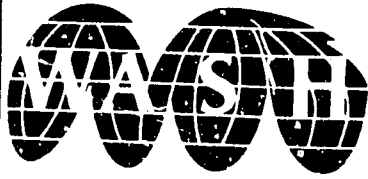


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WATER AND SANITATION  
FOR HEALTH PROJECT

Operated by  
CDM and Associates

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# EVALUATION PLAN FOR CARE AND GOVERNMENT OF SIERRA LEONE RURAL WATER PROGRAMS

VOLUME I

WASH FIELD REPORT NO. 156

NOVEMBER 1985

The WASH Project is managed  
by Camp Dresser & McKee  
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Prepared for  
the USAID Mission to Sierra Leone  
Activity No. 162

WASH FIELD REPORT NO. 156

EVALUATION PLAN FOR CARE  
AND GOVERNMENT OF SIERRA LEONE  
RURAL WATER PROGRAMS

Volume I

Prepared for the USAID Mission to Sierra Leone  
under WASH Activity No. 162

by

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and  
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November 1985

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This report, which was prepared for the USAID Mission to Sierra Leone, is divided into two volumes. Volume I describes the development of an evaluation plan for the rural water activities sponsored by CARE and the Government of Sierra Leone. It first provides background information leading to the study, and then details the overall program. Following a review of program activities, Volume I then focuses on findings; evaluation instruments and methodology; and finally recommendations regarding system construction, health education, and village-based maintenance of both hand-dug wells and gravity-fed systems.

The second volume comprises the survey questionnaires, project evaluation survey forms, an operation and maintenance survey form, and two project implementation logs as well as manuals for each of the questionnaires and evaluation forms.

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## ABBREVIATIONS

ADB	African Development Bank
AID	Agency for International Development
CUSO	Canadian University Services Overseas
CRS	Catholic Relief Services
EEC	European Economic Community
IADP	Integrated Agricultural Development Projects
IRDP	Integrated Rural Development Projects
MAF	Ministry of Agriculture and Forestry
MEP	Ministry of Energy and Power
PVO	Private Voluntary Organization
RWSD	Rural Water Supply Division
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
VSO	Voluntary Service Overseas
WASH	Water and Sanitation for Health
WHO	World Health Organization
GOSL	Government of Sierra Leone
NAP	National Action Plan (of the MEP)

1 \$US = 5 Leones

## ACKNOWLEDGEMENTS

The activities associated with this particular assignment required a close working relationship with the MEP/CARE/WaterAid project staff. This close working relationship with the project staff resulted in the design of evaluation instruments which met CARE's and the Government of Sierra Leone's needs in measuring the behavioral change of beneficiaries and the effectiveness of project implementation. The health coordinators and health educators spent a considerable amount of time working with the health educator WASH consultant in developing and testing the survey forms and field manuals.

The Ministry of Energy and Power's administrative office was most helpful in arranging meetings, obtaining information and in reviewing survey instruments and field manuals. The consultants would like to express their appreciation to the CARE staff in Sierra Leone for their assistance in affording the consultants a comfortable working environment and logistic support with an almost daily staff meeting to share experiences and to exchange information.

## EXECUTIVE SUMMARY

During July and August of 1985, a team of two WASH consultants collaborated with CARE, the U.N. Development Programme (UNDP), and the Government of Sierra Leone's Ministry of Energy and Power (MEP) in developing evaluation instruments for their rural water supply project. As part of this assignment, team members visited project sites, interviewed donor and ministry staff, and worked with MEP staff in developing these instruments. Over the five-week period, MEP staff and WASH consultants produced two user survey questionnaires, two project evaluation survey forms, an operation and maintenance survey form, and two project implementation logs, as well as field guides and manuals for each of the questionnaires and evaluation forms. The questionnaires were field-tested at CARE/MEP project sites in the Moyamba District and reviewed by the UNDP/MEP staff from the Koinadugu District, the Western Peninsula District, and the Freetown Central Office District. The substantive manuals and questionnaires/survey forms developed during this Activity are found in Volume II of this report.

In developing the evaluation instruments, two types of rural water supply projects were considered: improved hand-dug wells and gravity-piped systems. MEP/CARE are implementing approximately 40 wells a year in the Moyamba District. For the past four years, CARE also has been working in the water supply and sanitation sector in this district.

CARE is also assisting the MEP in the Western Peninsula District in constructing and operating 13 gravity-fed water systems for large rural villages. WaterAid, a U.K. private technical assistance organization, is supplying the engineering and construction management manpower for the project, while CARE is purchasing construction materials and equipment and supplies for the health educators.

Overall, evaluation of the health education and village-based maintenance components of the CARE projects yielded the following recommendations:

1. Health education should be given higher priority by the project managers; that is, health educators should manage all project contacts with the community. Project managers should become better informed regarding the needs, complexities, and time requirements of effective health education programs.
2. UNICEF should organize and fund an annual meeting for staff training and program planning.
3. A greater emphasis be given to satisfying the demand for latrines.
4. More emphasis should be placed on involving children in health education at school or at home.
5. Health educators should receive training in interviewing, communication, and adult education skills.
6. More women should be employed as health educators.



7. An effort should be made to standardize program strategies and materials for all districts based on impact and effectiveness evaluations.

CARE should continue its association with WaterAid in implementing gravity water systems in Sierra Leone. Such collaboration would take advantage of the capabilities of each of these organizations, while still allowing for community participation. Moreover, CARE should increase its activities in the water sector in Sierra Leone in both hand-dug well and gravity-fed system projects. To increase the effectiveness of these projects, however, it is recommended that:

1. Steps be taken to ensure better integration of construction and health education activities. (An implementation log and regular meetings of project personnel should improve integration.)
2. A standard village-based maintenance program be developed by the Ministry of Energy and Power.
3. Establishment of an operation and maintenance fund by the village health committee be a prerequisite for project implementation.
4. A well maintenance team be formed at each site to work with villages that have a history of serious maintenance problems as well as those that have abandoned wells in favor of traditional sources.
5. The Ministry of Energy and Power establish a source of supplies and equipment for maintaining the water supplies that the village health committees are able to purchase.

## Chapter 1

### INTRODUCTION

#### 1.1 Background

In January 1985, CARE/Sierra Leone requested assistance from the Water and Sanitation for Health (WASH) Project, through the U.S. Agency for International Development (AID)/Sierra Leone office, in developing evaluation instruments and a methodology for the Ministry of Energy and Power (MEP)/CARE water and sanitation programs in the Moyamba and Western Peninsula Districts and in evaluating the health education and village-based maintenance components of the program.

The evaluation methodology was to include field tests of the evaluation instruments, field and/or instructional guides, training of staff, and an evaluation plan. In March 1985, CARE/New York expressed interest in working on the development of the evaluation instruments as an on-the-job training activity. In addition, in March CARE and AID/Sierra Leone contacted other private voluntary organizations (PVOs) undertaking water and sanitation projects in Sierra Leone to determine their interest in participating in the evaluation. A team of two consultants, one a water engineer and the other a health educator, spent five weeks in Sierra Leone to carry out the assignment.

#### 1.2 Scope of Work

The specific objectives of the assignment were to:

1. In collaboration with the CARE and MEP staff, develop a list of goals for the well, gravity system, latrine, and health education components of the program and indicators of the degree of goal achievement.
2. In collaboration with the CARE and MEP staff, develop an evaluation plan. This will include a draft questionnaire for baseline data collection, a protocol on how the evaluation will be managed, and a schedule.
3. Assist the CARE and MEP staff in field testing the questionnaire.
4. Assist the CARE and MEP staff in critiquing and revising the questionnaire and modifying the protocol and schedule as needed.
5. To the degree necessary, train MEP and CARE/Sierra Leone and New York staff in all aspects of evaluation methodology.
6. Discuss with CARE and MEP staff the health education component and curriculum and make recommendations to them on ways to improve it.
7. In collaboration with CARE and MEP staff, discuss the concept of a community-based maintenance system and point out ways in which this concept can be related to the health education component.
8. Prepare a final report for WASH, CARE, the MEP, and USAID.

## Chapter 2

### REVIEW OF THE PROGRAM

#### 2.1 Introduction

The National Development Plan of the Government of Sierra Leone states that "...the government will accord high priority to...a county-wide village water supply programme." The MEP's National Action Plan proposed to supply water to 20 percent of all rural residents by 1986 and to 70 percent by 1990 through the Rural Water Supply Unit.

In recent years, the government has shifted its development strategy from isolated sectoral efforts toward integrated rural development. The key to this intervention has been the establishment of regionally-based integrated agricultural development projects and more recently integrated rural development projects. The Water Supply Division of the MEP, which has national responsibility for water supply (excluding Freetown), feels that the water supply components of these various projects will serve as the foundation of a National Rural Water Supply Program.

#### 2.2 The Rural Water Supply Unit

The Rural Water Supply Unit's role is to plan, coordinate, monitor, and assist in the implementation of rural water supply projects -- in short, to bring all rural water supply activities under its sphere of influence. Its approach is to integrate community mobilization, environmental (health) education, construction, operation and maintenance, water quality monitoring, and rural sanitation in its projects. The unit's headquarters staff is developing guidelines, standards, and policies which are being executed by the various field projects throughout the country. At the present time three long-term U.N. Development Programme (UNDP) advisors are assisting the unit with these tasks. In addition, a long-term advisor from UNICEF is developing and implementing a water quality monitoring function for the unit. This water quality advisor is based at Njala University with field laboratories at various project sites.

A MEP/UNDP field project was initially established in the Koinadugu District to construct 225 wells. The Rural Water Supply Unit has now prepared comprehensive water program proposals for eight projects. Of these, four conform to the recommended standards of construction, two will adopt the national standard as their funding agreements are finalized, and two are not a part of the National Action Plan, although it is anticipated that they will eventually adopt the national standard.

#### 2.3 The CARE/MEP Projects

CARE/Sierra Leone, in collaboration with the MEP's Rural Water Supply Unit has been working over the past several years with villages of 100-200 people in the Moyamba District, Southern Province, to provide safer water, improved sanitation, and environmental health education. The MEP's improved water

supplies are open hand-dug wells (Peace Corps design) with buckets and ropes. The sanitation improvements consist mainly of latrines and environmental education. In addition, WaterAid has recently begun a three-year project to construct or upgrade 13 gravity-fed systems supplying 30 small communities in the Western Peninsula District.

