PN-ABL-769
78309

AGENCY FOR INTERNATIONAL DEVELOPMENT
PPC/CDIE/DI REPORT PROCESSING FORM

ENTER INFORMATION ONLY IF NOT INCLUDED ON COVER OR TITLE PAGE OF DOCUMENT

1. Project/Subproject Number: 9365948

2. Contract/Grant Number: DPE-5948-C-00-9030-00

3. Publication Date: July 1991

4. Document Title/Translated Title:
Community-Based Initiatives To Eradicate Guinea Worm: A Manual For Peace Corps Volunteers

5. Author(s)
1. Silverfine, Eva
2. Brieger, William
3. Churchill, Angela

6. Contributing Organization(s)
Vector Biology and Control Project
Medical Service Corporation International

7. Pagination: 210

8. Report Number: 81134

9. Sponsoring A.I.D. Office: R&D/H

10. Abstract (optional - 250 word limit)

11. Subject Keywords (optional)
1.
2.
3.
4.
5.
6.

12. Supplementary Notes

13. Submitting Official: Robert W. Lennox, Sc.D.

14. Telephone Number: (703)527-6500

15. Today's Date: 7/27/92

DO NOT write below this line

16. DOCID

17. Document Disposition
DOCRD [ ] INV [ ] DUPLICATE [ ]

AID 590-7 (10/88)

PN-ABL 769

Community-based Initiatives to Eradicate Guinea Worm

Prepared by
the Peace Corps of the United States and
the United States Agency for International Development
Vector Biology and Control Project

by
Eva Silverfine
William Brieger
Angela Churchill

July 1991

Purpose

This manual is for community promoters, health agents, and school teachers working in communities where Guinea worm disease is endemic.

The purpose of the manual is to give you the information you need to help eradicate Guinea worm disease. We hope that this information, combined with the practical experience you receive in Guinea worm disease-eradication training, will enable you to work with local communities and government extension agents to eliminate the disease from your community. The underlying assumption is that you can become an effective change agent and promoter of community action in rural communities. Before you start to work on Guinea worm activities, however, please contact your supervisor and the National Guinea Worm Eradication Program Coordinator to discuss your plans and coordinate activities with those of the National Program.

We hope you will be able to pass this manual on to another Peace Corps Volunteer or counterpart. Please keep it in good condition.

Through your efforts, we can help the World Health Organization meet its goal: to eradicate Guinea worm disease by the end of 1995.

Acknowledgements

This manual has drawn upon a variety of sources of information and has benefitted from the contributions of a number of people. The following documents were used extensively.*

Opportunities to Control Dracunculiasis. 1983. National Academy Press, Washington, D.C. (ICE# HE052) [Available in French.]

Guinea Worm/Dracunculiasis Eradication Programme: Training Course for Guinea Worm Coordinators. CDC Training and Laboratory Program Office, Division of Technical Services. [Available in French.]

Case Study: Guinea Worm — A Successful Approach to Community Education and Participation Results in Safe Drinking Water Supply and Guinea Worm Eradication. 1987. World Neighbors. A. Foly and D. Caudill.

Workshop on Guinea Worm Control at the Community Level: A Training Guide. 1988. WASH Technical Report No. 50. W.R. Brieger and F. Rosenweig.

Adding Guinea Worm Control Components: Guidelines for Water and Sanitation Projects. 1988. WASH Technical Report No. 51. A. Prins and M. Yacoob.

Programming Guide for Guinea Worm Eradication. 1990. WASH Field Report No. 319. D. Yohalem. (ICE# T0058)

Helping Communities to Eradicate Guinea Worm: A Training Guide. WASH Field Report No. 322. [Draft.] W.R. Brieger.

The addresses for the organizations mentioned above appear in Appendix A.

We would like to thank Dr. D. Roberts and the Vector Biology and Control Project subcontractor, The Henry M. Jackson Foundation, for their assistance in producing the manual.

Preparation of this document was sponsored by the Vector Biology and Control Project under Contract No. DPE-5948-C-00-9030-00 to Medical Service Corporation International, Arlington, Virginia, U.S.A., for the Agency for International Development, Office of Health, Bureau of Science and Technology.

* These references are listed here only and do not appear as citations in individual chapters.

Table of Contents

The Guinea Worm Disease Eradication Effort 1
The Global Plan 3
National Plans of Action 4
The Role of International Agencies 4
The Role of Peace Corps 6
The Role of the Community 7
The Role of the Peace Corps Volunteer 7

The Disease 10
Life Cycle 10
Symptoms 13
Diagnosis 15
Community Perceptions 16
Case Treatment 17
Traditional Treatment 18
Generally Accepted Treatment 19

The Problem 21
Guinea Worm Disease Disability 22
Social and Economic Effects 22

Prevention: Health Education 26
Community Education and Action 27
A Definition of Health Education 29
Health Education Messages 29
Roles of a Health Educator 30
Counselor 31
Facilitator 31
Linker 31
Trainer 32
Health Education Planning 32
Identifying Target Behaviors and Audiences 33
Assessing Influences on Behavior 34
Selecting the Strategy 35

Health Education Methods 37
Pretesting Educational Methods 38
Putting Educational Methods into Practice 39
Stories in Health Education 39
Demonstrating Skills 45
Group Discussion 49
Health Education Media 54
School Health 58
Teaching Children about Health 58
Children as Community Activists 59
Roles of the Teacher 61

Prevention: Water Resources 26
Water Supply Protection Options 65
Protecting Existing Water Supplies 66
Developing New Sources 73
Treating Water 77
Choosing a Plan of Action 84
Identifying Alternatives 84
Comparing Alternatives 86
Selecting an Alternative 90

Measuring The Problem 96
Community Assessment 96
Community Assessment Information Needs 97
Methods for Obtaining Information 105
Interviews 105
Observation 106
Surveillance 108
Case Recognition of Guinea Worm Disease 111
Eradication Program Information Needs 111
Methods for Obtaining Information 111
Special Case Detection Activities 120
Issues of Information Validity 120
Reporting 121

d

Planning and Evaluating GWD Eradication Activities 123
Community Participation 123
The Local Planning Group 125
Project Name 126
Problem Statement 126
Project Purpose 127
Project Goals 127
Project Objectives 128
Project Milestones 129
Project Tasks 130
Strategies 130
Project Resources 132
Action Plan 134
Monitoring and Evaluation 135
Monitoring 135
Evaluation 136
Writing a Project Report 138

Appendices

Information Resources Appendix 141
Health Education Appendices 141
Health Education Session Plan Outline 142
Factors Influencing the Acceptance of Filters in a Nigerian Village 145
Resistance to Change Continuum 146
Teaching Tools and Techniques 147
Participatory Techniques 154
Sample Lesson Plans for a Guinea Worm Unit 156
Sample Posters 165
Steps for Conducting a Community Survey With Students 171
Water Resource Appendices 173
Determining Quantity of Available Water 174
Wells 177
Developing Streams and Rivers 182
Rainwater Catchment 185
Community Involvement in Marketing of Monofilament Filters 188

Measuring the Problem Appendices 189
Interview Guide on Community Beliefs 190
Formal Interview on Water Source Use 192
Water Contact Observational Study 193
Village/Town Monthly Summary Form 194
Clinic Data Summary Forms 195
Case Search Form 197
Village Summary Form 199
Suggestions for Selecting Meaningful Samples 200
Planning and Evaluation Appendix 205
Sample Budget Format 206

Index 207

Introduction

The Guinea Worm Disease Eradication Effort

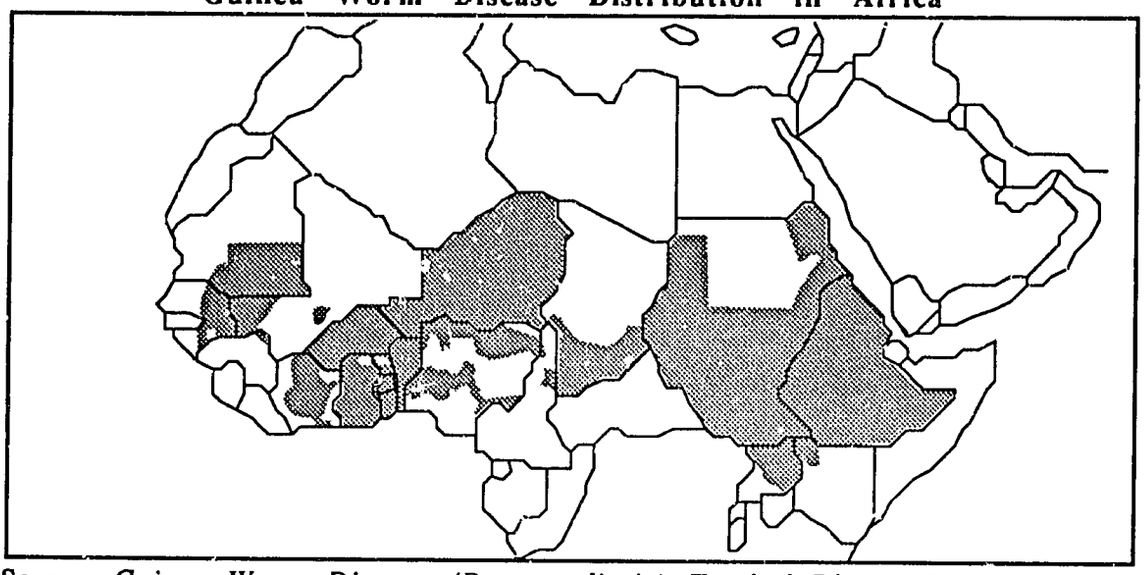
Guinea worm disease, also known as dracunculiasis, is a parasitic infection caused by a long, stringlike worm, the nematode *Dracunculus medinensis*. Although people rarely die from Guinea worm disease (GWD), it is extremely incapacitating. The pain often forces victims to discontinue many essential daily activities for four to six weeks or longer. And no matter how often people are infected with GWD, they do not become immune to it.

GWD has afflicted the poorest of the poor for centuries. It typically affects rural people who do not have access to safe drinking water and basic health care. Lack of understanding of its preventable causes has shrouded GWD in myth and kept people from taking the action necessary to free themselves of its burden. The tragedy is not that GWD exists, but that people do not realize how easy it is to eliminate GWD from their lives. What is needed is a concerted effort to educate the people of endemic areas and help them break the cycle of the disease.

GWD occurs in Africa and Asia, where 140 million people are at risk of infection. (The distribution of GWD in Africa is illustrated below.) GWD is believed to afflict an estimated 3-5 million people every year. In African communities where the disease is found, prevalence rates of 40 percent are common.

Information on reported cases of GWD submitted to the World Health Organization (WHO) is presented below. Reports of the number of cases based on routine surveillance underrepresent the

Guinea Worm Disease Distribution in Africa



Source: *Guinea Worm Disease (Dracunculiasis)*, Tropical Disease Paper No. 4, VBC.

Reported Cases of Guinea Worm Disease 1985-1990*

Country	1985	1986	1987	1988	1989	1990
Benin	NA†	NA	400	33,962	7,172	37,414+
Burkina Faso	458	2,558	1,957	1,266	5,122	42,187+
Cameroon	168	86	NA	752+	871+	742+
CAR	31	0	1,322	NA	NA	10+
Chad	9	314	NA	NA	NA	NA
Ethiopia	1,467	3,385	2,302	1,487	3,565	NA
Gambia	0	0	0	NA	NA	0+
Ghana	4,501	4,717	18,398	71,767	179,556+	117,034
Guinea	0	0	0	NA	1	0+
India	30,950+	23,070+	17,031+	12,023+	7,881+	4,798+
Ivory Coast	1,889	1,177	1,272	1,370	1,555	1,360
Kenya	NA	NA	NA	NA	5+	6+
Mali	4,072	5,640	435	564	1,111	884+
Mauritania	1,291	NA	227	608	447	8,036+
Niger	1,373	NA	699	NA	288	NA
Nigeria	5,234	2,821	216,484	653,492+	640,008+	394,082+
Pakistan	NA	NA	2,400	1,110+	534+	160+
Senegal	62	128	132	138	NA	38+
Sudan	NA	822	399	542	NA	NA
Togo	1,456	1,325	NA	178	2,749	5,118+
Uganda	4,070	NA	NA	1,960	1,309	NA

* *from passive reporting and/or area-limited searches unless otherwise indicated; 1990 numbers provisional*
† *data not available*
\+ *national survey*
Source: *Guinea Worm Wrap-Up* #31, WHO Collaborating Center for Research, Training, and Eradication of Dracunculiasis at Centers for Disease Control.

extent of the problem in the affected country. Case reports from nationwide village-by-village case searches give a far more accurate picture of disease prevalence.

Like malaria, onchocerciasis, and schistosomiasis, GWD is a water-based parasitic disease. Unlike the others, however, it is transmitted *only* through drinking contaminated water. Thus, GWD is the only water-based disease that can be entirely prevented through education and improvement of drinking water supplies.

A number of countries have eradicated GWD. The USSR (Turkestan) declared GWD eliminated in the 1930s, and Iran reported elimination in 1983. GWD is no longer reported in Yemen and Saudi Arabia and has probably been eliminated from The Gambia and Guinea. In India, which began an eradication program in 1980, the disease is now limited to six states. In 1990, a national survey detected only 160 cases in Pakistan.

Intervention efforts have also been successful in reducing the prevalence of GWD in several African countries. In recent years, for instance, public health scientists in Burkina Faso, using health education alone to promote the filtration of water, were able to reduce the incidence of GWD in three villages from 54, 37, and 24 percent to zero in only two transmission seasons. A World Neighbors' project successfully used two interventions — community education and provision of safe water — to eliminate the disease from the village of Kati, Togo, in the mid-1980s.

The Global Plan

GWD was a largely neglected issue until the International Drinking Water Supply and Sanitation Decade[1] steering committee adopted a resolution in 1981 calling for its global eradication. Global eradication of GWD is feasible because

- humans are the only reservoir of infection,
- transmission is usually focal and seasonal,

[1] In 1980 several agencies, including the United Nations Development Programme, the World Health Organization, and the World Bank, declared 1981-1990 the "International Drinking Water Supply and Sanitation Decade." A major goal was the provision of safe drinking water to all countries.

- control technologies, such as improved water supply and health education, are effective interventions, and
- the disease is easily recognizable, so surveillance and certification of elimination are relatively easy.

National Plans of Action

Countries with endemic GWD are conducting national surveys to define the extent of the GWD problem and develop National Plans of Action for elimination. Most national programs are directed by the Ministry of Health, with other ministries providing support.

As of April, 1991, National Plans of Action had been adopted in Benin, Burkina Faso, Cameroon, Ghana, India, Kenya, Mali, Mauritania, Pakistan, Niger, Nigeria, Senegal, Togo, and Uganda.

The Role of International Agencies

Many international agencies, non-governmental organizations, and private businesses have been collaborating in GWD eradication efforts, including the following:

- United Nations Development Programme (**UNDP**),
- United Nations International Children's Emergency Fund (**UNICEF**),
- World Health Organization (**WHO**),
- Agency for International Development (**A.I.D.**),
  - Water & Sanitation for Health Project (**WASH**),
  - Vector Biology & Control Project (**VBC**),
- Centers for Disease Control (**CDC**),
- Organisation de Coordination et de Cooperation pour la lutte contre les Grandes Endemies (**OCCGE**),
- Organisation de Coordination pour la lutte contre les Endemies en Afrique Centrale (**OCEAC**)
- Peace Corps (**PC**),
- World Neighbors,
- Global 2000,
- Tulane University School of Public Health and Tropical Medicine
- UCLA Danfa Project,
- American Cyanamid Company, and
- The Dupont Corporation.

A summary of efforts made by endemic nations and international agencies is presented below.

Milestones of the Initiative to Eradicate Guinea Worm Disease

1981
- The International Drinking Water Supply and Sanitation Decade Steering Committee targets GWD for elimination.
- India begins five-year program to eliminate GWD.

1982
- First International Workshop on Opportunities to Control Dracunculiasis is held by the U.S. Academy of Sciences.

1983
- Benin and Togo develop National Plans of Action with assistance from WHO.

1984
- WHO designates the Centers for Disease Control (CDC) as the WHO Collaborating Center for Research, Training and Eradication of Dracunculiasis.
- Niger develops National Plan of Action with assistance from WHO, USAID.

1985
- PC begins training volunteers for GWD eradication effort.
- Burkina Faso establishes National Committee for the Control of Dracunculiasis.

1986
- The thirty-ninth World Health Assembly adopts a resolution for GWD elimination.
- First African Regional Conference is held in Niamey, Niger.
- Cameroon prepares National Plan of Action with assistance from CDC, USAID.

1987
- Pakistan prepares National Plan with assistance from Global 2000.

1988
- Second African Regional Conference is held in Accra, Ghana.
- PC plans to mobilize 10 volunteers in each country where GWD is endemic to be assigned to eradication projects.
- Ghana and Nigeria adopt National Plans of Action.

1989
- The forty-second World Health Assembly adopts a resolution setting the goal of worldwide eradication of GWD as a public health problem during the 1990s.
- "Target 1995: Global Eradication of Guinea Worm," an international donors' meeting, is sponsored by Global 2000, the Bank of Credit and Commerce International, UNDP, and UNICEF in Lagos, Nigeria.
- Mauritania and Uganda adopt National Plans of Action.

Milestones of the Guinea Worm Eradication Initiative (cont.)	
1990	• WHO sets provisional criteria for certifying elimination of GWD. • Third African Regional Conference is held in Yamoussoukro, Ivory Coast. • American Cyanamid announces it will donate Abate. • Dupont Corporation and Precision Fabrics donate monofilament cloth. • Kenya, Mali, and Senegal prepare National Plans of Action.
1991	• Meeting of National GWEP Coordinators in Brazzaville, Congo. • The forty-forth World Health Assembly adopts Resolution WHA 44.5 calling for the eradication of GWD by 1995.

Source: *Programming Guide for Guinea Worm Eradication*, PC, WASH. (ICE# T0058)

The Role of Peace Corps

The Peace Corps, with the financial and technical assistance of A.I.D., has established a U.S. Peace Corps Guinea Worm Eradication Program (GWEP) to enable its staff, volunteers, and their counterparts to join the international effort to eradicate GWD. The purpose of the program is to provide program assistance, training, technical assistance, and support to Peace Corp staff and volunteers working on GWD eradication activities. The program is administered by Peace Corps' Office of Training and Program Support (OTAPS).

The program has six key objectives:

- To support host-country governments in the implementation of national Plans of Action.

- To promote increased collaboration and integration of GWD eradication activities between the PC, host-country governments, and other international organizations.

- To collect, organize, package, promote and disseminate multimedia information on all aspects of GWD and efforts to eradicate it. The GWEP will make materials developed in one country available to Peace Corps Volunteers (PCVs) in other countries.

- To increase PC programming in GWD eradication activities through new primary projects, add-ons to existing projects, and a wide range of secondary activities.

- To assist PC staff and contract trainers in training PCVs and their counterparts in GWD eradication efforts.
- To help PC staff and Volunteers implement coordinated surveillance, monitoring, and evaluation systems.

The Role of the Community

GWD can be eradicated with concerted community action. People in endemic areas need help to break the cycle of the disease by avoiding drinking water contaminated with Guinea worms and preventing contamination of their water sources. The guiding philosophy of the global initiative to eradicate GWD is to help people help themselves eliminate the problem.

The approach to GWD eradication recommended by the international community and currently being built into national action plans throughout Africa is community-based. The interventions recommended in this manual are also community-centered. PCVs should be community capacity-builders — helpers who facilitate other peoples' actions, act as resources, and organize and train others to make and execute decisions.

The Role of the Peace Corps Volunteer

Peace Corps Volunteers (PCVs) stationed in rural areas of Guinea worm-endemic African countries can play a crucial role in the national and international efforts to conquer this debilitating disease. The real effect of your efforts, the elimination of GWD from a community, may not be manifested during your two-year stay. You should, however, see positive results — an increase in the number of people filtering their water and a reduction in the number of GWD cases.

Volunteers have a variety of principal assignments: agriculture, community development, health, and education. While some of you may be assigned to work full time on GWD eradication, others may want to add GWD activities to your primary assignment. Regardless of your primary assignment, if you are living in a GWD-affected area you can provide invaluable assistance to national programs and endemic communities through a variety of secondary activities that do not take time away from your primary job.

PCVs' participation in surveillance, health education, filter distribution, water source protection, and other community-based interventions will greatly enhance GWD elimination efforts. If all PCVs in endemic areas take part in the national search for GWD cases (see Chapter Five), they could have a marked impact on the quality and scope of this surveillance effort.

Discuss GWD's impact in your community with community leaders and members, extension personnel, and representatives of the National GWEP. Talk to your Assistant Peace Corps Director (APCD) about:

- GWD eradication efforts in the host country and local region,
- possible GWD control activities that would fit naturally into your job description,
- other community workers with whom you would naturally collaborate in GWD control,
- community groups with which you can meet to discuss GWD control, and
- how you might help facilitate local action and planning.

Remember to be a role model in your community by protecting yourself against GWD and encouraging others to do the same. *Always* filter your water or drink from only protected sources.

This manual is intended to serve as a reference to Volunteers engaged at all levels of the GWD eradication effort. Chapter One will provide basic background information on the disease — the Guinea worm life cycle, GWD symptoms, and GWD treatment, from both western and traditional perspectives. Chapter Two discusses the impact of GWD on the individual and community. Prevention options are presented in Chapter Three, which guides the Volunteer in the role of health educator, and Chapter Four, which provides some useful information about water resource protection. Chapter Five reviews methods for determining the extent of the GWD problem in the community for both community and national planning, and Chapter Six outlines the process by which communities can plan, implement, and evaluate GWD intervention activities.

Although this manual has been prepared for PCVs, it can be used by any community-based health or development worker participating in GWD eradication activities.

Many of the references cited herein are available through PC's Information Collection and Exchange (ICE); many of the other references can be obtained through WASH. Addresses for ICE and WASH are included in Appendix A.

REFERENCES

Carter, J. The Modern Horror of an Ancient Scourge. *The Washington Post*, April 24, 1990.

Guinea Worm Eradication Newsletter. 1990, 1991. Peace Corps.

Guinea Worm Wrap-Up. 1990, 1991. WHO Collaborating Center for Research, Training, and Eradication of Dracunculiasis at CDC.

Hopkins, D. 1990. *Guinea Worm Disease (Dracunculiasis)*. Tropical Disease Paper No. 4, VBC.

Hopkins, D. We Can Get Rid of Guinea Worm. *World Health*, Jan.-Feb. 1990:26-27.

Hopkins, D., and E. Ruiz-Tiben. 1990. Dracunculiasis Eradication: Target 1995. *Am. J. Trop. Med. Hyg.* 43(3)296-300.

Morbidity and Mortality Review. Jan 5, 1990. WHO

Rymer, R. The Mission. *Health*, March-April 1990.

Thompson, D. Battling the Guinea Worm. *TIME*, Oct. 2, 1989.

Watts, S. 1987. Dracunculiasis in Africa in 1986: its geographic extent, incidence and at-risk population. *Am. J. Trop. Med. Hyg.*

Chapter One

The Disease

Source: *Guinea Worm/Dracunculiasis Eradication Programme: Training Course for Guinea Worm Coordinators*, CDC.

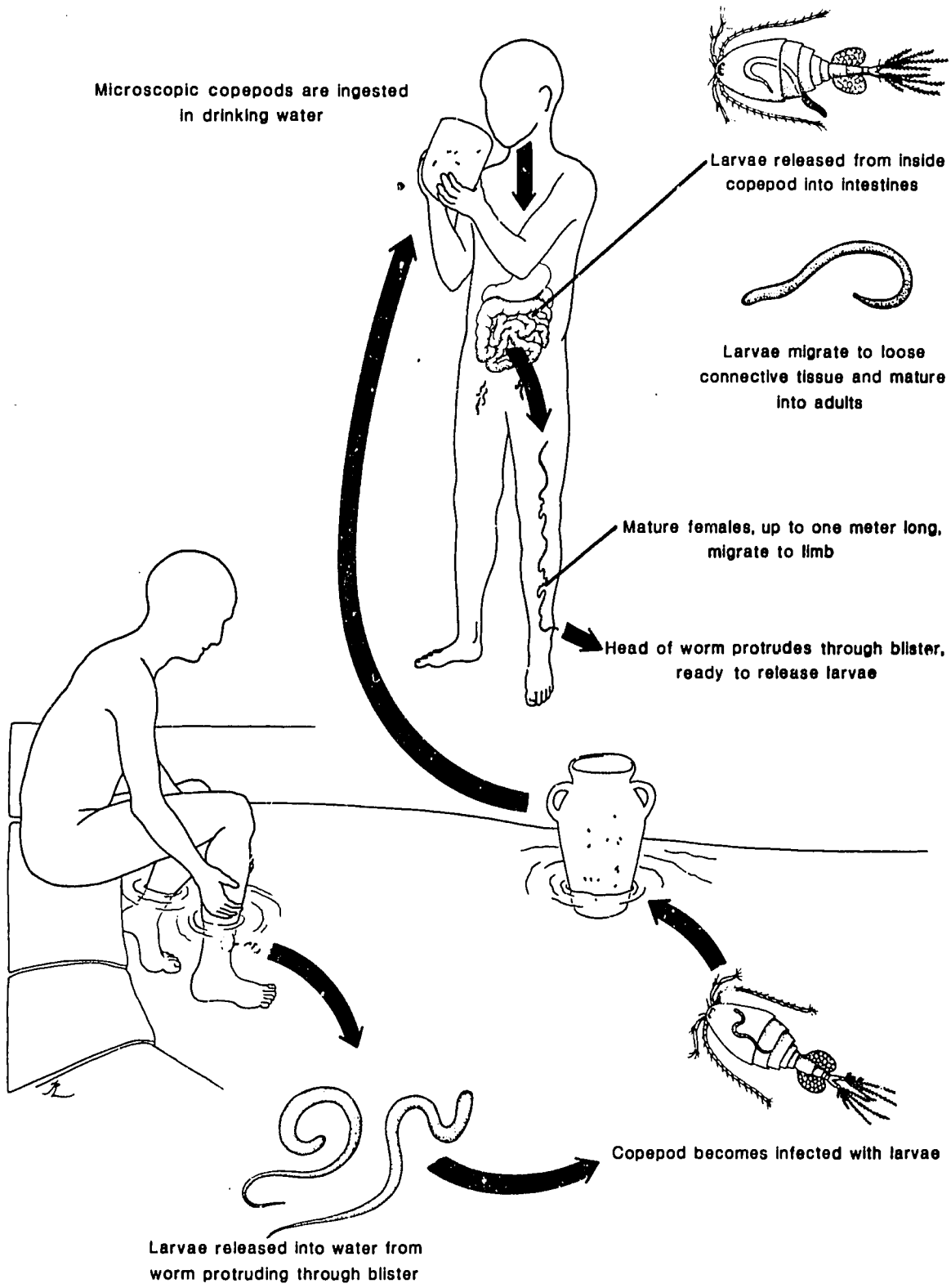
This chapter provides an introduction to Guinea worm disease (GWD), including:

- the life cycle of the Guinea worm,
- GWD symptoms,
- community perceptions of the causes and treatment of GWD, and
- generally accepted and traditional treatment for GWD.

Life Cycle

Guinea worms enter the human body when people drink water containing copepods, barely visible shrimplike crustaceans, infected with Guinea worm larvae. When the copepods, also known as "water fleas," are killed by

Life Cycle of Dracunculus medinensis



Source: *Guinea Worm Disease (Dracunculiasis)*, Tropical Disease Paper No. 4, VBC.

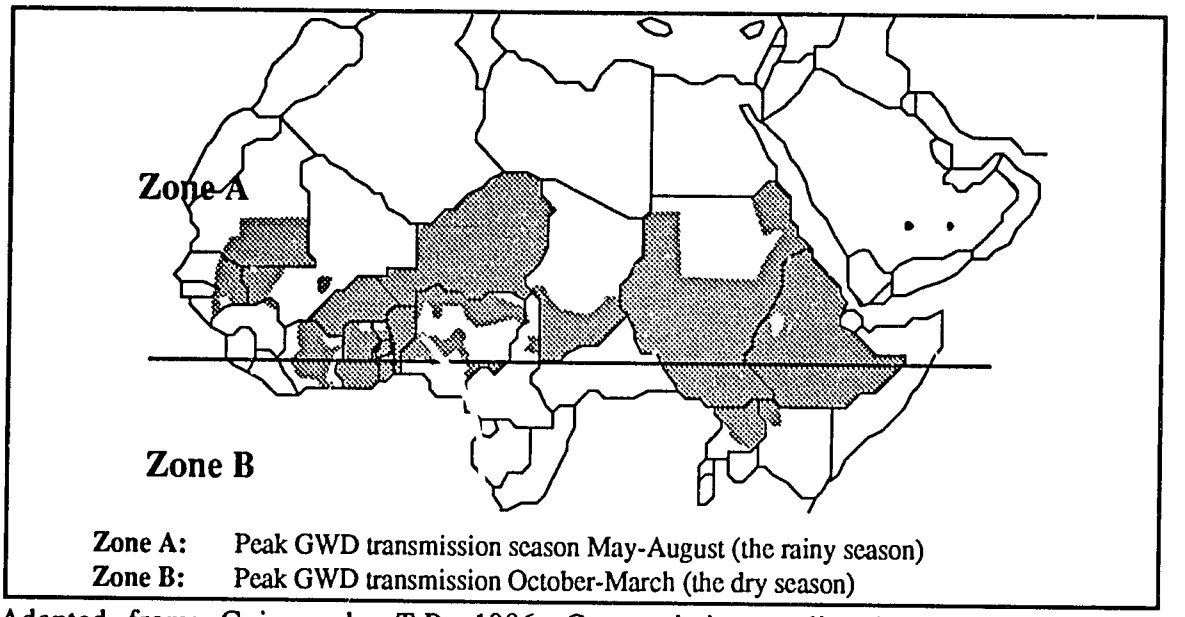
gastric juices in the stomach, Guinea worm larvae are released. The larvae move to the small intestine, penetrate the intestinal wall, and migrate to the abdominal muscles, where they begin maturing in connective tissue. Male and female worms mate about three months after ingestion. After eight months, the adult female worm, which grows to 1-3 feet long by less than 1/8 inch, usually moves to the lower limbs.

Approximately one year (range 9-14 months) after a person is infected, the Guinea worm is ready to emerge and emit larvae. The worm migrates to the tissues just under the skin and secretes a toxic substance that produces a painful blister. Infected people frequently try to relieve the burning sensation caused by the blister by immersing it in water. Contact with water causes the worm's uterus to rupture and stimulates the worm to expel larvae into the water. The process is repeated intermittently over several weeks.

Each female worm releases about one million microscopic first-stage larvae into the water. The larvae can remain active for up to five days in standing water, where they die unless they are ingested by copepods. Inside a copepod, the larvae develop into their infective third stage in 10-14 days. First-stage larvae swallowed directly by humans do not develop further and are probably killed immediately by gastric juices.

Seasonality is an important part of the epidemiology of GWD. Transmission occurs only under certain climatic conditions and varies according to the local rainfall pattern. In very dry areas such as the Sahel of West Africa (Zone A, map below), transmission generally is limited to the few months during the rainy season when surface sources of drinking water become available. Because of GWD's year-long incubation, infections become apparent during the same period a year later. In other areas where rainfall is much more substantial and prolonged, such as the savannah in southern Nigeria (Zone B, map below), the disease is most evident and is transmitted during the dry season, when surface water sources are shallow.

Guinea Worm Disease Transmission Seasons in Africa



Zone A: Peak GWD transmission season May-August (the rainy season)
Zone B: Peak GWD transmission October-March (the dry season)

Adapted from: Guiguemde, T.R. 1986. Caracteristiques climatiques des zones d'endemie et modalites epidemiologiques de la dracunculose en Afrique. *Bull. Soc. Path.* 79:89-95.

Symptoms

Infected people exhibit no symptoms until the female worm matures and is ready to emerge. The symptoms that herald the appearance of the Guinea worm ulcer include headache, body ache, and often fever. Itching and rashes are also reported. A variety of nonspecific symptoms, including stomach upset, diarrhea, vomiting, loss of appetite, and asthma, may accompany the appearance of the Guinea worm at the skin, but they are usually not severe.

Pain and swelling at the spot where the mature worm will emerge precedes the blister. In more than 90 percent of cases, the worm emerges somewhere on the legs or feet, although worms may emerge from any part of the body. Intense burning or itching accompanies the swelling, which develops into a blister in one or two days. This blister ruptures several days later and becomes a superficial ulcer containing a protruding worm. Occasionally worms die before reaching the skin's surface and are absorbed, form aseptic abscesses, or become calcified, leaving cordlike masses in the body. Worms also may become lodged in joints.

Signs and Symptoms of Guinea Worm Disease	
PRE-EMERGENT	• Mild pain or fever • Localized itching or burning • Localized swelling • Worm visible under skin • Blister
EMERGENT	• Ruptured blister • One to three worms emerging • Localized secondary or no infection • Moderate pain • Limited or no incapacitation (e.g., patient still able to perform routine tasks such as bathing or toileting, not bed-ridden)
COMPLICATED	• Severe secondary infection (e.g., cellulitis, discoloration, extensive swelling, pus) • Involvement of joint (e.g., knee, elbow) • Severe incapacitation (e.g., patient unable to perform routine tasks, bed-ridden) • Location of worm in breast or genital region • Cow dung or root remedies on wound • More than three worms emerging

Source: *Guinea Worm/Dracunculiasis Eradication Programme: Training Course for Guinea Worm Coordinators*, CDC.

