. Logs could also be used as a base. The wood can be treated against termites with either a mixture of kerosene and crank case oil or by using a long lasting insecticide.

2.4 Latrine Pit

The latrine pits at the hospital were dug three meters deep during the training course. Excavation below three meters in an unlined pit is not recommended due to dangers from possible cave-ins.

Where the soils are stable and the pits are designed to be dry, there is no need to line the pits. In villages where there is unstable sandy soil it is recommended that the pits be lined with wood or cement blocks.

2.5 Latrine Superstructure

The superstructure for the hospital latrines is to be built of unfired clay blocks which are obtained locally. The blocks are placed directly on the cement block foundation. The nurses' latrine will have a door that can be locked while the two latrines for the patients will have no door as shown in Figure 4.

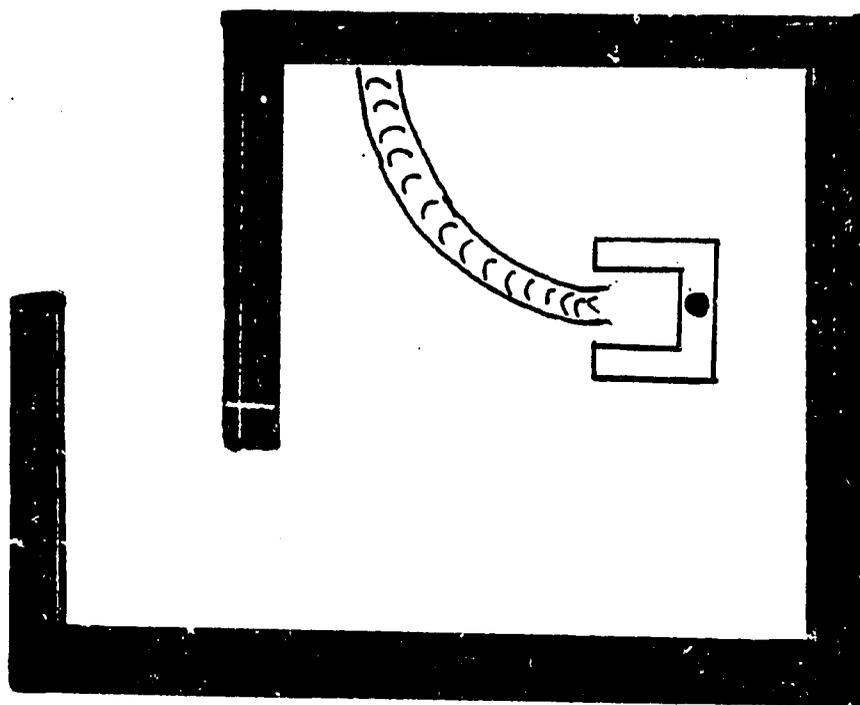


Figure 4. Plan of Superstructure of Patients' Latrine

Some of the nurses disagreed with this design for the patients' latrine. They suggested the patient latrines should be locked with use restricted to the in-patients. These nurses felt that people from the neighboring area would use the latrines and make it very difficult to maintain them.

The continued problem with public latrines is they must be maintained daily due to their considerable use. However, the families of the patients and other hospital visitors will continue to defecate on the hospital grounds if the latrines are restricted to in-patients.

The latrines are to be constructed without roofs as is consistent with the traditional latrines. This reduces odors in the latrine. The squatting slab will also be exposed to sunlight which will help kill any pathogenic organisms left on the slab.

2.6 Soakage Pit

The soakage pit is filled with gravel and located two meters from the latrine pit. The wastewater gully in the squatting slab is connected to the soakage pit by a pipe. In the training course a metal roofing sheet was used to form a pipe.

The dimensions of the soakage pit were one meter on each side. This size pit was felt to be adequate in most cases. An infiltration test was conducted on the hospital grounds previous to building the soakage pit to determine soil suitability. The rate was found to be seven minutes per 25 mm. This is a rather high percolation rate due to the loam soils around the hospital. In villages with less permeable clay soils the size of the soakage pits can be increased to accomodate for slower infiltration rates.

The gravel in the soakage pit is covered with burlap sacks, straw, or other materials. A packed earthen mound then covers the whole soakage pit to prevent surface water runoff from entering the pit. Special attention is made to make sure there is no direct opening to the soakage pit in which insects can enter and leave.