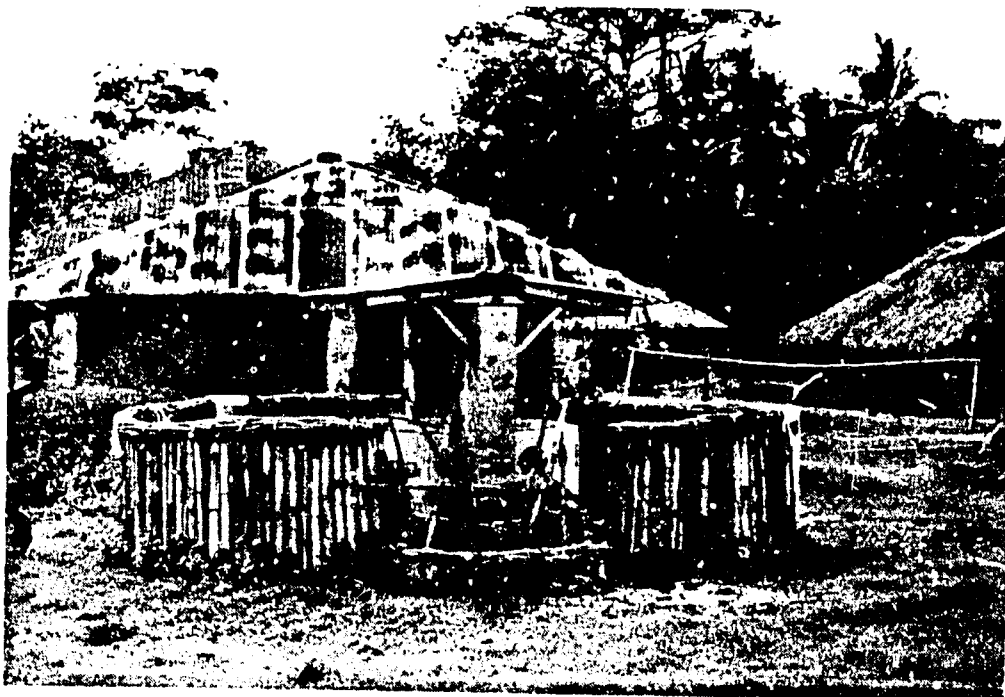
### 2.3.1 Hand-Dug Wells -- Moyamba District

The CARE-assisted clean water supply project in Moyamba District began in 1980. The first phase of the project called for the construction of 100 wells in villages of 100 to 1,000 people. Pre-construction project activities began in November 1980, with actual well construction beginning in March 1981.

This project has adopted the standard design and integrated approach to rural water supply as specified by MEP's Rural Water Supply Unit. From its inception the Moyamba project has cooperated closely with this unit. CARE has supplied vehicles, equipment, supplies, tools, and spare parts for the project, while the Rural Water Supply Unit has provided the technical assistance and the trained supervisory staff.

The standard design of the hand-dug wells includes concrete lining down to the water table, a casing extending into the zone of saturation, a reinforced concrete apron, and raised well cover, and a rope and bucket retrieval system. Mark II handpumps have been installed in several communities on a trial basis. The bacteriological quality of the well water is monitored on a quarterly basis by the Rural Water Supply Unit. See Photos 1-12 for examples of hand-dug well structures.

Community self-help in both construction and operational phases is an important component of these projects. Villagers are expected to provide sand and gravel, labor, and room and board for project technicians. Workshops and training activities in environmental health education are conducted for village health committees and villages, respectively.



Photos 1-3. The MEP/CARE hand-dug wells feature locally designed and constructed structures and fences built from bamboo, bush poles, and timbers.

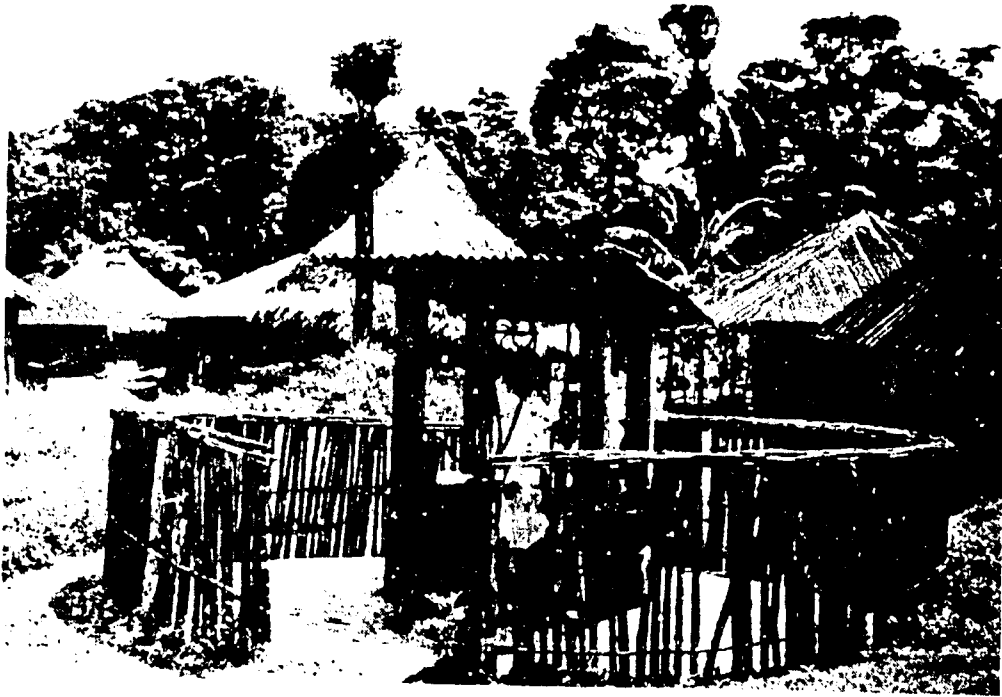


Photo 3.

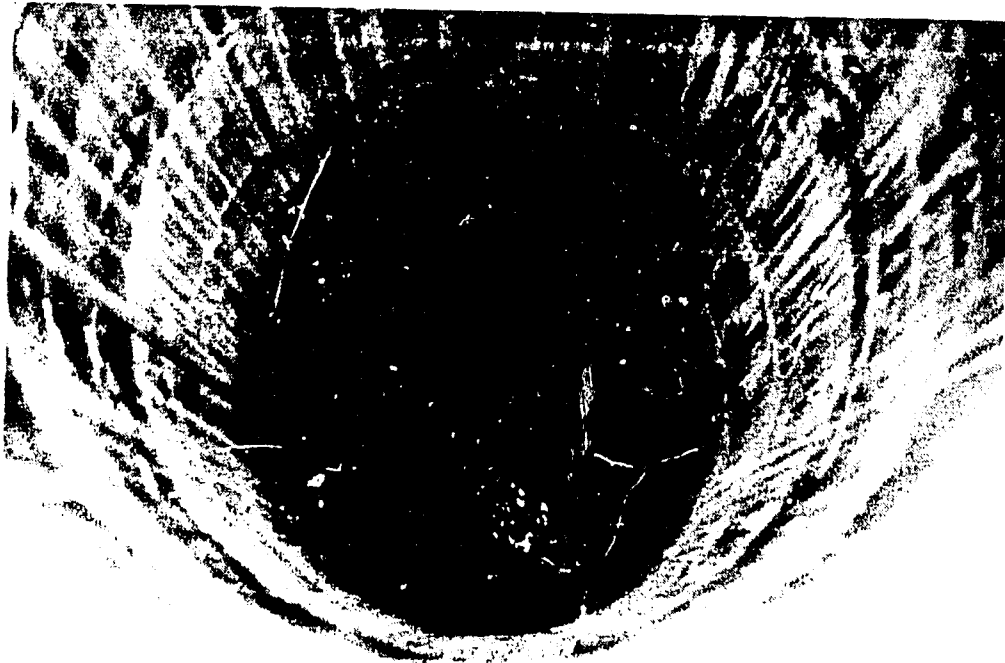


Photo 4. A well lined with reinforced concrete.



Photo 5. A lined well with cussions extending to the groundwater. Note wood shims used to align cassion when excavating.



Photo 6. The poured-concrete apron with headwall and cover yet to be added.



Photo 7. Well technicians and community members excavating well (note man in hard hat being lowered into the well).



Photo 8. Well technicians and community members removing water from cassion to allow for excavation and cassion lowering.





Photo 9. Mark II shallow well handpump in Kabala mounted on a hand-dug well with secured cover (notice drainage slope for pump on the cover of the well).



Photo 10. Well site with Mark IV handpump showing apron, pad for children to stand on, steel frame for mounting pulley, and concrete brick outer wall and surface drainage diversion.



Photo 11. Village youth acquiring water from traditional source (swamp water) for use in test drilling.



Photo 12. Well technicians test drilling with a hydro drill (water source in 50 gallon bucket, gasoline driven pump, and hydro drill).

### 2.3.2 Gravity Water Systems -- Western Peninsula District

In May-June 1982, a MEP/CARE team made a preliminary reconnaissance visit around the peninsula to determine the status of community water supplies. CARE surveyed the existing water sources for the communities and found out what problems were associated with their continuing use and what potential there was for community participation in repairing or constructing new systems. At the same time, a member of WaterAid was in Sierra Leone to investigate the kind of assistance WaterAid might provide Sierra Leone during the U.N. Water Decade. It was decided that WaterAid would send an engineer and surveyor to perform a feasibility study for the MEP.

The Western Peninsula plan grew out of this study. It proposes to construct ten new gravity sites and to upgrade three existing systems. (See Photos 13 and 14.) The project will also construct 120 latrines within the 27 villages served by these 13 gravity systems. To mobilize and support this activity 27 village health committees will be formed, 26 village technicians will be trained, and 300 educational and promotional sessions will be implemented.

CARE and WaterAid will provide material, financial, logistical, technical, and supervisory support to the MEP's Rural Water Supply Unit for a three-year period. Community water committees will be formed in each of the participating communities. The committees will be responsible for providing sand and gravel, community labor, and board and room for the skilled laborers. A five-member village health committee, to be selected by the community, will normally be composed of two women, two men to be trained as water technicians, and a village elder or headman. The committee will be responsible for the tariff/user fee collection and maintenance. Simple maintenance and repair of the systems will be carried out by Community Water Technicians. They will be trained by the MEP before and after construction. A special unit within the MEP will be set up for performing more extensive and sophisticated repair work on the gravity systems.

Baseline community surveys and household surveys will be conducted by health educators employed by CARE. Environmental health education will be implemented before, during, and after the construction of the system by the CARE health educator in the Western Peninsula.

### 2.4 The National Health Education Structure

About five years ago, several ministries decided to implement centralized coordination of primary health care, sanitation, water supply, and health education programs. Several of these programs reside in different Ministries -- Health, Agriculture, Education, Interior, Social Welfare, Energy and Power -- but all are closely related. A statutory body within the Ministry of Health was created -- the Council on Health Education and Nutrition -- under the chairmanship of the chief medical officer; this interministerial body was to advise the government on coordinating the programs.

Since the Ministry of Development and Economic Planning functions as a coordinating ministry and also negotiates all projects with outside donors, as a first concrete coordinating step, a Health Education Secretariat was created within this ministry to coordinate and oversee all health education activities



Photo 13. Gravity water system intake diversion (pipe with control valve located at the toe of the dam).