The tissues near the blister become swollen, red, and very tender, probably as part of a largely allergic reaction. There is usually a secondary infection, which commonly spreads from the initial skin lesion to deeper tissues. Infected ankle and knee joints can become contracted, leading to permanent disability. Even in cases uncomplicated by secondary infection of the ulcer, the affected person may find it very difficult to walk. On average an uncomplicated infection may take about four to six weeks to heal. Severe resulting conditions include septic arthritis, tetanus, gangrene, pulmonary scarring, and eye disease. Death resulting from GWD-associated infection occurs infrequently.

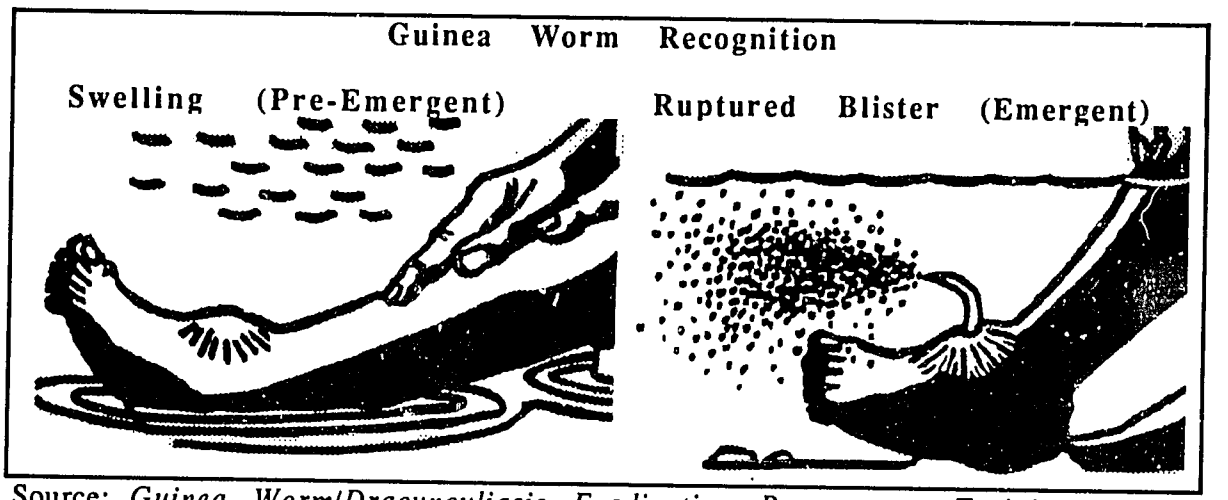
It is not uncommon for a person to be infected by several Guinea worms at the same time. The worms may emerge in sequence over several weeks or months, prolonging disability and suffering.

Diagnosis

GWD is easily diagnosed. No other infection is likely to be confused with the picture presented by an adult Guinea worm emerging through an ulcer. Accurate reporting of GWD cases (see "Surveillance," Chapter Five) requires a clear definition of GWD. A common GWD **case definition** is[1]:

a) any person who has an emerging Guinea worm, or
b) any person who reports having had an emerging Guinea worm during the past year.

Verbal and visual verification of current ulcers or recent scars prevents misclassification of cases due to local perceptions (see "Community Perceptions" below). A person who has a visible emerging Guinea worm is classified as a **current case**. The worm *must be seen* before the case can be counted as current.



Source: *Guinea Worm/Dracunculiasis Eradication Programme: Training Course for Guinea Worm Coordinators*, CDC.

[1]The case definition from the 1989 Guidelines for Surveillance prepared by the WHO Collaborating Center for Research, Training and Control of Dracunculiasis at CDC is: "An individual exhibiting or having a history of a skin lesion with emergence of a Guinea worm. A recent (within one year) history of a skin lesion with emergence of a Guinea worm is the proposed time frame for use in surveillance programs."

Community Perceptions

From the outset, your definition of GWD may differ from the community's. Diverging views about the causes, symptoms, and treatment of GWD can lead to communication problems. For example, a case may be misidentified during surveillance when an individual says he has GWD because he had it 25 years ago and believes the worm still lives in his body. Villagers may think that you are in the throes of some strange superstition, blaming an invisible being in one's cup of water for an affliction of the limbs that occurs a year later, especially when they see that everyone drinks the water, but only some get sick.

Beliefs vary from community to community, but some common beliefs about GWD are:

- Guinea worm is always present in the body;
- Guinea worm is a loose vein or tendon;
- Guinea worm is inherited;
- Guinea worms emerge when they smell other nearby Guinea worms;
- Guinea worms emerge when the blood becomes bad or weak;
- Guinea worms emerge when body temperature is high;
- Guinea worm is caused by an angry local God;
- Guinea worm is the result of a curse placed on the village because someone has done something taboo, such as farming on forbidden days;
- Guinea worm is caused by witchcraft.

Guinea worms are also blamed for a number of internal disorders. Any swelling or subcutaneous nodule is thought to be the work of a Guinea worm, even if no worm has emerged for years. Stomach disorders are often attributed to Guinea worms. Some women complain that Guinea worms "disturb their pregnancies."

Understanding and appreciating local beliefs and learning to work through them is essential to the success of any eradication program. Antagonizing people by rejecting their ideas as unscientific or foolish will only lead to their rejection of effective interventions. For example, treatment messages (see below) should

not conflict with traditional beliefs. In some traditional practices, no dressing is placed on the ulcer until after the Guinea worm has emerged completely on its own. Covering the site before emergence is believed to anger the worm and make it fight to find another outlet, a reportedly painful experience. People may accept dressings, but the dressing will probably be removed later, exposing the ulcer to secondary infections. If you cannot get people to use dressings, stress that cleaning the ulcer is important because an open, unclean ulcer provides opportunity for other troubles to enter the body.

On the other hand, traditional beliefs may be used to develop the connection between the disease and water. Any existing belief about water's role in causing GWD should be reinforced. In Togo, a health care worker was told that witchcraft could cause GWD. "How do you think witchcraft can give you GWD?" she asked. Community members mentioned water in their answers, so she asked to visit the place where water was fetched. Once there, she collected some water and showed the people that there were small things alive and moving in the water.

It is important to understand how the community perceives GWD. If community members believe that you respect their opinions and beliefs, they may give more credence to yours. Suggestions for interviewing community members about their beliefs about GWD are outlined in "Community Assessment" in Chapter Five.

Case Treatment

There is no cure for GWD. There are, however, measures to relieve pain and prevent secondary infections. Case treatment is an important part of national GWEPs for humanitarian and strategic reasons. Being responsive and sympathetic to those with the disease can help you gain the cooperation and confidence of the community. Organizing assistance for those who suffer from GWD may be a useful tool for community education and mobilization. Treatment efforts should be coordinated with any primary health care personnel in the community or region.

If you treat GWD, take the opportunity to provide health education about prevention and care. Give the following important **health messages:**

- Always filter your drinking water through a piece of cloth.
- When you have Guinea worm, do not go into the drinking water source.
- Keep your wounds clean and dry. Cover them with a clean dressing (if available and acceptable).
- Do not cover your Guinea worm wound with animal dung or remedies made from roots. These can cause serious complications, such as tetanus.
- If you get a high fever or your wound becomes very swollen, see a doctor or nurse. If you are unable to go, send someone in your family to bring medical help to you.

These messages may contradict traditional beliefs, so exercise your judgement and diplomacy in delivering them.

Traditional Treatment

In general, traditional treatment consists of the following:

- When swelling is noted, oils (palm oil, shea butter, palm kernel) are put on the site for their soothing effects.
- When the ulcer forms, herbs are added to the oils for their cooling properties and to draw the worm out. Animal dung, ground bones, lantern soot, and insecticides may also be applied to the ulcer.
- Once the worm is expelled, selected leaves are boiled: the water is used to clean the wound and the leaves are used to cover the ulcer.

Generally Accepted Treatment

The standard procedure for treating Guinea worm ulcers in settings where medical supplies are available[2] consists of the following:

1. Keep wounds as clean as possible by washing with soap and water or with antiseptic *at least once a day.* (Saltwater can be used as a cleaning agent if no other antiseptic is available.) A daily rinse of the worm in a container of water will speed the release of larvae, which, in turn, will allow easier removal of the worm. Be sure that the water in the container is *not* thrown back into a water source because it contains the larvae. You might suggest cleaning the wound with antiseptic before applying traditional herbs and oils, whether or not individuals will accept a dressing.
2. Apply a clean dressing if acceptable. In addition to protecting the sore from infection, dressings can inhibit contact with water, preventing further transmission. Covering the ulcer will not delay the natural exit of the worm.
3. Apply topical antibiotics to treat secondary bacterial infection.
4. Obtain tetanus immunization.
5. Relieve the pain with aspirin.
6. Wind the worm out on a match stick. This must be done gently because breaking the worm can cause *serious* complications.[3] One winds the worm until he or she gets resistance, bandages the stick to the spot until next day, and then winds some more.

If complications arise, patients should be referred to a medical facility; they have developed infections that need to be treated by medical personnel. Unfortunately, referral is not possible in all

[2] GWD occurs mostly in remote rural areas where people may be served by the most peripheral units of the health care system; supplies may be minimal or non-existent.

[3] Some believe a broken worm will emerge from another part of the body; if another worm subsequently does emerge, it is a different worm.

villages. Many factors can affect whether a patient should be referred to a facility or not, and it is not always a clear-cut decision. You will have to use your judgment in each situation to determine whether or not referral is appropriate. One should refer a patient to a medical facility if the following conditions are present:

- medical facilities are close to the village;
- medical facilities have supplies to treat the number of cases referred;
- the person appears generally sick;
- a breast, genital region, or joint is affected.

REFERENCES

Gbary, A.R. 1987. Dracunculose: Etude des croyances et attitudes des population en zone endemique de savane Burkina Faso. *Bull. Soc. Path. Ex.* 80.

Guidelines for Surveillance in Dracunculiasis Eradication Programs. World Health Organization Collaborating Center for Research, Training, and Control of Dracunculiasis. Working Document. May 1989

Ilegbodu, V.A., A.E. Ilegbodu, R.A. Wise, B.L. Christensen, and O.O.Kale. 1991. Clinical manifestations, disability and use of folk medicine in dracunculus infection in Nigeria. *J. Trop. Med. Hyg.* 94:35-41.

Kale, O.O. 1982. Fall in incidence of Guinea worm infection in western Nigeria after periodic treatment of infected persons. *Bull. WHO* 60(6):951-957.

Nwoke, B.E.B. 1990. Cultural consideration of Guinea worm eradication programmes. *Africa Health.* January:32.

Ramakrishna, J., W.R. Brieger, J.D. Adeniyi, and O.O. Kale. 1986. Illness Behavior in Guinea Worm Disease. *Int. Quart. Comm. Health Ed.* 6(2):101-114.

Seeking Safe Water: The community-based approach to guinea-worm control. 1991. *Contact* No. 118.

Watts, S. 1986. Human behavior and the transmission of Dracunculiasis: a case study from the Ilorin area of Nigeria. *Int. J. Epid.* 15(2):252-256.

Chapter Two

The Problem

Source: *Guinea Worm/Dracunculiasis Eradication Programme: Training Course for Guinea Worm Coordinators*, CDC.

This chapter will explore the impact of GWD. In it you will learn about:

- the effects of GWD disability on the individual, and
- the social and economic impact of GWD on agricultural productivity, the family, women, and children.

You may find that the impact of GWD is underestimated or ignored at the regional or national level because the extent of the disease is not known or because leaders believe little can be done about it. Establishing the extent of the GWD problem and its impact in your community is discussed in Chapter Five.

Guinea Worm Disease Disability

While GWD is rarely fatal, the pain can be so great that victims discontinue many activities that are a part of daily living. As many as 50 percent of GWD victims are severely disabled and unable to leave their compounds for an average of one month (and up to three). Incapacitation by GWD can lead to diminished personal hygiene as well as loss of income and poor nutrition. In addition, the psychological stress of worms emerging from the leg, chest, or even genitals can be considerable.

Adults between the ages of about 15 and 45 years are most often infected, although a considerable proportion of children older than 5 may also be affected. Young children and very old people are much less likely to acquire the disease, possibly because they drink less often from contaminated shallow ponds and wells near agricultural fields.

Social and Economic Effects

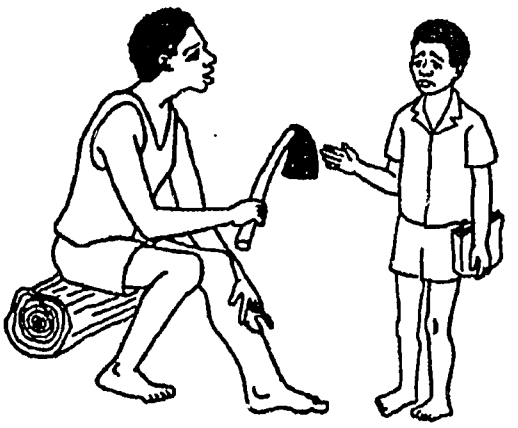
Since the crippling effects of GWD usually occur during the height of the agricultural labor season, the disease has an enormous negative impact on agricultural productivity. One study estimated that the equivalent of about 5.3 percent of the total agricultural gross domestic product of Burkina Faso was lost because of the effects of the disease on local farmers (Paul, Isely, and Ginsberg, 1986). The U.S. National Academy of Sciences estimates that global agricultural losses are as high as US$3 billion a year.

Some families are affected more heavily than others, with virtually all family members incapacitated at the same time. Families with high rates of infection may suffer during the remainder of the year from lost agricultural earnings and inadequate food supplies for home consumption. Responsibilities for working in the fields may have to be given to other members of the family, often to the detriment of adequate child care and education of school-age children.

Women suffering from GWD are often unable to care for themselves, their children, or their household, or to do work that would add to the family's income. Women play a major role in generating income for the family, especially for the children. When mothers cannot do their regular work (farming, trading, crafts),

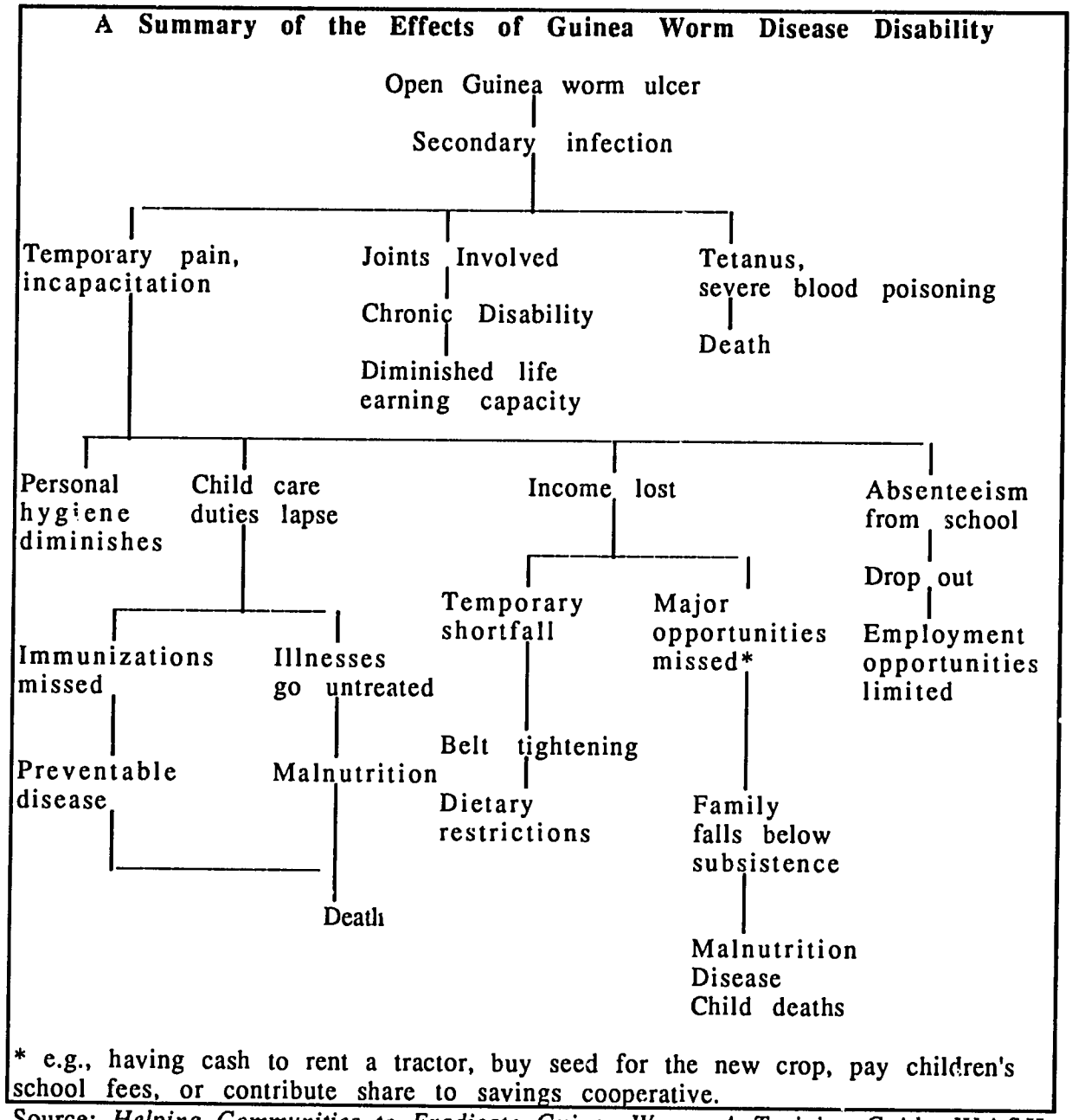
they suffer income losses equaling a month's earnings or more. This often translates into a lack of money for children's food, clothing, and school fees. GWD incapacitation has also been found to lead to defaulting on children's immunizations because mothers are unable to bring their children to the clinic.

Although GWD primarily affects adults, some children are also infected and suffer from temporary disability. They may become permanently disabled or die of tetanus. Children may also suffer from indirect adverse effects, such as poor nutrition or a disruption in education while temporarily disabled by the infection or while attending to the needs of affected adults. Studies in Nigeria estimate school absenteeism due to GWD as high as 33 percent.



Source: *Guinea Worm/ Ver de Guinea*, World Neighbors.

A summary of the effects of GWD is presented below. Helping community members see how GWD affects their welfare should help you motivate them to action.



Source: *Helping Communities to Eradicate Guinea Worm: A Training Guide*, WASH Field Report No. 322. [Draft.]

REFERENCES

Brieger, W.R., and J. Guyer. 1990. Farmers' loss due to guineaworm disease: a pilot study. *J. Trop. Med. Hyg.* 93(2):106-111.

Brieger, W.R., S. Watts, and M. Yacoob. 1988. *Maternal Morbidity from Guinea worm in Nigeria and its Impact on Child Survival.* WASH Technical Report No. 232.

Brieger, W.R., S. Watts, and M. Yacoob. 1989. Guinea worm, maternal morbidity, and child health. *J. Trop. Pediatrics* 35:285-288.

Edungbola, L.D., and S.J. Watts. 1990. The elimination of Dracunculiasis in Igbon, Oyo State, Nigeria: The success of self-help activities. *J. Trop. Med. Hyg.* 93:1-6.

Guiguemde, T.R. 1985. Etudes epidemiologiques en zone savane (Haute-Volta). I. Consequences socio-economiques. *Med. D'Afrique Noire* 32(1).

Hopkins, D. 1989. *Guinea Worm (Dracunculiasis).* Tropical Disease Paper No. 4, VBC.

Ilegbodu, V.A., A.E. Ilegbodu, R.A. Wise, B.L. Christensen, and O.O.Kale. 1991. Clinical manifestations, disability and use of folk medicine in dracunculus infection in Nigeria. *J. Trop. Med. Hyg.* 94:35-41.

Ileqbodu, V.A., O.O. Kale, R.A. Wise, B.C. Christensen, J.H. Steel, and L.A. Chambers. 1986. Impact of Guinea worm disease on children in Nigeria. *Am. J. Trop. Med. Hyg.* 35(5):962-964.

Imtiaz, R., Hopkins, D., and E. Ruiz-Tiben. 1990. Permanent disability from dracunculiasis. *The Lancet.* Sept. 8.

Paul, J.E., R.B. Isely, and G.M. Ginsberg. 1986. Cost-Effective Approaches to the Control of Dracunculiasis. WASH Technical Report No. 36, September.

Smith, G.S., D. Blum, S.R.A. Huttly, N. Okeke, B.R. Kirkwood, and R.G. Feachem. 1989. Disability from Dracunculiasis: effect on mobility. *Annals Trop. Med. Parisitol.* 83(2)151-158.

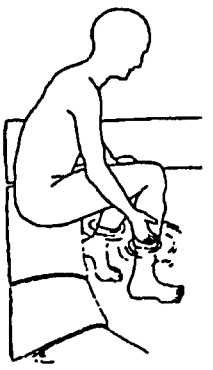
Yacoob, M., W. Brieger, and S. Watts. 1989. Primary health care: why has water been neglected? *Health Policy Planning* 4:328-333.

Chapter Three

Prevention: Health Education

Since there is no specific treatment for or immunity to GWD, prevention is the only real solution. Prevention can be aimed at different points of intervention in the Guinea worm's life cycle.

Points of Intervention Against GWD

LIFE CYCLE STAGE	INTERVENTIONS
 person infected with GWD wades in drinking water source	• keep infected people out of water source
copepod swallows Guinea worm larvae	• treat source chemically to kill copepods
person drinks contaminated water	• filter water for personal protection • find safe source of drinking water

Adapted from: *Guinea Worm Disease (Dracunculiasis)*, Tropical Disease Paper No. 4, VBC.

Ultimately, provision of safe drinking water will protect communities from GWD and other water-borne diseases. But improving water sources can be a huge undertaking (see Chapter Four) and can't be done immediately. Even if there is a good source of water in the community, people may still contract GWD if they drink from unprotected sources when away from home. Hence health education is the key to the success of any GWD intervention strategy.

This chapter explores basic health education concepts and activities. In it you will learn:

- the role of a community worker at different stages of the GWD eradication effort;
- the definition of health education;
- the health education messages of a GWEP;
- the roles of the health educator;
- the steps involved in planning a health education program;
- specific methods of health education, such as stories, demonstrations, and discussions; and
- the roles teachers and students can play in the GWD eradication effort.

Community Education and Action

Many elements of GWD eradication require economic, social, or political resources that the individual or family cannot acquire alone. Community education and action, premised on an understanding of local beliefs, can be approached in three broad phases. (See also "Community Participation" in Chapter Six.)

Phase I. Help the community recognize that GWD is an important problem and that the problem can be solved.

- Discuss the disease and its impact.
- Assess the prevalence of the disease in the community (surveillance).
- Reinforce any existing beliefs about the role of water in GWD (see "Community Beliefs" in Chapter Five).

- Arrange discussions with leaders from any nearby GWD-free villages where improved water sources have helped reduce or eliminate GWD.
- Show people copepods in their water (see "Demonstrating Skills" below) or how the worm releases its larvae into water.
- Ask local health workers to lead discussions on the topic.

Phase I is a long, slow process. Community workers in Kati, Togo, where GWD was eliminated in the mid-1980s, attributed their success in working with the community to:

- foremost, patience,
- intensive personal involvement,
- understanding of the cultural values of the community, and
- commitment to empowering the people to take their lives and health into their own hands.

It took Kati two years to identify its priorities, accept that GWD was transmitted by water, and develop a plan of action.

Phase II. Help determine possible solutions to the GWD problem and help the community accept responsibility for implementing solutions. Discussions of possible solutions, available resources, organizations that can accept responsibility, and mechanisms to ensure maintenance of intervention strategies take place during this phase (see Chapter Six). Try to emphasize learning problem-solving mechanisms rather than the solution of one particular problem, so that community members will develop the capacity to address other needs in the future.

Phase III. Help implement the plan and ensure sustainability. Help the community assume responsibility for the plan of action they've made. Community members often need support and advice on how to carry out plans effectively. Such support may range from helping the community contact technical experts to developing a bookkeeping system. Sustainability depends on continued health education. Train community health volunteers to educate fellow community members about GWD and ensure that healthy behaviors are maintained. Reinforce the eradication effort by discussing it with community leaders and arranging talks by visiting

health personnel. Community members should be confident that they can keep GWD from returning.

Source: *Guinea Worm/Dracunculiasis Eradication Programme: Training Course for Guinea Worm Coordinators*, CDC.

A Definition of Health Education

Health education is any combination of learning activities that encourages voluntary adaptation of behaviors that promote health, prevent disease, and enhance recovery from illness. The basic **ethic** underlying health education is "change by choice."

Health Education Messages

Effectively communicating the health education messages provided below will be your greatest contribution to the eradication effort. The messages may have to be tailored to suit community members' beliefs and address gaps in their knowledge about GWD. Design your health education activities to communicate these messages.

Guinea Worm Disease Health Education Messages	
CONCEPT	MESSAGES
GWD is caused by drinking water contaminated with Guinea worm larvae.	1. GWD comes from drinking water from ponds, dams, unprotected wells, and slow-moving streams. 2. People who have Guinea worm ulcers spread the disease when they wade in ponds and streams.
The community can work together to prevent GWD.	3. Communities can work together to protect their ponds, wells, and streams. 4. Neighbors can help collect water for those with GWD. 5. Communities can work together to improve their drinking water supply.
Individual people can protect themselves from GWD.	6. People can make their water safe by filtering it before drinking it. 7. People can collect their drinking water from a safe source.

Source: *Guinea Worm/Dracunculiasis Programme: Training Course for Guinea Worm Coordinators*, CDC.

Roles of a Health Educator

Some community workers are professionally trained to provide health education in the community, but all community workers will have opportunities to practice the basic skills of health education needed to control GWD.

You may find yourself working with individuals, groups, or an entire community to solve health problems. Try to be flexible and recognize that with each audience and health education activity, you may be required to use a different educational method and fill a different educational role. Four of the most common roles — counselor, facilitator, linker, and trainer — are presented below.

Counselor

As a counselor, a health educator encourages individuals to think about their problems so that they come to a greater understanding of the causes. Counselors guide people to consider alternative solutions to problems so that the most appropriate action can be taken.

Example

You are working as a school teacher and make a home visit to the family of one of your pupils who has missed a week of school. Her mother has GWD, and she needs the child to fetch water. You listen carefully as the mother and child explain the problem. First, you express concern about the mother's suffering and also note the value of school attendance. You encourage them to think of alternative solutions to the problem. The child mentions that she can collect some water early before school. The mother remembers friends whom she helped in the past who will return a favor. Between them they come up with a water collection schedule that aids the sick mother without sacrificing the child's school work. As counselor, you guided the discussion but allowed the family to make its own decisions.

Facilitator

As a facilitator, a health educator simply provides a setting where people who share a common problem can come together and help themselves. It is important to foster the feeling that the group belongs to its members, and that they should decide how the group can best serve their interests. (A fuller discussion of the role of the facilitator is included below in "Group Discussion.")

Example

As an agricultural extension worker, you notice that several farmers are complaining because they don't have enough people to work the land because their families are sick with GWD. You invite the farmers to have coffee at your house one evening. Their common complaint surfaces during the conversation. You suggest the situation can be changed. You give them information about GWD and ask what they think can be done to solve the problem. The group decides to build a head wall around the local well (see Chapter Four).

Linker

Networking is an important health-educator function that helps link a community (or individual) with a resource agency or group. The health educator initially serves as an advocate for the needs of the community but eventually brings the community and agency together to solve the problem. The link may be made between

groups within a community or between a community and an external organization.

Example
You visit a nearby village to talk about the GWD problem. The villagers complain that the cloth filters mentioned on the radio have never been delivered to the village. You explain that the cloth is available for collection at the District Health Office. The villagers say they don't know how to sew the filters. You note that the District Tailors' Association has agreed to help. You ask the villagers to send representatives to meet you at the district headquarters, where you will introduce them to the health office staff and the tailors. The village chief asks three people to meet you the following week.

Trainer

In the role of trainer, health educators provide formal or informal opportunities to transfer knowledge, skills, and attitudes to community members as well as other health and development workers. Although health educators may not be technical experts on every subject, they can organize appropriate learning experiences in collaboration with technical staff.

Example
A village development committee has decided filtering is a good short-term measure to get GWD under control, but none of the members has ever used a filter. Committee members ask you to help plan a training session so that they can learn how to use filters correctly and distribute the filters in the community. You and a group of committee members form a subcommittee to plan the training. The subcommittee lists the skills the committee members want to learn, assembles the materials needed for demonstration, outlines a schedule, and presents its plan to the whole committee for consideration.

Health Education Planning

Before a health educator can determine what role to play or which activity to conduct, a "diagnosis" of the health problem must be made. Understanding what behaviors may lead to or prevent a problem and why those behaviors do or do not occur will help you choose appropriate strategies and methods for promoting healthy behavior.

The steps of the **health education diagnosis** — (1) identifying target behaviors, (2) assessing the reasons for them, and (3) choosing and implementing educational strategies — are described below. As is discussed in Chapter Six, evaluation is a vital part of

any planning process. An example of the evaluation of a health education activity is included in Appendix B-1.

Step 1: Identifying Target Behaviors and Audiences

Health education focuses on the behaviors involved in disease transmission. In the case of GWD, these behaviors are quite simple:

1) *drinking* water that contains infected copepods;
2) *wading* in water while Guinea worm ulcers are still active.

To change these behaviors, it is necessary to assess the possible alternative behaviors and decide who will have to make what changes. For example, consider the first behavior, drinking water that contains infected copepods. The goal of our health education activity becomes:

> Community members will drink only water that does not contain infected copepods.

Numerous behaviors and technologies can help the community reach this goal. Through community assessment (Chapter Five), the most appropriate alternative behaviors and technologies can be determined.[1]

Different health education activities should be targeted at different groups within the community depending on what functions those groups perform and which unhealthy behaviors they may engage in. Below are some examples of target groups and their potential tasks in the GWD eradication effort based on their roles within the community.

[1] Through community assessment, community structure, beliefs, and resources, as well as unhealthy behaviors, are identified. This information is essential to developing appropriate health education activities for appropriate target audiences.

Target audience	Task
Mothers	Filtering the water they collect for their family
School Children	Helping infected/disabled people fetch and filter their water
Village Elders	Mobilizing community resources to ensure all community members have filters
Farmers' Cooperative	Spreading the message of the need to carry safe water to the field

Source: *Helping Communities to Eradicate Guinea Worm: A Training Manual*, WASH Field Report No. 322. [Draft.]

Once a specific behavior is targeted for intervention, a health educator continues the behavioral diagnosis by identifying all the specific actions needed for the alternative behavior. For example, the "simple" option of filtering water involves:

- buying or obtaining a filter;
- using the filter each time drinking water is collected;
- placing the filter on the pot correctly so that unfiltered water cannot splash into the pot;
- removing the filter carefully so that copepods do not spill into the filtered water;
- washing the filter after use;
- storing it in a safe place;
- inspecting the filter before each use for holes or tears;
- discarding a damaged filter and replacing it.

Step 2: Assessing Influences on Behavior

Once the behaviors involved in adopting a control option have been identified, the factors that influence adoption of those behaviors should be analyzed. Some of the factors that influence behavior include

- knowledge,
- access to services,
- availability of money, and
- skills.

One health education model divides the factors that influence behavior into three categories: predisposing, enabling, and reinforcing.

"Predisposing factors" concern people's perceptions and motivation. Predisposing factors include knowledge, attitudes, beliefs, and values, and are best addressed through information strategies.[2]

"Enabling factors" are the resources that make it possible for the desired behavior to take place. Examples are personal skills, time, and access to services, money, and materials. Resource development strategies address the need to develop individual and community resources.

"Reinforcing factors" encompass the influences other important people have on our behavior. Such factors may be social rewards, incentives, or punishments for a behavior through the influence of friends, family, and co-workers. Social support strategies work toward developing community support.

An illustration of how these kinds of factors influenced social and cultural acceptance of filtering behavior in a Nigerian village is included in Appendix B-2.

Another health education model[3] focuses on the range of attitudes toward change. Identifying the degree and type of **resistance to change** will also help you design appropriate health education activities. If individuals are open to change, a straightforward message-focused approach may be appropriate. If individuals are resistant, you may first need to address basic attitudes. Appendix B-3 provides a model spectrum of attitudes toward change.

Step 3: Selecting the Strategy

Selecting the most appropriate health education methods involves careful consideration of the factors that influence target behaviors. As an example, the chart below shows the educational strategies

[2] For description of information, resource, and social support strategies, see below and Chapter Six.

[3] See, *Tools for Community Participation: A Manual for Training Trainers in Participatory Techniques*, PROWWESS/UNDP.

that can be used to change the factors that influence filtering behavior.[4]

Selecting Health Education Strategies	
EDUCATIONAL STRATEGIES	FACTORS THAT INFLUENCE BEHAVIOR
Information Strategies ----->	**Predisposing Factors**
• stories at village meetings --->	knowledge of how filter works
• health talks at clinics -------->	belief that filter prevents GWD
• talks with community groups and clubs -------->	value that temporary inconvenience pays off
• visual aids to depict filtering behavior ---------->	knowledge of correct use of filter
• counseling at clinic ---------->	decision to buy filters
Resource Strategies ---------->	**Enabling Factors**
• local fundraising ---------->	money to buy filter cloth
• organize local tailors to produce filters -------->	source of ready-made filters
• train village health workers to distribute filters --------->	access to filters
• train villagers to use filters properly -------->	skill of correct filtering
Social Support Strategies ---->	**Reinforcing Factors**
• discussion at women's society meetings ------->	elder women influence younger
• village health workers, as neighbors, distribute filters ------>	neighbors encourage purchase of filters
• opinion leaders mobilize support ---->	general acceptability of filtering idea
•human relations training --->	health worker attitude influences acceptance/belief

Source: *Helping Communities to Eradicate Guinea Worm: A Training Guide*, WASH Field Report No. 322. [Draft.]