2.7 Latrine Costs

The cost of the materials needed for constructing the latrines are estimated as follows:

35 blocks of cement for latrine foundation and soakage pit border @ 125 CFA per block	4,400 CFA
8 meters re-bar (8 mm diameter) @ 1500 CFA per 12 meters	1,500 CFA
30 cm x 2 meter metal sheet @ 1000 CFA per sheet 2 m x 1 m	1,000 CFA
20 5-cm nails for building riser form	100 CFA

2.4 meter planks 2 cm x 6 cm x 200 cm for building riser form	600 CFA
1 sack of cement	<u>2,500 CFA</u>
(350 CFA = US \$1,00)	TOTAL 10,100 CFA

The price of materials assumes sand, gravel, and clay blocks for the superstructure are available on location at no cost and that labor is supplied by the family. It is also assumed the tools needed for construction are already owned by the villager or can be borrowed from a neighbor. If more than one latrine is built at the same time there is less waste of materials. For example if the riser form could be used on several latrines and the cement bought together to not waste the excess, the price per latrine would be reduced to 8,300 CFA (\$24.00). If the base of the latrine and border of the soakage pit were constructed of locally obtained logs the price would be greatly reduced, to about 3,000 CFA (\$8.50) per latrine.

3. Solid Waste Disposal

Each village needs to develop at least one sanitary landfill. Most villages have a large pit on the outskirts of town which is the result of years of excavation for bricks. The pits are unproductive land and have become uncontrolled dumping grounds. During the rainy season they fill with water and become mosquito breeding grounds. If all the solid wastes of the village could be dumped in one section of the pit at a time, the refuse could be easily covered with a layer of earth excavated from the pit. This should reduce the health hazard from the solid wastes. Kerosene or crankcase oil can be applied to the stagnant water in the pit to reduced mosquito breeding.

The trench method of waste disposal, as shown in Figure 5 below, can be used if no large hole or depression is available. A trench is dug one meter deep and one meter wide. The trench is then filled in with refuse. When the first trench is filled another trench is dug parallel to it. The excavated earth is used to cover the refuse in the first trench. Where waste reduction is desired before burying, incineration is a simple solution.

The health committee could provide a laborer to dig the trench and cover the wastes with the hygienist responsible for the overall supervision of the landfill. The hygienist could stake out the area to be used and be responsible for informing the public where to dispose of the wastes. His job should also be to discourage the population from disposing of refuse outside of the designated area.

When individual households are reticent to change their waste disposal habits, the health committee should determine how best to persuade the household to use the waste disposal site. Fines or peer pressure might be applied.

The nurses felt village clean-up days can be organized bi-monthly by the village health committee or Comite de Jeunesse in order to clean the streets and other public areas.

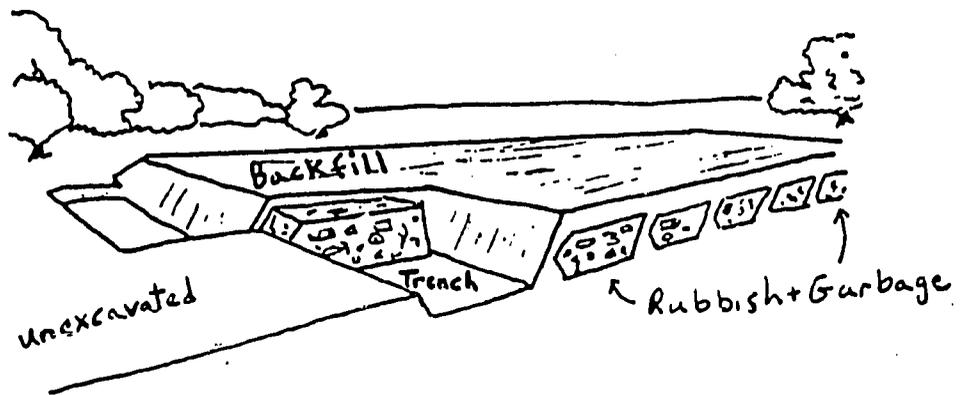


Figure 5. Trench Method of Solid Waste Disposal

4. Wastewater Disposal

The primary technical intervention recommended for control of the wastewater problem was the use of soakage pits. This was discussed in some detail in Section 2.6 above. Ways to improve soakage pits or construct new ones were also covered.

ATTESTATION

Nous Soussignés, reconnaissons par la présente que

a suivi le cours de formation sur

LA CONSTRUCTION DES LATRINES

L'AMENAGEMENT DES EAUX USEES

LE DEBARRASSEMENT DES ORDURES

En foi de quoi la présente ATTESTATION lui est délivrée

**POUR LA DIRECTION DE
L'EQUIPE FORMATRICE**

**Fred Rosensweig
Water and Sanitation for
Health Project**

**POUR LA DIRECTION DU
PROJET DE SANTE RURALE DE BAKEL**

**Cheikh N'Diaye
Médecin, Chef du Centre
Medical de Bakel**