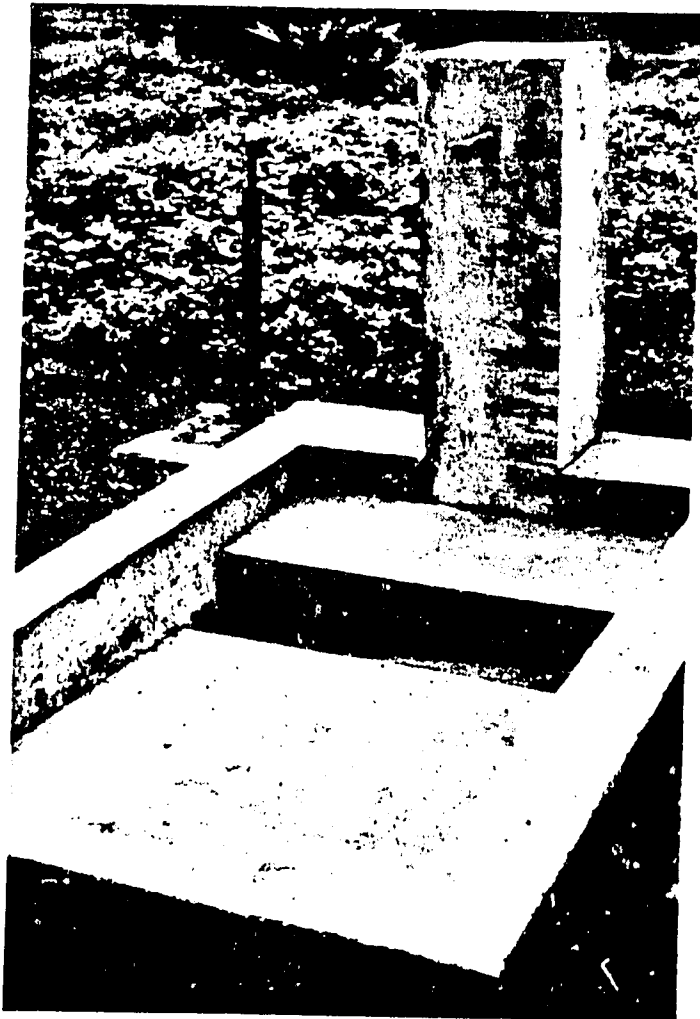


Photo 14. MEP/WaterAid designed community water stand. (Existing stand can be seen behind the new stand).

in the country. The Council on Health Education and Nutrition was to be an advisory body to the secretariat. Because of a lack of funding, for most of the last five years the secretariat staff has consisted of one person; it was recently expanded to two people -- a National Environmental Education Coordinator and an Assistant EEC. Because of the limited personnel, the secretariat has been concentrating its attention solely on the Rural Water Supply Unit program. However, it is now also working with the Ministry of Education to plan a new health education curriculum for the schools. The primary health care and nutrition health education programs are still strictly under the control of the Ministry of Health and not the Secretariat. The members of the council on Health Education and Nutrition are not satisfied with the secretariat's present limited agenda and would like to see more attention given to a broader spectrum of health education programs.

The Rural Water Supply Unit's health education program is overseen by the Health Education Secretariat. Funding for the program comes mostly from UNICEF, which supplies transport, supplies, and training funds; salaries are paid by the government with "topping-off" and per diem paid by UNICEF. There is an intersectoral steering committee on primary health care that meets quarterly. This committee would like the MEP to join, and the MEP intends to do so. This should result in further integration of the Rural Water Supply Unit's program into the national primary health care strategy.

## 2.5 The MEP's Health Education Program

In coordination with the Rural Water Supply Unit of the MEP, the Environmental Education Secretariat of the Ministry of Development and Economic Planning aims to implement a systematic national health education program within the framework of "health for all by the year 2000." The long-term goals of the program are as follows:

- a. to reduce the incidence of water-related diseases;
- b. to develop an effective and systematic administrative link for the coordination of environmental health education on a national basis;
- c. to continually provide state-of-the-art training for project health educators; and
- d. to allow women to play a greater role in the development process.

The immediate objectives are:

- a. to implement an ongoing plan of action for environmental health education at the village level;
- b. to train a village health committee to be responsible for organizing community assistance in well or system construction and maintenance;
- c. to sensitize villages to the need for water hygiene;
- d. to encourage and increase the construction of family hygiene and household sanitation facilities, such as latrines, compost fences, clotheslines, plate drying racks, etc.

### 2.5.1 Inputs

The government provides the personnel and pays the salaries. It also ensures the availability of necessary provisions not provided by UNICEF, CARE, and other cooperating agencies.

UNICEF provides cash assistance for the training of village committees and for other training activities, per diem, fuel, spares, supplies, equipment and vehicles, including motorbikes for each of the health educators. CARE provides fuel in Moyamba. Coordinators are Peace Corps volunteers.

### 2.5.2 Organization

Launched in 1981, the program now operates in six districts: Koinadugu, Moyamba, Kenema, Bonthe, Kambia, and the Western Peninsula. Staff size is 22 with 6 district coordinators and 16 health educators in the field. At the national level there is a national coordinator for environmental education with an office in the Ministry of Development and Economic Planning. Overall responsibility for the program lies with the Rural Water Supply Unit of the MEP, which integrates the health education component and the water supply, latrine construction, and water quality testing components. The program is organized by district with the senior health educator functioning as district coordinator with support from health education assistants.

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Table 1  
Rural Water Supply Unit Health Education Staffing

<u>District</u>	<u>District Coordinator</u>	<u>Health Education Assistants</u>
Koinadugu	1	7
Kenema/Kono	1	6
Moyamba	1	3
Kambia	1	0
Bonthe	1	0
Western Peninsula	1	0

---

The background of the health education personnel is quite diverse; some are U.S. Peace Corps volunteers, but most are public health inspectors from the Ministry of Health or personnel from the Ministry of Social Welfare, the Ministry of Interior, or the Ministry of Education. The program is fortunate to have the unusual arrangement whereby personnel can be seconded to the project from ministries other than the MEP, yet continue to be paid by their home ministries even though they are completely under the supervision of the MEP project managers. Thus, to expand its staff, MEP does not attempt to create new positions -- a very difficult proposition given the economic situation -- instead it tries to persuade a ministry to second the person interested in working for the program.

Of course there are other health educators in the Ministry of Health who are not associated with the Rural Water Supply Unit program. However, they are probably involved to some extent in water- and sanitation-related activities as part of primary health care programs.

### 2.5.3 Activities

It is the health educators' job to prepare a community for a well or a gravity-water supply. They assist the community in choosing a village health committee and then assist the committee in getting the community to contribute labor and other inputs stipulated by the well agreement between the community and the MEP. As soon as contact between the health educator and the community is initiated, health education activities are supposed to begin with community talks and visits to individual households. Health educators are assigned to specific chiefdoms. They plan the strategy for each village with the district coordinator, who is their direct supervisor. Health educators go out on an itinerary that keeps them in the field for five and a half days. This is necessary given the inaccessibility of many communities. The number of communities visited per day differed significantly in the two districts the consultants visited. In one district, two to three villages were visited a day, while in the other only one was visited. One wonders if there is a tradeoff here between quantity and quality, but until the program has some means of evaluation that is a moot question.

The educators fill out trek forms that record the purpose of their visit, their accomplishments, the problems they encountered, and follow-up solutions, and actions requested from the district coordinator. These forms are then reviewed in the district office and added to the community file.

The village health committee members are the first to be affected by the program. They participate in a series of training sessions to learn about all their responsibilities as committee members and to learn how to pass on information about health behavior modification to the other members of the community. It is not clear from the curriculum how much training the members receive in teaching other adults and persuading others to change their behavior, but, based on the descriptions of members' performances given at community meetings, it would appear that much more such training is required. Village health committee members are likely to be most effective with their friends and neighbors, not in community-wide meetings; this approach should be fostered and encouraged.

## 2.6 The Water Quality Unit

The Rural Water Supply Unit program has developed a water quality unit to monitor the bacteriological and chemical quality of the projects implemented by the MEP. This program, funded through a UNICEF research and development project, has devised a technique for differentiating fecal and non-fecal coliform for use in tropical climates. The research and administrative center for this unit is at Njala University. The developmental and implementation phases of this water quality unit have been funded by UNICEF. The UNICEF funding pays for the director, a laboratory supervisor, equipment, supplies, and motorcycles for the analysts. The salaries of the analysts are paid for by

the MEP. At the present time there are three field laboratories, two in Koinadugu District, and one in Moyamba District.

A water quality analyst is assigned to the MEP wells program project office. The analyst is responsible for sampling, analyzing, and reporting the bacteriological quality of the water in project wells on a quarterly basis.

At the present time chemical water quality analyses are not performed on the various well samples. However, it is envisioned that the water quality unit will be capable of performing health-related chemical constituents tests in the near future.

The water quality technicians have been trained in the particular membrane filter technique developed at Njala University. They have also been trained in sampling and reporting procedures. They appear to be well trained in these specific skills and keep a clean and organized field bacteriological laboratory.

The water quality analyst performs routine bacteriological tests to ensure that contamination is detected at the earliest possible time. Contamination of the groundwater aquifer from latrines and surface drainage is of first concern in this monitoring program. A procedure has been developed to follow up on samples which exceed provisional bacteriological water quality standards. As a standard procedure the water quality analyst reports any contaminated well to the health educator. The health educator then makes a sanitary survey of the village and the well site and applies hypochlorite salts to the well if the standards are exceeded on a continuing basis. The health educator will institute remedial action if a potential source of contamination is identified in the sanitary survey. This might involve the skills of the well technicians, for example, if construction or excavation is involved.

The role that the water quality unit plays in delivering safe drinking water to the rural population of Sierra Leone is not well defined. Serious problems exist in both the laboratory analysis and in the reporting and follow-up protocol. Because of undependable power supplies the water baths used for fecal coliform incubators were not operable at any of the three sites visited. A battery operated incubator at one site was non-operable due to a malfunctioning battery charger. Even though a protocol was developed for the incubation of plates at room temperature, considerable variabilities exist in the data. All media preparation is done at Njala University and shipped to the various field laboratories. Quality control and technician training is administered by Njala University at the various field sites.

The major issue is whether there is really a need for such equipment and manpower-intense functions in a rural water supply project. The MEP water well design has incorporated many safeguards and siting requirements to minimize contamination of groundwater aquifers.

If contamination is found in a well the source must be identified before any remedial action is taken. If the well is contaminated through the well opening, by a contaminated bucket or rope, for example, then health education intervention is necessary. If the groundwater aquifer is being contaminated by a latrine or surface infiltration, then a new well must be dug or a drainage project must be implemented.



The existing reporting procedures are not responsive enough to detect contamination through the well opening. The follow-up sampling and testing procedure for a well which exceeds the provisional standards is such that 30 to 60 days could elapse until remedial action is taken. If in fact fecal contamination had occurred through the opening, then community exposure to potential pathogens would have existed for at least as long as it would take for die-off to occur and for infiltration replacement volume to dilute the bacteria density in the well. The nature of the use of a community hand-dug well is such that it would take almost daily sampling to detect any contamination through the well opening.

## Chapter 3

### FINDINGS OF THE PROGRAM REVIEW

#### 3.1 Health Education Issues

It should be noted that the two district programs visited are very well organized and supplied health education programs. The health educators have transport -- without which there can be no program -- and they have very capable, thoughtful, and well-organized supervisors. The field staff have some basic skills, but they need significantly more training. The education program is integrated with the construction, latrine, and water quality components, although more can be done to improve that integration. The potential is definitely there for a very effective program.