It is unlikely that a health educator will conduct all of these activities but some mix of methods will be more effective than any one method alone. Health educators must determine which factors are most changeable and which educational methods most appropriate within the community.

[4] Matching educational strategies with technological strategies is discussed in Chapter Six.

The health education methods you use are limited only by your imagination. Some common methods are discussed in the following pages, and additional information on preparing and using visual materials is included in Appendix B-4. Appendix B-1 contains a sample outline for planning a health education activity.

Health Education Methods

There are two broad complementary approaches to using the methods described below. The traditional teaching style, or didactic approach, is content-focused. Information is largely passed from the "expert" to the learner. This is the most appropriate approach when a problem exists because of a lack of knowledge. The participatory approach is learner-centered. Learners develop abilities and skills to diagnose and solve their own problems. This approach is useful when the goal is to achieve fundamental changes in attitude and behavior. Some exercises that stress the participatory approach are suggested in Appendix B-5. These exercises use some of the same methods discussed below — storytelling, posters, flexi-flans — but are designed to maximize community participation.

Although health education activities may have different objectives — sharing information, aiding decision-making, providing skills, encouraging health values and attitudes — they all share the goal of having some impact. If your message does not seem to be reaching its audience, don't give up on the message. Instead, find a better method for reaching your target audience. *Listening* to community members is essential; effective teaching requires dialogue.

When working with adults, remember that they:

- learn best when they are actively involved in the learning process — carrying out field exercises, discussing and analyzing problems, experimenting — rather than passively listening to lectures or observing others;
- bring a wealth of experience and knowledge to any learning situation; and
- learn from their peers as well as from their trainers.

Pretesting Educational Methods

Before putting an educational method into practice, or using educational materials, you should make sure that they are well suited to your target audience; otherwise, they may not have the desired impact. Materials and methods should be pretested, therefore, whenever possible. Pretesting is trying out an educational method or material with a small group of people from the target audience. Methods and materials that are prepared in advance, such as stories, posters, plays, puppet shows, and photographs, can be pretested. If the method works in the way that you hoped, then you can use it with other people and groups in the community.

There are three basic reasons to pretest methods and materials. First, people may not understand the nature and purpose of the method. Second, they may not understand the message you are trying to share. Third, they may not like what they see or hear. If, for example, a poster does not look attractive, people may ignore it. If you can find out what problems people have in understanding your methods, you can change and improve them, making your methods more effective. Pretesting involves five basic steps:

1. ***Prepare your materials well.*** Make sure they are clear and simple.

2. ***Gather a group for the pretest.*** Choose people who are similar to the people who will use the finished materials.

3. ***Present the materials.*** Allow the small group to see or hear what you have prepared.

4. ***Ask questions.*** Find out whether the group has understood and accepted what you presented. If you were testing a poster, here are examples of the types of questions you might ask.

- What do you think is the message or the idea in this poster?
- Who do you think this poster is planned for (adults, children, men, women, farmers, workers, etc.)?
- What would your friends think if they saw this poster?
- Do you think the poster could look nicer?

- Do you think other colors should be used?
- Are the pictures, drawings, and words big enough, too big, or too small?
- In what ways do you think the poster could be improved?
- Are the ideas and suggestions on the poster practical and useful?

5. Make changes. Revise materials according to the suggestions you have received.

Putting Educational Methods into Practice

There are three things to consider when putting educational methods into use:

- when to find people,
- where to find people, and
- how to involve people.

Choose the right time. If you are working with farmers, find out when they work and when they rest. Women often work at home or away from home and go to the market at the same time each day. Displays should be set up in the market when people are gathered there. Plan a time for an educational program that is best for those involved.

Choose a convenient place. Find out where people normally gather — markets, schools, workplaces, or places of worship. There may also be places where people gather socially or a small community building that is used for important meetings. You and the group can decide which is the easiest place for everyone to reach.

Involve people. There are many ways to involve people. Some methods, such as plays and discussions, require more participation than others. But even when you give a talk or show a film, you can always find ways to get people involved by asking questions or asking them to do things themselves.

Stories in Health Education

A traditional way of sharing knowledge and values, storytelling is useful in health education. Stories can juxtapose traditional and scientific beliefs for listeners to examine and critique. They allow

community members to compare behaviors that are healthy and those that are harmful. A sample story is included below with guidelines on presenting it. Some other sample stories are included in Appendix B-6.

Characteristics of a Good Story

Purpose. A story, like any other health education activity, needs a clear objective. For example, if a story's objective is encouraging people to filter drinking water, the story should focus on one main point: "When people filter their drinking water, they do not get Guinea worm." By the end of the story, listeners should have little trouble identifying the main point or lesson.

Culture. Two concerns arise when one tries to tell culturally relevant stories. First, many cultures have a unique style of storytelling. Certain phrases may always be used to start a story, or stories may be told differently if the audience consists of children versus adults. A fable format using animals as actors may be preferable in some societies. Health educators should learn about local storytelling styles and develop stories that will fit in.

The second aspect of culture is descriptive. The storyteller should use names, foods, activities, and locations that listeners recognize. Integrate local beliefs and proverbs into the story.

Characters. A story should have one or two main characters whom the audience will be able to identify with and remember. The behavior of these characters will model the healthful and harmful behaviors that form the basic points of the story. If only one character is used, he or she may start out behaving one way and later modify his or her actions. Be careful not to name and model characters too closely to actual people in the village, as this will cause embarrassment.

Believable Action. Characters should not engage in strange, foreign, or unbelievable action. If people usually walk to the farm, do not have characters ride in a car. If people do not eat fruit at their morning meal, do not include fruit in a description of what a character ate that morning. Action is believable when it is simple and straightforward. Do not congest a story with too many twists and turns. Keep it short and focused.

Objectivity. Do not use judgmental words in describing a character or his or her behavior. Do not say things like, "That foolish mother refused to give her child an egg." Simply describe the behavior in its local context and let the listener make his or her own conclusions. "Mama Saka always fed Saka maize porridge for breakfast. If she could afford it, she would add a spoon of dried milk, but she would never give the child an egg. Grandmother would not approve, because she believes that eating eggs causes a child to grow up to be a thief."

Format. A story may take two general forms. First, a story might objectively present characters behaving in two different ways, e.g. one who drinks water straight from the pond and another who filters water. Listeners can be encouraged to comment on the differences in the characters' behavior and discuss which is better and why.

The second approach is to lead up to a point where a character must make a decision. The alternatives can be laid out, perhaps in the form of two friends offering the main character conflicting advice, but the listeners should be called upon to suggest the next course of action and to justify their choices. This is a participatory problem-solving approach (see Appendix B-4). Choice of format may depend on how much the listeners already know about the subject.

Sequence. A story should have a natural flow or logical sequence of events. The beginning sets the stage, introduces the characters and establishes the problems they face. In the middle, action develops as the characters confront their problems. Relationships and contrasts between characters become manifest. By the end of the story a decision may have been made, a problem solved, a conflict resolved or at least alternative solutions may have been posed. The point of the story should be most evident at the end.

Involvement. All health education methods should involve the participants in thinking about and solving health problems, and a story is no exception. The storyteller should never conclude by telling audience members exactly what they should have learned from the story. She or he should encourage listeners to think about the story and draw conclusions for themselves.

Questions at the end of a story help listeners focus on what they heard. Ask people to recall what a certain character did, to explain why he or she behaved this way, to deduce the possible consequences of the character's action and to suggest better or alternative behaviors.

Sample Story: Babu Wants to Prevent Guinea Worm

Objectives. After hearing this story, listeners will be able to

- identify causes of GWD in the community;
- explain that filtering water can protect them from GWD.

Apata is a village that lies not too far from here. The people of Apata are farmers — good farmers. They grow maize, yams, cassava, beans and fruits. The money they make from selling these crops has been used in many ways to improve their lives. Most houses have iron sheet roofs. Many people own radios.

The people of Apata feel that they have an ideal life except for the Guinea worm that they suffer each dry season. The disease is so prevalent that the people of Apata believe that they have been cursed. The disease seems to hit hardest just when farmers must be busy preparing their fields and planting their crops for the new season. During the Guinea worm season it is not uncommon to see otherwise strong and healthy farmers lying on mats in front of their houses because Guinea worm has knocked them down.

The people of Apata get their drinking water from a few small ponds on the edge of town. These supply plenty of water in the rainy season, but in the dry season when Guinea worm strikes, the ponds are shallow. People spend hours scraping the bottom to get enough water to drink. This water is muddy, but Apata residents feel they have no choice.

Babu is a farmer in Apata. Babu and his sons and wives farm about six acres of land about eight kilometers from the town. Early each morning they trek to the farm. During the dry season the women often stay behind to collect water for the family, joining the others later. While on the farm, they usually drink water from a nearby stream, but this too is almost gone in the dry season.

It is now February and Babu is trying to prepare his fields for the new yam crop. Unfortunately, only he and one son, Bola, are in the field today. His other sons and wives all are knocked down by Guinea worm. Babu fears that he will not have his fields ready by the time the rains come. To make matters worse, Bola has been complaining of a throbbing in his left leg that might mean that a Guinea worm is about to emerge. Babu tells Bola to sit down and rest.

Babu also sits down and looks across his fields in despair. In the distance he sees Musa from the neighboring village of Tabale. Musa is not alone like Babu. All of his children and wives are busy preparing the fields. When they are tired, they go over to a tree and pick up small containers and drink from them. Babu is curious and walks over to greet Musa and find out how he is so lucky to have a full labor force.

Babu and Musa greet and ask after each other's family and friends. They exchange a bit of news about the weather and expectations for the coming growing season and market. Babu has been eyeing the small containers from which Musa's family have been drinking. Musa then says, "Forgive me for ignoring you. Here, have some water to quench your thirst on this hot day."

Babu thanked Musa and drank his fill. He looked at the container carefully and commented, "This must be a special container. We usually just walk over to that stream and drink water from there. I guess it must be dry now. Is that why you brought your water in containers?"

Musa responded, "You are right about the stream being dry, but that is not the main reason why we carry water out to the farm. For the past year we have been using a cloth to filter our water. We fill up these containers from the pot of filtered water. My son who is schooling in the capital says that this should protect us from Guinea worm."

When Babu returned home that evening, he told his family members about Musa and the water containers. He laughed a bit, "I am not sure what Musa is really preventing. People in Apata believe Guinea worm is part of our bodies. We have been cursed with this disease from time immemorial. Maybe things are different over in Tabale village?"

One wife commented, "The nurse at the health center said something about filtering water, but it did not make sense at the time."

Bola added, "When I was in primary school, one teacher used to filter the water the students collected for him. We never understood why he did it, but as small boys we were afraid to ask."

Babu began to wonder what he should do about this filtering business.

Discussion Questions.

1. Why do members of Babu's family have GWD?
2. What problems does GWD pose for Babu's family?
3. Is there a way they can protect themselves from this disease?
4. How do we know that filtering will prevent Guinea worm?
5. If you were Babu, what would you do now?

Adapting the Story. Look at the story of Babu carefully. What changes would make the story seem more realistic in the community where you work? Some details that might need changing include:

- names of characters,
- season when Guinea worm is common,
- types of crops grown (e.g. yams versus millet),
- signs of a good life (e.g. iron sheet roof),
- family structure and division of labor, and
- male and female roles.

In some settings this story may be acted out or performed by community members. A **drama** may reach a larger audience than a story. This method also reinforces the health message for the actors involved in promoting the message. The performance should also be followed with questions.

Guidelines for Presenting a Story

Writing out a story in advance helps ensure that all important points are covered, but a story should not be read to an audience from a written text. It should be memorized and told naturally.

The following points will help you to be an effective storyteller:

Greet the assembled group as local people do. Introduce yourself as a health worker who would like to talk to the group about a problem the village is facing.

Explain that you would like to start by telling a story. Describe the *objectives* of the story as, for example, those listed at the beginning of the story on Babu.

Tell the story from *memory* to make it more natural. Stop briefly at the end of each major point to make sure people understand what you have said. Ask members of the audience to repeat some of the key points as the story progresses.

Ask *questions* at the end of the story and encourage participants to answer as if they were members of the community in the story.

Also ask participants to tell you what *lessons* they learned from the story and how they might apply these lessons to their own lives.

Ask participants specifically how they, as community members, might *solve the problems* faced by the people in the story.

Close by *summarizing* the main points, lessons, and possible solutions.

Demonstrating Skills

One reason why people may not filter water is that they do not have the skills to do it properly. By properly, we mean that

- the filter must be inspected before use to determine if it is damaged or safe,
- it must be placed on the pot in such a way that no unfiltered water can splash into it, and
- it must be removed carefully so that copepods are not inadvertently turned into the pot.

You can help people gain these skills by demonstrating them. First you should *model* the correct behavior. Afterwards give participants an opportunity to *practice* the skills.

During the demonstration, you can also show participants copepods in the water source. This has been found to be one of the most effective ways to convince people to filter their water.

In addition to the guide below on conducting a demonstration on water filtration, information on filtering water can be found in Chapter Four.

A Sample Demonstration on How to Filter Drinking Water

Objectives.

Knowledge At the end of this demonstration, participants will:

- understand that pond or slow-moving stream water can contain Guinea worm larvae and
- explain that filtering water through a clean cloth can remove Guinea worm larvae.

Skills By the end of the demonstration participants will be able to show how to filter drinking water through a clean cloth to prevent GWD.

Materials Needed

- water from a local pond
- a clean local water storage pot or container
- filter cloth as presently used in the National GWEP
- samples of other local cloth
- soap and basin with clean water to wash the filter

Notes:

The filter cloth should be fine mesh cotton or monofilament nylon (see Chapter Four). Ideally the filter should be sewn with a rubber band or drawstring so that it fits snugly on the pot.

To demonstrate the presence of copepods, you need a clear glass jar and, if available, a magnifying glass (or better yet, an overhead projector).

Procedures.

1. Introduction

Introduce yourself, the topic, and the objectives, and give appropriate greetings to the participants.

Set up the materials where they can be seen and ask participants to identify each item.

Describe what you are about to do: demonstrate how to filter water in order to prevent GWD.

2. Demonstration

Perform each step below and *tell people what you are doing* as you carry it out.

Explain that cloth with fine enough weave can "catch" the small animals that contain Guinea worm larvae, protecting you from drinking them.

Pass around samples of the filter cloth and other local cloth with wider weave and ask people to note the difference.

Show that a cloth with a looser weave can be doubled over and used for filtering if better cloth is not available.

Inspect the filter to be sure there are no holes or tears.

Attach the filter to the drinking water pot "dirty" side up.*

Make sure the filter fits snugly around the edges with a slight depression in the center.

Pour the pond water from the bucket very slowly so that none will splash or cause the filter to come off. (You can also pour it out in cupfuls.)

Allow all water to go through the filter.

Remove the filter carefully so that no dirt or tiny organisms fall into the filtered water.

Cover the water pot.

Show the participants any dirt or animals that have collected in the filter.**

Shake out the filter away from the drinking pot.

Wash the filter with soap and water.

Hang the filter to dry in a safe place.

Remind participants to keep filters away from knives and sharp objects.

Ask if participants have any questions about what they have just seen.

*Ideally filters are made with some marking to indicate a top and bottom side to prevent people from reversing the filter and dumping copepods in their pots. If the filter has been washed and dried for more than 12 hours in an airy place, it is unlikely that any copepods have survived.

**To demonstrate the presence of copepods (or tiny animals), before you wash the filter, take a clear glass jar, turn the filter upside down over the jar, and pour some clean water through it to wash copepods into the jar. With a hand lens or magnifying glass, it should be possible to see small animals, some of which may be copepods.[5] The organisms in pond water can also be shown by placing the clear glass jar on an overhead.

3. Repeat Demonstration

Knowledge Ask participants to repeat in order the steps that you have just performed in filtering the water. Also ask them the reasons why you are filtering the water.

Skills Ask for a volunteer participant to come forward and repeat the filtering demonstration. Ask the rest of the group to critique this demonstration. If time and materials permit, encourage more people to practice this skill.

4. Application

Ask participants to discuss how they will apply their new knowledge and skills when they reach home.

[5] Copepods should be visible to the naked eye.

Find out if they perceive any problems in adopting the filter procedure (e.g. lack of funds to buy one or discouragement by other family members).

Seek their ideas on how to overcome these problems.

5. Conclusion

Ask a few participants to summarize the main points of the demonstration. Be sure that the following points are emphasized:

- Always filter drinking water from ponds, slow-moving streams, and other suspect sources.
- Use the special filter cloth or another cloth with a fine mesh or weave.

Seek any final questions from participants.

Thank participants and wish them good luck in preventing GWD.

6. Evaluation

Note that during the process of repeat demonstration, application, and closure, you have been getting feedback from the participants on the knowledge and skills they have gained. Be sure to praise correct answers and procedures; politely correct any mistakes. Pay careful attention to evaluation now because you will not be able to follow every participant home to find out whether she or he has achieved the intended objectives.

Group Discussion

Group discussions are useful for learning about community beliefs and needs, creating understanding about new ideas, and encouraging decisions for action. Health workers must be ready to learn from community members as well as provide them with new knowledge.

Sometimes people know what needs to be done to prevent disease, want to do so, and may even have the necessary resources, yet they may be discouraged from taking action by

family members or friends. This problem can be addressed in a supportive group environment. People who share the same problem and interests can discuss their situation together, learn strategies, and gain encouragement from each other to try new ideas.

Health education often reaches mothers attending a clinic or young people at school, neither of whom generally has power to influence decisions and practices in the household. Alone, a mother may not be encouraged to try new ideas. Yet among a group of women who share the same problem, she may begin to think creatively about ways to introduce new ideas to the family. Each person's contributions to the discussion will stimulate others to think.

Purpose

The two main purposes of group discussion sessions are

- to provide individuals who have common needs or problems an opportunity to share experiences and ideas for solutions, and
- to create a supportive group environment in which participants can encourage each other to take action to solve the problem.

Preparation

Problem Identification. Through community assessment (Chapter Five) and health education diagnosis, you may identify problems that have not been solved because people have been discouraged by others from taking action or simply feel that they are not able to take action themselves. For example, you may discover that even though the GWEP has distributed free filters to all households and demonstrated correct use, many women do not filter their water. In this case the problem is *not* availability of resources, lack of knowledge, or lack of skill. Through informal interview and observation you may uncover the following reasons why some women are not filtering:

- Some have never filtered water before and do not feel confident about doing it.

- Some wish to filter, but the elders in the household are discouraging them by saying that filtering is not their tradition.
- Others may think they are too busy to add this extra step to the drudgery of collecting water.

These are issues of perceived capability and social support. A small group setting is ideal for handling such problems.

Participant Recruitment. The group should include about eight participants. The small size of the group will give everyone a chance to talk and get to know one another better.

As noted above, participants should share the same sorts of problems and should be similar in other respects, such as sex and age, so that they feel free to talk.

Potential participants should suggest a convenient time and place to meet to ensure that they will actually attend.

Arrangements. The place selected for meeting should not only be convenient but should also offer some privacy and as few distractions as possible. Seating that is considered comfortable by community members should be provided.

Facilitator Role. Be a facilitator, not a leader who tells participants what they should feel, think, or do. You are simply providing a setting where people who share a common problem can come together and help themselves.

Procedures

Wait a reasonable amount of time until most or all invited participants are assembled.

Introduce the purpose for which the group has gathered and very briefly share your observations about the common problem that participants share.

Seek confirmation that this problem is in fact common to all.

In a small community it is likely that all participants will know each other, but it is still useful to ask people to introduce themselves briefly.

Explain that the group belongs to those present. They should feel free to say whatever is on their minds and expect to learn from and help each other.

Also make sure that participants agree on the importance of confidentiality. They would not be helpful to each other if they went back to the community and talked about what each other had said in the privacy of the group.

Return to the issue at hand. Ask open-ended questions[6] to generate discussion.

- Why does this problem exist?
- What attempts have people made to solve the problem?
- Why have these attempts succeeded or failed?
- What new ideas might be tried?

The facilitator's role is not to provide the answers to these questions. Group members are the real experts on life in their community; it is they who can best provide feasible solutions to these problems.

The facilitator should make sure that all members participate. If someone is quiet, the facilitator may politely comment, "We have not heard from Mary; maybe she could tell us what she thinks about this problem."

Similarly, the facilitator must make sure that one or two people do not dominate the group. If someone is talking too much, the facilitator might politely say, "Well, John has given us some interesting ideas, but what do the rest of you think?"

It is natural for group conversation to go in many directions. The facilitator should not worry much if the discussion turns from GWD to the condition of crops or prices in the market. Part

[6] Alternatively, or in addition, use one of the techniques described in Appendix B-5.

of the supportive environment of the group is generated when people feel free to talk together as friends. At the same time, it may become obvious that the group has strayed far from the original topic without suggesting any useful ways to solve the problem. In this case the facilitator can politely reintroduce the issue.

Group discussion is helped when the facilitator occasionally summarizes the major points of the discussion. These summaries may encourage the group to reach concensus on a solution to the problem being discussed.

Participants should feel that the group is useful and can accomplish something more than just talk. At the same time the facilitator must be careful not to push the group to make a decision before it is ready. Being a facilitator is really a balancing act.

A facilitator must keep watch of time. One cannot say in advance that a group discussion should last only one hour. Some groups may feel ready to close in 30 minutes and others will be happy to talk the whole afternoon. A facilitator must be sensitive to participants' other commitments and not allow the talk to keep them from important duties.

Participants may not resolve their problems in one sitting. As facilitator, let it be known that participants are free to decide to close the meeting and reassemble at another convenient time.

After tackling one problem, the group may decide that the meetings have been useful and wish to continue meeting to discuss other pressing issues. As facilitator, you should encourage them to make this decision themselves.

The group may ask you to continue meeting with them, and you should thank them for wanting to include you. You should also let the members know that since they have now solved one problem, they are capable of handling others. Therefore, they should go ahead and meet whenever they wish. You will join them when you can, but they should not let your absence dissuade them from meeting.

Health Education Media

In the campaign to control GWD, health educators may recognize a general lack of knowledge about GWD in their communities. Using an appropriate media technique could increase public awareness about GWD. Media include both modern print and electronic media as well as traditional or local means of spreading information, such as town criers or posters.

Modern Mass Media

When we hear the term mass media, we tend to think of something huge and impersonal — a newspaper in the national capital, a radio broadcast for millions of listeners, or a television program produced at enormous cost. But mass media need not be "big" media.

Many small towns and rural areas are served by local newspapers, and many small cities have local radio stations. It is true that not everyone can read and many people do not own a radio, but the numbers reached by these media are growing each year. Using local mass media for health communication offers great advantages:

Speed and reach. Mass media can reach many people quickly. Our goal is the elimination of GWD from *all* villages. No health worker or health team can reach all people individually.

Credibility. If people read something in a newspaper or hear it on the radio, they tend to believe not only that it is true but also important. The credibility of a mass-media message is increased when a highly respected person, a government official, or a leading doctor is the spokesperson.

Reinforcement. The media can provide continuing reminders and reinforcement. In a long-term program to promote filter use, for example, repeated radio messages help remind women why it is important to filter for their families' health.

Working with Mass Media at Community Level. Mass media should be used in conjunction with other health education activities that focus on individual and group methods. Mass me-

dia can add so much strength to an education program that you should explore every possibility of working with them.

1. Find out about the media in your area.

If people in your community read a newspaper, which paper do they read? Remember, even if only a few people read newspapers, they are likely to be opinion leaders in the community. Where is this newspaper printed? If it is printed in a nearby town, who writes the news about your district? Is there someone who writes about health? Would newspaper editors be interested in a story about a local health event, such as villagers organizing to improve or construct their own well to prevent GWD?

Ask the same kind of question about radio. What programs do the men or women listen to? At what times of day do the people listen most? Do all the programs come from the capital city? Are there regular programs about health? Is there a radio station in or near your district and would it be willing to broadcast messages about personal protection against GWD, for example?

Note that even in rural districts there is often a representative of the Ministry of Information or Culture who gathers local news to disseminate to the regional and national press. Identify this person and involve him or her in your health education activities. Ask him or her to publicize your community's successes.

2. Be aware of media health coverage.

Even if you are not able to use radio or newspapers for your own messages, you can still use mass media in your education program. Be alert for stories in the newspaper in which the president or minister of health makes a statement about health. This happens more often than you might think. If, for example, the president proclaims a national campaign against GWD, cut out the article, put it in a prominent place, and be prepared to answer questions about it. Use the article as the basis for a community or health committee meeting on the topic.

Radio stations often print or announce their schedule of programs in advance. If you find out that a program on

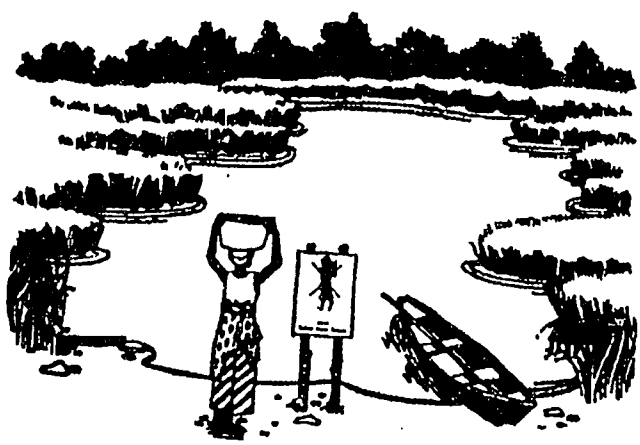
health is planned for a certain day and time, invite a group of people to listen together and discuss the topic afterwards. Prepare yourself to answer questions. These "radio meetings" are an ideal way to combine the benefits of person-to-person and media communication.

Developing Local Media

Because access to the modern mass media is variable and uncertain in rural areas where GWD strikes, local alternatives for spreading accurate information quickly may be more useful. It is important to assess which media are appropriate for your community. If a medium is unfamiliar, its message may be lost. Three methods are presented here, and examples of other teaching media are presented in Appendix B-4.

Posters. Posters can provide simple messages. Posters can be used in two ways:

- to complement a health education session, or
- to stand alone and provide information at strategic points in the community.



Source: *Guinea Worm/Dracunculiasis Eradication Programme: Training Course for Guinea Worm Coordinators*, CDC.

The poster's message must be extremely clear and unambiguous. Ask community members for their ideas about local language captions. Seek their suggestions for effective locations to place the posters. (Refer to the discussion of pretesting materials presented earlier in this chapter.)

Posters on GWD may be available from the Ministry of Health, but homemade posters can be just as effective. Poster-making contests for schoolchildren can provide useful posters for the community and help teach children about GWD. (See "Making Posters," in Appendix B-4.)

When using a poster to complement a health talk, try to involve the audience. First ask people what they see in the poster. If a poster shows a person collecting water from the pond, ask questions to encourage people to learn the poster's message:

- What is the woman doing?
- Why is she collecting water from the pond?
- Is there any danger in this practice?
- How can the woman make the drinking water safe?

Additional suggestions for using posters in community health education are presented in Appendix B-5. Some sample posters are included in Appendix B-7.

Songs. In many cultures people sing to express ideas and feelings. Songs may tell a story of a famous person or recount a current or past event. They can also be used to educate. Lyrics about preventing GWD can be set to an attractive local tune; since the tune is familiar, people will be able to sing it and may find it easy to remember the new words.

GWD songs can be aired on the local radio stations and sung at clinics, schools, and public gatherings. The songs alone will not change behavior, but they will help people remember the important steps for preventing GWD. Children are particularly quick to take in such messages and pass them on to their parents.

Here is a traditional song about GWD that is common in some parts of western Nigeria:

Guinea worm, Guinea worm, don't knock me down!
People you knocked down last year cannot walk.
People you knocked down last year cannot get up.
People you knocked down last year cannot work.
Guinea worm, Guinea worm, don't knock me down!

Town Criers. Before radios and newspapers were invented, people had ways of spreading information. Many rural areas today have no newspapers and few radios, and town criers are still making important announcements. When village leaders want to get information to community members quickly, town criers move from one section of town to the other, making sure that everyone has heard the news.

When village leaders are involved in a GWD control project, they may decide to ask the town crier to spread the word about the availability of filters or the need to contribute funds for a community well. Discuss the potential of town criers with the leaders in your village.

School Health

Teachers play a very important role in rural communities of developing countries. Community members generally view them as role models, links to the "outside" world, and individuals of great knowledge.

Secondary school teachers are in a prime position for encouraging GWD prevention because of the special respect they and their students command. Secondary school students can influence the behaviors of siblings, and household elders often seek their advice.

In a school setting, teachers can:

- educate students about the causes of GWD and its prevention and
- train students to become active in community GWD eradication programs.

Teaching Children about Health

Health education can be taught and reinforced through many school subjects. In science classes, children often learn about animals and plants. They can be taught about animals that carry disease and what they can do to prevent such disease.

In language classes, children can read stories and act in plays that have a health theme. They can learn to spell words connected with health and illness.

During history classes, children can learn about famous people who discovered solutions to many of the world's serious health problems. They can also learn how health and disease have been connected with the progress and decline of nations and empires.

Developing a GWD Curriculum

A school GWD curriculum will differ from a standard academic curriculum because of its focus on action. Methods will be more practical and will involve community leaders, health professionals, and families.

The key elements of a GWD school curriculum are:

- the Guinea worm life cycle and transmission,
- the effects of the disease,
- care of victims,
- prevention of the disease, by filtering drinking water and protecting water sources, and
- community surveillance.

Sample lesson plans for a GWD curriculum are outlined in Appendix B-6. These lessons can be developed to form a complete curriculum, sometimes called a **module** or **unit**.

Children as Community Activists

With the help of their teachers, students can become community activists for GWD prevention. Possible areas for school or student involvement include:

- demonstrating and promoting water filtration,
- counselling people about care for GWD sores and GWD prevention,
- conducting community surveys and surveillance,
- promoting certain behaviors in the community, such as
  —staying out of the water source when one has a GWD sore and
  —helping neighbors affected by GWD collect their water,
- organizing plays, fairs, or other school events about GWD.

Students as Activists	
STRENGTHS	LIMITATIONS
• students are members of families and communities, not outsiders	• students lack credibility because of their youth
• their opinions are respected because they go to school	• they lack certain skills to carry out community health activities
• they are familiar with traditional beliefs and practices	• it may not be appropriate for young people to instruct elders
• they can counsel and instruct "on the spot" in their homes and in neighbors' and friends' homes	• there are limits to how much they can teach, especially where treatment is concerned
• they are often in charge of younger siblings and can teach them preventive practices	• they also must overcome prevailing misconceptions about GWD in their communities
• they are more open to nontraditional explanations about disease transmission and prevention.	• there is a potential for conflict between students and the local health establishment unless roles and limitations are clear

Source: *Teaching Guinea Worm Prevention in Secondary Schools: A Guide for Training Peace Corps Volunteers*, PC, WASH. (ICE# T0060)

The strengths and weaknesses of students as activists are important to keep in mind when selecting activities for student involvement. Criteria that may be useful in selecting appropriate activities for students are listed below. Activities should be:

- inexpensive or free (no outside resources required),
- not highly technical,
- acceptable in the eyes of community leaders and health center staff,
- promotional and instructional, and
- aimed at families and neighbors rather than community leaders.

Teachers can facilitate student activities by:

- organizing student meetings with community members and school officials;
- calling special meetings to inform and involve other teachers and parents;
- holding small workshops to develop certain skills;

- designing simple planning forms for students to use;
- helping students design and practice events such as demonstrations or community theater presentations;
- enlisting other resource persons such as artists and health educators to counsel and train students; and
- planning periodic review meetings.

Teachers should follow up and support students as they carry out GWD eradication activities. Steps for involving students in community surveillance efforts are described in Appendix B-8.

Roles of the Teacher

Teachers can also be activists in the school community. Obtaining the support and involvement of school administrators and other teachers will greatly increase the effectiveness of community efforts to eliminate GWD.

If one teacher alone takes responsibility for GWD activities, problems may arise:

- The program will seem imposed, and other teachers won't identify with it.
- It will be hard to get other teachers to cooperate, and the program won't be sustainable.

Involving Other Teachers in the GWD Eradication Effort

Some strategies that can be used to involve other teachers in the GWD curriculum include:

- inviting teachers to observe classes on GWD;
- sharing lesson plans and other materials;
- asking the head of the school to organize a meeting to introduce the curriculum;
- organizing a school health committee to organize teaching about the disease and to work with the PTA on projects such as ensuring that the school drinking water is safe;
- holding a workshop for teachers on how to involve students in GWD prevention activities;
- inviting teachers to planning sessions for student activities;

- asking teachers if they would supervise certain student activities or teams;
- asking for help with student activities in teachers' areas of expertise.

You will probably have many opportunities to use the health education methods described in this chapter, so we have provided greater procedural detail in this chapter than in others. Still, there is a great deal more to be learned in the references that follow, and we urge interested readers to obtain them if possible.

REFERENCES*

General

A Manual on Health Education and Primary Health Care. 1987. WHO.

Green, L.W., M. Kreuter, S.G. Deeds, and K. Partridge. 1980. *Health Education Planning: A Diagnostic Approach.* Mayfield Publishers, Palo Alto, CA, USA.

Hope, A. and S. Timmel. 1984. *Training for Transformation.* Mambo Press. Gweru, Zimbabwe.

Rothman J. 1977. Three models of community organization, *in* Zaltman, Katler and Kaufman (eds.), *Creating Social Change*, pp. 472-501.

Srinivasan, L. 1990. *Tools for Community Participation: A Manual for Training Trainers in Participatory Techniques.* PROWWESS/UNDP Technical Series.

Guinea worm

Brieger, W.R., J. Ramakrishna, S.U. Akpovi, and J.D. Adeniyi. 1984. Selecting alternative strategies for community health education in guineaworm control. *Int. Quart. Comm. Health Ed.* 5(4):313-320.

Ekeh, H. and J. Adeniyi. 1987. Using teachers as change agents in the control of tropical diseases: an extra-curricular approach. *Int. Quart. Comm. Health Ed.* 6(4):323-333.

* See additional sources in Appendix B-4.

Guidelines for Health Education and Community Mobilization in Dracunculiasis Eradication Programs. 1991. WHO Collaborating Center for Research, Training and Eradication of Dracunculiasis at CDC.

Isely, R.B., and D. Yohalem. 1988. *A Workshop Design for Community Participation.* Volume I. Starting Work with Communities (ICE # TR048). Volume II. Planning and Implementing Sustainable Projects (ICE # TR049). WASH Technical Report No. 33.

Muller, R. 1979. Guinea worm disease: epidemiology, control, and treatment. *Bull. WHO* 87(3):683-689.

Seeking Safe Water: The community-based approach to Guinea worm control. 1991. *Contact* No.118.

Smith, J., and M. Yacoob. 1988. *Teaching about Guinea Worm Prevention: A Manual for Secondary School Teachers.* WASH Field Report No. 223.

Teaching Guinea Worm Prevention in Secondary Schools: A Guide for Training Peace Corps Volunteer Teachers. Peace Corps/ WASH. WASH Field Report No. 321. (ICE# T0060)

Teaching Aids

Fox, H. *Nonformal Education Manual* 1989. The Institute for Training and Development (ICE # M0042)

Ghana Guinea Worm Eradication Program Teachers' Handbook. Global 2000-BCCI/Ghana Ministry of Health.

Guiguemde, T. *Eliminous le Ver de Guinee — un Guide pour l'Agent de Sante Communautaire.* 1984. l'OCCGE, Centre Muraz, B.P. 153, Bobo-Dioulasso, Ivory Coast.

Guinea Worm/Ver de Guinee. [Flipchart] World Neighbors. (ICE # HE205)

Guinea Worm/Dracunculiasis Eradication Program: Training Course for Guinea Worm Coordinators, CDC. [Includes flipchart, posters, recognition cards, water resource cards.]

Werner, D. and Bower, B. *Helping Health Workers Learn,* 1982. The Hesperian Foundation Palo Alto, California. (ICE #HE-061)

Chapter Four

Prevention: Water Resources*

The most effective long-term solution for eradicating GWD is to provide access to water sources that are free of infected copepods. This approach has the advantage of also resolving other water-related health problems and improving the quality of life in a community.

Benefits of a Community Water Supply Project

Health
- Reductions in water-borne diseases: GWD; polio; gastroenteritic diseases (paratyphoid, typhoid, cholera, etc.); hepatitis; schistosomiasis
- Reductions in water-washed diseases: trachoma; diarrheal diseases from fecal-oral contamination; scabies; yaws
- Water for use in clinics and oral rehydration therapy (ORT)
- Water for home gardens — improved nutrition
- Water supply projects stimulating participation in primary health care projects

Economic
- Time saved carrying water
- Time not sick put to productive use
- Water for home gardens or livestock
- Water supply available to cottage industries
- Part-time or full-time employment of caretaker

Social
- Stimulus to community development and organizational skills
- Stimulus to participation in other self-help projects
- Beneficial effects of villagers' working together to achieve a common goal
- More time available to work together on community projects and attend school regularly since people are no longer slowed down by GWD and other water-related diseases
- More time for participation of women in community life

Source: *Workshop on Guinea Worm Control at the Community Level: A Training Guide*, WASH Technical Report No. 50.

Improving water supplies, however, is not a simple task and cannot be undertaken without careful planning and preparation.

* References cited in this chapter, as well as all chapters, are available through your APCD, ICE, or WASH (see addresses in Appendix A).

Many of the technologies described in this chapter require specialized training. Planning and implementing them would require involvement of your APCD, water/sanitation Volunteers, host-country government extension agents, and/or ministry personnel. *The purpose of this chapter is to review water source-based intervention strategies and to provide you with some knowledge of water source improvement and development technologies so that you can assist your community in evaluating its options.* This chapter is not intended as a construction guide. In this chapter you will learn about

- water supply protection options, including
  - protection of existing sources through both community action and technology;
  - development of new sources, such as the construction of wells, spring boxes, and rainwater catchments; and
  - treatment of water by filtering, applying chemicals, and boiling;
- choosing a plan of action by identifying, comparing, and selecting among alternative options.

Water Supply Protection Options

A number of alternative approaches to obtaining safe drinking water are available to communities. Options range from relatively simple, immediate, personal actions to sophisticated water source improvements by the community.

A Matrix of Guinea Worm Disease Control Strategies

	short-term solutions	
case treatment*		source protection
cloth filters		chemical treatment of sources
boiling water		sand filters
personal action		community action
utilization of improved water sources		improved water sources: dug wells, borehole wells, protected springs, rain catchment
	long-term solutions	

* Although not a prevention in itself, case treatment can be used as an avenue for education.

Source: *Helping Communities to Eradicate Guinea Worm: A Training Guide*, WASH Field Report No. 322. [Draft.]

In essence, though, there are three means of obtaining safe water:

- protecting existing water sources,
- developing new water sources, or
- treating water sources.

Protecting Existing Water Supplies

The quickest, least expensive, and most effective way to provide safe water to the community is probably through protecting existing water supplies from contamination. Existing sources may not need much improvement, and modification of these sources will probably meet with little local resistance.

A Summary of Measures to Protect Water Sources

Wells
- Line wells with casing, cover, or finish them so that run-off flows away from rather than into the well.

Ponds and Lakes
- Protect the pond or lake from people entering it while infected with GWD.
- Install sand filters or infiltration galleries to filter water.

Springs
- Remove all sources of contamination above the spring (e.g., animal yards or latrines).
- Install a fence and diversion ditch for run-off above and beside the spring.
- Protect springs with a covered spring box to seal them off from contamination.

Rivers and Streams*
- Install streamside wells or infiltration galleries so that water from the stream flows underground and loses its impurities.
- Install intakes at a point in the river above all inhabited areas and pipe the water to the community.

* If water is flowing, the stream or river will not be a source of GWD infection.

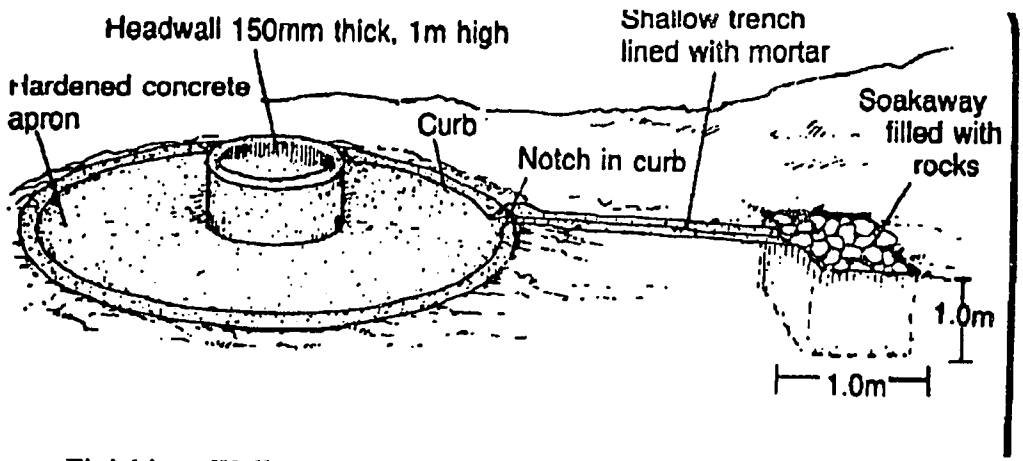
Source: Planning a Water Treatment System, *Water for the World.*

Protecting wells

Open shallow wells and unedged wells can become contaminated from surface runoff. These wells may be protected by constructing simple sloped aprons and head walls that will keep exiting larvae from washing into the well. At a relatively low cost, well **rehabilitation** can dramatically improve an existing drinking water supply. Such rehabilitation may include installing a sloped apron, a head wall, a cover, or a water-lifting device.

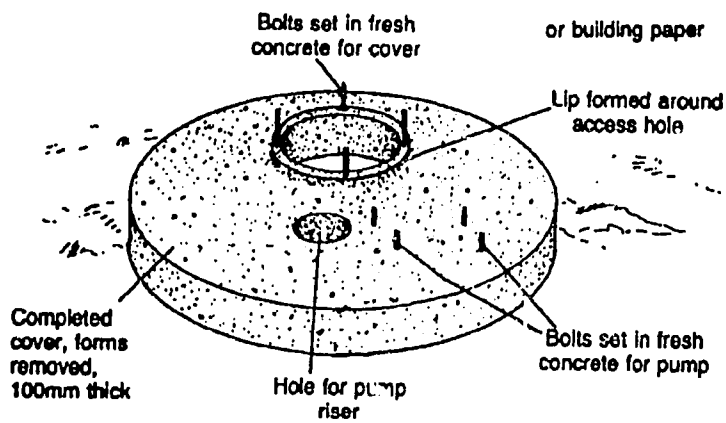
A **sloped apron** is a concrete rim that slopes away from the well, preventing ground run-off from washing in.

A **head wall** is a concrete wall that raises the water-lifting device above ground level and prevents ground run-off from washing into the well.



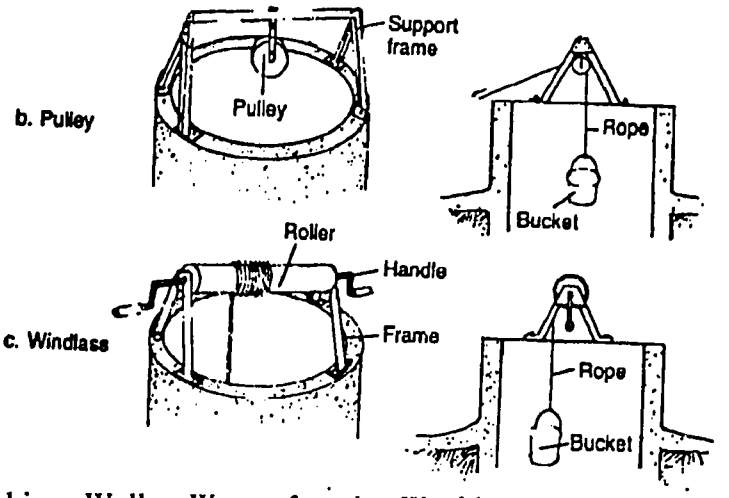
Source: Finishing Wells, *Water for the World.*

A **cover** protects the well from contamination.



Source: Finishing Wells, *Water for the World.*

A water-lifting device, such as a pulley, windlass, or pump, minimizes contact with the water source.



Source: Finishing Wells, *Water for the World.*

Greater detail on well improvements can be found in "Finishing Wells," cited in the references of this chapter. Well improvements can be made using local construction expertise and/or assistance from your APCD or water/sanitation Volunteers.

Protecting Ponds and Lakes

The best way to protect existing surface water supplies is to keep individuals infected with GWD out of them. There are a variety of approaches, all of which are based on community education and cooperation:

- educate community members not to enter the water source if they have GWD;
- develop a community assistance program in which noninfected people help infected people collect water — one option is to build a resting shelter at the water source where those with GWD can wait for healthy neighbors to gather water for them;
- build a platform into the water source or a barrier such as a retaining wall so that people do not enter the water while collecting it;
- display GWD intervention posters at water source;
- post a local authority to monitor water source.

Source: *Guinea Worm/Dracunculiasis Eradication Programme: Training Course for Guinea Worm Coordinators*, CDC.

Pond and lake water can also be made safe by technological interventions: **infiltration galleries** (see Appendix C-3) or **community sand filters** (see "Treating Water," below).

Protecting Springs

A spring or seep is water that reaches the surface from an underground supply, appearing as small water holes or wet spots on hillsides or along river banks. Spring water is generally free from harmful contaminants before it reaches the surface. Before developing a spring, one should conduct a sanitary survey (see "Developing New Sources," below) and measure the quantity of available water (see Appendix C-1).

Some other means of protecting springs are

- constructing more effective drainage systems for spring areas;
- providing adequate space under the outlet for collecting springflow directly into a vessel;
- erecting fences to provide protection from animals;
- directing several springflows, via pipes, to one collection point; and
- constructing protective structures.

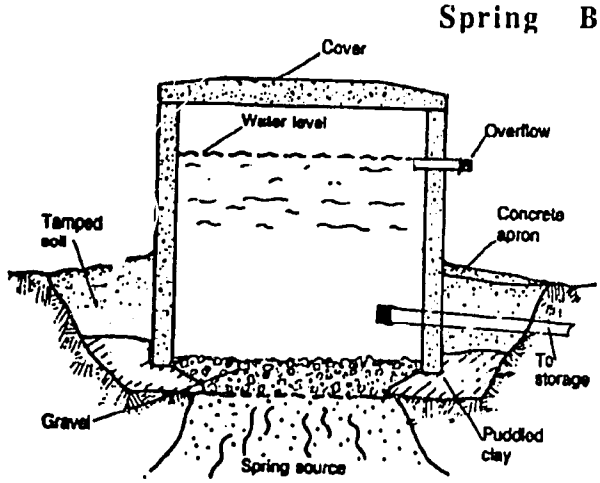
Protective structures are an important part of spring protection and development. **Spring boxes** collect water from springs and protect the source from contamination. First, a small area is dug out around the spring and lined with gravel. A

concrete box with a removable cover is placed over the spring to collect and store the water. The cover prevents outside contamination and should be heavy enough to keep people from removing it to collect from inside the box. A tap and an overflow are installed. The size of a spring box depends on whether or not it is being used for storage.

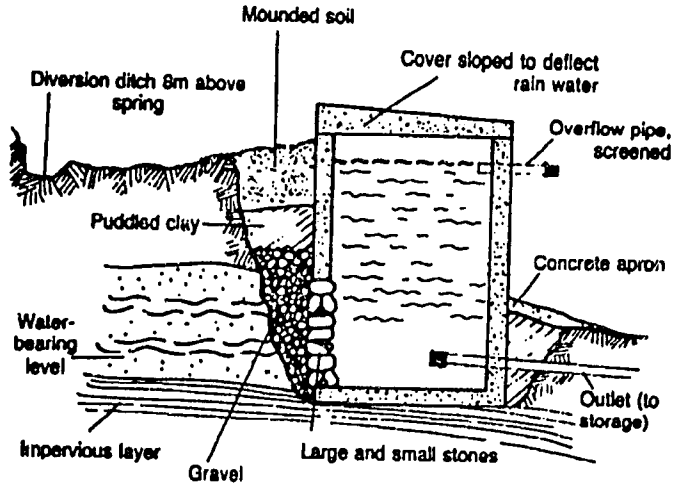
The cost of developing a spring box is minimal, and the system is relatively maintenance free. Disinfection is seldom required. Since springs are generally located on hills, a simple gravity flow delivery system can be developed if water is to be brought closer to the community. Spring boxes can be constructed using local construction expertise and/or assistance from your APCD and water/sanitation Volunteers.

For springs that flow from a spot on level ground, an open-bottomed spring box should be placed over the opening to capture all available flow (see figure *a* below). For springs on a hillside, a box with an open back should be placed against the hillside and the water should be channeled into the collection box (see figure *b*).

Spring Boxes



<-- a

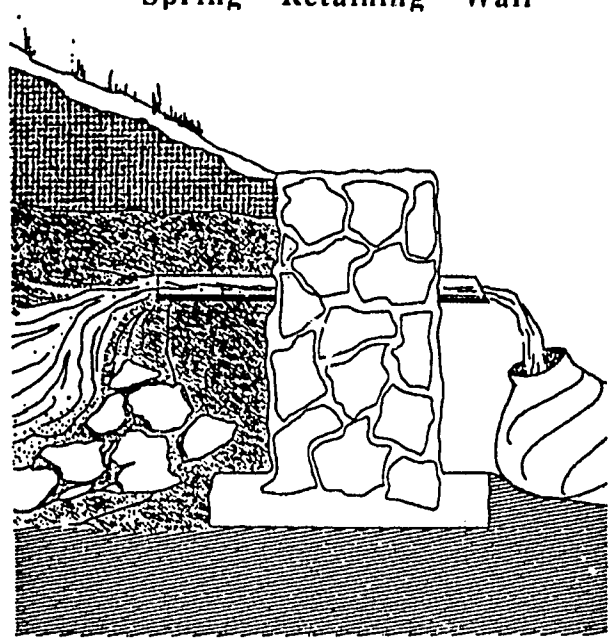


b-->

Source: Choosing Where to Place Intakes, *Water for the World.*

Retaining walls, pictured below, can be constructed where springs occur on steeply sloping hills. Pipes are driven into an aquifer to tap it at a point higher than the natural discharge. A retaining wall is relatively easy to build, can be made from locally available materials, and is inexpensive.

Spring Retaining Wall

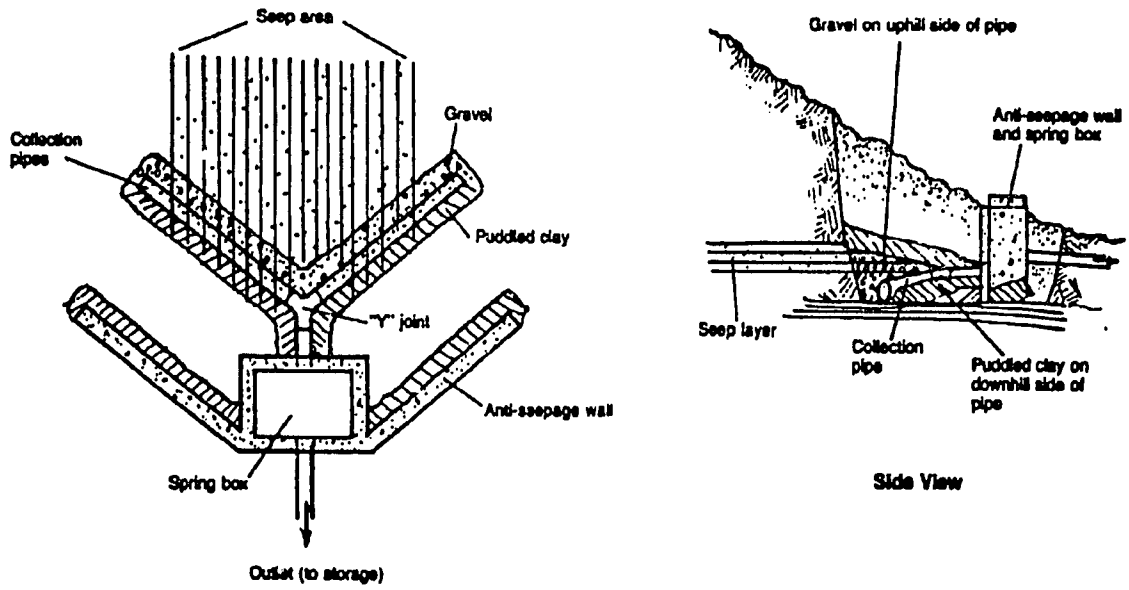


Source: *Workshop Design for Spring Capping: A Training Guide*, WASH.

A disadvantage of using spring water is that the quantity of available water may change seasonally. Community members should be consulted to determine the reliability of the source.

Seep development. If water seeps from the ground and covers an area of several square meters, pipes can be laid to collect the underground water and transport it to a collection box, as shown in the figure below. A poured concrete wall just downslope of the pipes traps the water for more efficient collection. Developing a seep is expensive and difficult. Unless the seep supplies abundant quantities of water (see Appendix C-1), this method should not be considered.

Seep Collection System



Source: Methods of Developing Sources of Surface Water, *Water for the World.*

Protecting Rivers and Streams

Remember, copepods thrive in shallow, standing water (ponds, lakes) but do not live in running water. Streams, however, can become stagnant and provide a breeding ground for copepods. Technologies for making water from rivers and streams safe and accessible are discussed below in "Developing New Sources."

Developing New Sources

There are three sources of water: surface water, ground water and rainwater. Rainwater is actually a subcategory of surface water.

Surface water includes water from ponds, lakes, streams, rivers, and springs. Surface water is available without major

digging and sometimes can be delivered to users without pumping. Surface water, however, is subject to run-off and human and animal contact and may be contaminated. Most water from surface sources will have to be treated (and not for only copepods).

Ground water is water that is stored underground in porous layers called **aquifers**. Ground water slowly flows to a point where it comes out of the earth as a spring or feeds streams, ponds, or lakes. The two most significant characteristics of an aquifer are its **porosity** and **permeability**. Porosity governs the amount of water that an aquifer can contain. The amount of water that can be brought to the surface depends on the aquifer's permeability. For example, some aquifers may contain large quantities of water, but their rate of yield is too slow to suit the needs of users.

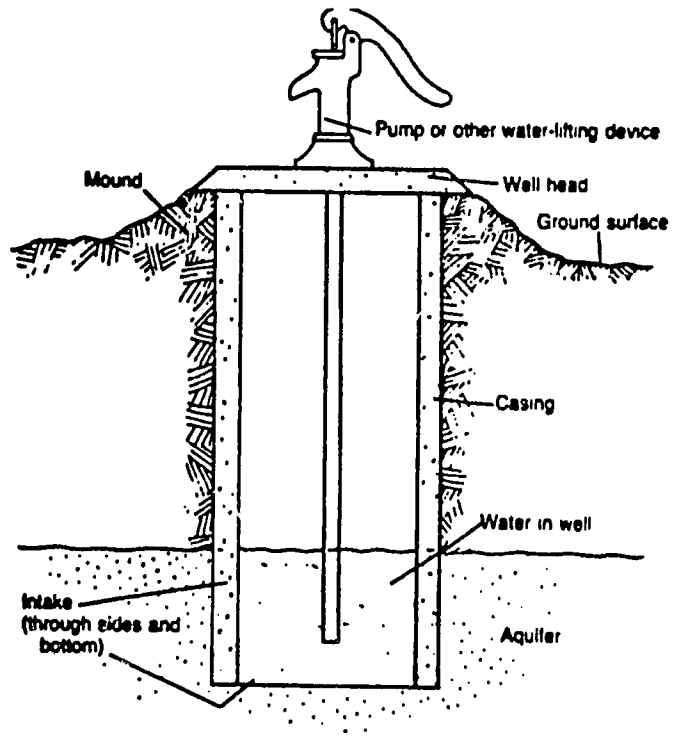
In rural areas, ground water may be the safest and most reliable source of water; it is usually free from disease-causing bacteria and is often available in all seasons. The major disadvantage is that ground water must be extracted from beneath the ground. Copepods are not found in ground water, but shallow wells may become contaminated.

Water that is both safe and acceptable is called **potable**. A sanitary survey and water analysis can be conducted to determine whether a potential water source is potable. A **sanitary survey** is a field evaluation of local conditions that affect the acceptability of a potential water source. It is an important step in determining the need for water treatment and should be undertaken by a sanitary engineer when new water sources are being developed. See "Conducting Sanitary Surveys to Determine Acceptable Surface Water Sources," in the references.

Wells

Wells are used to develop or extract ground water. A well is simply a hole that pierces an aquifer so that water may be pumped or lifted out. Wells can be classified according to their method of construction. Examples include hand-dug, driven, jetted, bored, and cable tool wells. The least expensive and technologically complex types are described in Appendix C-2.

Wells have five basic parts: shaft, casing, intake, wellhead, and water-lifting device. The **shaft** is the hole that is sunk from the surface of the ground down into, and sometimes through, the aquifer. The shaft provides access to ground water. The method of sinking the shaft differs with each type of well.



Source: Methods of Developing Sources of Ground Water, *Water for the World.*

The **casing** lines the sides of the shaft. It prevents the shaft from collapsing, provides an impermeable container for storing water, and keeps polluted surface water out. Casings are usually made from concrete or metal, but they may be brick or masonry for dug wells. Casings are installed either after the shaft is sunk, or as it is sunk.

The **intake** is either the lower portion of the casing, which is perforated or made from porous material, or the open bottom end of the casing. In either case, the intake is in the aquifer, and its purpose is to allow ground water to flow into the casing.

The **wellhead**, usually made of concrete, is built on and around the casing at ground level. The purpose of the wellhead is to provide a base for a pump or other water-lifting device, to prevent contaminants from entering the well, to keep people

and animals from falling in the well, and to drain away surface water. (See illustrations above under "Protecting Wells.") The wellhead is built on an earthen mound 15-20cm above the original surface so water will drain away from the well.

The **water-lifting device** can be a pump, windlass, windmill, pulley, or set of rollers. The purpose of the device is to get water out of the well.

Selecting a well site, methods of well construction, and finishing a well are additional topics covered in Appendix C-2.

Rivers and Streams

Rivers and streams have variable yield and water quality. Some dry up during the dry season and have no water for several months. Rivers and streams are also exposed to contamination by humans and other animals and may be unsuitable for drinking unless treated. But in mountainous areas or in places with few inhabitants, the quality of stream water can be very good. Streams in such areas offer a good source of water that requires little or no treatment.

Three methods of developing rivers and streams — **infiltration wells, infiltration galleries**, and **gravity flow intakes** — are discussed in Appendix C-3.

Rainwater Collection

In some cases, rainwater may be the only acceptable source of surface water available to a community. If it is to be used for drinking water, rainwater must be collected and stored in sufficient quantities to meet individual or community needs (see Appendix C-1).

Rainwater catchments collect water from precipitation. In areas of little rain or at times of drought, catchments can be used in combination with other surface sources. For example, water from catchments can be used for drinking and cooking while other sources meet cleaning needs. There are two types of catchment systems: roof catchments and ground catchments. They are described in Appendix C-4.

Treating Water

Water can be treated to eliminate copepods by filtering, chemically disinfecting, or boiling it. A general problem with all these techniques is that any lapse in vigilance can result in infection. In addition, people may resist using these techniques. Treatment methods should be employed:

- if no other water source is available or its development is not feasible;
- as an interim measure as adequate water sources are being developed;
- in an emergency if the source has become contaminated or there has been some failure of the safe source to provide water.

Filtering

Filtering water through monofilament or cotton cloth is becoming the most common strategy in the early phases of most national GWEPs in Africa because of its low cost and ease of use. With filtering, copepods are physically removed from water when it is poured through cloth.

Source: *Guinea Worm/Dracunculiasis Eradication Programme: Training Course for Guinea Worm Coordinators*, CDC.

To filter water:

- Inspect the filter for tears or holes before use.

- Place the "dirty" side of the filter upward on the pot. There should always be a "clean" side and a "dirty" side to the cloth to prevent washing copepods into the drinking water when the filter is reused. The "dirty" side may be marked (e.g., with a dark thread).
- Attach the cloth to (or place the filter over) the mouth of the water jar with string or elastic. Be sure there is a slight downward dent in the cloth. The middle of the filter should sag so water will not splash out.
- Pour the water by cupfuls through the filter. Water should be poured slowly so it does not splash.
- Allow all water to drain through the filter to avoid contamination during removal.
- Remove the filter carefully so that all debris and copepods on the top side will not be flipped into the water pot.
- Cover the water pot.
- Wash the filter with soap and water. Shake it out thoroughly.
- Hang the filter to dry outside in the sun for the next day's use.
- To protect the filter, store it away from sharp objects.

(See also "Demonstrating Skills" in Chapter Three.)

Nylon or polyester cloth, also referred to as **monofilament**, is the preferred cloth for filters. It is a fine-mesh gauze that is more easily cleaned, is more durable, and filters more quickly than other types of cloth. If monofilament is available, you should urge community members to use it. Monofilament cloth has been donated by The Dupont Corporation to the Guinea worm eradication effort and is being distributed by Global 2000. Requests for cloth from Global 2000 should be made by the National GWEP Coordinator[1] and addressed to Dr. Don Hopkins, c/o Global 2000 (see Appendix A for address). Requests should specify how the materials will be used, stored, and distributed.

[1] In Ghana and Nigeria, monofilament is being distributed directly by Global 2000.

Cotton cloth is the most common type of filtering material used because it is readily accessible. Gray baft, a cotton cloth that is widely available, has proven effective for filtering copepods.

It is important to use a tightly woven cloth. If the cloth is of loose weave, encourage people to use a double layer because two layers will do a better job of filtering, although they may clog more quickly.

According to local water gathering practices and available materials, different **filter designs** can make filtering easier. Options include:

- making or purchasing filters with elastic around the edge to fit over the mouth of any container;
- sewing filter material into the center of a piece of cloth (thus being able to make more filters out of same amount of filter material);
- making frames of pliable bark and nailing the cloth to the rim;
- making small filtering devices especially for farmers to carry out in the field.

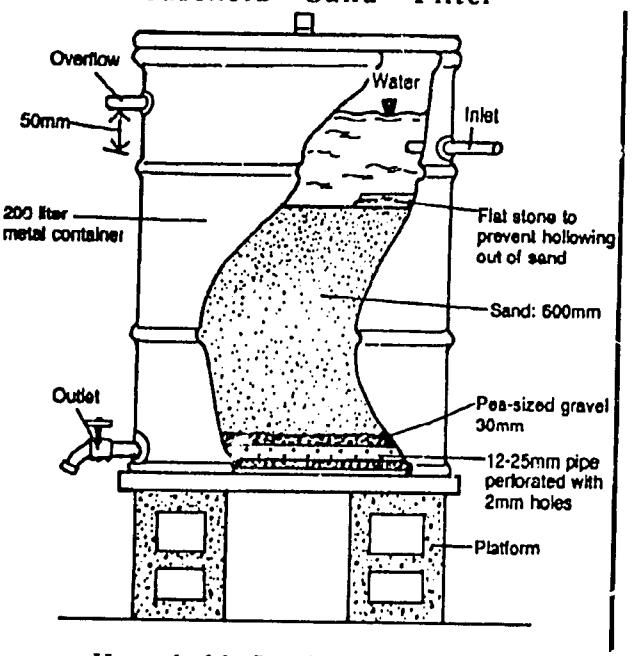
Source: *Guinea Worm/Dracunculiasis Eradication Programme: Training Course for Guinea Worm Coordinators*, CDC.

In Idere, Nigeria, an association of local health workers established a system to produce and market filters. A summary of their project is presented in Appendix C-5. It was found that the sale and use of filters was greatest where local primary health workers were involved in all phases of marketing. Still, there were difficulties in making the filters acceptable to

community members. Some of the factors that influenced the acceptance of the filters in Idere are presented in Appendix B-2.

Household sand filters can also be used. A household sand filter is made of a large barrel partially filled with a layer of clean sand on top of a layer of small stones. Water poured into the top of the barrel flows through the sand, which traps the sediment and copepods. The decontaminated water flows out of a perforated pipe at the bottom of the barrel. The sand layers *must* be changed every two to three weeks to keep up the flow rate and prevent organisms (other than copepods) from growing in the sand layers and recontaminating the water. The sand that is removed can be washed, dried, and used again. Household sand filters can filter large quantities of water quickly but do not actually kill pathogenic (disease-causing) organisms. They work well if they are properly maintained and can be made wherever sand is available.

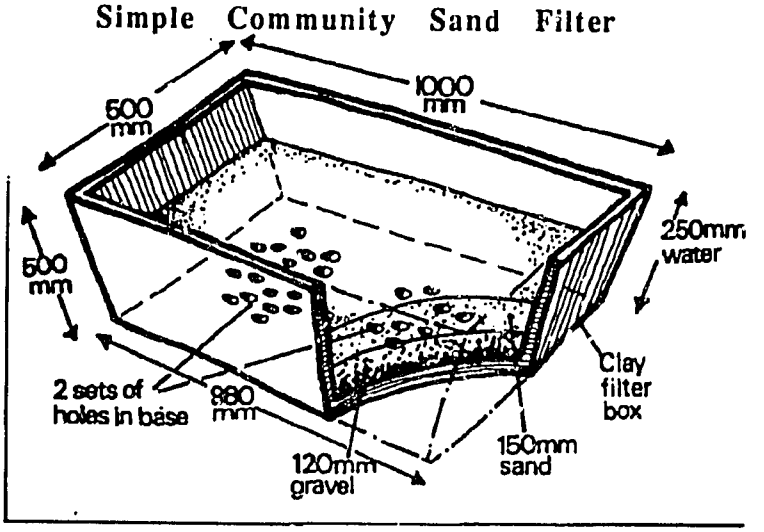
Household Sand Filter



Source: *Constructing a Household Sand Filter*, Water for the World.

Community sand filters are a larger version of the household sand filter. The filter consists of a steel drum or large concrete tank. Although construction of a community sand filter system does not require highly specialized labor, its design requires a fair amount of expertise. Additionally, costs are high and a large site is needed.