##### 3.1.1 Hiring Women Health Educators

A major weakness is that the program puts men in charge of behavior modification activities. It is now acknowledged on a world-wide basis that water hygiene and sanitation are primarily women's responsibilities. Within the cultural setting of Sierra Leone, the consultant is sceptical about how credible men can be with women on the subject of hygiene. In one district the men were even giving talks on breastfeeding hygiene, baby diet, etc., and it is difficult to imagine that these presentations had much impact. Villagers are responsible for socializing their members into the correct behaviors and rituals. The chief woman in the community is the mammy queen, and she is a strong leader whose word is law among the women. She would appear to be the most important community contact point for the health education strategy. If she can be persuaded to adopt the new behaviors, the rest of the women will probably adopt them too.

The two Peace Corps volunteer coordinators are women who have retired after careers in nursing; they are in the communities with their husbands; they have had children; and they are generally the same age as the mammy queens. The consultant is convinced that these characteristics of the present coordinators is a major factor in the success of the program in the two districts. The coordinators both have a good chance of being accepted and respected by the women they meet. In contrast, a single childless woman is considered to still be a child herself and therefore would have a difficult time establishing credibility. The Peace Corps should take this into consideration when considering the placement of people in health education activities.

The Rural Water Supply Unit project director is fully in support of the idea of getting women onto the staff. The problem appears to be recruitment. In the field, the consultants found that most women field personnel were from the ministries of Health, Education, and Social Welfare. In terms of educational level, persons from the last two ministries would be preferable. However, the Ministry of Education has not been cooperating in seconding women to the project. Its attitude seems to be that the person needs to resign first and be taken off the MOE payroll. Since the MEP cannot hire any new personnel under the present economic conditions, this is not a helpful position for the Ministry of Education to take.

In the case of the Ministry of Social Welfare, there are few women available for recruitment. The third source is the Ministry of Health. At the community level within the primary health care program there are the maternal/child health aides; their educational background is usually low and the rate of pay abysmal, between \$3 (L.15) and \$9 (L.45) a month at the current official exchange rate. If CARE or UNICEF offer to "top off" the salaries or provide other benefits, many of the aides may be willing to transfer. The reaction of the Ministry of Health is hard to predict, since it already feels that the MEP is encroaching on its home turf. Another factor would be the cost of training needed to bring the aides up to required program skill standards. However, it is recommended that the MEP look into this possibility as soon as possible.

### 3.1.2 Upgrading Field Personnel Skills

Another program weakness is the lack of an ongoing program of training and upgrading of skills of the field personnel. One of the stated goals of this program is to continually provide state-of-the-art training, but little has been done in practice. The field staff need further training in interviewing, listening, adult education, and communication. From what the consultant was able to see, the health educators tend to talk at, to preach to, or to admonish their clients. This approach is not generally considered to be effective for achieving long-term behavioral modifications.

### 3.1.3 Emphasizing School Health Education

At the present time, it appears to the evaluator that much more emphasis should be given by the program to interactions with children either in the school or in the communities. Children are an important client target group for obvious reasons. The Ministry of Education has set up a committee to develop a health education curriculum, but it will be two to five years before it is ready. It is recommended that the educators work closely with the teachers, helping them develop lesson plans and simple demonstrations. The program should be strongly encouraging the construction and maintenance of latrines at schools. Within the communities the program should explore giving presentations to the children using puppetry, plays, and tapes. Another idea that was raised is an activity aimed at educating older siblings to take physical care of their younger siblings -- washing them, teaching them to use the latrine, etc.

### 3.1.4 Reviewing Educational Materials

There was no consistency in the use of materials in the two districts visited. Materials seemed to come from a variety of sources, some very professionally prepared others non-professionally developed. There was concern about the extent to which some of the materials had been field-tested for relevance and meaning to the clients. To the evaluator, the illustrations used at one presentation violated the criteria for well developed materials -- they were crudely hand drawn illustrations on pieces of board too small to show effectively to a group of twenty or more women. There are some very good materials available from previous CARE/Sierra Leone efforts, namely "Project Learn" that flourished some five years ago. All material used should be

vigorously tested and evaluated and then should be uniform in all the districts.

The curricula being used in the two districts were not the same -- one was based on Small Talks by Nancy Minett, a former CARE health staff member, and the other on the Extension Manual. Since Minett's material employs maternal and child health topics, as well as water, personal hygiene, and sanitation, one district ended up with the previously mentioned strange situation of male educators talking about breastfeeding. The curriculum should be standardized for all districts. The Extension Manual is adequate, but perhaps the proposed annual seminar would be a good forum for all the educators to develop a revised curriculum.

### 3.1.5 Satisfying the Demand for Latrines

In terms of potential health impacts, most public health professionals would agree that an effective latrine program will do more to lower sanitation-related disease rates than water supply. The Sierra Leone program is blessed with the situation that there is actually a flourishing demand for household latrines in the two districts reviewed. And yet at this point, satisfying that demand is a low priority. At present the construction of wells is the priority activity, to the detriment of latrines and health education. The evaluator was told that the situation will change this year with greater emphasis and resources being given to meeting the latrine demand. Several suggestions have been made. One is that households be aided in good designs that use locally available materials rather than concrete, another is that a revolving fund be set up where people pay for the materials, such as the cement and rebar. The money paid back can then be used to purchase more materials for new units. (See Photos 15 and 16.) The demand is for household units, not community ones. Therefore, perhaps the approach to take would be to issue contracts to individual households with payments over several years. If cement and rebar are scarce resources, the program must decide whether they should be used for well construction or latrine construction. If the goal is to reduce disease and improve health, which has the greater priority, a well or a latrine?

### 3.1.6 Making Health Education a Priority

It seems to be agreed that up until now the driving force in the Rural Water Supply Unit program has been the technical side of constructing wells rather than the sociocultural side of health education. If health education is in fact to be given greater importance, this has to be communicated clearly by the highest levels of management.

## 3.2 Maintenance of Water Schemes

The proper operation and maintenance of hand-dug wells and handpumps is a major concern within the MEP. The program to date has featured hand-dug wells with bucket and pulley technology. A few handpumps were placed in service in previous programs, but these have not remained operable. A few India Mark II handpumps have been installed in the Kabala project area on a trial basis. At

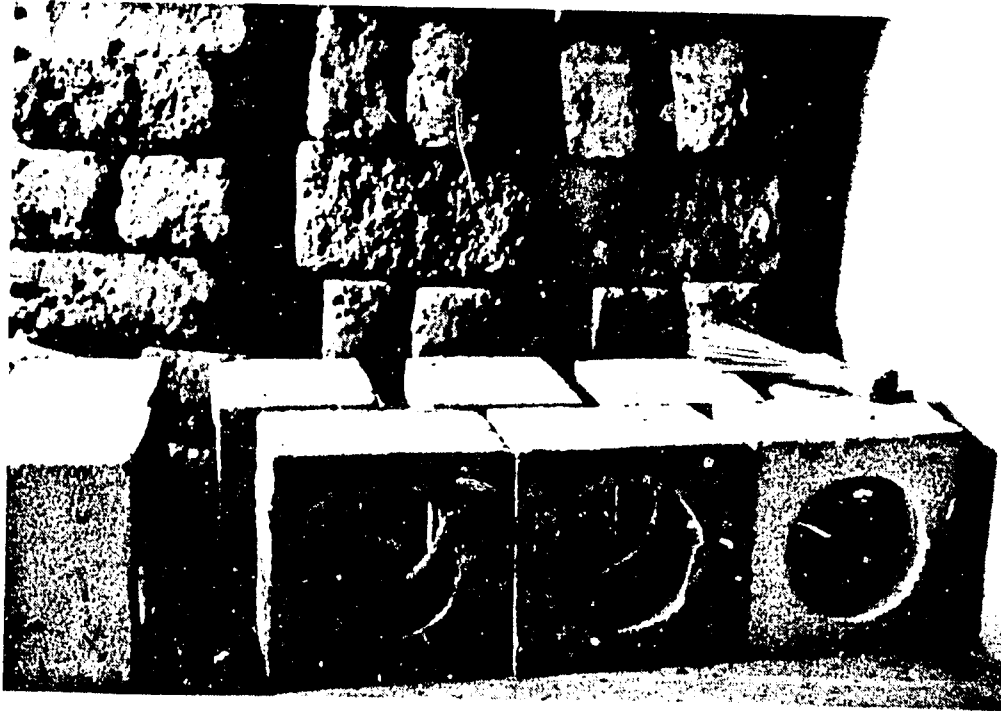


Photo 15. Village-constructed chimney blocks for a ventilated improved pit (VIP) latrine.

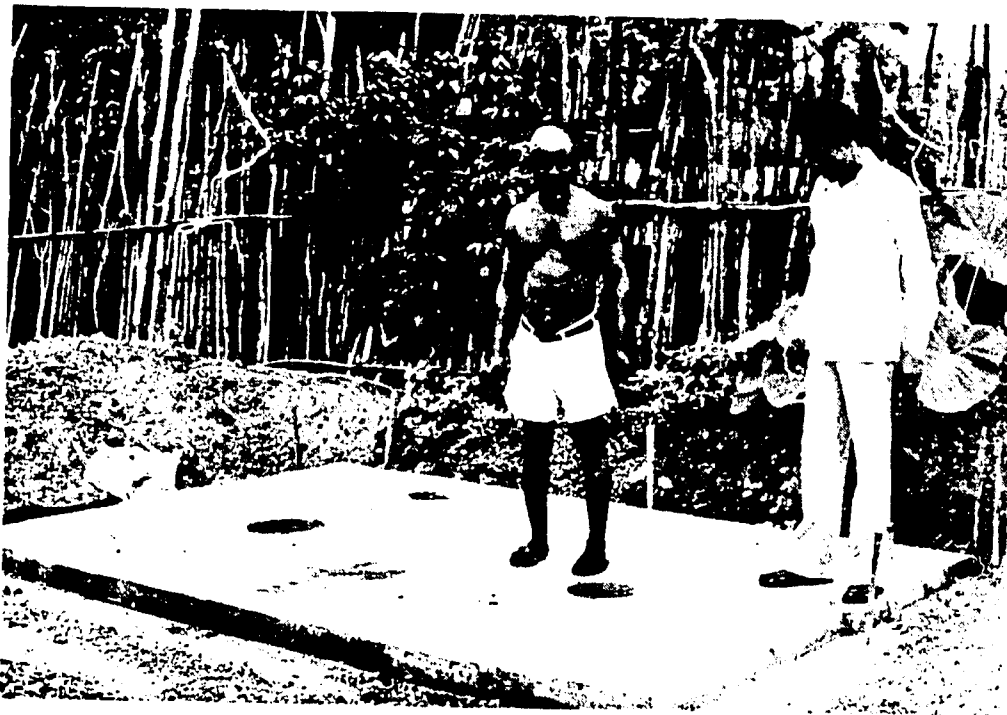


Photo 16. Village-constructed VIP latrine slab for two families.

the present time there is no policy within the MEP as to the operation and maintenance of bucket, pulley, and rope systems.

Even though no policy exists, several options have been developed as possible alternatives to deal with the operational phase of the well projects. The first attempts to place total responsibility for maintaining the well at the village level. Under this option the health educator is responsible for mobilizing and organizing the village-based maintenance and for promoting locally available replacement components. The health educator will be responsible for collecting the necessary fees and for transferring them to the Health Education Coordinator for safe deposit in a bank. The monies from all the villages will be pooled in a revolving fund, which will be drawn upon as replacement components are needed by individual villages. A village assessment will be made every six months based upon the preceding six months' withdrawal. The Health Educator will be responsible for the monitoring and inspection of component conditions as well as for transfer of receipts of money and proof of purchase.