The design for a simple but effective sand filter that can serve a small group of people (approximately ten) is illustrated below.



Source: Srindhar, M.K.C., O.O. Kale, and J.D. Adeniyi. 1985. A simple sand filter to reduce Guinea worm disease in Nigeria. *Waterlines* 4(2):16-19.

The advantages of the community sand filter are that it

- removes 90-95 percent of bacteria responsible for water-related disease,
- removes suspended matter and reduces color,
- can generally be built with local materials using local skills and labor,
- needs no complex mechanical or electrical machinery, and
- requires simple operation and maintenance.

A community sand filter is not very effective if a source is highly turbid, large quantities of clean, suitably-sized sand are not readily available; or people dedicated to the maintenance of the filter are not available.

Chemical control

Treating contaminated drinking water sources with the chemical temephos (brand name, Abate) is an effective method for making water sources safe from GWD. Temephos application isn't a control strategy in and of itself. Because treated water sources can be continually reinfected if there is no education, temephos should be used only as a supplement to other interventions.

Temephos is used in GWD-affected villages when one or more of the following conditions exist:

- The body of water is small to moderate in size.
- The local GWD transmission cycle is known and the application can be timed appropriately.
- Provision of alternative safe drinking water sources is not feasible.
- Previous attempts to change community members' behavior have consistently failed.
- The water source is frequently used, the probability of individuals coming into contact with the water is high, and no other intervention is immediately available.
- There is a large outbreak, but the village must wait for provision of safe drinking water source(s).
- The area has very little transmission remaining and rapid elimination is desired (most likely in the final stages of the eradication program).
- The area has many migrants passing through, some of whom might contaminate the water.
- There is lack of control over who uses the drinking water source, e.g., several villages, including some infected people, share the same water source.
- Political pressure demands vector control.

If temephos is used, all contaminated drinking water sources in the community must be identified and the community must be willing to cooperate. Temephos application is scheduled according to the peak GWD season in the area. The chemical is effective from four to six weeks, so from four to six applications will be needed per year starting approximately two months before GWD season begins.

Temephos has been thoroughly studied by scientists and has proven to be extremely safe for use in drinking water when applied correctly. It takes only a small amount (1 mg per litre or 1 part per million) of temephos to kill copepods. When applied at this concentration, temephos will not harm humans, domestic animals, or fish. Temephos is added according to the amount of

water the source contains. The suggested maximum size of a water body to be treated is 500 cubic meters. The correct calculation of the volume of the water source and the amount of temephos to be added is very important because miscalculation may cause serious problems.

Abate has been donated by The American Cyanamid Company and is being distributed by Global 2000. Requests for Abate from Global 2000 should specify how it will be used, stored, and distributed (see directions for requests for monofilament cloth above).

Because proper application of temephos depends on accurate measurement of the volume of water, accurate calculation of the required amount of chemical, and accurate timing, a chemical control program should be closely monitored by national or regional GWEP offficials. Chemical treatment requires trained personnel and may not be appropriate for community worker's involvement, but it is an important component of the intervention efforts in most National Plans of Action.

Boiling

Boiling water is the most effective way to disinfect relatively small quantities of water. All pathogenic (disease-causing) organisms are destroyed in water brought to a rolling boil for two to three minutes. The fuel required to boil water may be difficult to acquire, however, and can be very expensive. Boiling is practical only if fuel is available in large quantities. In addition, many object to the taste of boiled water.

Source: *Guinea Worm/Dracunculiasis Eradication Programme: Training Course for Guinea Worm Coordinators,* CDC.

To ensure that boiled water does not become contaminated, follow these steps:

- Always store the boiled water in the same container in which it is boiled. Changing containers increases the risk of recontamination.
- Use containers that have covers or can be covered adequately.
- If possible, attach a spigot to the container so that there is no need to dip cups or other utensils into the water. If no spigot is attached, always pour the water rather than dipping into it.

Boiling may best be considered a short-term emergency treatment rather than a long-term solution to water quality problems.

Choosing a Plan of Action

Identifying Alternatives

Different control strategies will be appropriate in different communities at various stages of the eradication program for economic, social, geographical, and cultural reasons. There may be some reverence for the local pond, for example, and residents may resist using another water source. The pond may be a landmark and meeting place. The pond is often the primary reason for a village's location and may be credited with

the village's longevity. If the pond was good enough for the residents' ancestors, why not for their children?

Other villages may be in an area where it would be very difficult to construct improved water sources because of geological or climatic conditions. There may be no spring to develop or the composition of the ground may make well-digging impossible. Under such circumstances, filtering water may be the most viable alternative for prevention and control.

Think strategically: there is no single 'right' or even 'best' answer.[2] To determine what combination of strategies will work in a community, a critical assessment, or **water resource assessment**, of available and potential water sources must be made. Assessing existing sources and their role in GWD transmission is outlined in Chapter Five under "Community Assessment."

Sources being considered for improvement or development should have the following characteristics:

- **Quality.**[3] Here, water quality is defined as the absence of GWD.

- Sufficient **quantity** to meet the needs of users. Water quantity is measured by the number of liters per day people use. A water source should provide an average of 15 liters per person per day. If water is brought close to houses, the amount of water used will increase greatly (up to 40 liters per person per day). Determine the amount of water the community will need by multiplying the population by the estimated amount of water used per person per day.

[2] *Lessons Learned from the WASH Project: Ten Years of Water and Sanitation Experience in Developing Countries.* 1990. WASH.

[3] The quality of an existing water source can often be judged simply by observing the source and local habits of water use. Very turbid water (clouded by sediment), human or animal activity in a source, and direct waste disposal into a source are strong signs of contamination. Algae growing in a water supply may indicate the presence of sewage and cause bad tastes and odors. Algae may also indicate large amounts of nitrate, which can cause blood problems in infants. Rust-colored or black water indicates high iron and manganese content.

Measuring the amount of water various sources may yield is described in Appendix C-1.

- **Accessible.** A water supply should not be located more than 250m from the users, otherwise individuals may use a closer, contaminated source. Political considerations may influence accessibility — for example, there may be pressure to locate a new water source near an influential member of the community.

- **Reliable.** Reliability of a source ensures its continued use. A safe source of water must be available year round.

- Improvable or developable at an affordable cost. (See "Comparing Alternatives" below.)

If community members decide to develop a new water source, appropriate environmental and geologic data will be needed on soil conditions, groundwater levels, topography, rainfall, stream flow rates, and spring yield. These data should be collected by appropriately trained personnel. More information on analyzing potential water sources can be found in the references listed under ground and surface waters.

Comparing Alternatives

Once the various alternatives have been identified, community members should compare them. Some advantages and disadvantages of various control options are summarized below.

Methods for Preventing Guinea Worm Disease

METHOD	ADVANTAGES	DISADVANTAGES
Deter infected people from entering drinking water sources	low cost; minimal need for outside support	depends on quality of health education. degree of social support and long-term behavior change
Physical barriers to water source	low to moderate cost; minimal external support; effective if maintained	needs maintenance; water levels change so may not be useful all year; uncooperative people may still enter pond and infect
Filter drinking water through cloth filters	low cost; minimal need for outside support; production can provide income for some villagers; simple to demonstrate and distribute	temporary solution; may not be accepted culturally; protects only individuals; requires adoption of a habitual new behavior; effective only against GWD
Community sand filters	low cost; minimal external support; removes other organisms	temporary solution; may not be accepted culturally; requires new habits; requires maintenance
Boiling drinking water	minimal external support; kills other organisms	temporary solution; fuel unavailable or expensive; may not be accepted culturally; changes water taste
Chemical control (temephos) (Abate, brand name)	relatively quick; with training, villagers may be able to apply it themselves; protects all users; minimal behavior change; kills mosquito larvae	moderate cost; temporary solution; may not be accepted culturally; imported materials; requires precise measuring and calculating skills; not suitable for large ponds
Safe water sources: *dug wells *borehole wells *protected springs *rain resevoirs	permanently effective if maintained; protect against other water-related disease; generally accepted & preferred by community members	moderate to high costs; external resources needed; takes time to plan and implement; needs maintenance

Methods for Preventing Guinea Worm Disease Continued

NOTE: Health education is essential for promoting the provision, organization, and adoption of each of these preventive strategies through training, communication, and mobilization.

Source: *Guidelines for Developing a Plan of Action for Dracunculiasis Eradication Programs*, WHO Center for Research, Training, and Eradication of Dracunculiasis at CDC.

For each option considered, the following questions should be addressed:

- Is the cost high, moderate, or low?
- Does the method offer a long or short-term solution?
- Will the method be culturally acceptable?
- Is it technically simple or complex to operate?
- Does it require much or little maintenance?
- Can it be accomplished with local action, external help or both?
- Does the method require individual or community action to implement?
- Are the necessary materials available?
- Will the method be convenient?

During this process, community members should also assess national and regional plans for water improvement projects. The presence of GWD in the community may give it priority for government assistance.

You may want to prepare a matrix to compare options:

	Action on Sources			
METHOD				
COST				
LONG/SHORT TERM SOLUTION				
CULTURAL ACCEPTABILITY				
SIMPLICITY OF USE				
NEED FOR OUTSIDE RESOURCES/HELP				
MAINTENANCE NEEDS				
INDIVIDUAL OR COMMUNITY ACTION				

Once the number of options has been narrowed down, a more detailed analysis of alternatives should be conducted:

- What materials, tools, and equipment are necessary? Which are available locally? How can non-local materials and supplies be obtained?
- What kind of and how much labor is necessary? Is labor available locally? When will laborers be available?
- How much will materials, equipment, and labor cost? How will the project be funded? When will funding be available?
- Are trained personnel necessary for operation and maintenance? Are local personnel available to operate systems? How much will training cost? Who will provide training?
- If construction is needed, is a site available? Is that site convenient for everyone in the village?

- What is best season for construction?
- What is the minimum cost of keeping the system going? How will funds be provided? Will spare parts be available?

Evaluating project resources is also discussed in Chapter Six.

Selecting an Alternative

After evaluating the alternatives, community members must choose the most appropriate system. (See Chapter Six, "Community Participation.") Often the most desirable alternatives are not the most workable solutions. Community members need to decide how much effort they are willing to make. They should be careful not to choose either a sophisticated but unrealistic system or a system that is realistic but inadequate for meeting the community's needs. Options that emphasize using local resources — not solely money but materials and skills — should be given priority.

Water sources that need no treatment[4] or pumping should be given top priority. Water from a protected spring generally needs no treatment or pumping. A stream or river in a highland region with few inhabitants can be developed through a gravity flow system and probably will not require treatment or pumping. Of all the alternatives, the most expensive is one that requires both treatment and pumping. Ponds, lakes, and some streams fit into this category. If a pond is the only available source, however, pond water may be pumped or permitted to seep through a slow sand filter or infiltration gallery. A water supply should be treated only when the source cannot be protected from contamination, when a better source is not available, and when complete operation and maintenance of the treatment system is possible.

Plans for water resource improvement or development can be organized into a project plan that will guide the community in

[4] Treatment here does not refer solely to elimination of copepods but other contaminants as well (other organisms and chemicals hazardous to health). A source that needs treatment for only copepods may be preferable to a source that requires pumping. As discussed earlier, however, if behaviors are not changed, chemical treatment for copepods is not sufficient for prevention.

planning, implementing, and monitoring its solution (see Chapter Six).

REFERENCES

General

Edungbola, L.D., and S. Watts. 1986. *Impact of protected water supplies on the prevalence of Guinea worm disease in Asa, Kwara State, Nigeria.* Univ. of Ilorin, Nigeria.

Koffi, J.F. 1986. Hydraulique humaine et sante publique en Côte d'Ivoire. *Med. Trop.* 46(2).

Rural Water/Sanitation Projects: Selected Technical Fact Sheets. *Water for the World.* 1982. 284pp. (ICE# WS052) [This volume includes all the references cited as HR and RWS below.]

Small Community Water Supplies: Technology of Small Water Supply Systems in Developing Countries. 1981. 413pp. (ICE# WS043)

Udonski, J.K. 1987. Control of endemic dracunculiasis by provision of water supply in rural communities of Imo State, Nigeria. *Public Health* 101:63-70.

Water and Sanitation Programming Guidelines. 1989. Peace Corps. (ICE# T055)

Community participation

HR* .2.M Methods of Initiating Community Participation in Water Supply and Sanitation Projects

HR.2.P Community Participation in Planning Water Supply and Sanitation Projects

HR.2.I Community Participation in Implementing Water Supply and Sanitation Programs

Edungbola, L.D., and S. Watts. 1990. The elimination of Dracunculiasis in Igbon, Oyo State, Nigeria: the success of self-help activites. *J. Trop. Med. and Hyg.* 93:1-6.

Participation and Education in Community Water Supply and Sanitation Programs. 1981. 222pp. (ICE# WS003)

* HR = *Water for the World* series; available as ICE# WS052.

Surface Water

General

RWS* .1.M Methods of Developing Sources of Surface Water
RWS.1.P.1 Planning How to Use Sources of Surface Water
RWS.1.P.2 Conducting Sanitary Surveys to Determine Acceptable Surface Water Sources
RWS.1.P.3 Selecting a Source of Surface Water
RWS.1.D.5 Designing Small Dams
RWS.1.C.5 Constructing Small Dams
RWS.1.0.5 Maintaining Small Dams

Ponds and Lakes

RWS.1.P.4 Choosing Where to Place Intakes
RWS.1.D.2 Designing Intakes for Ponds, Lakes and Reservoirs
RWS.1.C.2 Constructing Intakes for Ponds, Lakes and Reservoirs
RWS.1.0.2 Maintaining Intakes

Rivers and Streams

RWS.1.P.4 Choosing Where to Place Intakes
RWS.1.D.3 Designing Intakes for Streams and Rivers
RWS.1.C.3 Constructing Intakes for Streams and Rivers
RWS.1.0.2 Maintaining Intakes

Springs

RWS.1.D.1 Designing Structures for Springs
RWS.1.C.1 Constructing Structures for Springs
RWS.1.O.1 Maintaining Structures for Springs
Workshop Design for Spring Capping: A Training Guide. 1984. 477pp. (ICE# TR040)

Rainwater catchment

RWS.1.D.4 Designing Roof Catchments
RWS.1.C.4 Constructing, Operating and Maintaining Roof Catchments
RWS.1.P.5 Evaluating Rainfall Catchments

* RWS = *Water for the World* series; available as ICE# WS052.

Ground Water

General

RWS.2.M Methods of Developing Sources of Ground Water
RWS.2.P.1 Planning How to Use Sources of Ground Water

Wells

RWS.2.P.2 Selecting a Method of Well Construction
RWS.2.P.3 Selecting a Well Site
RWS.2.D.1 Designing Dug Wells
RWS.2.C.1 Constructing Dug Wells
RWS.2.D.2 Designing Driven Wells
RWS.2.C.2 Constructing Driven Wells
RWS.2.D.4 Designing Bored or Augered Wells
RWS.2.C.4 Constructing Bored or Augered Wells
RWS.2.C.6 Maintaining Well Logs
RWS.2.C.7 Testing the Yield of Wells
RWS.2.C.8 Finishing Wells
RWS.2.C.9 Disinfecting Wells

Hand Dug Wells and Their Construction. 1979. 253pp. (ICE# WS007)

La Construction des Puits en Afrique Tropicale et l'Investissement Humain. 1974. 191pp. (ICE# WS046)

Well Construction: Hand Dug and Hand Drilled. 1980. 282pp. (ICE# M0009)

Workshop Design for Well Improvement: Protecting Open Wells. 1988. 270pp. (ICE# TR047)

Water Treatment

RWS.3.M Methods of Water Treatment
RWS.3.P.1 Determining the Need for Water Treatment
RWS.3.P.2 Taking a Water Sample
RWS.3.P.3 Analyzing a Water Sample
RWS.3.P.4 Planning a Water Treatment System
RWS.3.D.5 Water Treatment in Emergencies

Brieger, W.R., J. Ramakrishna, and J.D. Adeniyi. 1986. Community involvement in social marketing: Guineaworm control. *Int. Quart. Comm. Health Ed.* 71(1):19-31.

Guidelines for Chemical Control of Copepod Populations in Dracunculiasis Eradication Program, WHO Collaborating Center for Research, Training, and Eradication of Dracunculiasis at CDC.

Household

RWS.3.D.1 Designing Basic Household Water Treatment Systems
RWS.3.C.1 Constructing a Household Sand Filter
RWS.3.0.1 Operating and Maintaining Household Treatment Systems

Sedimentation Basin

RWS.3.D.2 Designing a Small Community Sedimentation Basin
RWS.3.C.2 Constructing a Sedimentation Basin
RWS.3.0.2 Operating and Maintaining a Sedimentation Basin

Slow Sand Filter

RWS.3.D.3 Designing a Slow Sand Filter
RWS.3.C.3 Constructing a Slow Sand Filter
RWS.3.0.3 Operating and Maintaining a Slow Sand Filter

Slow Sand Filtration for Community Water Supply in Developing Countries: A Design and Construction Manual. 1978. 175pp. (ICE# WS039)

Srindhar, M.K.C., O.O. Kale, and J.D. Adeniyi. 1985. A simple sand filter to reduce Guinea worm disease in Nigeria. *Waterlines* 4(2):16-19.

Water Distribution

RWS.4.M Methods of Delivering Water
RWS.4.P.1 Choosing Between Gravity Flow and Pumps

Pumps

RWS.4.P.4 Selecting a Power Source for Pumps
RWS.4.P.5 Selecting Pumps
RWS.4.P.6 Manufacturing Hand Pumps Locally
RWS.4.D.2 Determining Pumping Requirements
RWS.4.C.2 Installing Mechanical Pumps
RWS.4.O.2 Operating and Maintaining Mechanical Pumps
RWS.4.C.3 Installing Hand Pumps
RWS.4.O.3 Operating and Maintaining Hand Pumps

Hand Pumps for Use in Drinking Water Supplies in Developing Countries. 1977. 229pp. (ICE# WS008)
Hand Pump Maintenance in the Context of Community Well Projects. 1977. 38pp. (ICE# WS009)
Human and Animal-Powered Water-Lifting Devices. 1985. 111pp. (ICE# WS080)
Manual on the Hydraulic Ram for Pumping Water. 1977. 39pp. (ICE# WS010)
Six Simple Pumps: A Construction Guide. 1983. 94pp. (ICE# WS002)
Workshop Design for Handpump Installation and Maintenance: A Training Guide. 1984. 585pp. (ICE# TR038)

Gravity flow

RWS.4.D.1 Designing a System of Gravity Flow
RWS.4.D.5 Designing a Hydraulic Ram Pump
RWS.1.D.3 Design of Intakes for Rivers And Streams

Pipes

RWS.4.P.3 Selecting Pipe Materials
RWS.4.C.1 Installing Pipes
RWS.4.0.1 Detecting and Correcting Leaking Pipe

Water Storage

RWS.5.M Methods of Storing Water
RWS.5.P.1 Determining the Need for Water Storage
RWS.5.D.1 Designing a Household Cistern
RWS.5.C.1 Constructing a Household Cistern
RWS.5.D.2 Designing a Ground Level Storage Tank
RWS.5.C.2 Constructing a Ground Level Storage Tank
RWS.5.D.3 Designing an Elevated Storage Tank
RWS.5.C.3 Constructing an Elevated Storage Tank
RWS.5.0.1 Maintaining Water Storage Tanks

Operation and Maintenance Training

HR.3.P Planning Operation and Maintenance Training
HR.I.1 Implementing Operation and Maintenance Training
HR.I.2 Evaluating Operation and Maintenance Training

Chapter Five

Measuring The Problem

Measuring the extent of the GWD problem in endemic communities is a *crucial* step in planning and evaluating GWD eradication activities at both the community and national levels. Also crucial to planning and evaluating education activities and water source improvements is an understanding of the community — its structure, beliefs, and resources. In this chapter, you will learn:

- the components of a community assessment;
- methods for conducting a community assessment;
- the purpose of surveillance;
- methods for conducting surveillance activities; and
- methods for summarizing data.

Community Assessment

GWD is complicated by many human behavioral, social, economic, political, and geographical issues. As Mary Marrow, a Volunteer in Togo, writes[1], "...the work at hand is much more involved than providing clean water supplies or health education. Understanding and addressing a community's traditions, ethnic rivalries, and [questions of equity] are also vitally important in a comprehensive GWD eradication program."

A **community assessment** is an information gathering process that can be used to learn about a community and its GWD problems. Gathering local technical, socio-cultural, and economic information is an important educational process for you and the community. The information can be used

- to identify what kind of program activities might be appropriate for the community,

[1] *As the Worm Turns*, Guinea Worm Eradication Newsletter, Vol. 2 No.1, Peace Corps.

- to tailor GWD program activities to suit the community's needs, and
- to enable community workers to work with the community to plan the GWD activities they want to implement.

A field investigation is a very effective way to establish a good working relationship with community members because it stimulates community involvement in the project. Although getting community members involved in the assessment may require extra time and energy, doing so should pay off in earlier and more frequent successes. In addition, the skills community members learn by participating in assessment and surveillance activities will facilitate continued surveillance throughout the GWD eradication program and improve the community's ability to tackle other problems. Some exercises to familiarize community members with concepts of data collection and analysis are included in Appendix B-5.

Community assessment also provides people at the regional and national levels with information they need to make decisions on the most appropriate actions to take at those levels to help eradicate GWD.

Community Assessment Information Needs

The type of information needed to plan GWD intervention strategies includes:

- National GWEP activities,[2]
- community demographics (included below in "Surveillance"),
- community structure — local leaders and community groups,
- community beliefs and practices regarding GWD,
- a community map or registry,
- community water sources,
- community resources, and
- community experience with previous self-help projects.

[2] Although this is not information about the community per se, the national program will influence what support you and the community will have in your efforts.

All these aspects of a community assessment do not have to be completed before you can begin GWD eradication efforts. Learning about the community will be a continuous process.

You will gather a great deal of preliminary information during your basic orientation to the community and will continue to gather it through participant observation as an active and aware member of the community. Heighten your observation skills to learn about problems, social relations, and beliefs. It is helpful to keep written notes on information gathered in informal conversations as well as formal ones. Techniques for obtaining specific information are discussed below in "Methods for Obtaining Information."

National GWEP Activities

You and the community need to know what is being done or has been done to eliminate GWD in the country. Talk to community leaders and groups about what has been done, e.g. who has come into the community to talk about GWD. Discuss the following questions with your APCD and representatives of the Ministry of Health or the National GWEP.

- Is there a national strategy for GWD control? If so, what does it consist of? Has an attempt to implement the strategy been made or is an attempt being planned? If so, what is being done and who is responsible? What organizations are involved in the GWEP effort?

- Are surveillance efforts in place? If so, who is conducting the effort? How might the community take part? From whom can we get forms? To whom do we return them?

- Is there a national program distributing filter material or chemically treating water sources? If so, whom should we contact? What are their criteria? (See Chapter Four for more information on these technologies.)

Later in community planning you may want to learn:

- Is the presence of GWD an official criterion for the selection of villages in rural water development projects? If so, how should the community apply for assistance?

Community structure

For a GWD eradication program to succeed, local leaders and community groups must be involved in planning and implementing eradication activities (see Chapter Six, "Community Participation"). Working through local leaders and organizations will involve the community and avoid causing offense or alienation.

Local leaders include:

- the chief
- village elders
- political representatives
- religious leaders
- leaders of women's group
- school teachers
- community development officers
- community health workers
- agricultural extension agents
- literate villagers

Village leaders can help you identify which community groups may want to become active in GWD eradication efforts.

Community groups. Social groups, clubs, organizations, and societies can be mechanisms for reaching specific segments of the community (e.g., youth, women). Social institutions (e.g., religious, educational) have access to resources and provide communication channels for program promotion.

Identify existing groups. Meet with them and learn about their scopes of interest, their membership, when and where they meet, and whether they would be interested in becoming involved with GWD eradication efforts.

There may be existing village-level organizations that already deal with health or other local problems, such as community health, water, and development committees or an agricultural cooperative.

There may be village organizations that can readily extend their activities to become involved in GWD activities, such as a

women's group, parent-teacher organization, agriculture club, youth association, or religious or political group.

There may be existing liaisons between village-level organizations and regional, national, or international organizations:

- schoolteachers' associations;
- primary health care facilities, mobile health services, or health educators;
- government extension services or offices of national ministries of health, rural development, agriculture, water and sanitation, education, women's affairs, or rural programs;
- religious missions;
- volunteer agencies or donors, such as Peace Corps, World Neighbors, UNICEF, WHO, and World Bank.

It may be that no existing organization can readily coordinate GWD eradication efforts, and a GWD task force may need to be formed (see "The Local Planning Group," in Chapter Six).

The community's leaders and organizations can become sources of information and ready participants in subsequent community assessment efforts:

- Community leaders can help identify water sources and community resources.
- Women's group leaders can help interview members about water collection practices.
- Schoolchildren can help observe water contact behavior and construct community maps.
- Teachers can help analyze school attendance data or construct village registries.
- Local community health workers can conduct household surveys.

Community Beliefs

As discussed earlier, "a prerequisite for the successful establishment of a community-based health effort is sincere and deep respect by the outside facilitators for the local people's

knowledge, attitudes, and beliefs."[3] The community's perceptions about GWD will greatly affect how willing people are to make an effort to adopt new ways. In order for intervention activities to be successful, GWD elimination must be important to the community members. If they consider other problems to be of higher priority, community members may not be ready or willing to address the GWD problem in their village.

To determine how the community perceives GWD, you will want to conduct interviews. Guidelines for conducting interviews are presented below in "Methods." You will use what you learn about attitudes toward GWD in all your work with the community to eradicate GWD.

Community Map or Registry

A map or registry of the community is necessary for any GWD surveillance effort and for identification of community water sources. Depending on the stage of the surveillance effort, a map or registry may already exist. Community members can help you construct either if needed (see Appendix B-5).

A registry should list all households by head of household. (See discussion on household structure in "Surveillance" below.) The registry can readily be expanded to include other basic information, such as water source, presence of latrine, head of neighborhood, and ethnic or tribal identity. The last may be important if different groups use their water resources differently; some groups may be more at risk than others.

A map can provide a great deal of valuable information. Maps can tell you:

- the number of households in the village,
- where people live,
- who lives next to whom (are they related? is the village divided along religious, ethnic, or economic lines?),
- what sources of water exist and where,
- how many households have latrines,

[3] Seeking safe water: The community-based approach to Guinea worm control. *Contact* No. 118, Feb. 1991.

- what services exist in the community, such as schools, churches, government offices, and community centers,
- what community development has been accomplished.

The quality of the drawing is not important, only its accuracy. If the community is very large, break it up into geographical quarters and map each quarter. Include a legend on the map.

The following physical structures are useful to include:

- all homes (identify by name of head of household),
- all other buildings (identified by what they are used for),
- standpipes, wells, springs, rivers, and other sources of water,
- latrines and other places for human waste disposal,
- roads and major paths,
- sites for solid waste disposal, and
- all other significant sites that can be seen and easily identified.

There are some redundancies in the information included in maps and registries. Having both may be best, but if time does not permit creating both, the registry may be quicker to construct and more readily adapted for surveillance.

Community Water Resources

Water sources and water use practices get to the heart of the GWD problem and indicate who and how many people have access to safe water and whether they use existing sources in a safe or unsafe way.

Determining appropriate solutions to GWD depends on finding out as much as possible about a community's drinking water supply. Because the interventions taken in each community will depend a great deal on the types of water sources found there, part of the community assessment involves classifying a village's

water sources as safe or unsafe from GWD contamination.[4] Every source of drinking water in each affected community needs to be identified (and placed on the village map if one is produced). Try to visit as many of these water sources as possible with community members to assess whether a source is (or may become) a transmission site and, if so, to assess how it may be protected. Remember, different sources may be used at different times of the year: there may be safe water supplies during part of the year but other times when only unsafe sources are available.

Pay particular attention to where those working in agricultural fields obtain their drinking water while working. These sources are likely to be different from regular community water sources and are often prime GWD transmission sites.

It is also important to find out whether villages share water sources. This can have a great effect on any GWD eradication effort because *all* villages using a common drinking water source must cooperate with prevention activities if they are to succeed.

A water resource assessment should include:

- the type and location of all water sources;
- the accessibility and reliability of those sources[5];
- identification of all possible GWD transmission sites;
- evidence of source protection or potential for source protection (see Chapter Four);
- information about how community members collect water.

Information about water resources and water use can be gained through observation and interviews. Guidelines for both are presented below.

If the community decides to improve or develop water sources, water resource assessment will require more informa-

[4] Copepods are not found in deep wells, pipes, or running water. They thrive in shallow, stagnant water. If you are uncertain about whether a particular dam or pond is a transmission site, it is best to assume that it is contaminated.

[5] Is the source available year-round with sufficient quantities of water for the community? See Chapter Four, "Identifying Alternatives."

tion than is outlined here. Water resource assessment is also discussed in Chapter Four. Improvement or development projects will also necessitate assessing the community's material and human resources. An introduction to such an assessment is provided below.

Community Resources

Depending on what community members decide they want to do about GWD, some assessment of community resources should be made during the initial planning stage. As the proposals narrow, a more detailed analysis of available resources will be necessary (see Chapters Four and Six).

Community resources include:

- local funds (community cash contributions, local taxes, and government grants or loans) designated for community improvement projects;
- external resources (from international organizations, churches, national ministries, or donor groups who contribute to this village);
- income of village members, their occupations, major possessions like motorcycles (these are indicators of the resources the community may have to devote to projects such as improved water supply), their ability to pay for improvements, and their seasonal distribution of incomes;
- teachers, health workers, and agricultural extension agents residing in the village;
- affiliations with extension workers in other villages;
- types and quantities of available tools and equipment;
- types and quantities of available local building materials (sand, gravel, stone and wood);
- names and special skills of available workers (both men and women, including masons, carpenters, welldiggers, mechanics, tailors, and accountants);
- people who may be available for training for construction, operation, and maintenance of water systems.

Previous Community Self-help Projects

Previous experiences with community self-help projects will likely influence community members' attitudes toward GWD eradication efforts. Through interviews (see below and Appendix D-1), learn about what projects have been conducted in the community and who was involved in them (both community members and collaborating agencies). What were the outcomes? What worked well? What were the difficulties? What was learned in the process? Answers to these questions may help avoid potential pitfalls.

Methods for Obtaining Information

There are basically three means of collecting the data needed for community assessment or surveillance:

- ask people directly (interviews, questionnaires);
- observe the community;
- review records and documents.[6]

Interviews

"The purpose of interviewing is to find out what is in and on someone else's mind. The purpose of open-ended interviewing is not to put things in someone's mind...but to access the perspective of the person being interviewed."

— Michael Quinn Patton

Informal interviews are valuable for gathering information from a few key informants on the different ways people think about an issue. Such information makes it easier to develop a more culturally appropriate and specific set of questions to conduct formal interviewing later if necessary.

The informal **conversational interview** is the most open-ended and flexible form of interviewing. Most questions flow from the immediate context and situation. There is no pre-determined set of questions; in-depth information is gathered in the natural flow of social interaction because respondents feel at ease.

[6] Record review will be discussed in the surveillance section of this chapter.

This approach takes time and depends on the interviewer's conversational skills, but it is a good starting place to get ideas. It may be the most appropriate technique for talking to community leaders.

You can also use an **interview guide** during an informal interview to make sure the same basic topics are covered in each interviewing session. During this type of interview, one keeps to a general theme of questioning with no particular order or structure. The interviewer is encouraged to adopt a natural conversational style and encourage respondents to elaborate their answers. An interview guide concerning community beliefs about GWD is included in Appendix D-1.

Focus group interviews are exploratory sessions among 6-12 people who are guided by a facilitator to talk freely and spontaneously about topics being studied. Focus groups help draw out the general scope of beliefs and opinions in the community at large. Depending on information needed, the facilitator can use either an interview guide or a formal interview format (see below) during the session. Preferably, a recorder is present to take notes not only on what is specifically said but also on the nuances and nonverbal communications within the group.

To encourage the free flow of conversation within the focus group, participants should be somewhat homogeneous. It might be necessary to organize several group discussions among representatives of the various subgroups a program may target.

The **formal interview** follows a set of questions written out exactly as they should be asked during the interview. The result is a highly focused interview that is valuable for baseline data gathering and subsequent program evaluation. This sort of standardization makes data analysis much easier. A formal interview on water use is included in Appendix D-2. The national case search (see below and Appendix D-6) can also be considered a formal interview.

Observation

Information on community water use can also be obtained through observation.When you become a member of a social group, community, or institution, even if temporarily, you

become a participant-observer. A participant-observer can tell how and why certain decisions were made, who were the prime movers, who resisted, and who took responsibility. In short, the participant-observer is able to learn a great deal about how and why things work in a community.

While participant observation provides a general picture of the community, it may be necessary while planning and evaluating a program to engage in intentional, structured observation.

Structured observation of water contact and use can help you determine who is spreading GWD and why they are in contact with the water. Data on water collection practices can be used to target audiences for education and to plan preventive action.

First, in the company of a community leader or committee, you might visit the water sources and collect the following information:

- location of water source(s),
- distance from village/houses,
- size of source,
- visible quality,
- evidence of attempts to protect water source from waders.

Next, stay at a village water source long enough to observe the normal variation of activities and note a specific, predetermined set of observations. Keep in mind that you might observe different activities at different times. For example, people usually collect water in the early morning or evening, so a visit to the pond in the midafternoon would not show typical use.