This self-help option depends for its success upon the availability of locally manufactured rope, pulleys, and buckets. The Health Educator will be responsible for identifying local craftsmen or merchants who will manufacture or stock supplies. One alternative is to commission a craftsman to make a certain quantity of materials based upon the first six months needs. The Health Educator will be responsible for determining the amounts and specifications of these replacement components. The inventory and accounting procedures will be developed by the Health Education Coordinator and Health Educators. The Health Educator will be responsible for communicating component costs to the communities and for maintaining a viable working environment with the craftsman.

The second option is also based upon self-help, but with a different source of replacement components. UNICEF has agreed to purchase an initial supply of ropes, pulleys, and buckets which will be sold to villagers at cost. This option also will require the establishment of a revolving fund. The revolving fund will be used to re-purchase these components on a continuing basis in large quantities.

This option requires much more coordination with the Project Manager. Since components will come through the MEP in Freetown to local project offices, the scheduling of purchases, the timing of deliveries, the on-site storage, and the inventory system must be integrated into activities of all staff members.

### 3.2.1 Hand-Dug Wells

A hand-dug well water supply system, while considered a simple system compared to other alternatives, is in fact somewhat sophisticated in terms of both construction and operation. It is made up of three separate components. Any one of these, if not operating, can reduce the ability of the well to supply a safe and reliable source of water. It is important to understand the operation and maintenance requirement of each of these components while planning for an ongoing village-based maintenance program.

The first component is the structural system which protects the well from contamination by surface water and from sediment build-up with the lining. The second is the gravel backfill and filter, which is the active interface between the aquifer and well. The third component of the system is the mechanical means for removing the water from the well, which in this case is the rope, pulley, and bucket. Each of these components has maintenance, repair, and replacement requirements.

The structural system is designed not to require repairs or additions under normal operating conditions. The well design which the MEP has chosen more than meets the minimum criteria for the protection of the water sources from surface contamination and sediment buildup. Any repairs on the structural system would have to be done by a skilled craftsman, i.e., a well technician. If cracks occurred on the apron or around the headwall, indicating a potential point of entry of contaminated surface water, cement and possibly wire mesh would have to be used to close the opening. The structural components and construction techniques used by the MEP to build the well are more than adequate to meet the life cycle requirement of the well.

The second component of the system, the rock filter and reservoir, requires monitoring and occasional maintenance to ensure proper operations. If silts and clays enter the well through the backfill, a layer of sediments will begin to build up in the bottom of the well. These sediments could contribute to turbidity and color in the water. They could also serve as a habitat for organisms such as aquatic insect larva, worms, etc. Sediments need to be removed from the bottom of the well to ensure a safe source of water. To remove the sediments, the water needs to be drawn down and the sediments removed from the gravel filter. In some cases the gravel will have to be removed and repacked with washed filter material. This type of maintenance will have to be performed by a well maintenance team. It would be extremely difficult to perform this job without a compressor or generator powered pump.

Several other types of operational problems would require the removal of the water from the well. A case was found in Moyamba, for example, where oil or solvents from an unknown source, had tainted the well water. The villagers returned to their traditional source of water because of this hydrocarbon taste and odor. This particular case would probably require drawing down the water level and thoroughly cleaning the sides of the cassion and lining. Another case involved a community in which dead snakes were found in the well. This particular well was not covered, so the exact manner in which the snakes entered the well was unknown by the community leaders. This well would also have to be drawn down and thoroughly cleaned and disinfected before the villagers would use the water. Several problems of this type have occurred; solving them requires a significant level of material and skilled labor input. The cassion hand-dug well system does allow for returning at a later date and lowering the operating level of the well by extending the cassions.

The mechanical system for retrieving the water from the well is the most critical component in the system. The moving parts of any system receive the wear. The rope, for example, is subject to the load of the bucket of water applied over the travel distance of the haul with the associated rope abrasion going through the pulley. The condition of the rope at a well is usually the best indicator of the use of the well by the community. Ropes which were spliced, knotted, frayed, unwound, and discolored are not uncommon at well

sites. The buckets usually show signs of heavy use; they are dented and bent, their handles have been reconnected, and they are rusty. In some cases the containers used for drawing water were poor substitutes for the original equipment. Still these are all signs that the well is serving a community need. A community of 200 people could require as many as 400 to 500 buckets per day of water.

For a well ten meters deep, the rope would travel through the pulley, loaded with 30 pounds, approximately 4,000 meters per day (or two and a half miles). The pulley itself is an important link in the system in that it assists the user by minimizing friction. The pulley must be able to withstand the application of continual force as a loaded bucket of water is rotated over its surface. Wooden pulleys, for the most part, are not able to withstand this kind of force as well as cast iron pulleys. Both types of pulleys, however, need to be lubricated to insure ease of operation. Care should be taken in lubricating a pulley not to allow the lubricant to enter the well, as might have happened in the example mentioned above. At least three different types of pulley designs were seen in Sierra Leone. One was made of wood, one of cast iron, and the third of steel.

### 3.2.2 Gravity Systems

At the present time the local MEP foreman has the responsibility of maintaining the gravity water system. The foreman inspects the system for needed repairs and reports defects to the Division Office in Freetown. The Division Office must requisition spare parts; however, the MEP does not have readily available monies to purchase these parts. If the MEP's budget does not include an item for spare parts, equipment, and tools, they cannot be supplied to MEP maintenance personnel.

At the present time no user fee or household assessment is charged the community members. For some of these projects, those that are rehabilitation of existing systems, this "no-fee" approach has been in place over ten years. In the past, approximately five years ago and longer, the MEP was capable of supplying parts and material for maintaining the system. Therefore, some communities expect the projects to be supported totally by the government. This expectation will be the greatest in communities in which rehabilitation is the focus.

The MEP/WaterAid/CARE proposed maintenance procedure is designed to alleviate this fiscal shortfall. The responsibility for maintaining the system will still reside with the MEP under this scheme, with some significant differences. The project will purchase spare parts based upon an assessment of normal parts replacement necessary for the first three years of operation. The MEP's Water Supply division will assume the responsibility of maintaining the stock at this initial level.

The success of this proposal lies in the strength of the village health committee. The committee will be responsible for hiring the village level technician. This village level technician will be trained by the MEP to maintain standposts and taps. Tasks such as replacing stopcocks and taps are examples of the skill level required. The village technicians will also be responsible for keeping the standposts clean and ensuring adequate off-site



drainage. Technical back-up for village technicians will be provided by the MEP foreman at no cost to the village.

The village health committee will have other responsibilities associated with the operations of the water system. Any major faults or failures in the system are to be reported to the MEP by the village health committee. The committee will monitor and rectify any non-conforming household connections. A major responsibility of the committee will be to establish and collect an appropriate levy from the community members using standposts. The committee is also responsible for protecting the source and inlet work. An overall responsibility of the committee is to promote good health through safe drinking water and sanitation habits.

Two fees will be levied by the village health committee. When legislation is implemented, a fee will be levied to reimburse the MEP head office. The second fee will be a contribution (assessment) to a capital fund to pay the technicians and to repair the standposts. Under normal procedures the village technician would request parts from the MEP mobile unit to be paid for out of this fund. If parts are not available then the village technician can use the fund to purchase parts on the open market in Freetown.

It is proposed that a weekly or monthly charge be levied from each household based upon the number of inhabitants. The capital fee will be collected prior to construction as an act of commitment to the overall success of the project.

In the case of the first project to be constructed by MEP/waterAid/CARE (at York), a capital fund of 1,500 Leones (US \$300) is presently available for annual operating costs. This amount was arrived at based upon experience in other areas. Adjustments will have to be made after the first year of operation, based upon the age of the system and the inflation rate.

## Chapter 4

### EVALUATION INSTRUMENTS AND METHODOLOGY

#### 4.1 Health Education Issues

The general goals of the health education evaluation are:

- a. To improve policy decisions about the usefulness and design of future health education activities, and
- b. To improve the performance of the existing program.

The scope of work called for assistance to CARE and the MEP in developing an evaluation of the water and sanitation program. It was considered impractical to evaluate actual changes in health status with the limited resources available to the project. It was decided instead to concentrate on the behavioral changes targeted by the program, on the assumption that long-term adoption of healthful personal hygiene and sanitation behaviors would lead to an improvement in the health status of individuals adopting those behaviors.

The purpose of the evaluation would be to measure occurrences of behavioral change over time at the household level. There was also to be an evaluation of behavioral changes associated with the use and maintenance of the hand-dug wells constructed by the project.

##### 4.1.1 Guidelines

After preliminary visits to the field, meetings with personnel, and detailed discussions on the present program, several factors were chosen to guide the development of the evaluation instruments. The substantive instruments developed here are found in Volume II to this report.

- a. The instruments should be developed as much as possible by field staff members so that there would be some feelings of ownership, even though the stimulus for evaluation tools was an external and not an internal one.
- b. Given the level of interview skills of the field staff, the instruments were to be kept as simple as possible and to be based as much as possible on direct observation, rather than on direct questioning.
- c. The field staff were to be able to carry out the first level of data analysis so that they could see how the findings of the evaluation could be applied to their planning needs.
- d. The forms were to be accompanied by manuals of instruction on how to interpret and score the responses.
- e. The use of sampling techniques was to be avoided by doing total population coverage. In time that might have to be modified if the pool of villages served becomes too large to handle.

- f. Embarrassing questions were to be avoided.
- g. The information was to remain in the field so that it could be used for district program and individual work planning.
- h. Evaluation instruments were not to be too long or cumbersome; completion time was not to be greater than 30 minutes.
- i. The surveys were to require minimal training before implementation proceeded.

#### 4.1.2 Procedures for Developing the Instruments

Since CARE had initiated the request for assistance, it was decided to base activities in Moyamba District where CARE operates with the MEP in the well construction program.

There are three persons working as health educators in the district. They are supervised by an acting district health coordinator, a very newly arrived U.S. Peace Corps volunteer. The first objective was to build a good working relationship with the field staff. The first day was spent in sharing experiences and discussing field conditions and activities.

Two days were then spent developing three surveys: the community survey (Appendix 1, Vol. 2), the household survey (Appendix 2, Vol. 2), and the well survey (Appendix 3, Vol. 2). The consultant took notes on the discussion of each item for use in developing the manuals for each survey (also included in Appendices 1, 2 and 3, Vol. 2).

As many as possible of the behaviors that are targeted by the health education program were examined for their feasibility for evaluation by observation or inoffensive questioning. (Previous surveys had been disliked because questions were asked that both the interviewer and the informant found either embarrassing or offensive.) This involved going through the health education curriculum page by page and discussing how one could observe whether or not a particular behavior had been adopted. Criteria for observation were thus developed. The household survey ended up with some 50 target behaviors or conditions, the well survey with some 30.

The forms were then drafted on a computer so that there would be minimal concern about making deletions, additions, and changes. Version numbers were part of the form description so that there would be no confusion over document changes. The manuals were also drafted on the computer.