Examples of items to observe may include:

- Who comes to the pond? (e.g. age, sex, occupation)
- Do people come individually or in groups?
- What do people do in the pond? (wash, bathe, fish)
- What activities go on around the pond? (e.g. clothes washing, soap making, vegetable growing)
- Are any rules of usage observed? If so, who enforces them?

- How and where do people enter the pond? Is there a specific entrance, a step or rock, or are there barriers?
- What parts of their bodies do people submerge in the water and for how long?
- Do people with GWD enter the source?

Included in Appendix D-3 are examples of forms on which to record answers to some of these questions. Secondary school students might be engaged to conduct such a study. The findings can be discussed with community members to determine what activities and kind of contact should be limited.

Surveillance

The purposes of surveillance are to

- determine which communicties have endemic disease and how much,
- target communities where GWD exists in order to direct national efforts,
- monitor the effect of intervention strategies, and
- document the elimination of GWD.

Carrying out surveillance activities as part of a national program essential to the success of eradication efforts. If they are well done, surveillance activities will provide the national and district GWEP coordinators with accurate, up-to-date information on the magnitude of GWD, the persons at highest risk of infection, the location of contaminated water sources, and when transmission of the disease is occurring in a given community. The success of a country program to eradicate this disease depends on information about each of these factors. Surveillance provides the baseline data and feedback needed to direct program resources toward areas most in need and to measure progress in achieving program objectives.

You and your community's role in GWD surveillance will depend on the program phase of the National GWEP (see summary below). As discussed above, you should learn what activities are being conducted at the local, district, and national levels of your host country through your APCD, the National

GWEP Coordinator, or from the communicable disease sector of the Ministry of Health.

If the National GWEP is at its earliest stages, your contribution may be to help identify villages where GWD is endemic. This can be done by reviewing clinic or school records or interviewing village leaders. (See Appendix D-7 for a village summary form.)

If the national surveillance effort is just being initiated or if it has not but you are living in a GWD endemic area, you can participate in surveillance efforts to determine the number of GWD cases and the number of people at risk in your community. You can also identify and characterize the water sources available.

If the surveillance effort is underway, you can participate in ongoing surveillance activities, which at this stage will be defined by the national program. Ongoing surveillance includes a village register, maintained by a community member, in which new cases are recorded each month (see Appendix D-4 for an example). Records should also be kept of intervention activities pursued within the community.

As the program meets success in reducing and eventually eliminating GWD, attention will be given to identifying any residual cases. HH case searches may still be conducted, but you may seek out GWD cases in schools and marketplaces or by offering rewards. Any cases reported to clinics should be verified.

Summary of Surveillance Activities

PROGRAM PHASE	NATIONAL STRATEGY	COMMUNITY WORKER'S ROLE
PLANNING	•Rapid determination of the extent of the problem through passive surveillance methods: health facility surveys, school attendance records, and review of previous studies •National case searches at the household level in all endemic regions of the country •Concurrent national survey of existing water supplies and planned water supply improvement	•Review records •Help coordinate household (HH) case search within community —Prepare community for case search, train interviewers, review results, make summary reports, teach local staff •Identify existing water supplies through community assessment
INTERVENTION ("ATTACK")	•Improvement of passive reporting system — GWD made a notifiable disease such that health services regularly reports all new cases •Continued case searches in villages identified as endemic in previous national search •Ongoing monitoring of implementation of control strategies — placement and use of wells, filters, Abate, etc.	•Continue to participate in HH case searches with attention given to effectiveness of intervention strategies •Monitor filter distribution or well utilization through HH survey and observation
CONSOLIDATION	•Continued passive reporting from health services •Prompt investigation of all reported cases •Active case detection through various means of outreach — schools, markets, house-to-house, rewards — especially focused on transmission season	•Conduct special searches in markets or schools to help verify elimination •Conduct localized intensified HH survey •Work with village leader to plan reward for identification of cases when scarce
MAINTENANCE	•Continued passive reporting and active case detection	
ELIMINATION	•Prompt and thorough investigation of all reported cases •Final searches or surveys to verify the elimination of GWD	

The definitions, objectives, and methods described below are fundamental to all GWD eradication programs and should be useful to program participants in any setting, with appropriate adaptation to host country program guidelines. If you find yourself in a situation where a national program is not fully functioning, use this section to guide your efforts.

Case Recognition of Guinea Worm Disease

Surveillance must be based on a commonly accepted or standard definition of a case of GWD. For surveillance, the WHO Collaborating Center for Research, Training and Eradication of Dracunculiasis at CDC has proposed the case definition[7] that is described on page 15.

Several characteristics make GWD among the simplest of diseases to identify:

- visual diagnosis that requires no laboratory confirmation;
- lesions that usually occur in the lower extremities;
- a predictable duration of infection, i.e. observed infections reflect exposure to infected copepods within the previous 9-14 months.

Eradication Program Information Needs

The basic information required for an adequate surveillance program of the occurrence of GWD disease are:

- Which villages have endemic GWD?
- How many cases of GWD occurred during the last transmission season or during the past year?

Eradication of the problem requires more specific information, however, and these basic question are elaborated further on.

Methods for Obtaining Information

The methods of obtaining information are the same as those described in "Community Assessment" above. Interview and

---

[7] Although a standard GWD case definition was agreed to during the Second African Regional Conference in Accra, some national programs may employ other definitions that should be used accordingly.

observation are active methods of searching for cases of GWD; reviewing records and documents is considered a passive method. Data are obtained from existing reporting systems in health clinics, hospitals, or schools. This method is used to assess the extent of the problem when there are no other sources of information, usually during the very early stages of a GWD eradication program. Passive surveillance will work best if GWD is a mandatory reportable disease in the country. The completeness of records, however, will depend on the health care-seeking behavior of those affected by the disease.

Passive surveillance is also limited because GWD occurrence is highly focal, and the one remote endemic village may fall outside the passive reporting system. Active surveillance provides more complete, reliable information on GWD but requires much more money, time, and training.

Remember, involving community members in surveillance will ensure thay they have the skills and mechanisms necessary to continue surveillance activities once you have left the community.

Record review

Infectious disease surveillance statistics are most often reported passively from fixed health facilities such as clinics or hospitals. You can obtain permission to review these records to make special surveys of patients attending the facility. Data gathered from records is confidential, so it is important to work through the appropriate channels to gain access to it. Community health workers may be engaged to collect such data.

Health facility records are fraught with many a pitfall. For example:

- patient information may be incomplete with one or more important pieces of data missing, e.g. sex, age, address;

- patient attendance will be recorded on return visits for the same problem, in this case GWD, but a case should be counted only once during a single period of infection;
- GWD may be referred to in the records by a different name, or lumped into a large category of similar diseases;
- not all persons with GWD attend the clinic because they live too far, they know that little can be done during infection, they are unable to walk during the period of worm emergence, or for other reasons.

School attendance data may also be used to determine the incidence of GWD. School teachers can be asked to collect this information (see, "Special Case Detection Activities," below).

While information collected from records provides an incomplete picture of the occurrence of GWD in a community, it nevertheless alerts eradication program workers to the continued presence of the disease, which is particularly important during the early and final stages of a GWEP. Included in Appendix D-5 are examples of forms for recording data from records.

Within your community, you might encourage those infected with GWD to report it to any existing passive reporting system, or you might develop a way for community members to report cases at a market or other commonly visited location.

Interview (National Case Search)

The village-by-village case search, in which HH members are interviewed, is the most valid method for determining where the disease occurs and how many cases ocurred during the past year.[8] The case search:

- provides accurate baseline information to determine the extent of GWD in a given village or community;

[8] If the National GWEP is in an early stage, an HH case search may not yet be appropriate. First villages where GWD occurs can be identified through interviews with village chiefs or other leaders. A sample Village Summary Form is included in Appendix D-7.

- is conducted periodically in targeted villages to monitor program effectiveness;
- provides documentation of the eventual elimination of the disease from a village or community.

To standardize information obtained from HH interviews so that the information may be easily summarized and community statistics compared at the national level, a questionnaire, or standardized survey, is developed. In the interest of HH harmony and minimal disruption during HH visits, the questionnaire should be brief but should include the following:

- basic HH demographics: age and sex of all current residents (occupation and ethnic group are important but optional factors);
- history of GWD for each member during the last full year, based on the case definition (interviewers should use the local term for the disease and show respondents a case recognition picture or photograph like the one below that graphically demonstrates the emergence of a worm from a lesion);

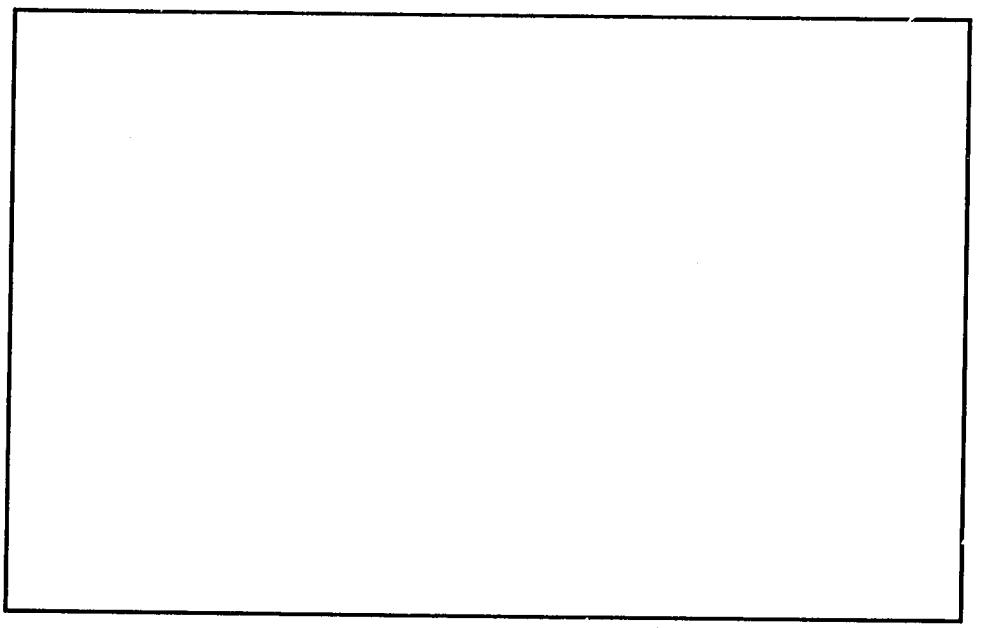


Photo by Donald Hopkins

- the month when the worm or worms first emerged and the number of worms (recording disability that interfered with work or school is optional);

- the HH drinking water source(s) and water treatment practices, e.g. filtering;
- travel history (to differentiate locally acquired from imported cases).

Differentiating between locally acquired and imported cases will help you design proper intervention strategies. It is also important, particularly during the final stages of elimination, to determine whether a case is actually endemic.

If intervention strategies are actively being pursued, you may want to design an additional questionnaire to evaluate their success.

Questions should be simply and clearly worded for easy translation into local languages. They should also be translated back into the language used to develop the survey to ensure meaning has not been lost in translation. For example, if you are not using a standard questionnaire from the National GWEP, you should ask a bilingual person to translate your questions into the local language and ask another bilingual person to translate the questions back into English so you can make sure that the first translation is accurate.

The questionnaire should be pretested with a small number of people who have characteristics similar to the target population to ensure that it is easy to administer, understandable, and free of culturally sensitive or offensive questions.

One person in an HH may be designated the respondent for all its members. Local HH definitions may vary to include all the people under the same roof, eating from a common pot, or sharing economic resources. Use a definition that will ensure the most accurate reporting. Decide in advance the definition of an HH unit, and use this consistently for all surveys in the community.

If an HH survey form has not been developed by an existing eradication program, the example provided in Appendix D-6 may be used.

Planning the search. The size of the community and the number of persons available to conduct interviews will determine whether a complete search can be undertaken or whether it will be necessary to select a sample of HHs to survey. A community map, registry, or some accurate census of residents and HHs is required to make this determination. (Suggestions for selecting a sample of HHs for inclusion in a large community survey are contained in Appendix D-8).

Reliable interviewers may be enlisted from community groups participating in GWD eradication activities or from the staff of a local community health facility. (See Appendix B-8, "Steps for Conducting a Community Survey with Students.") Someone must be responsible for training the interviewers to administer questionnaires, performing supervisory tasks, and editing completed questionnaires at the end of the day so that questions left blank or partially completed can be corrected as quickly as possible.

Checklist for Community Surveillance

- Seek permission and involvement of community leaders.
- Develop or obtain a registry or sketch map of the area.
- Count the number of houses.
- Learn about local household structure.
- Identify appropriate times to visit homes.
- Consider any local taboos such as men not interviewing women.
- Prepare forms — this may include pretesting or just preparing an adequate number.
- Recruit and train interviewers.
- Develop procedures that all interviewers will follow.
- Assign interviewers to sections of community.
- Select supervisors for each section.
- Arrange appropriate transportation.
- Announce publically the time and purpose of the survey.
- Review completed survey forms daily to check accuracy.
- Report results to National GWEP, APCD, and community.

Source: *Helping Communities to Eradicate Guinea Worm: A Training Manual*, WASH Field Report No. 322. [Draft.]

Summarizing questionnaire information. Numerical summarization of information may require nothing more than tabulations that are forwarded to the National GWEP Coordinator on forms provided by the national eradication program. (An example of such a form is included Appendix D-7.)

Data analysis can be the most fun and satisfying part of the surveillance process. We include several suggestions for carrying

out some simple analyses that require nothing more than a rudimentary function calculator.

Tabulation begins with frequency distributions of all the major factors contained in the questionnaire. To do this, prepare a separate table for each factor or question showing how many people included in each HH surveyed fall into each category of a factor, e.g. male and female or age categories . These data can be used as the denominator for calculating means, percentages, or rates associated with GWD in the surveyed population.

On these same tables, include a column in which to record the number of GWD cases that fall into each category. Dividing the number of cases in a category by the total number of persons surveyed in that category will produce a value that reflects the proportion of GWD cases.

Factor: Sex

	#female	#male	total #	#female w/ GW	#male w/ GW	total # w/ GW
HH1						
HH2						
HH3						
.						
.						
.						
TOTAL	_____	_____	_____	_____	_____	_____

With the total figures from this table, you may produce another that looks like this:

Occurrence of GWD in Village X between Jan & Dec 1990

Total number in population	Number of GWD cases	Proportion with GWD
1,954	450	23%

or

Total population Male	Total population Female	Number with GWD Male	Number with GWD Female	Proportion with GWD Male	Proportion with GWD Female
977	977	189	261	19.3%	26.7%

OR you may wish to numerically describe the use of water filtration in Village X:

Prevalence* of filtration use in Village X between Jan & Dec 1990

Total number HH in Village X	Number of HHs using water filtration	Prevalence of water filtration usage in Village X HH
382	94	24.7%

* Prevalence figures should always state the period of time to which the collected information relates.

Cross tabulations of factors may reveal relationships between pairs of factors. This information may be useful for developing various components of the eradication program, such as the promotion of water filtration practices. A table producing this kind of analysis looks like this:

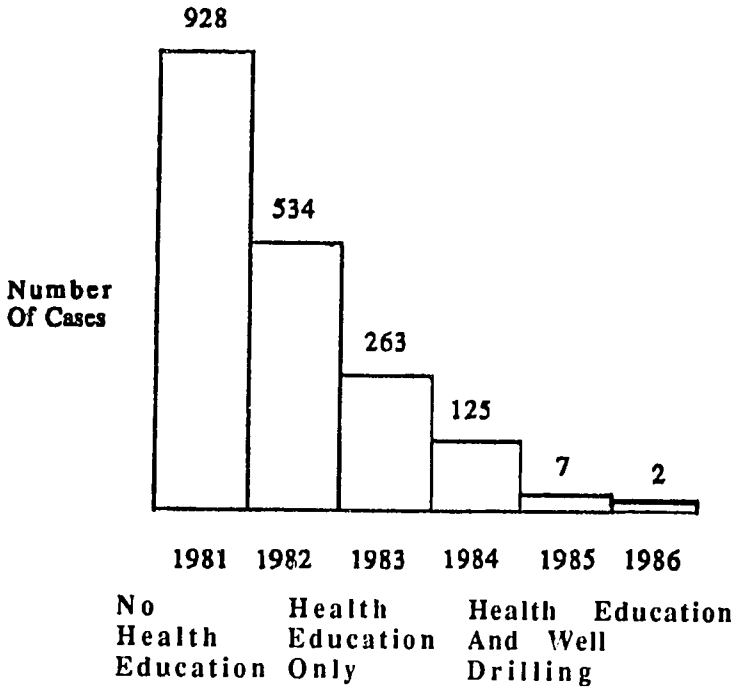
Filtration of drinking water	Total number of individuals	Number of ind. with GWD	GWD per 1000
no	1,113	420	377.4*
yes	841	30	35.7
Total	1,954	450	230.3

Risk Ratio = $\frac{377.4}{35.7}$ =10.57 which means that the risk of developing GWD is 10.57 times greater for individuals who do *not* filter their drinking water.

*$\frac{420}{1113} = \frac{0.3774}{1000}$; =377.4 per thousand

Data can also be represented graphically, as in the example below from a GWD elimination project in Kati, Togo.

Incidence of Guinea Worm in Kati, Togo, from 1981 to 1986



Source: *Case Study: Guinea Worm*, World Neighbors.

Additional indices that may be calculated from survey data include:

- annual incidence of GWD (history of infection over the year) per 1,000 people;
- point incidence (current cases) per 1,000 people;
- average number Guinea worms per infected person per unit time (month, year);
- percent of cases during each month (seasonality of disease);
- age distribution of cases;
- relative risk of infection associated with type of water source used.

Observation

Questionnaires will reveal the number of people with GWD, but only observation can verify actual behaviors (e.g., water filtration). A water observation study is outlined above in "Community Assessment."

Special Case Detection Activities

Special case detection activities that combine both passive and active elements of data collection will be needed during the later consolidation/maintenance phases of an eradication program. Cases can be identified through clinic records, school or market surveys, intensified HH visits by village volunteers, or a reward system that provides incentives for selected village sentinels to identify cases. Any one of these activities is likely to be less costly than the HH case search surveys required during the earlier planning phase.

Teachers may question students about their observations of GWD in families or neighborhoods and record cases on forms similar to the Clinic Data Summary Form A (Appendix D-5). A school may also serve as a sentinel during the season of disease transmission if the reasons for student absences are recorded so that trends of GWD incidence may be produced form school records.

The traditional exchange of information that occurs at rural farm markets, where people from a wide geographic area regularly congregate, might also provide timely information on cases in remote rural villages. Reports obtained this way are likely to overestimate disease occurrence, but they would alert program authorities who could follow up with visits to affected villages to verify and elaborate market survey reports.

Issues of Information Validity

Ensuring the truthfulness of field-collected data is one of the most neglected procedures associated with surveillance activities. Methods of quality assurance depend on the supervisory capabilities of those who are responsible, knowledgeable about the objectives of the surveillance activities, and committed to the overall goals of the program. Supervisory tasks include observing interviewers and respondents, making follow-up visits to confirm a proportion of positive and negative reports from a sample of HHs, health, or sentinel facilities surveyed, and careful editing of questionnaires and forms for missing or incomplete information. Processing information by hand, punch cards, or computer provides another occasion for serious error and must be carefully supervised if the numerical

description of collected information is to reflect the truth of what is occurring in the surveyed population.

Reporting

Surveillance is not simply a filing system. It is a dynamic exchange in which information is continuously assembled, considered, and communicated — both to the large-scale planners and community members. No matter what stage of GWD eradication activities you become involved in, the results of your surveillance efforts *must* be reported so that eradication activities can be coordinated at the regional, national, and international levels. Surveillance results should be sent to your APCD and to any office that may be designated by the National GWEP Coordinator (or the communicable disease sector at the National Ministry of Health). Sharing your results with the community will help maintain interest in and commitment to eradication efforts.

You may want to submit a report of your surveillance efforts to your APCD. Chapter Six provides guidelines for preparing a project report.

One last, but important, word of caution. If possible, make a copy of or keep your original data. Damage and loss of paper are very real phenomena.

REFERENCES

Community Assessment

Methods of Initiating Community Participation in Water Supply and Sanitation Programs. *Water for the World Technical Note* No. HR 2.M.

Surveillance

Abramson, J.H. 1984. *Survey Methods in Community Medicine: An Introduction to Epidemiologic and Evaluative Studies.* 3rd edition. Churchill Livingstone.

Guidelines for Surveillance in Dracunculiasis Eradication Programs. 1989. WHO Center for Research, Training, and Eradication of Dracunculiasis at CDC.

Prins, A., and M. Yacoob. 1988. *Adding Guinea Worm Control Components: Guidelines for Water and Sanitation Projects.* WASH Technical Report No. 51.

Richards. F., and D. Hopkins 1989. Surveillance: the foundation for control and elimination of dracunculiasis in Africa. *Int. J. Epidem.* 18 (4):934-943.

Chapter Six

Planning and Evaluating GWD Eradication Activities

Whatever intervention strategies you and your community decide to use, you will need to plan your actions. Plans help organize action step-by-step, giving you a clear idea of what you are doing and why you are doing it.

It is important to note that there are as many different planning formats as there are agencies involved in planning programs. Although these formats may use different terminology, they all address the basic process presented here. This chapter will follow the Peace Corps' planning format.[1]

In this chapter you will learn about the four overlapping phases of the planning process:

- diagnosis of the problem,
- planning the intervention strategies,
- implementation of the plan, and
- evaluation of the project's success.

Community members should participate in every step of this process.

Community Participation

Community involvement is common to Peace Corps' project plans. It is both a philosophical and pragmatic underpinning of successful programming. Philosophically, respect of human dignity requires that people be encouraged to develop acceptable and affordable solutions to their own problems and not have solutions (projects) imposed upon them. Pragmatically, people will be more committed to using

[1] *Programming and Training System Manual.* 1989. U.S. Peace Corps, Office of Training and Program Support. (ICE# T0054)

improved services or facilities if they've had a hand in developing the project and implementing it themselves.

Community members will accept responsibility for GWD eradication activities only if they are convinced of the importance of the GWD problem and believe that they can respond adequately. As discussed in "Community Assessment," GWD must be analyzed in relation to other community problems and priorities. The relative importance of GWD depends not only on other health problems but also on many social, economic, organizational, cultural, and resource concerns of the community. It is up to community members to decide whether to put their energies into resolving GWD or some other major concern.

Simply knowing that effective solutions to the GWD problem exist may not always be enough to convince a community that it can solve the problem. (See discussion of resistance to change in Chapter Three and Appendix B-3.) Community members may need to discuss previous experiences in resolving other problems. Such discussions are initially conducted during community assessment (see "Previous Community Self-help Projects," Chapter Five).

Once community members have committed themselves to eliminating GWD, they need to determine what information needs to be gathered, who will be responsible for what actions, how local and outside resources can be marshalled, and how finances and materials will be best mobilized and managed. Even if some resources come from outside the community, management of interventions should remain a community responsibility. To implement GWD elimination activities, a community will have to

- set its own goals;
- designate an organization and individuals to supervise and carry out the needed tasks (see below, "The Local Planning Group"); and
- accept responsibility for funding, developing, and maintaining local systems.

Community members must agree on ways to raise money if it is needed to implement and maintain activities over the long haul. A community organization should manage local funds,

operation and maintenance of water supply improvements, and continued monitoring of new behaviors to make sure that GWD does not return. Community members must understand that mechanical or water system breakdowns need not bring a return of GWD because other control measures are within the capacity of the community. They must also recognize that reintroduction of the problem can occur from contacts outside the community. Continued surveillance will be required, along with care of those with the disease to prevent its spread within a community.

The Local Planning Group

During community assessment, you and community members determine which existing organizations might take on GWD control. Although many groups can be involved, each taking responsibility for different aspects of a project, one group should coordinate the entire project. Discuss the problem and proposed project with community organizations to find out what each group's contribution could be. Determine which groups are effective (as exemplified by past projects) and respected.

Organizing a new committee to undertake a project is usually a long and difficult process. Diverse people representing different interests in the community must be contacted and convinced to find time in their busy schedules to attend meetings. It may take several months before the new committee members trust each other and work well together. Where no strong local groups exist, there may be no choice but to organize a new committee to undertake the project. Be sure, though, to involve local leaders and existing groups in selecting committee members.

Note that in many communities, women are responsible for collecting water while elder men are responsible for decision-making. As the main carriers of water for domestic needs and as principal molders of their families' hygiene habits, women's involvement in decisionmaking is critically important to the success of GWD interventions. Traditional community structure and management must be respected, but it is important to make decisionmaking as broad-based as possible.

Project Name

Every project should have a title that summarizes its aims and intent. This gives people a good sense of what they are working toward.

GWD control involves several major technologies that can be phased in over time. By organizing each aspect of a control effort as a separate, shorter but overlapping project, you can involve more people. This will also make progress from step to step more visible, motivating people to continue with the next phase.

Problem Statement

The problem statement defines the situation that needs to be changed. It clearly states:

- what the problem is,
- the scope of the problem,
- the consequences of the problem, and
- the causes of the problem.

The tools of disease surveillance and community assessment (Chapter Five) have helped you gain an understanding of the GWD problem in your community. You should understand not only who is at risk of having GWD, but what behaviors and other influences cause the GWD problem and what the impact of GWD is on the community.

The scope of the problem. The problem statement should identify the proportion of community residents who had GWD during the last transmission period and whether certain segments of the population (old or young, male or female, Moslems, Christians or traditionalists, or certain geographic or economic sections within the community) have a higher or lower proportion of GWD victims. If certain segments of the community are more likely to have the disease, people can begin to ask why. The answer to this question will help community members plan programs most appropriate to each segment of the population.

If surveillance data are not yet available, indicate what is known. Your project may outline the steps needed to gather information on GWD prevalence in the community and related factors.

The consequences of the problem. The impact of GWD on the community should also be included in the problem statement. This impact may be purely descriptive or may include some statistics, such as the percentage of school absenteeism due to GWD or the percentage of farmers unable to tend their fields.

The causes of the problem. We know the basic reasons why people get GWD: infected people wade in water sources and others subsequently drink the water that contains infected copepods. To develop an effective intervention program, though, one must analyze *why* these behaviors occur. The factors that influence these behaviors — local beliefs, past commmunity development experiences, availability of resources — and the interactions among these causes will influence the success of any intervention project. Exploring the real and perceived causes of GWD in a community is discussed in Chapter Five; the factors that influence behavior are discussed in greater detail in Chapter Three.

Finally, the problem statement should include information on the current status of water supplies in the community. What are the current sources, are there any safe sources, and what proportion of the community has access to safe water? Ideally, the prevalence of GWD by type of water source used would be available to guide planning.

Project Purpose

The project purpose states *why the project should exist.* It should be stated in terms that reflect a reversal of the problem statement, including a reference to how the community's condition will change for the better:

> To improve productivity and the quality of life in Village X by eliminating GWD.

Project Goals

A project goal is a broad statement, expressed in terms of improvements, of *what is to be accomplished* by the project. Goals should be observable improvements in the well-being of the community or the establishment of the capacity for change.

Observable improvements are known as **production goals** and long-term changes are known as **capacity goals.**

Production goals can be verified statistically — a decrease in the number of GWD cases, for example. To measure progress toward achieving these goals, you will need current baseline information. If your goal is to decrease the number of GWD cases by 30 percent, you'll need to know the current number of cases before project interventions begin.

Capacity goals may be verified statistically but may also require observation and interview methods to measure progress. Capacity goals reflect lasting solutions — community participation in development, reliance on local resources (both human and material), and potential for replication. When project plans do not include capacity-building goals but assume they will be met, the result is often dependence on outside assistance rather than increased self-reliance. In developing capacity goals, try to be specific enough so that improvements can be identified.

Goals should:

- define the results or changes that the project will bring about,
- set specific deadlines, and
- indicate how the project will improve the conditions of the community.

Project Objectives

Project objectives taken together achieve the project goal. They provide a more detailed picture of what is to be accomplished. Project objectives should:

- be realistic,
- be stated in measurable and verifiable terms,
- specify a time frame for achievement, and
- be used to guide and evaluate the program.

Project objectives are similar to goals but are more focused on time frame and measurement. They establish a framework for tasks and participants' roles within the project. Like goals, objectives fall into two catergories — production and capacity.

Below is an example cf the linkage between project purpose, goals and objectives.

Project Purpose: To improve productivity and the quality of life in Village X by eliminating GWD.

Production Goal: To reduce the number of GWD cases in Village X to two-thirds[2] of the current level within two years.

Production Objectives:
In the first year after intervention, the number of new GWD cases in Village X will drop to one-third of the current number of cases (give actual numbers).

In the second year after intervention the number of new GWD cases in the village will drop by another one-third (give actual numbers).

Capacity Goal: Over the next two years, to establish the capacity of the village water committee to meet operational requirements and future problems of the community water supply.

Capacity Objectives:
In the first year, to define the scope of the committee's responsibilities and the function of each members' office and to establish a decisionmaking protocol and a mechanism for fundraising.

In the second year, to develop skills for analyzing water supply problems and identifying and engaging appropriate assistance when needed.

Project Milestones

Milestones are short-term indicators of progress toward meeting project objectives. They should use active verbs and be linked to verifiable tasks performed by members of the community:

By the end of December, the National GWEP will have supplied Village X with some specified quantity of monofilament cloth.

By the end of January, the women's committee will have cut the cloth for distribution within the community.

[2] The numbers used here are not fixed. An objective of reducing the number of GWD cases by 30 percent of the number of families/ individuals *with which you are working* is a figure based on past and current efforts.

By the end of April, the community health committee will have demonstrated proper filtering techniques to some specified number of households.

Project Tasks

The project task analysis defines *how the project will work.* First, break down the project into the specific tasks that must be performed to accomplish the project milestones, objectives, and goals. Each major project activity is the basis of a task analysis. A task analysis is a list that includes the:

- steps to be taken to involve the community and subgroups within the community in the project,
- steps to be taken to implement surveillance or intervention aspects of the project, and
- contacts that need to be made with external resources (e.g., extension agents, donor agencies).

Before the task analysis can be completed, strategies for achieving the objectives must be selected, specific resources needed for the project must be outlined, and a budget drawn up. Finally, planning requires a detailed action plan, or outline of the steps to be taken, so that implementation can proceed. These elements will be described below.

Strategies

Strategies describe the approaches to be used to achieve project objectives. The planning group should determine which strategies are feasible for the community based on what people can afford, what people are willing to accept, and what resources are available. The community can implement any combination of strategies appropriate to the circumstances it is facing. The choice of strategies should be justified in the project plan.[3]

There are actually two sets of strategies involved in any GWD project — "technological" strategies and health education strategies. As discussed in Chapter Four, **technological strategies** are of three broad types:

[3] Comparing control strategies is discussed in Chapter Four.

- treatment of existing water sources;
- protection of existing water sources; and
- development of new and safe water sources.

Health education strategies, as described in Chapter Three, are also of three broad types:

- information strategies, including individual counseling, mass media and values clarification;
- resource development strategies, including skills training, community organization and mobilization, and resource linking or networking; and
- social support strategies, including family counseling, human relations training, and support group formation.

Health education strategies can be matched with technological strategies by considering the behaviors needed to adopt a particular GWD control technology and the factors that will influence adoption of those behaviors. The chart below gives some examples of this matching of strategies, which is a way to define the tasks of the project.

Strategy Matching	
GWD CONTROL	HEALTH EDUCATION
Treating existing water sources through filtering	Resource development that includes obtaining filter materials and training distributors Information on need for and correct use of filters
Protecting existing sources through social pressure	Social support through family counseling and working with community groups to set up a system for helping those with GWD collect water Resource development to organize community to build a small shelter near the pond where those with GWD can wait for help
Developing a new, safe water source like a dug well	Resource development including organizing to get resources and volunteers, fundraising, and training on well maintenance Information to ensure that everyone uses the new well

Project Resources

Before implementing a new project, you must identify the human, financial, and material needs of the project and a means of securing those resources. Community assessment will help you identify which resources — land, labor, materials, finance, skills — are available within the village or district. The financial value of local resources can constitute a considerable proportion of the total project cost. Local resources should be included in any prepared budget (see Appendix E-1). If items are donated, their value should still be estimated, but a note should be added that the items were donated.

The community can raise local funds to pay for all or part of the costs of a planned project. These monies may also help pay for recurrent costs. Care must be taken to make sure that the payments by community members are equitable. In Kati, Togo, in a project assisted by World Neighbors, community financing of

one well was so successful that ten wells were eventually drilled by the Evangelical Church of Togo, which subsidized the wells' real cost. In addition to their capital investment, community members provided food, lodging, and labor to the drilling team.

Many GWD intervention projects will require both internal (local) and external (agency) resources. Once local resources have been assessed, consult with external agencies — both host-country resources (e.g., the National GWEP, government ministries) and collaborating-agency resources (e.g., the PC, UNICEF) to clarify what resources they might provide. Active collaboration between the community and participating agencies is essential. Use your project plan as a basis for seeking these resources.

An outline of the human, material, and financial resources required to undertake the project can be organized in simple grid format, as illustrated below. Costs of each resource can be included.

GWD Control Program Resources		
TYPE OF RESOURCE	SOURCE OF RESOURCE	
	Community	External
Human (labor& skills)		
Material (supplies& equipment)		
Financial (funds)		

Source: *Helping Communities to Eradicate Guinea Worm: A Training Guide*, WASH Field Report No. 322. [Draft.]

If a community applies for a grant from a government ministry, foreign embassy, or international agency, these funding sources will want to know what resources the community has

committed to the project. The budget format presented in Appendix E-1 can be used, unless the funding agency has its own required format.

Additional discussion of project resources can be found in Chapter Four under "Comparing Alternatives."

Action Plan

Developing an action timetable is the link between planning and implementation. Tasks should be listed in order of priority and written as steps that translate general strategies into day-to-day and week-by-week project operations. During regular meetings of the planning group, the action plan can be reviewed to monitor project progress.

The plan of action should:

- name each intervention and describe it;
- detail what will be done, when, and by whom;
- establish deadlines for completing the activities.

The two charts shown below can help the planning group organize its action in an orderly sequence based on the steps required to carry out each strategy. One chart is a responsibility roster and the other a time line. The **responsibility roster** specifies exactly who will do what and when so the planning group can hold people accountable for what they agreed to do to help the community. Responsibilities should be listed in a logical sequence.

GWD Control Responsibility Roster and Action Plan

ACTIVITY	RESOURCES NEEDED	RESPONSIBLE PERSON(S)	TIME/DATE COMPLETED

Source: *Helping Communities to Eradicate Guinea Worm: A Training Manual*, WASH Field Report No. 322. [Draft.]

The time line chart outlines all major activities and their components. This chart provides a good picture of the project at a glance. Use the following guidelines in drawing your timeline, as in the example below:

- the time span should be in one or two year periods;
- demarcations are in months;
- the chart begins at the start of work in the field;
- a line indicates where the activity starts and ends;
- lines that end with a vertical bar show where the activity terminates;
- lines ending in arrows indicate ongoing activities.

Time Line for GWD Control Implementation

```
ACTIVITY                          MONTH
                1   2   3   4   5   6*  7*  8*  9*  10  11  12
Baseline
Surveillance        --------------|

Filter
Production                --------------|

Filter
Distribution                    ---------------->

Education on
Filter Use                      ---------------------------->
```

Months of GWD transmission should be marked (* in this case). This will help ensure that planners initiate certain crucial activities before the season begins, e.g. early distribution of filters.

Source: *Helping Communities to Eradicate Guinea Worm: A Training Manual*, WASH Field Report No. 322. [Draft.]

Monitoring and Evaluation

Monitoring

Monitoring is a process of gathering and analyzing information as part of a project evaluation system. Regular and frequent review of the project is necessary to determine whether:

- activities are taking place as planned,
- resources are being made available as needed,

- group members are carrying our their responsibilities, and
- immediate output, such as filter production, is occurring on schedule.

Monitoring helps the planning group identify problems before they become serious and allows participants to see the results of their efforts.

The planning committee needs to designate individuals responsible for monitoring activities. The planning committee should also establish procedures to ensure that members continue to oversee project monitoring.

The action plan has defined the short-term objectives of the project. Progress toward these objectives can be determined by:

- holding regular planning group meetings,
- reviewing action plan records,
- observing scheduled activities, and
- interviewing responsible persors.

Project progress can also be monitored with a monthly reporting form much like the "Evaluation Planning Chart" provided below. Column headings can be planned activity (input), outcome of activity (output), impact of activity, data collection method, and individual(s) responsible for collecting data.

Revising Plans

Based on observations made during monitoring, the planning group may determine that the project is not proceeding on schedule or not having the desired impact. The committee must immediately investigate the reasons for problems and decide what to do. Should alternative strategies be considered? Should other people be given responsibility? Should the timetable or cost estimates be revised? If decisions to make such revisions are delayed, a successful outcome of the project will be jeopardized.

Evaluation

Two general types of evaluation are needed to determine whether a project has achieved its goals and objectives: program process and program outcome. As described above, the program

process can be evaluated by keeping careful track of the responsibility roster and time line commitments through regular meetings.

Project objectives spell out the program's outcome targets. You begin to plan for evaluation at the outset of the project, so you know how, when, and what information must be gathered to determine whether the program has been successful. Surveillance and community assessment provide the baseline for this evaluation.

The following chart depicts some of the indicators that might be used in an evaluation of a GWD eradication project. The data collection techniques used to diagnose the GWD problem (Chapter Five) will also be needed to determine program results.

Evaluation Planning Chart

INFORMATION NEEDED	WHEN IT SHOULD BE GATHERED	DATA COLLECTION METHODS	WHO WILL GATHER
No. filters distributed	Month 6	Sample survey; health worker records	Village health workers
Knowledge of GWD cause and prevention	Month 12	Sample survey (interviews); focus groups	School teachers
No. HHs filtering water	Months 6-9	Sample survey (interviews); observation	Village health workers
GWD prevalence for year	Month 12	Sample survey (questionnaire);	Clinic staff

Source: *Helping Communities to Eradicate Guinea Worm: A Training Manual*, WASH Field Report No. 322. [Draft.]

Evaluation is not simply an amassing of numbers. For one thing, numbers and measurements can obscure the human side of the project and its real impact in the community. Evaluation is a way to determine whether the project worked and how future efforts might be improved. Evaluation should answer the following questions:

- How much of the target was achieved?

- Is the level of achievement adequate to solve the problem?
- Were the best methods chosen to meet the goals?
- What impact has the project had on the community?
- Does the community have the skills it needs to carry on the project?
- What follow-up activities should be pursued.?

Ultimately the planning group must address the issue of *why* the project made the level of progress that it did. This major question should address both positive and negative results because plans for future projects will benefit from the lessons learned from either type of outcome.

Writing a Project Report

Even though a project report is not required, it is still valuable to write one to document the history of the project and ensure that all activities and their outcomes are available for future learning. Much of the report will already be in written form; the subheadings of this chapter provide a useful report format.

Many agencies that provide assistance to community projects require reports periodically during a project or at some designated time when funding expires. The funding agency is likely to have its own report format for the planning group to follow.

Tables and graphs showing before and after numbers and percentages, much like those described in the surveillance section of Chapter Five, are a good way to present project results. A summary section that emphasizes the major project achievements, problems, and lessons learned should also be included.

All members of the planning group should participate in compiling the report. Even if they cannot read or write, they can still dictate their views and experiences for others to record. Presenting this report verbally to the community may encourage community members to pursue future self-help projects. The report will provide evidence to you and the community of what you both can achieve. It also may be useful in encouraging funding agencies to support future community projects.

You should share the report of your community's GWD eradication activities with your APCD and National GWEP officials so that they can see what the project has accomplished and provide continued support and advocacy for the community's efforts.

REFERENCES

Project Planning

Guidelines for Developing a Plan of Action for Dracunculiasis Eradication Programs. WHO Collaborating Center for Research, Training, and Eradication of Dracunculiasis at CDC.

Programming and Training System Manual. 1989. U.S. Peace Corps. (ICE# T0054)

Small Project Design and Management: Training Manual for Volunteers and Counterparts. U. S. Peace Corps. (ICE# T0050)

Community Participation

Hope, A. and S. Timmel. *Training for Transformation.* Mambo Press, Gweru, Zimbabwe.

Srinivasan, L. 1990. *Tools for Community Participation: A Manual for Training Trainers in Participatory Techniques.* PROWWESS/UNDP Technical Series.

See also references on Community Participation in Chapter Four.

A. Information Resource Appendix

Appendix A
Addresses of Information Resources

WHO at CDC
(World Health Organization Collaborating Center for Research, Training, and Eradication of Dracunculiasis at the Centers for Disease Control)
Division of Parasitic Diseases F22
1600 Clifton Road
Atlanta, Georgia 30333 USA

Global 2000, Inc.
Carter Presidential Center
One Copenhill
Atlanta, Georgia 30307 USA

U.S. Peace Corps
OTAPS (Office of Training and Program Support), and
ICE (Information Collection and Exchange)
1990 K Street, N.W., 8th floor
Washington, D.C. 20526 USA

Vector Biology and Control Project (VBC)
1901 North Fort Myer Drive, Suite 400
Arlington, Virginia 22209 USA

Water and Sanitation for Health Project (WASH)
1611 North Kent Street, Room 1001
Arlington, Virgina 22209 USA

World Neighbors
5116 North Portland Avenue
Oklahoma City, Oklahoma 73112 USA

B. Health Education Appendices

Appendix B-1
Health Education Session Plan Outline*

1. Title of the Session: _____
2. Target Group: _____
3. Objectives of the Session: _____
   (specify the health behaviors)
4. Rationale: (reason for conducting this session)

(Attach a time to each of the following items.)

5. Introduction: TIME: _____
(briefly outline below how you will start off the session)

   Greetings

   Introduce Self

   Explain Purpose

6. Methods: TIME:_____
   — list the health education methods being employed
   — in the order in which they will be presented
   — showing the main points/issues (see objectives) to be covered by each method and then
   — indicate the time needed for presentation

7. Feedback/ Evaluation: TIME:_____
   Describe ways by which you will get feedback from the audience on what they have learned and how they intend to apply it when they return home. List specific questions you will use and describe specific opportunities where you will observe participants demonstrate skills.

8. Conclusion and Summary: TIME: _____
   List specific summarizing statements that are needed. You may make these yourself or encourage members of the audience to summarize the main points.

   Summary Statements

   Appropriate Farewells

   Further Help (indicate where people may contact you for further help and information)

TOTAL TIME:_____

* Source: *Helping Communities to Eradicate Guinea Worm: A Training Guide*, WASH Field Report No. 322. [Draft.]

Sample Health Education Session Plan

1. **Title of the session:** Filtering for Life

2. **Target group:** The girls in school who fetch water for their families.

3. **Objectives of the session:** *Identify very specific behaviors that you would like to see by the end of the session to indicate that the girls are correctly filtering the water.*

—By the end of this session, participants will be able to demonstrate which side of the filter faces up on the water jug.
—By the end of the session, participants will be able to list the 10 steps of filtering water on a piece of paper.
—By the end of the session, each participant will be able to conduct a demonstration of how to filter water for another participant in the session.

Notice that each objective is based on a very concrete action that can be seen. Objectives should not use words that cannot be seen or measured.

4. **Rationale:** In community X, young girls often collect water for their families. Those same girls have been introduced to GWD causes and prevention in school. Teaching them how to filter water will expand upon and reinforce what they've already learned.

5. **Introduction:**
Greetings
Introduce self
Explain purpose
Guinea worm larvae in our drinking water cause GWD. We can rid our water of these Guinea worm larvae by filtering it through a fine-weave cloth. If we always drink filtered water, we will not get GWD. Today, we will learn how to filter our water.

6. **Methods:** *List the educational methods to be included in the session. One activity may cover all objectives, or you may need several activities to achieve the objectives.*

(5 minutes)	1. Demonstrate correct use of filter.
(10 minutes)	2. Demonstrate using poster, "Ten steps involved in correct filtering."
(45 minutes)	3. Have each participant demonstrate the process to another participant.

7. Feedback/ Evaluation: *Feedback on both the teaching process and the impact of the lesson on behavior can now be measured. In the objectives you have already written your standards to compare participants' behavior:*

Teaching Process

- Observe participants demonstrating to another participant the filtering process.
- Ask the girls to list the steps they remember in the filtering process and leave the list with you.

Impact of Lesson on Behavior

- If all the girls used the correct side of the filter in their demonstration, you were successful.
- If all the girls listed the ten steps correctly on the paper, you were sucessful.
- If all the participants correctedly demonstrated the ten-step process of filtering water, you were successful.

Additional information can be obtained by talking to participants. Ask them:

When will you filter your water?
What will you do when you are away from home?

If you conduct an activity involving a larger group of people, you may want to evaluate the activity through a survey of a smaller sample of households. Once at a household, you can ask questions to find out about knowledge and beliefs and observe performance of the filtering skill. You can even inspect the filter to see whether it is dusty and full of holes or clean and intact (thus showing evidence of proper use).

8. Conclusion and Summary: *Summarize the main points of the session.*

Summary Statements

- Inspect your filter before using it.
- Make sure the right side of your filter is up.
- Avoid splashing dirty water into your pot.
- Wash the filter after you've used it.
- Always filter the water you collect for your family.
- When away from home, drink only filtered water if you want to avoid GWD.

Appropriate farewell

Further help

Appendix B-2
Factors Influencing the Acceptance of Filters in a Nigerian Village*

Predisposing Factors

Beliefs: Some people believed that Guinea worm was a natural part of the body, like a tendon, and thus could not be prevented. They did not believe that the filter would work as promised.

Knowledge: Fortunately, there was also a set of people who had access to well water, but they still bought filters. They knew that the wells sometimes went dry and wanted backup protection against GWD. They had accepted 'modern' health ideas.

Perceptions: Some people blindly accepted their filters and used them regularly to the point where tiny holes started to form. They did not understand that the protective effect of filtering depended on the quality of the cloth. Unfortunately, they did not perceive that the holes were dangerous. On the positive side there were those people who were happy with the filter because they could see what they felt were the results of filtering: dirt, leaves, and other residues left behind after pouring water through the filter.

Enabling Factors

Costs: Although the filter was sold basically at cost, and this price was less than a measure of rice or about the same as a bottle of beer, some people still complained that they did not have money to buy one.

Usefulness: A few individuals liked the filters because they could envision other, though inappropriate, uses for them, such as sieving corn and cassava starch.

Skill: Even when people remembered to use the filter, they sometimes did not use it correctly and placed it on the pot upside down.

Reinforcing Factors

Friends: Generally the filters were distributed through the network of village health workers (VHWs), who were local people selected by members of their hamlets for this GWD job. As friends and neighbors, VHWs found it easy to communicate to others in their hamlet and encourage acceptance. In hamlets where there were no VHWs, acceptance was quite low.

* Source: Brieger, W.R., J. Ramakrishna, and J.D. Adeniyi. 1986. Community involvement in social marketing: Guineaworm control. *Int. Quart. Commun. Health Ed.* 71(1):19-31.

Appendix B-3
Resistance to Change Continuum*

Stage 1 Complete denial of the existence of the problem.
Example: We have been drinking from this pond for generations. It never harms us.

Stage 2 Problem is recognized but the will to act is missing due to a feeling of powerlessness, apathy, dependence or fatalism.
Example: We need water but it is up to the government to build a water system for us.

Stage 3 While the problem is recognized, there are some doubts and fears inhibiting the adoption of the solution, such as:

Doubting the motives of the agency.
Example: They are giving us a pump only so that taxes can be raised.
Doubting the competence of the extension worker.
Example: What do these urban girls know about caring for a family? They are not even married.
Doubting the community's readiness to cooperate.
Example: It won't work in this village. People are too lazy.
Doubting one's personal capactity to effect change.
Example: What can I do? I am only a woman. I have never been to school; I am too old.

Stage 4 There is some interest in the proposed change but also fear of the social, economic, or other risks involved.
Example: I would like to filter my water. But what if my family still gets knocked down by Guinea worm? The neighbors will laugh at me.
Example: The local leader asks that we all contribute towards maintaining the well. But what if it costs too much? I cannot afford another debt.

Stage 5 There is real interest in learning about the proposed change with a view to adopting it.
Example: There is a lot of GWD in this village. Tell me what you know about it.

Stage 6 There is readiness to adopt the change.
Example: GWD is a serious problem in our village. Show me how to filter my water so my family will not get it.

Stage 7 Not only is the new idea accepted and applied, but there is readiness to convince others to adopt it as well.
Example: You can count on me. I will tell my neighbors how to prevent GWD and show them how to filter their water.

* Source: *Tools for Community Participation: A Manual for Training Trainers in Participatory Techniques*, PROWWESS/UNDP Technical Series.

Appendix B-4 Teaching Tools and Techniques*

Effective teaching aids need not be elaborate or expensive. Many of them can easily be made from local materials at little or no cost and with the participation of local people. Making teaching aids is often part of the learning process and should be included in the dialogue between health workers and community members. It is important to remember, however, that all teaching aids should be carefully pretested to make sure that the message they are intended to convey is well understood and accepted. If people are not used to learning from pictures, another way should be found to help them understand basic health messages. Images or activities that are not culturally acceptable may do more harm than good. The best way to ensure that materials are appropriate is to involve members of the community in making them.

Using pictures

Visual images can be very useful in conveying health messages. Existing materials such as the ones contained in this manual or in *The Copy Book* (see Resource list), can be used to make posters or wallcharts. Walls can be turned into billboards for display. For small groups, a simple easel can be made to carry a poster, flipchart, blackboard, or flannelboard.

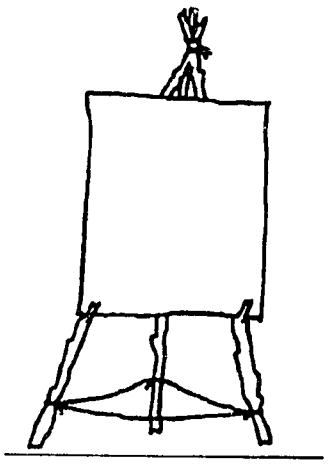
* Source: *Dialogue on Diarrhoea*, AHRTAG, 1 London Bridge Street, London SE1 9SG, UK.

Source: *Dialogue on Diarrhoea*, AHRTAG, 1 London Bridge Street, London SE1 9SG, UK.

How to make an easel. You will need

- three long tree branches
- string

Tie the branches together at the top, and allow them to splay outwards. Boards may be rested on protruding twigs.



Making posters. Posters can convey a single, simple message powerfully. They can be displayed in health centers, clinics, schools, and other public places. When designing a poster:

- choose large, clear images;
- avoid too much unnecessary detail or background;
- include only the relevant details that are essential to the message;
- avoid complex ideas that are hard to represent visually;
- avoid the use of objects shown larger than they really are within a picture — this may be misleading;
- do not use technical drawings;
- select colors, where used, with care, so that they fit in

with the message, make people want to look at the poster, and are culturally acceptable.

Different cultural groups will respond to different types of visual image. In some countries photographs are familiar, but in others it may be better to use outline drawings. Careful use of color is important. Color can help make a poster more attractive and effective, but certain colors have connotations that may undermine the message of the poster.

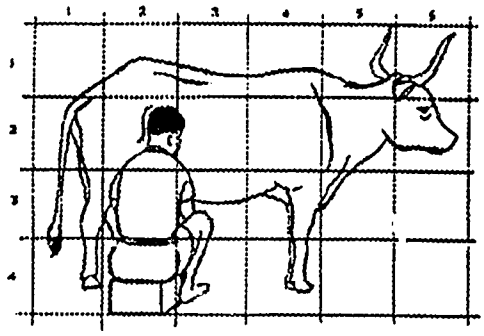
Using words. It is important that any writing used is clear and easy to read:

- make the letters big enough to be easily seen;
- keep the style of the letters simple — printed capitals are usually best;
- leave enough space between words and lines;
- be sure that the contrast between the color of the background and color of the letters is clear so that they are easy to see.

Where it is appropriate to use written materials for health education, try to choose or make materials that are as clear as possible. Written materials should be

- attractive, easy to read, with plenty of space and pictures;
- broken into short sections;
- as short as possible, with the most important points at the beginning;
- written with the shortest and simplest words possible.

Copying and adapting pictures. When you have chosen a picture, it may be copied as illustrated below.



To make a copy the same size as the original, use squares of the same size. To make the copy bigger, use bigger squares.

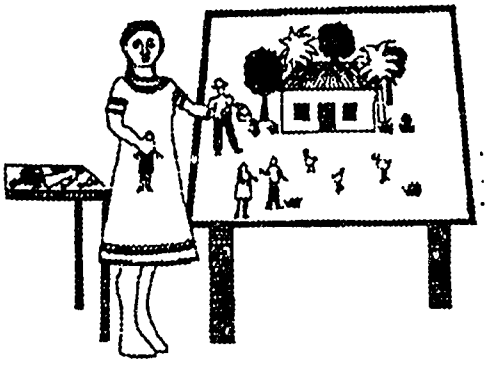
1. Draw a grid of equal-sized squares over the picture using a soft pencil.
2. On a blank piece of paper to be used for the poster, draw a plain grid with the same number of squares.
3. Copy the picture square by square in pencil.
4 When you have the outline, draw over it in ink.
5 Allow the ink to dry, and rub out the pencil lines.
6. Fill in the outline with shading and color as required.

Adapting pictures. Certain details in a chosen picture can be changed to more appropriate ones. For example, hair or clothing styles can be changed or two images can be combined to create a new picture. It can be useful (and fun) to work in a group to adapt pictures. This can be a good way to involve others and encourage them to participate in learning activities.

How to make and use a flannelboard

You will need

- a piece of plywood, fiberboard, or strong cardboard
- soft cloth to cover the board
- cut-out pictures



Stretch the fabric over the board and fix it at the edges. Pictures for the flannelboard may be cut out of magazines or copied or drawn by the participants. To make the pictures stick to the fabric of the board, back them with sandpaper or smear the backs with a paste made of flour and water, and then sprinkle wheat or rice chaff on the paste while it is still wet. Allow this to dry, and the resulting rough surface will hold the pictures in place on the soft cloth. With suitable pictures, a story can be told effectively using a flannelboard. To make your presentation as good as possible

- plan the presentation;
- rehearse and pretest the presentation;
- use only large, clear pictures;
- do not crowd the board with too many pictures;
- lean the board slightly backwards so that the pictures stick well;
- remember to stand beside the board, not in front of it!

How to make a chalkboard

You will need:

- a sheet of plywood or fiberboard (about 22 X 23 in)
- matt black paint

CHALKBOARD PAINT

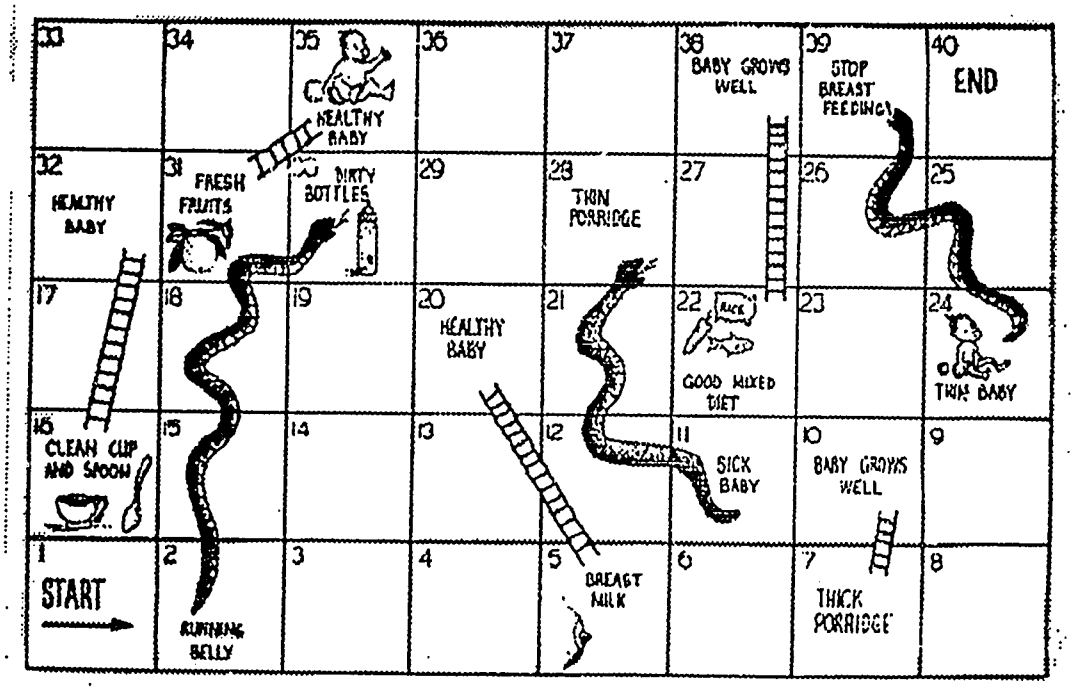
1 part lamp black
1 part varnish
1 1/2 parts kerosene

Mix varnish and kerosene thoroughly. Add lamp black and mix again, making sure all three ingredients are completely mixed together before using.

If possible, roughen the surface of the board before painting the first coat. Allow to dry, roughen the surface again, and apply a second coat of paint. When the paint is dry, rub the board with a cloth covered in chalk dust. This will make it easier to rub out chalk marks later.

Games

Visual images can also be used in games. These could be either board games, such as 'snakes and ladders,' or picture card games. Games are a good way to involve people in active learning, which is always the most effective kind. Taking part in a game is far more interesting than listening to a talk, and the messages are more likely to be remembered. The board game illustrated shows how certain practices will result in illness and other practices in health and growth. Card games may be suitable for older children or adults and can be used to test what knowledge has been gained from other health education activities. People can always be involved in making up their own games — they can make the rules or just the cards or boards.



Using puppets

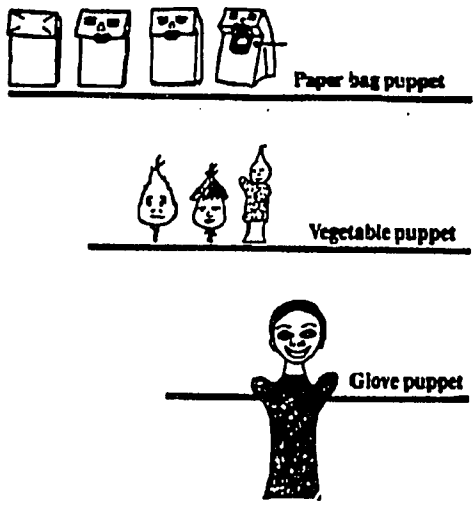
If you are planning to use puppets for health education, ask yourself:

- What story will be used, and who will make it up?
- What information will be used in building up the story?
- What is the aim or result hoped for?
- How will you find out whether this has been achieved?
- What support and follow-up will there be?

Appropriate stories can be developed using local experience, beliefs, and culture. Be careful to appeal to what people understand. Better still, ask community members to develop stories. Identify the major health problems in your area and explore ways to help people overcome them through the puppet show. It is very important to be responsible about the message contained in the show: unrealistic drama will either raise false hopes or be ignored by people. Plan follow-up activities after the puppet show or series of shows.

Making puppets. Some kinds of puppets are extremely simple to make. Others are more complicated but can still be made at very little cost. Children usually enjoy making puppets. Different types are:

- glove puppets with paper mache or clay heads
- rod puppets
- paper bag puppets
- vegetable puppets
- jointed puppets
- shadow puppets



The puppet stage or theatre. A puppet stage can be just a wall or curtain for the puppeteers to stand behind while they operate the puppets. You can hang a blanket or large piece of cloth between two trees or across a doorway, or use the window of a house. Or, you could make a simple box theater using wood or mats that could be taken apart and easily transported.

For shadow puppet shows, all that is needed is a large sheet of thin fabric that light will shine through. This can be hung between trees or poles. Remember to position the light source so that the puppets will cast shadows in the way you want.

Putting on a puppet show. For an effective show, remember to use music and dance and to have plenty of action. People are not interested in puppets that just talk. Sound effects and props are also helpful if you can make them. Use local languages and culturally appropriate scenarios.

The plot should have one central idea, and all action should contribute to it. Characters should display a range of emotions. This will add variety and help hold the audience's attention.

Involve the audience by having the puppets ask them questions and demand a response. Questions asked at the end of the show can help you evaluate whether the show has contributed to a change in the audience's knowledge.

After the show, evaluate whether the performance can be improved, whether it was well received, and whether people were involved during the performance.

SOURCES OF INFORMATION AND MATERIALS

These organizations supply teaching aids, books, manuals and other types of educational materials, some of which are listed below.

- AKAP. 66 JP Rizal St., Project 4, Quezon City, Philippines
- African Medical and Research Foundation (AMREF). PO Box 30125, Nairobi, Kenya
- American Public Health Association (APHA). 1015 15th St., NW, Washington, DC 20005, USA
- Atelier de Material Audio-Visuel. BP 267, Yaounde, Cameroon
- Caribbean Food and Nutrition Institute (CFNI). PO Box 140, Kingston 7, Jamaica
- Centre for Health Education Training and Nutrition Awareness (CHETNA). Drive-in Cinema Building, 2nd floor, Thaltej Road, Ahmedabad, Gujarat 380 054, India
- Child-to-Child Programme. Room 634, 20 Bedford Way, London WCl 0AL, UK
- Christian Medical Commission (CMC). 150 Route de Ferney, 1211 Geneva 2, Switzerland
- Clearinghouse on Development Communications. 1815 N. Fort

Myer Drive, Suite 600, Arlington, VA 22209, USA
- Editorial Pax Mexico. Av. Cuauhtemoc 1434, Mexico 13 DF, Mexico
- ENDA Tiers Monde. BP 3370, Dakar, Senegal
- Hesperian Foundation. PO Box 1692, Palo Alto, CA 94302, USA
- Intermediate Technology Publications. 103 Southampton Row, London WCI, UK
- Mambo Press. PO Box 779, Gweru, Zimbabwe
- Macmillan Publishers. Houndmills, Basingstoke, Hants, UK
- MEDEX. John A. Burns School of Medicine, University of Hawaii, 1833 Kalakaua Ave., Suite 700. Honolulu, Hawaii 96815-1561, USA
- Program for Appropriate Technology in Health (PATH). Suite 700, 1990 M St. NW, Washington DC 20036, USA
- Popular Education and Primary Health Care Network. Diagonal Oriente 1604, Casilla 6257, Santiago 22, Chile
- Resources for Child Health (REACH). John Snow Inc., Ninth Floor, 1100 Wilson Boulevard, Arlington, VA 22209, USA
- Teaching Aids at Low Cost (TALC). PO Box 49, St Albans, Herts ALI 4AX, UK
- UNESCO. 7 Place de Fontenoy, 75700 Paris, France
- Volunteers in Technical Assistance (VITA). 3706 Rhode Island Ave., Mt. Ranier, MD 20822, USA
- Voluntary Health Association of India (VHAI). 40 Institutional Area, South of IIT, New Delhi 110 016, India
- Water and Sanitation for Health (WASH), Information Center. 1611 N. Kent St., Room 1002, Arlington, VA 22209, USA
- World Health Organization (WHO), 20 Ave. Appia, 1211 Geneva 27, Switzerland, and WHO Eastern Mediterranean Regional Office, PO Box 1517, Alexandria, Egypt
- World Education, 251 Park Ave. South, New York, NY 10010, USA
- World Neighbors. 5116 North Portland, Oklahoma City, Oklahoma 73112, USA

BOOKS*

Aarons, A. and Hawes, H. **Child-to-Child** (1979). Well-illustrated manual with ideas about how children can teach other children and their parents. Child-to-Child.

Abbatt, F R. and McMahon. R. **Teaching health care workers: a practical guide** (1985). Macmillan. TALC.

CHETNA. **Kathputli se seekhna aur seekhana** (Teaching and learning with puppets) (in Hindi). CHETNA.

Fetter, K A. et al. **Teaching and learning with visual aids: a resource manual for community health workers, health trainers and family planning workers in Africa and the Middle East.** TALC.

Gordon, G. **Puppets for better health** (1986). Manual for community workers and teachers on all aspects of puppet-making and use. Macmillan.

Harner. R . et al . **A manual for learning exercises: for use in health training programmes in India** (1983). VHAI.

Hope, A. and Timmel, S. **Training for transformation: a handbook for community workers** (1984). (Books 1, 2 and 3). Mambo Press.

Jarmul. D. **Plain talk: clear communication for international development** (1981). A manual on how to write simply for development education. VITA.

* Acronyms are described above in organizational listing.

Johnston, M P. and Rifkin, S B. **Health care together: training exercises for health workers in community based programmes** (1987). TALC.

Linney, B. **The copy book** (1988). A collection of copyright-free illustrations donated by various artists, which may be copied or adapted. IT Publications.

Macdonald, I., and Hearle, D. **Communication skills for rural development** (1984) . Evans Brothers/IT Publications.

Stinson. W, et al. **Training community health workers** (1983). World Federation of Public Health Associations. APHA.

UNESCO. **Nutrition education series: easy to make aids for nutrition teaching-learning** (1984). UNESCO.

Voluntary Health Services Society. (23/4 Khilji Road, Shyamoli, Dhaka 7, Bangladesh). **Guide to public health films in Bangladesh.**

Werner, D. and Bower. B. **Helping health workers learn** (1982). Hesperian Foundation. An excellent manual, full of practical ideas and advice. TALC.

WHO. **The community health worker: working guide. Guidelines for adaptation** (1987). WHO.

WHO. **Education for Health** (1988). WHO.

Zimmerman. M, et al. **Developing health and family planning print materials for low literate audiences: a guide.** Illustrated guide that can be used to develop teaching materials. PATH.

NEWSLETTERS*

- **Agripomo.** Quarterly magazine (French). Subscription. INADES Formation.
- **Cajanus.** Quarterly journal (English). Subscription. CFNI.
- CHETNA News. Quarterly journal (English). Free to health workers in India.
- **Contact.** Bi-monthly magazine (English/ French/ Portuguese/ Spanish). Free to developing countries. CMC.
- **Development Communication Report.** Quarterly newsletter (English). Free to developing countries. Clearinghouse on Development Communications.
- **Health and Popular Education.** Occasional newsletter (English/Spanish). Free to developing countries. Popular Education and Primary Health Care Network.
- **IRED Forum.** Quarterly journal (English/French). Subscription. Development Innovations and Networks.
- **Soundings from Around the World.** Biannual newsletter reviewing new resources (English). Subscription. World Neighbors.
- **Teaching and Learning News.** Irregular newsletter (Arabic/English). Free. WHO (Eastern Mediterranean).
- **World Neighbors in Action.** Quarterly newsletter (English). Subscription. World Neighbors.

* Acronyms are described above in organizational listing.