#### 4.1.3 Field Tests

The consultant returned to the field and a day was spent going over the forms and the manuals word by word, instituting changes in the question format and language in the instructions. The next day was spent field testing the surveys and manuals. The interviewers were accompanied by the consultant or the acting district health coordinator. After each interview discussions were held and clarifications made. Due to difficulties in duplicating the forms, the number

of homes visited was limited and an interviewer comparison test originally planned was not carried out. (The interviewer comparison test compares the findings of two interviewers visiting the same household to see how their observations differed.) The interviewer comparison test attempts to gauge instrument accuracy. Instrument reliability is gauged by the test-retest trial. The same household is surveyed by the same interviewer twice, generally with a couple of days between visits so that neither the surveyor nor the informant is likely to remember the original responses to the questions.

No sampling procedures needed to be field tested since the intention was to do complete population surveys, i.e., the well survey is done on all constructed wells, the household survey is done on all households visited by the health educator, and the community survey is done on all project communities.

This is open to modification if desired. Stratified samples may be chosen of villages in a district or of households within a community. Instead of following all households, a randomly chosen sample could be studied longitudinally in time at three to six month intervals. Sampling may become necessary if the number of communities to be surveyed becomes too large for the staff to handle. Stratification might be based on village size, tribal dominance, accessibility, age of well, or interviewer. A statistician or epidemiologist in the Central Planning Unit of the Ministry of Development and Economic Planning should be consulted for help with designing and implementing sampling procedures.

After full discussion in Moyamba and further changes to the form and manual, the field testing was repeated in the Western Peninsula District where CARE is planning to construct gravity water supplies. Further changes resulted from this field testing.

During this period, the surveys were reviewed and questions asked by the senior managers of the Rural Water Supply Unit with changes resulting from these discussions.

Before leaving the country the plan was for final copies of the surveys and manuals to be transferred to mimeograph stencil sheets for subsequent printing. However, the breakdown of the computer made this impossible.

#### 4.1.4 Data Collection

The community survey is to be done once whether for a new or "old" community. The district health coordinator has the responsibility of keeping the survey up to date from information provided by the Trek forms (included in Appendix 3, Vol. 2) submitted by the field staff after each village visit.

The household survey is to be started once a community has been selected to receive a system. Over a period of several days to a week each household in the community is surveyed. If the community has already received a well by the time the survey is implemented, the survey is still completed once for all the houses in the community to determine benchmark scores for each home.

After the initial survey, each home is to be resurveyed at least once every six months. Each time the educator visits the community, presumably on a

monthly basis, six to eight homes should be surveyed. After three to four community visits, all the homes will have been resurveyed, since the average community has about 20 homes. Since the educational process is a continuous one, one would not expect the mode of resurveying to affect the analysis.

The well survey is completed each time a visit is made to a community with a project well.

#### 4.1.5 Analyzing Results

##### 4.1.5.1 The Community Survey (Appendix 1, Vol. 2)

The purpose of the community survey is to collect all of the relevant information about a community in one document. Information on population, tribal composition, community organization, accessibility, public facilities, etc., is included. There is also a listing of water sources used by the community. For the purposes of evaluation, the community survey is designed to be useful for either explaining or at least hypothesizing what characteristics of a community are important to account for differing levels of response by communities. Thus, the community household behavior scores can at some stage -- after several years of data collection -- be used to test hypotheses about the importance of certain community factors: accessibility, schools, social organization, etc. If statistically significant connections are found -- chi square would be a likely statistical test of significance -- then such characteristics could be used to predict program success in new communities.

##### 4.1.5.2 The Household Survey (Appendix 2, Vol. 2)

The concept was to have a simple scoring system: for each proper behavior observed, a score of one point; for each incorrect behavior, a score of zero. Responses to be scored were either "yes"/"no" or "good"/"poor." The form was designed so that all the positive responses would be in the left-hand response column and all the zero responses in the right-hand column. Thus, after completing and checking the form, the surveyor him- or herself could add up the number of circled items in the left-hand column to get a crude score for the household for that visit.

The score at this stage is "crude," because the base number of questions is not always the same. For example, if there are no children in the household, then several questions do not apply. The forms are to be reviewed by the district health coordinator, who checks for consistency of information and puts the total score obtained over the number of applicable questions. Using a hand-held calculator, the coordinator can convert these numbers to a percentage of "desirable" responses. The adjusted scores then range between 0 and 100.

The households are to be surveyed at least once every six months, preferably once a quarter. Over several years it is expected that a trend of increasing scores will be seen in each household, implying an increasing adoption of healthful behaviors promoted by the field staff.

By adding up the adjusted scores for a community, a mean village score can be calculated with its standard deviation. Again, in time one would expect to see

an increase in the value of the community mean and a decrease in the value of the standard deviation.

If such increases are not found over time, the behaviors are not changing, presumably because the educational program is not having its supposed effect.

Another possibility is that the instructions for choosing responses are not adequately defined so that the reliability of the survey is too low for the results to be meaningful. The district health coordinators are the key people for deciding if the survey is not reliable. They should continually check the accuracy of the completed surveys by randomly choosing houses for retesting, say a week or two after they have been surveyed by the health educator. If there are more than one or two differences between the responses obtained by the district health coordinator and those obtained by the health educator, then there is a problem with the instruction manual and clarity of the criteria for choosing a positive or negative response. It is strongly recommended that one district health coordinator be assigned to take black and white photographs illustrating the desirable and undesirable conditions. These photos could be used in the original training session for discussion and clarification of the manual. Ideally, the final manual would contain copies of the photos as illustrations.

#### 4.1.5.3 The Well Survey (Appendix 3, Vol. 2)

This survey is constructed similarly to the household survey, in that almost all the items are answered by observing conditions or behaviors. The scope of behaviors are the so-called "laws of the well." Desired behaviors are scored one, undesirable behaviors zero. There are approximately 30 scored questions. The first part of the survey is related to maintenance and has questions on the structural condition of the well and its parts. These questions are also scored and the results handled in a similar manner as the household scores as far as analysis is concerned.

#### 4.1.6 Implementation

By the time the consultants left Sierra Leone, the survey forms and their manuals were ready for field use. The next stage is the training of the field staff to use the surveys accurately.

It is proposed that a training session be planned for October 1985 for all users of the survey and their supervisors. The health educators of Moyamba should be key leaders in the training since they were so instrumental in its design. It would be very helpful if photographs were available by then to illustrate the manual. Presumably someone on the CARE staff could lend a camera to the acting district health coordinator in Moyamba. If there is a slide projector available, slides could be used; otherwise, the prints could be passed around. The district health coordinator should take the central role in the training since they will supervise the surveyors and review the surveys.

Before using the surveys, the field staff must know the manual extremely well. The district health coordinators should test them extensively on this knowledge and not allow any field staff to use the forms until they have

demonstrated detailed knowledge of the instructions. If each surveyor uses slightly different criteria for answering the questions, the value of the evaluation will be reduced to zero. During the training session, the district health coordinators should feel free to amend the manual but not the form itself. The important thing is that everyone should have the same instructions; it would be counterproductive if changes in the manual were made at the district level and there was no comparability between districts. One of the responsibilities of the national coordinator is to insure that all districts use the same version of the instructions and forms. UNICEF has expressed a strong interest in funding the training session.

The surveys should begin in the field with the start of the dry season in November. It is crucial that the district health coordinators maintain close supervision and checking for the first month of field use. After the first month, the district health coordinators should meet in December to share the first data and to discuss any problems or issues with the forms and decide what to do about them.

After three months of use, at the end of January 1986, the district health coordinators should prepare and submit a quarterly report to the national environmental health education coordinator in Freetown. Quarterly reports would be submitted thereafter. These reports would state the number of communities, wells, households surveyed; summary scores for the district; and any comments of interest. The secretariat would discuss with the district health coordinators what information they would like to see in the quarterly reports. On a regular basis, reports would be submitted at the beginning of April, July, October, and January.

At the end of 1986, an evaluation of the evaluation should take place, perhaps at an annual seminar (see Section 5.1.2, #7). Among the questions to be asked are the following:

1. Were the evaluation goals accomplished?
2. What were the costs in terms of cash, resources, and staff time?
3. What problems were encountered, and were they solved?
4. How valid and generalizable are the findings?
5. Would extra resources significantly improve the evaluation?
6. Should it continue to be used?

#### 4.2 System Construction and Maintenance

The MEP/CARE Wells Project has constructed 140 hand-dug wells over the last five years. The program has incorporated the MEP's standard design and construction techniques in implementing these projects. Upon careful analysis of level of output, integration of health education, and community participation of the wells project, an evaluation instrument was developed which would schedule these activities in a more effective way and document critical times and periods for the purposes of evaluation.

The general scope of the hand-dug well and gravity implementation evaluation is:

- a. to integrate the community mobilization, health education, community participation, well construction, and village based maintenance phases of a project,
- b. to improve the performance of the existing programs, and
- c. to assist in designing future rural water supply projects.

The scope of work called for assisting CARE and the MEP in developing an evaluation of the water and sanitation program. CARE's role in these projects has been to supply materials, vehicles, and health educators, with the MEP supplying technicians, technical assistance, and project management. The focus of this evaluation was on the integration of the functions supplied by the various agencies and donors within the beneficiary communities.

The purpose of the evaluation is to correlate sequencing and timing of the various project activities with the impact evaluation as measured by behavioral changes in the beneficiaries.

#### 4.2.1 Guidelines

An analysis was made of project activities, in the order in which they must occur for a well to be constructed and accepted by the community. Then health education activities were added such as promoting the program, developing the village health committee, organizing the village health committee workshop, performing baseline and household surveys, mobilizing community participation, and implementing a health education program.

After preliminary visits to the field, meetings were held with MEP, CARE, and WaterAid personnel to discuss details of the existing programs. The following factors were chosen to guide the development of the evaluation instruments:

- a. The field staff were to be able to carry out the first level of data acquisition and analysis so that they could see how the findings of the evaluation could be applied.
- b. The instruments were not to create any more paper work than necessary for the well technician supervisor, health coordinator, project manager, and water quality analyst. Existing information was to be used wherever possible and information presently collected but not used in program monitoring and evaluation was to be eliminated.
- c. Field staff and project managers were to be involved in all aspects of the development, field testing, and review of the evaluation instrument.
- d. The evaluation forms were to be accompanied by manuals of instruction.



#### 4.2.2 Procedures for Developing the Instruments

A preliminary site visit was made to Koinadugu District to observe the MEP/UNDP implemented well project. Well technicians, health educators, water quality analysts, and the project manager were interviewed. Discussions centered on their concerns and questions about the impact of their project. A similar visit was made to Moyamba District where the MEP/CARE well project was centered. An attempt was made to see as many phases of construction as possible. Every phase of construction from test drilling to headwall construction was observed, except for finishing the headwall and cover. Construction of the superstructure and fence, which are community responsibilities, were the phases of construction not in progress during the field visits at the two sites.

The implementation tasks for the hand-dug well project and a gravity water system were then analyzed in terms of their sequencing and duration. From this network analysis the integration of community participation, health education, community mobilization, water quality monitoring, and well technician activity was developed for a standard project. The list of tasks are in order of occurrence to minimize the amount of time the well technicians are in a community and the total number of construction days. The order of tasks also maximizes the involvement of the community and the activities of the village health committee in the project.

The community contribution during construction of the village well, is in the form of labor, sand and gravel, and food and lodging for the well technicians. These contributions are necessary over the entire period of the construction. The timing of these contributions based upon the phase of construction often comes at critical periods for the villagers. For example, the well technicians might be in the village at the end of a dry season in a poor harvest year. This would require a sharing of rice and other staples at a time of limited supply. Or the well technicians might be in the village at the beginning of the wet season when all the family members are needed to work the fields and get the crops in for the next year. If the community has to sacrifice their food and labor at critical times and well technician crews are inactive in terms of well construction, then serious problems arise. The reasons for the technicians not working and the lack of production on the well technicians' part could also be due to an external factor such as lack of cement and rebar on the site, lack of transport to move sand and gravel, lack of lining and cassion forms, etc.

Project evaluation forms were developed for hand-dug wells and gravity water systems (Appendices 4 and 5, Vol. 2). This evaluation process should be performed on all wells constructed by the project. An attempt should be made to correlate the information from the evaluation with the impact evaluation gathered in household and community surveys and in the well operation and maintenance survey. Only through this kind of analysis can project successes and failures be related to implementation activities.

The time required to complete the various phases of a rural water supply project and the sequencing of these activities is measured with this evaluation instrument. Information concerning the present operating status of the water supply system is also included in this form.

#### 4.2.3 Field Tests

The ordered list of tasks was then taken to a health educator to review for health education activities. The order list was then taken back to Moyamba District and tested with the project manager and well technician supervisor. A completed well file was then pulled from the project office and the list of tasks or draft implementation log was evaluated to see if the existing monitoring and reporting requirements provided the necessary data. The field test revealed that all but five pieces of information were available in the existing files. Most of the voids were in the documentation of the community contribution. Since community participation is a major factor in the success of a water project, this information will have to be logged in all future projects. At the present time the well technicians keep a daily log of materials supplied and activity on site. The water quality analyst takes four samples a year from each project well. One copy of this report is filed with the central laboratory in Njala, the second copy is placed in the health educator's file. Trek reports are filed by health educators for every visit they make to a village prior to construction, during construction, and after construction. Some of the information necessary for the implementation log is recorded in these trek reports. The trek report (Appendix 3, Vol. 2) was redesigned as a part of this activity and currently includes all necessary information.

The draft hand-dug well project implementation log (Appendix 7, Vol. 2) was also reviewed by Horatio Wright, Alex Harleston, Bob Freedman, and Damion Gagnon. Review comments from field and headquarters staff were then incorporated into the instruments to be field tested.

The gravity water system project implementation log (Appendix 8, Vol. 2) was developed in a different manner. Since CARE/MEP have not constructed a gravity system as of this date, the sequence of activities was obtained from WaterAid engineers.

#### 4.2.4 Data Collection

The list and timing of activities for the implementation of a hand-dug well was obtained by interviewing two project managers (MED/UNDP and MEP/CARE), well technician supervisors, and UNDP technical advisors. Site visits were made to well projects at various phases of implementation from test drilling to a community with a recently completed well. Sixteen well sites were visited in Koinadagu and Moyamba Districts. Well technicians, community members, village health committee members, and test drilling technicians were interviewed at these sites.

MEP/UNDP field and headquarters project personnel reviewed the order of the implementation activities for the rural water supply project. WaterAid engineers and the CARE health educator reviewed the gravity water system sequence of activities. The hand-dug well evaluation instrument (Appendix 4, Vol. 2) was taken to Moyamba District and a well technician supervisor tested it there. The test involved finding information in existing diaries, trek reports, and community surveys to complete the questionnaire evaluation.

The gravity system evaluation (Appendix 5, Vol. 2) was tested by WaterAid engineers. Since the Western Peninsula projects have just begun, a complete project cycle has not been completed. The gravity system evaluation questionnaire should be retested after a full project cycle has been completed.

## Chapter 5

### RECOMMENDATIONS

#### 5.1 System Construction

##### 5.1.1 Program Level

1. CARE should continue to participate with WaterAid in the implementation of the gravity water system. In this project WaterAid handles the design and construction and CARE is responsible for community mobilization and health education; this appears to be an excellent combination of technical capabilities and resources.
2. Under the present conditions, CARE should not participate in a handpump program. A handpump program should be considered only after the MEP-based hand-dug well maintenance unit has been operational for several years. The MEP unit should demonstrate its ability to monitor, repair, stock parts, and train villagers to perform routine maintenance and repairs.
3. CARE should take a stronger role in selecting, coordinating, and training the health educators.
4. CARE should continue to increase its activity in the water sector. Specific targets should be identified only after the current project has been evaluated. It is impossible to know if MEP/CARE can construct 40 wells a year or to say that 80 percent of the wells will be used at the end of the first year. If priorities are to be assigned to types of projects, CARE should support gravity systems before well systems. Gravity systems have a better record of serving beneficiaries over the design life of a project. To date MEP/CARE have not demonstrated their capability to supply water to villages with hand-dug wells. Well systems should be supported only if serious attention is given to developing community-acceptable maintenance techniques over the life of a project. No hand-dug well program should be proposed for less than a five year period. A minimum of two years of health education should precede any construction activity. Village-based maintenance should begin two years after completion of the well.

##### 5.1.2 Field Level

1. A chart should be developed to track the progress of each well in terms of health education activities, community contributions, project inputs, and technician scheduling. This status chart should be posted in the district offices for use by all project staff. All members of the integrated team should be responsible for updating the information relating to their specific activities.
2. The data necessary for the status chart should be entered in the well-project log. This log should show the completion dates of various phases of construction and other critical prerequisite tasks. This log should be used to evaluate the integration of health education activities,

community participation, construction management activities, and water quality unit inspections.

3. A weekly meeting should be scheduled by the project manager to coordinate the week's activities. Special attention should be directed to community participation problems, such as the need to transport sand and gravel, seasonal demands on community labor, the availability of community contributed materials, and technicians who overstay their welcome, etc.
4. The project manager, with assistance from the staff should develop a plan for the year. The plan should be based upon the location of the well sites and supply depots, the stage of construction, the level of community mobilization, and hydro-geological conditions and should consider contingencies for fuel shortages, an extended wet season, and transport out of service.
5. Monthly meetings should be held at alternating project managers' offices: the MEP Freetown, CARE, and UNICEF. The purpose of these meetings should be to review plans, discuss problems, and share experiences. The emphasis should be on team building and common goals.

#### 5.1.3 Project Support

1. CARE should immediately resolve major logistic issues which are both real and imaginary roadblocks to success.
  - a. Moyamba should have diesel and gas bulk-storage capacity -- (500 gallons diesel, and 400 gallons gasoline).
  - b. Moyamba should have the capability to repair vehicles. This includes an inventory of spare parts, tools, and a garage.
2. CARE, through the MEP, should establish a well maintenance team for rehabilitating and repairing wells. This team should work under the direct supervision of the health education coordinator to sequence education activities with the physical repairs/rehabilitation.

#### 5.1.4 Hand-Dug Well Technology

1. The hand-dug well process should be modified to insure that the post holes used for well construction are outside the apron diameter. The patch that is later placed in the apron is a weak point in the design because it allows for direct inflow under the apron. This patch is within 1 meter of the lining. The timbers used for this construction frame are contributed by the community. This modification would require a beam approximately 1.5 meters longer than that presently specified.
2. A standard retrofit should be developed for rehabilitating all wells constructed with a wood frame and wood cover well opening. These systems appear to fail in approximately three years or less. The new frame should be metal with a galvanized cover plate. The cost of the materials should be paid by the community.

3. The MEP should develop alternative plans for the superstructure and fence based upon successful wells. A sketch or photograph of each successful alternative and a list of materials should be placed in a booklet for the health educator to use in discussions with the village health committee.
4. The use of a hand-operated winch should be incorporated into each well project. This winch should be mounted on a portable lightweight derrick. Community labor should be used to power this device. A safety feature should be required so that loaded buckets will not drop back into the well.
5. Information obtained from the test drill should be used to estimate the community contribution. This will require the sharing of experiences of the drillers and the technicians on the probable depth of the water, the degree of difficulty of drilling and the timing of putting in the lining and cassions.
6. A data base for the hydrogeology of the project regions should be developed, based upon test drills and well-drilling logs. The water level should be monitored to measure the subsidence and rise of the water in the project wells over various climatological conditions. This information could be used to determine regions where subsidence is minimal in the dry season. In these areas construction crews might be able to sink the linings and cassions without having to break off construction and return during the dry season. Regions where the subsidence rate is high would require two construction stages, with the cassion stage probably best timed at the end of the season.
7. Well technicians should be issued hard hats with their names stenciled on the front. They should be required to wear these at all times. Extra hard hats should be available for villagers who are excavating.
8. The technician performing the excavation should not dig while tailings are being removed from the hole. The technicians and villagers should be required to maintain a stationary position at the wall of the well while the loaded bucket is being raised to the surface.
9. The community should be required to construct a safety well covering made out of bush poles to be used during the construction period. Bush poles approximately 60 mm in diameter, and 2.5 meters long should be used. This cover should be placed over the well when construction is not taking place. These same bush poles can be used later in the superstructure construction, if the design selected calls for materials of this dimension.

#### 5.1.5 Latrines

1. CARE should increase the number of latrines on the project. The demand for latrines is such that the project should attempt to meet all needs. The approach should be on a community basis. An active latrine program in a village will require significant technical assistance and health education activity to insure that the latrines do not interfere with the water supply.

2. Villagers should be encouraged to share in paying for the latrines. The amount to be contributed and the technique for accessing the fund should be determined by the village health committee with assistance from the health educators.
4. The health educator should be trained in the techniques of latrine construction and be given the prime responsibility of promoting a latrine program in the village.

## 5.2 Health Education

### 5.1.2 Staff

1. Health education field staff need training in interviewing skills, listening skills, presentation skills, adult teaching/learning skills (how to coax and lead the community to develop its own ideas and identify its needs).
2. Locally available experts, such as Professor Pieh or Mr. Baylor Jalloh (of Makeni), should be used to carry out training.
3. Well technicians should receive communications skills training together with the health education staff. They should be given an opportunity to discuss mutual problems.
4. Priority should be given to the secondment of women for health education field and supervisory positions. Men should be used only in certain situations, such as interactions with male district or chiefdom leaders or for enforcement.
5. Guidelines on the recruitment process should be developed. This should help to insure that only skilled educators get hired. The quality of work and the success rate of each field staff member should be constantly monitored so that supervisors can build a profile of characteristics of the successful field worker. This profile could then be used during the hiring process to screen for potentially first rate employees. The quality of the program is primarily a function of the quality of the staff. Experienced professionals should interview potential new staff.
6. The average workload for staff should be calculated for staff size planning. If 30 wells per year are to be constructed, does this mean that one should plan on adding at least one more health educator per year?
7. A mechanism should be created to boost morale and to give field staff an opportunity to share experiences and help each other. One suggestion is an annual national seminar, featuring training, films, and discussions. Concrete production plans for the next year on a national, district, and personal-schedule level could be made at the seminar. All staff should participate -- management, health educators, technicians, drivers, mechanics, and maintenance people. The seminar would be a mechanism for communicating problems and learning how everyone's activities contribute to the functioning of the whole Rural Water Supply Unit. UNICEF has expressed great interest in funding such a seminar. They are particularly

interested in the production of an annual plan. The best time for such a seminar would be either before or at the beginning of the dry season in November.

### 5.2.2 Programs

1. Greater attention should be given to working with children in the schools or in the community. There is a need to help the Ministry of Education develop a health education curriculum, lesson plans, suggestions for classroom demonstrations, etc. Health educators need to work closely with teachers.
2. Opportunities to involve children in health education activities should be explored. Could children monitor or survey home conditions as a school health education exercise? Could older children, in charge of younger siblings, be trained at school or in the community about how to take care of their siblings?
3. Special presentations should be made to children in the community -- plays, puppets, demonstration, etc.
4. Sierra Leone is really fortunate in that there seems to be a strong demand for individual house latrines. Project emphasis and resources should be channeled to this program. From a disease reduction viewpoint, latrines are of greater importance than wells.
5. Well technicians should not be allowed to cut back on latrine design specifications (i.e., the slab foundation,) to save cement for well construction. This practice is dangerous for latrine users and could jeopardize the reputation of the latrine program.
6. A revolving fund for household latrines should be instituted. Individual households should be able to contract for a latrine with payment over two to three years.
7. Deciding whether cement stocks should be used for well construction or latrine construction is a policy issue. Latrines should not be pushed; however, the natural demand should be met.
8. It is not absolutely necessary that latrines be constructed out of concrete. Educators should receive guidance in aiding people to construct sound latrines using native materials.
9. The construction of school latrines should receive much greater attention. Children and teachers should be important target groups for the program.

### 5.2.3 Field Activities

1. The districts should discuss standardizing their strategy for working with the community. Should there be more intensive contacts at certain times than others? For example, one possible format might be:



Stage 1	Pre-construction	1-2 full weeks in village
Stage 2	During construction	1-2 times per week
Stage 3	After construction	1 time per week for 3 months
Stage 4	Follow-up	1 time per month for a year
Stage 5	Maintenance	1 time per quarter

Obviously any format has implications for workload planning and time scheduling.

Should there be a standard policy on length of community visits? Moyamba makes one visit per day, Koinadugu -- two to three visits per day. Is there a tradeoff between quantity and quality. Do these different policies get different or equal results?

2. Project "Learn" materials should be distributed to the staff to see how they can be used.
3. The village health committee members should be trained to teach, to communicate, and to pass on information to the community. It is unlikely that they have had previous experience of this kind. Teaching other adults is not a natural skill. Committee members need practice in talking to small groups of their friends and neighbors.
4. Community-wide workshops should be held in situ, with participation by all members of the community encouraged. In these workshops people can be shown how the well was made and then they can decide how it should be maintained. If they want to know about health or nutrition or agriculture, outside resource people can be brought in.
5. The community should decide how the well should look and what facilities for washing dishes, bathing, etc. should be constructed nearby.
6. When appropriate, traditional authority should be used to change community behavior. Education can occur in many ways and enforcement is one way. The important thing is to achieve long-term behavior change. The key person to cultivate a good relationship with is the mammy queen, as long as she is a strong leader in the community and is really respected by the other women.

#### 5.2.4 Priorities

1. Health education should get higher priority from project managers, i.e., the health educators should supervise all contacts with the community, not the managers, not the well technicians, not the engineers. Let the health educators call the shots as far as scheduling work in the communities is concerned. They know the good and bad times to ask the community for support and cooperation. The technician team must avoid damaging the rapport the health educator has built up with the community.
2. Health educators should be present during the test drilling to insure that culturally inappropriate sites are not chosen. They can also take advantage of the great interest shown by the community at this time to develop rapport and explain the project to them.

### 5.2.5 Implementation of the Evaluation

1. Paper should be supplied to duplicate evaluation forms.
2. Health educators should be trained in how to use the evaluation forms; otherwise, the quality of data will be poor and suspect. UNICEF is greatly interested in paying for a one- to two-day training session for all health education staff on how to use the evaluation forms. This should be planned for October 1985. If other agencies are interested in using the evaluation surveys they could be invited to send along members of their staff too. The training session could also be used to train all in communications, listening, and interviewing skills.
3. An evaluation system for village health committee performance should be set up. What are they doing? How effective are they? How well do they do it? What training do they need? How many people are they reaching?

### 5.2.6 Integration with Other Ministries

1. Steps should be taken to integrate Rural Water Supply Unit health education activities with those of the Ministry of Health. The maternal/child health aides, public health sisters, public health inspectors, and district health educators are natural allies in covering the large numbers of communities to be reached.
2. Community-level workers from other ministries, such as Agriculture, Social Welfare, and Interior, should be trained to carry the water and sanitation messages to wherever they are working.
3. The program director should attend the quarterly meetings of the Steering Committee on Primary Health Care -- an intersectoral group that is interested in the MEP's rural health promotion.

## 5.3 Village-Based Maintenance

### 5.3.1 Hand-Dug Wells

1. The MEP should develop a standard approach in all Districts in the integration of community participation, health education, expendable parts replacement, inventory system, and the use of trained technicians to maintain and repair hand-dug water wells and gravity systems.
2. The MEP/CARE village maintenance program education component should be based upon the villagers' perception and solutions of how they will keep their water system in operation after the construction crews have left. The health educators, through the village health committee, should actively involve the women in the community in establishing a maintenance and repair program for the village.
3. Villagers should be trained in the early detection of equipment wear and in techniques of maintenance and repair. The emphasis of the health education should be on recognizing the signs of impending failure in

equipment and parts. Early replacement and maintenance is the strategy, for it is too costly for each village to maintain a supply of spare parts to repair breakdowns.

4. The village should establish an operation and maintenance fund to pay for expendable supplies, parts, repairs, and a portion of any upgrade costs. The fund should be generated by assessing each house in the village a fee established every six months by the village health committee. Well construction should not begin until the first year's projected operations and maintenance costs are in the fund. The fund should be audited every six months by the health educator for balance, items of expense, and problems in collecting assessment.
5. The villagers, particularly the women, should be trained in routine operation and maintenance routines. Examples of these activities are found in the following list:
  - monitoring water level
  - retrieving rope and bucket from the well
  - replacing a worn rope
  - lubricating a pulley
  - replacing a worn pulley
  - reattaching bucket to rope
  - reattaching bail to bucket
  - repairing cover frame
  - replacing cover frame
  - repairing cover
  - replacing cover
  - repairing superstructure
  - repairing fence
  - repairing gate
  - clearing drainage
  - reconstructing drainage
  - replacing bucket hanger, etc.
6. MEP/CARE should establish a well maintenance team to support the villagers in operating and maintaining wells and to assist in the rehabilitation and upgrade of wells. This team should work under the direct supervision of the health education coordinator. The team's activities will be integrated into the village health committee request, the health educator's response, and the community's operation and maintenance monitoring and labor contribution.
7. The well maintenance team should be a permanent operating component of the Rural Water Supply Unit in each project area. It should be composed of an experienced well technician and an experienced health educator. The team should have a vehicle permanently assigned to its activity.
8. The health education coordinator, the project manager, and the operation and maintenance team should identify the villages with wells which, for one reason or another, are not being used. In most cases these villagers will be difficult to remobilize and to interest in the health education activities. Because of the past failure, experienced educators and

technicians will have to be employed to assist the community in solving their water supply problem.

9. The MEP should develop a supply of buckets, ropes, pulleys, galvanized covers, and grappling hooks with rope. These supplies will be requested by the village health committee based upon needs verified by the health educator. The MEP should continue to use UNICEF's procurement mechanism for buckets and ropes but should also develop a locally available source of the commodities as a back up and as a future source since the UNICEF source will gradually be reduced over the next five years.
10. Each MEP project should submit an annual report of the operational status of the wells in their district. The operation and maintenance evaluation survey which uses data from the health educator's trek report and well survey form will be the reporting instrument for this document. MEP/CARE will use this report to re-evaluate the operation and maintenance team, health educators, and well technician's activities and to re-evaluate their design and construction activities as they pertain to community-based maintenance.
11. The MEP/CARE operation and maintenance team should initiate special studies in the operating longevity of various expendable elements of hand-dug wells and handpumps. Replacement frequency and failure analysis should be performed on the following components:
  - a. UNICEF galvanized buckets, vs. locally made buckets
  - b. rubber tire buckets vs. UNICEF buckets
  - c. polypropylene rope vs. locally made hemp rope
  - d. replacement frequency of wearing services in MARK II shallow well pumps
  - e. sources of sediments and humic materials in wells with aquatic insect larva
  - f. wooden pulleys vs. cast iron pulleys
  - g. various means of attaching rope to bucket.

### 5.3.2 Gravity Systems

1. MEP/CARE/WaterAid should institute a gravity water system community-based maintenance program which incorporates a village committee revolving fund, a paid community member who performs routine operations and maintenance, and an MEP stock of equipment, parts, and tools.
2. The village health committees need to be fully trained before the system is inaugurated. This includes training people to maintain the system and do repairs and to manage the system's finances.
3. Although some people are trained by the technicians in how to lay pipe, construct faucets and so on, there is no guarantee that these people will stay in the community. They might turn this skill to their own advantage to make money outside the community. A mechanism has to be set up with the committee for keeping a pool of people in the community trained to do minor repairs. Women should be considered for this position since they are the persons responsible for providing water in the home and presumably

have the most interest in keeping the system running. A technician might visit the community once a year and give a "hands-on" maintenance and repair workshop to all those interested in learning.

4. A basic set of tools and spare parts should be made part of the project cost. These can be handed to the village health committee at the inauguration in front of the whole community. The committee would be responsible for storing them in a secure place and keeping track of where they are. Perhaps the use of a board with the tools outlined where they are hung could make it easy for village health committee members to see which tools have not been returned to their proper places.
5. CARE, in collaboration with the MEP, should develop an accounting system that is technologically appropriate for small rural village health committees, whose members do not have much schooling. One way of developing such a system would be to work closely with a committee that is doing a good job of maintaining their system and see what they suggest are the best forms, receipt books, and reporting procedures to be followed. Once such a system has been developed and field tested, members of that committee could then be used in workshops to train others. They are likely to be the most competent people to transfer the information to others like themselves.
6. Supervision of the village health committees should be set up to operate by "management by exception." For example, the committees might be required to submit quarterly reports to the MEP or CARE showing income, expenditures, salaries, and remaining funds. As long as these reports are received there is no need to follow these committees closely, but, if a committee does not submit a report, then a health educator should be dispatched as soon as possible to see what the problem is.
7. In uncertain times a sticky issue is how to adjust monthly or periodic use fees when there is high inflation and the price of spare parts and tools is continually increasing. From the start there should be some mechanism of increasing the user fee in pace with inflation. One suggestion is to tie the fee to some basic commodity available in the community, such as the cost of a beer or a cup of rice. Besides dealing with inflation it also helps to put the price of water service into a meaningful social context.
8. Committee members cannot be expected to be natural teachers and trainers of the community. If they are to carry out these functions they must receive considerable training themselves by personnel experienced in adult education.

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