Appendix B-5. Participatory Techniques*

Storytelling

Stories can be used to analyze community problems. For example, a character can receive contradictory advice from two friends. Leave the main character undecided and ask the audience to suggest the conclusion. Flexi-flans can be used to represent the main characters.

Posters and Flexi-flans

Flexi-flans and posters can be used to start a discussion and draw out ideas from a group.

A set of posters depicting a dramatic human situation can be used to learn about a community and discuss issues. Present a group with a set of pictures, in no particular order, of people with GWD and various sources of water. Ask participants to choose some number of the pictures and create a story about them.

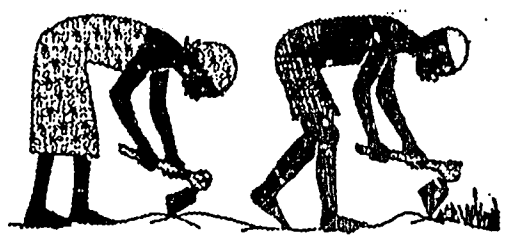
Posters can also be used to analyze community problems. Show a group a set of pictures (approximately 3) representing a critical incident (e.g. a farmer and his family unable to tend the fields because of GWD) and ask the participants what problem is being conveyed, what contributed to the problem, and how it can be resolved.

* Source: *Tools for Community Participation: A Manual for Training Trainers in Participatory Techniques*, PROWWESS/UNDP Technical Series.

A poster story with a gap can be used in planning discussions. Present a "before" and "after" picture. With the group, develop a story around the "before" picture and build the story up to a crisis point. Ask why the situation has gotten so bad. Then introduce the "after" picture. Discuss the improvement and ask how the people improved their condition. This exercise can be used to discuss a variety of issues, from what can be done about GWD to what can be done about a broken village pump.

Before:

After:



Source: *Eliminous le Ver de Guinee — un Guide pour l'Agent de Sante Communautaire*, l'OCCGE.

The story with a gap can be expanded upon. On the left side of a large paper, draw a box representing the present situation and on the right side, a box representing the goal. Above the line that connects the boxes, the participants should list the resources needed to achieve the goal. Below the line, list the constraints against achieving the goal. Discuss what can be done to eliminate the constraints.

Flexi-flans (see flannedlboard, Appendix B-4) can be used to define what the responsibilities and functions of the members of a committee might be. Have participants select from a group of flexi-flan figures who should be on a village water or GWD committee. Ask why these particular figures were chosen. What function will they be capable of fulfilling? Make a list of the functions of the committee.

Data Gathering and Planning

Participatory education techniques can also be used in data gathering and planning.

The pocket chart, in its simplest form, consists of rows of pockets (e.g. envelopes, jars) with a picture set above each pocket. The illustrations may be of water sources used, health practices followed, or water improvements preferred. Each community member places a piece of paper in the pocket of his or her choice. The results can be tabulated quickly and discussed. This technique can be used to involve the community in community assessment (see Chapter Five).

Some group of community members (e.g. secondary school children) can be asked to draw a map of the village for community assessment needs. From their maps, and discussion of their maps with other community members, you will get not only a physical layout of the village but insight into what the community is proud of and what it sees as problems.

To initiate planning discussions, one can create a set of cards illustrating scenes or behaviors that can be interpreted as good, bad, or in-between from the viewpoint of GWD prevention. Have participants sort the cards into these three categories. Select one or more cards from the bad category and discuss actions to resolve the problems and who should be responsible for each step.

Involving Women

Draw a circle within a circle. Have a group of women identify community problems in the outer circle and women's problems in the inner circle. Discuss which problems are different, which are the same, and what solutions can resolve both.

Alternatively, draw a village woman in the lower left corner of a large paper. Draw a balloon next to her representing one major problem, and then smaller balloons from this balloon reflecting the consequences of this problem. Draw and link other balloons. When all have been identified, talk about how and where the chain of negative consequences can be broken.

Appendix B-6
Sample Lesson Plans for a Guinea Worm Unit*

Below are the outlines of four sample lesson plans that could compose a GWD unit. The background information for these lessons is contained in the manual and, in full, in the original source.

Lesson 1: The Life Cycle and Transmission of Guinea Worm

Purposes

- To give students accurate information about the transmission of GWD through drinking water.
- To give students an opportunity to discuss local beliefs about GWD transmission.
- To give students an opportunity to discuss methods of preventing GWD transmission, including individual and community behavioral change.

Objectives

- By the end of the session, students will be able to describe the transmission of GWD.
- By the end of the session, students will be able to list the means of preventing GWD.

Reading for Teachers: Introduction and Chapter One of this manual.

Procedures

1. Introduction. Begin by introducing the topic and soliciting responses from the students about their knowledge of GWD, e.g., What traditional beliefs are they familiar with? Do they know anyone who has had GWD? How can one tell when someone has GWD?

2. Short Lecture. Proceed with a short lecture on the cycle and transmission of GWD, following the points in the discussion outline that follows. Posters showing the transmission cycle can be used to enhance the explanation (see Appendix B-7).

3. Discussion. Read the story to the group. Follow up the story by conducting a discussion based on the questions that accompany the story.

* Source: *Teaching about Guinea Worm Prevention: A Manual for Secondary School Teachers*, WASH Field Report No. 223.

4. Wrap-up. Emphasize the following points:

- GWD can be transmitted only by drinking contaminated water.
- A person's understanding of a problem can affect his or her behavior.
- Prevention of GWD is preferable to treatment.

Discussion Outline: Life Cycle and Transmission

A) Historically, GWD is one of the oldest-recorded diseases.

B) Parasitic infection
- The female worm (*Dracunculus medinensis*) lives in humans and emerges from an open sore.
- Larvae from the open sore infect the intermediate host, copepods.
- Copepods inhabit sources of drinking water.

C) Prevalence of GWD in Africa and Asia (see Introduction).

D) Life cycle (see Chapter One; summarize appropriate to age group).

E) Necessary conditions for transmission:
- a body of standing water with the type of copepods that act as intermediate hosts;
- an actively infected person to introduce Guinea worm larvae into the body of water;
- Guinea worm larvae ingestion by copepods within 5 days;
- larval development in copepods for approximately 14 days;
- ingestion by humans of infected copepods.

- GWD can only be transmitted when people drink contaminated water; there is no alternative infective pathway.
- GWD is the only water-related disease that can be entirely prevented by protecting supplies of drinking water.
- The transmission season of the disease (see Chapter One).
- The disease has been targeted for elimination by the World Health Organization.

Story: The Life Cycle and Transmission of Guinea Worm

Dale and Sina are best friends. Dale is from Idere and Sina is from Igbo-Ora. Both boys are students in form two at Okedere High School.

One day in November, Sina came to school and found that Dale was absent. After school Sina went to visit Dale to find out why. He found that Dale had been knocked down by Guinea worm. The disease was hurting Dale too much and he could not walk.

Sina said, "Dale, every year you get this Guinea worm, but I do not.

Why is this so?" Dale answered, "Our teacher says that drinking dirty water causes Guinea worm. You know that Igbo-Ora has tap water, but here in Idere we fetch our water from ponds."

Sina said, "I do not believe you. My grandmother says that Guinea worm is in the blood and will come out any time it wants to if blood becomes weak. I do not get Guinea worm because my family has strong blood."

While the boys were arguing about the cause of Guinea worm, Dale's mother entered the room and asked the boys to take food. Since Sina was hot and tired from work on the school farm and sports, he ate plenty of food and drank plenty of water.

After finishing the food, Sina looked up and saw that the sun was setting. He said, "I better reach home before dark." After thanking Dale and his mother for the hospitality, Sina started on his way back to Igbo-Ora.

Dale recovered from the Guinea worm after some weeks. Sina was glad to see his friend back in school. They started playing and talking and forgot all about the Guinea worm. Both boys did well in school that year and passed on to form three.

In September Dale and Sina returned to school. November came around again, but this year it was Dale who found that Sina was absent from school. Dale went to Igbo-Ora right after school and found Sina on his sickbed complaining of Guinea worm.

Sina was worried. He asked, "Why do I have Guinea worm? I never had it before. You said that if I drank clean water I would not get the disease. I only drink tap water in Igbo-Ora."

Then Dale reminded Sina that last year Sina had drunk water at Dale's house. Dale said, "Remember that our teacher says that Guinea worm takes a year to grow. The water you drank in Idere last year gave you Guinea worm."

Dale explained more. "After you left our house that day last year, my mother asked me what we were arguing about. I explained that when a person with Guinea worm puts his leg in water, the worm lays eggs in the water. Then when another person drinks the water, he also drinks the Guinea worm eggs.

"From that day on, my mother started filtering our drinking water through a clean cloth. This year no one in our family has Guinea worm. Now my father and his brothers are planning to dig a well for our compound so no one will get Guinea worm again."

Sina praised the efforts of Dale's family and promised that from that day onward he would always take his drinking water from a clean source.

Discussion Questions:

1. Why did Dale and Sina get Guinea worm?
2. How does Guinea worm spread?
3. What happens to someone who has Guinea worm?
4. How did Dale's family prevent Guinea worm the next year?
5. What are some of the different ways we can make sure drinking water is safe from Guinea worm disease?

Lesson 2: Prevention of Guinea Worm

Purposes

- To enable students to identify safe water sources.
- To enable students to identify methods for purifying contaminated water.
- To enable students to identify methods to prevent the contamination (or recontamination) of drinking water supplies.
- To demonstrate the necessity and effectiveness of community action in providing safe water supplies.

Reading for Teachers: Chapters Three and Four of this manual.

Procedures

1. Introduction. Introduce the topic by reviewing the main points of the previous segment on the life cycle and transmission of GWD.

2. Discussion. Read story. Following the story, conduct a discussion based on the first set of discussion questions.

3. Short lecture. Review methods to ensure that drinking water supplies do not contain Guinea worm larvae and ways to prevent contamination (or recontamination) of clean drinking water supplies.

4. Discussion. Conduct second discussion based on the second set of discussion questions that accompany the story.

5. Wrap-up. Summarize the lecture by emphasizing the need for health education and community action to provide safe water supplies.

Remind the group that people have already drunk some Guinea worm larvae. These worms will come out next year, so it will take two years to see results from their efforts. Say that unless we act now, the problem will continue and may become worse.

Discussion Outline: Prevention

A) Individual/family level:
- Treating contaminated water by filtering.
- Selecting non-contaminated water for drinking.

B) Community level
- Becoming aware of the relationship of GWD and water.
- Learning about the causes or transmission of the disease.
- Avoiding contamination of water sources by protecting source, controlling copepods.
- Making sure that contaminated water sources are not used for drinking.

Story: Prevention of Guinea Worm

The people of Ajegunle village enjoy their life most of the time. They grow cocoa, cassava, yams, maize and fruits. The money they make from selling these crops has been used in many ways to improve their lives. Most houses have iron sheet roofs. Several farmers have bought motorcycles. Most people have radios.

The people of Ajegunle enjoy life except in the dry season. Every year in January or February their stream goes dry. The women dig deeper, but only small amounts of water seep out slowly. If a woman or child goes to collect water in the morning, she may not return home before late in the evening.

Life is uncomfortable during the dry season. People cannot take baths or wash clothes because water is scarce. Diseases like Guinea worm and diarrhea spread because of the dirty pond water. Small onion farms grown by the women dry up because there is no water. Children miss school because it takes too long to collect water.

Wasinmi village is about five mile from Ajegunle. Farmers in Wasinmi grow cocoa, yams, fruits and other crops — just like the farmers of Ajegunle. In Wasinmi they use the profit from their crops to enjoy life also. The dry season in Wasinmi used to be troublesome too.

One day three years ago, the Baale of Wasinmi heard a health worker talk about improving community water supply. The Baale returned home and called his people together to discuss the idea. He said, "Every year in the dry season we suffer. Our women waste time searching for water. We cannot take our bath or wash clothers regularly. We get so many diseases like Guinea worm and diarrhea. What can we do to help oursleves?"

Some people suggested that the village dig a proper well. Everyone liked the idea and promised to contribute money and labor. The Baale contacted the health worker for help. The health worker came and helped the people find a good site for the well. He also taught them how to build it properly. With the cooperation of all villagers, the well was dug. Today, life in Wasinmi is enjoyable all year long. People can take baths and wash clothes whenever they wish. They no longer suffer from Guinea worm.

Discussion Questions
1. What problems do the people of Ajegunle have in the dry season?
2. Why do people in Ajegunle continue to suffer so much?
3. What could people in Ajegunle do to solve their problem?
4. If you were a member of Ajegunle village, how would you help your people?

Review of Methods of Prevention

1. The best way to prevent GWD is to drink clean water that contains no Guinea worm larvae.

- Dig a sanitary well (show picture).
- Make a tank to collect and store water during the rainy season (show picture).
- Filter pond water through a clean cloth to remove copepods (and hence Guinea worm larvae).
- Boil pond water to kill copepods.
- Put chemicals in the water to kill the copepods.

2. Another way to prevent GWD is to make sure Guinea worm larvae never enter water in the first place.

- Do not allow people with Guinea worm sores to go in the pond.
- Build a small wall or platform so people do not enter the pond when fetching water.

Discussion Questions
1. Under existing village circumstances, what are the best and easiest ways to prevent GWD?
2. When we go home after this lesson, how will we start to solve the problem?

Lesson 3: Water Filtration

Purposes

- To demonstrate that there are small organisms in the water that can swallow Guinea worm larvae.
- To provide an opportunity for each student to demonstrate and explain the procedure of water filtration to a group.

Materials and Procedures

See "Demonstrating Skills" in Chapter Three and Appendix B-1.

Lesson 4: GWD Symptoms and Treatment

Purposes

- To enable students to identify the signs and symptoms of GWD among themselves and their family members.
- To provide students with information about treatment of GWD.

Reading for Teachers: Chapter One of this manual.

Procedures

1. Introduction. Introduce the topic by pointing out that even though prevention is better than treatment, it is still improtant to be able to recognize the signs and symptoms of GWD and to treat it. The two main objectives of treatment are to prevent further complications and to keep the person with GWD as comfortable as possible.

2. Short Lecture. Proceed with a short lecture on the clinical symptoms of GWD, its medical complications, and obstacles to treatment.

3. Discussion. Introduce the discussion exercise by soliciting answers from the group about some of the ways people in their villages treat GWD. Include questions on how effective they think these treatments are. Read the story and conduct a discussion based on the discussion questions.

3. Wrap-up. Review individual treatment for GWD. Emphasize the need for proper care of Guinea worm sores to prevent tetanus and other infections. Encourage all who are able to seek medical attention, especially tentanus immunization. Conclude by pointing out that even though some drugs can reduce swelling and pain, there is no cure for GWD, and therefore prevention is the best course of action.

Discussion outline: Symptoms and Treatment

A) Clinical symptoms (see Chapter One).

B) Complications (see Chapter One).

C) Social/economic effects (see Chapter Two).

D) Obstacles to treatment
- There are no routine diagnostic tests to detect the presence of the Guinea worm.
- There are no drugs that kill the adult worm.
- Humans do not develop an immunity.
- A person can be infected by multiple worms at the same time.

- One year elapses between infection and emergence. People do not remember their actions that far back; therefore, it is difficult to establish cause and effect.

E) Individual/family level treatment (see Chapter One).

F) Community Level Treatment
- Identify people with GWD.
- Contact medical professionals for treatment.
- Teach the community home care of Guinea worm ulcers.
- Assist those who have GWD with daily activites.

Story: Guinea Worm Identification and Treatment

People in Owode suffer from Guinea worm each year. They use many different medicines to treat the disease, but no one has found a medicine that will cure Guinea worm.

Runmi was a form-four student at Owode High School. One day she noticed a swelling on her foot. In a few days this swelling became a Guinea worm sore. First Runmi tried rubbing the sore with palm oil. This made the sore softer but did not relieve the pain. Runmi's father suggested that she mix some owo imi with the palm oil. Runmi did this for some days but saw no improvement.

Next Runmi's mother suggested mixing tomato leaves with palm oil. Runmi tried this medicine, but it did not help either. Runmi's senior brother said she should mix soot from the rafters with the palm oil. Rumni used the medicine for some days but still saw no improvement.

Runmi's best friend Ronke said, "My uncle is a traditional healer. When we have Guinea worm he mixes burned dog bone that has been ground with shea butter." Even this medicine did not help Runmi. All the while her foot continued to swell and to give her much pain. Now her foot was so swollen that she could not even wear her sandals. Runmi had to walk to school and market with bare feet. Much dirt got mixed with the palm oil on her foot and entered the Guinea worm sore.

One morning Runmi was feeling uncomfortable. She could not swallow. Her mouth could not open easily. Her arms, neck, and legs felt very still. She could not go out that day.

By the next day Runmi began to have convulsions. Her family was so upset. The health worker said she had tetanus. They rushed her to the hospital. Runmi almost died, but the doctors finally saved her life.

Some days later Ronke noticed that she also had a Guinea worm sore on her foot. She remembered all the trouble her friend Runmi had, so she decided to go to the dispensary right away.

The dispenser gave Ronke some drugs to reduce the pain and swelling in her foot. He gave Ronke an immunization against tetanus. Then he showed Ronke how to dress the sore so that dirt could not enter. The dispenser reminded Ronke to wear her shoes, clean and dress the sore each day, take her medicine, and never step in the pond while she had the Guinea worm sore.

Ronke thanked the dispenser and followed all his instuctions. The Guinea worm took some time to remove, but Ronke did not suffer as much as her friend Runmi.

Discussion Questions

1. What happened to Runmi when she did not take good care of her Guinea worm sore?
2. Why did Runmi get tetanus?
3. Why did Ronke go to the dispensary?
4. What treatment did the dispenser give Ronke? Why?
5. How was Ronke supposed to take care of herself?
6. Why did the dispenser tell Ronke not to put her Guinea worm sore into the pond?

Appendix B-7
Sample Posters

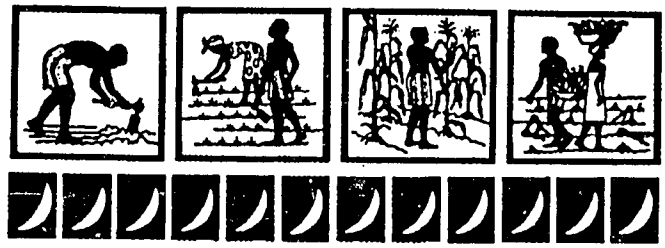
The simple pictures on the next five pages are posters developed for Guinea worm eradication programs by the CDC.* They can be adapted for local posters with messages written in local language. Before taking the time to draw large posters from these pictures, show them to local people to see if they are acceptable, comprehensible, and pleasing to view.

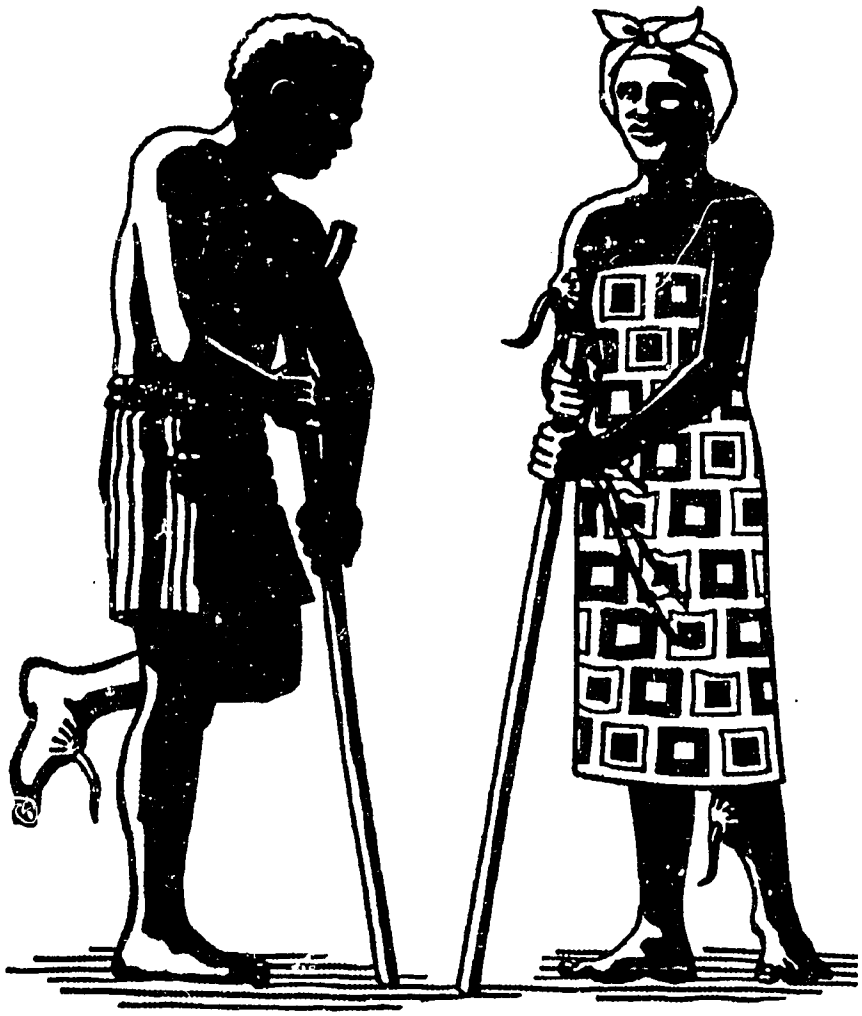
Note that the six posters follow a sequence:

1. A man drinks pond water.
2. After approximately 12 months he has a Guinea worm ulcer on his leg.
3. A painful blister appears just before the worm emerges.
4. When placed in water (the pond), the blister bursts and the Guinea worm releases its larvae.
5. The people who have GWD cannot walk well or do their usual work.
6. When a person with the disease allows his Guinea worm to expel larvae in the pond, someone else will drink them and get the disease next year.

These posters can be used separately or joined together to make a **flipchart**. Flipcharts are useful for illustrating the process of GWD transmission.

* Source: *Guinea Worm/Dracunculiasis Eradication Program: Training Course for Guinea Worm Coordinators*, WHO Collaborating Center for Research, Training, and Eradication of Dracunculiasis at the Centers for Disease Control.





Appendix B-8
Steps for Conducting a Community Survey With Students*

Explain to the group that a survey will reveal the number of people affected by GWD, and, if repeated periodically, will help determine the seasonality of the disease and whether the number of people with the disease is decreasing or increasing.

- Divide students into teams of twos or threes.
- Assign specific areas and households to each team.
- Explain the forms carefully to the students. (See forms in Appendix D-6.)
- Decide on a time frame for completing the survey.
- Present the plan to community leaders and health officials for approval and cooperation.
- Practice using the survey forms (role plays).
- Carry out the survey.
- Tabulate the results.

* Source: *Teaching Guinea Worm Prevention in Secondary Schools: A Guide for Training Peace Corps Volunteer Teachers*, PC/ WASH. (ICE# T0060)

C. Water Resource Appendices

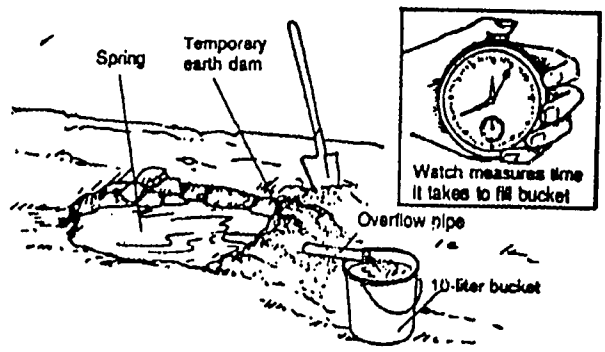
Appendix C-1
Determining Quantity of Available Water*

Springs

To determine the suitability of a spring, it is necessary to know how much water it will yield, and how well it will keep up its flow in dry weather.

Yield is measured by a very simple method. First, channel the spring's flow into a small, hollowed-out collection basin that is dammed at one end. Make sure that the basin collects all available flow. Place an overflow pipe through the dam so that the collected water flows freely through the pipe, as shown in the figure below. Make certain there is no leakage around the pipe. Then,

- put a bucket of a known volume (for example, a 10-liter bucket) under the pipe to catch the flow;
- with a watch, measure the amount of time it takes for the bucket to fill;
- divide the volume of water by the amount of time to find the rate of flow in liters per minute.



Source: Selecting a Source of Surface Water, *Water for the World.*

For example, if the 10-liter bucket fills in 45 seconds, the rate of flow is:

$$\frac{10 \text{ liters}}{45 \text{ seconds}} = 0.22 \text{ liters/second}$$

0.22 liters/second x 60 seconds/minute = 13.2 liters/minute

13.2 liters/minute x 60 minutes = 792 liters/hour

792 liters/hour x 24 hours/day = 19008 liters/day

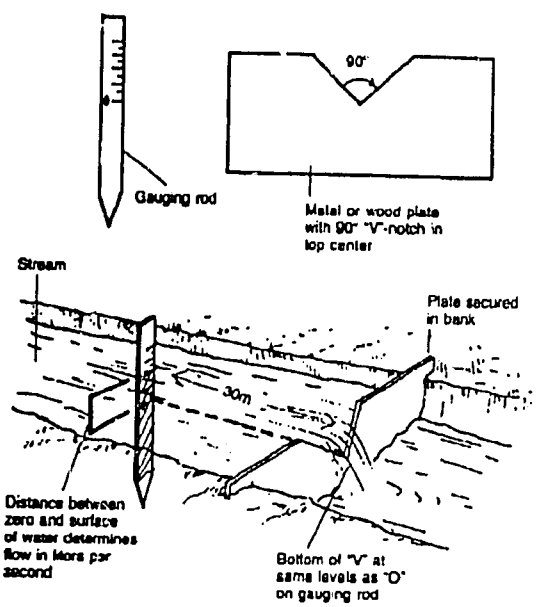
Compare this amount to the daily needs of the community. The daily need is computed by multiplying the number of users by the number of liters each person will use in one day. For example, if there are 300 people using 20 liters per day, the daily water usage is 6000 liters. A spring with a daily flow of 19008 liters and a storage tank would be more than enough to meet the needs of a community of this size. If the volume is insufficient, the spring may still be a good site for well development because there is a high water table.

* Source: Selecting a Source of Surface Water, *Water for the World.*

Rivers and Streams

Simple methods are available for measuring the flow of water in a stream or river. The flow of smaller streams and springs can be determined by building an overflow pipe and measuring how long it takes for a bucket of known volume to fill with water.

In small streams with a slightly greater flow, the V-notch method is used. A V-shaped notch with a 90° angle is cut out of a flat piece of metal or wood and placed in the middle of a dam so water flows through the notch, as shown in the figure below. A gauging rod is placed in the stream 2 to 3m up-stream from the dam. The zero point on the rod must be level with the bottom of the notch. The depth of the water from the bottom of the notch (the zero point) to the water level can be read from the gauge. Table 1 gives the flow per second for a given height. This information helps determine the amount of water available for an intake in a stream or river.



Source: Selecting a Source of Surface Water, *Water for the World.*

Table 1. Flow Over a 90° V-Notch	
Height of Water (mm)	Flow (liters/ second)
50	0.8
60	1.2
70	1.9
80	2.6
90	3.4
100	4.5
110	5.6
120	7.0
130	8.6
140	10.3
150	12.3

If the flow is too great to use the V-notch, another, less accurate, method can be used. Find a straight, wide stretch of a stream and measure a length along the bank. Place a stake at each end of the measured distance. Throw a floating object into the stream at the first stick and time how long it takes for the object to reach the second stick. Repeat this test three times and take the average. The flow in liters per second is calculated using the following formula:

$$850 \times \text{measured length(m)} \times \text{width of the stream(m)} \times \frac{\text{average depth(m)}}{\text{average time(min)}} = m^3/\text{minute} \times 1000 = \text{liter/minute}$$

To find out if the flow will be sufficient, determine the daily demand for water and the volume of available water.

Rain Catchments

To determine how much water will be available from a roof catchment system, multiply the length of the roof by its width to obtain the catchment area.* The width of the roof is the length of the base of the triangle it forms. If the length of the roof is 8m and the width is 6m, then the area of the roof is $48m^2$.

Next, determine the amount of annual rainfall for the region. This should be available from a local government agency, a weather station or an airport. Multiply the amount of annual rainfall by the area of the roof catchment to find the amount of water available for consumption. For example, assume that 750mm, or .75m, of rain falls on a $48m^2$ catchment area. The quantity of water available for use is .75m x $48m^2 = 36m^3$. To convert $36m^3$ to liters, multiply by 1000:

36 x 1000 = 36000 liters/year.

Not quite all the water will be collected. Some splashes to the ground and some evaporates. For planning purposes, assume that 20 percent of the water is lost. Then the amount of water actually available is:

36000 liters x .80 = 28800 liters.

To make the numbers easier to work with, divide the total quantity available either by 12 to get liters per month or by 365 to get liters per day.

Compare the total available quantity to the demand for water to determine whether family needs can be met using a roof catchment system. Each person should have 15 liters per day available, but in some cases demand for water from catchments may be less than 15 liters. If the quantity available ranges between 10 and 15 liters per person, the system is suitable.

If a cistern must be constructed to store the water collected by the catchment, see "Methods of Storing Water," and "Determining the Need for Water Storage," listed in the references of Chapter Four.

* These same calculations can be used for a ground catchment system.

Appendix C-2
Wells*

Selecting a well site properly is important to ensure that the well will tap into a reliable source of good quality ground water and that the water will not be contaminated in the future. The well site should be selected by a qualified engineer who has made a thorough field investigation. This investigation may be expensive and time-consuming, but it is one of the most important steps in developing a source of ground water. If your community wants to construct a well, request assistance from your APCD, water/sanitation Volunteers, or the appropriate national ministry to site and construct the well.

The primary objective when sinking a new well is to sink it where ground water is likely to be found. The **presence of ground water** can be indicated by:

- Surface water. A successful well can generally be sunk near a river because the river will replenish the ground water and reduce changes in the water table.
- Topography. Ground water gathers in low areas, therefore, the lowest ground is generally the best place to sink a well. An exception to this general rule is a spring on the side of a hill.
- Vegetation. Certain types of vegetation can indicate that ground water lies near the surface. The most useful indicators of ground water are perennial plants (those present year-round). The dry season is probably the best time to survey vegetation for indications of ground water.

Once ground water is located, its **quality** must be tested before permanent wells are constructed. The well site should not be subject to flooding during the wet season or any other time. If the site cannot be protected from flooding, another site should be considered.

The **quantity** of a ground water source is nearly as important as its quality. Testing the yield of a well to determine its capacity and to obtain information needed to select a permanent pump is important. Unfortunately, the only way to test the yield of an aquifer is to dig a well and pump it.

Methods of well construction must be suitable to the soil conditions at the well site. The table below shows some of the limitations of well construction methods based on soil conditions.

* Source: *Water for the World.*

Well Construction Methods and Soil Conditions

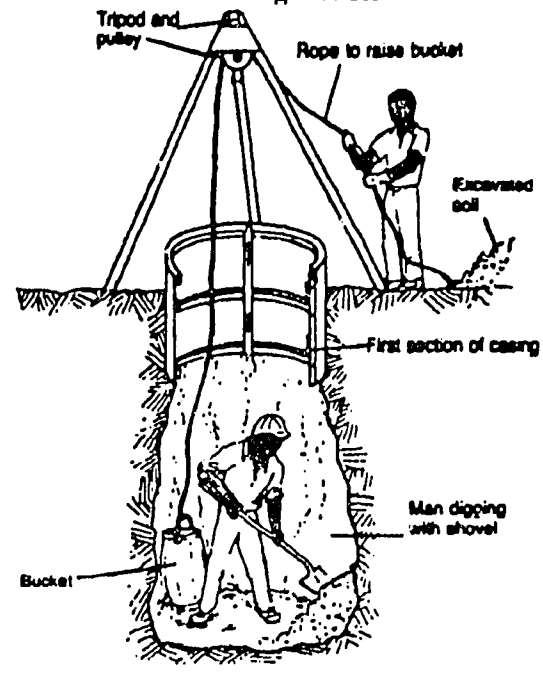
Method	Unsuitable Soil
Hand Dug	Hard rock, large boulders
Driven	Hard rock, heavy clay, boulders, coarse gravel
Jetted	Hard rock, boulders
Bored	Hard rock, boulders larger than auger
Cable Tool	None

Source: Selecting a Well Site, *Water for the World.*

Hand-dug wells are usually 1.0-1.3m in diameter and rarely more than 10m deep. They are dug with pick and shovel by one or two people working in the bottom of the shaft. Excavated soil can be lifted out with a bucket and rope as shown in the figure below. Workers should be prepared for the potential of well collapse, particularly in loosely compacted soils.

The casing or lining of a hand-dug well should be concrete. Masonry lining can be used, but it is hard to make joints watertight with masonry. The casing can be installed in two ways. The shaft may be sunk and the casing built in place, or sections of casing may be pre-formed above ground, and as soil is excavated, sections of casing may be lowered into the shaft. More sections are added on top as the shaft is deepened.

Hand Dug Well



Source: Methods of Developing Sources of Groundwater, *Water for the World.*

The intake of a hand-dug well is designed to fit the nature of the aquifer. Usually the lower sections of casing that are within the aquifer are made of porous concrete to allow ground water to seep through. If the aquifer, however, is made of fine sand, which would clog the porous concrete, the lower sections should be standard concrete and the bottom of the shaft should be left open and lined with layers of carefully selected gravel. Ground water seeps up through the gravel.

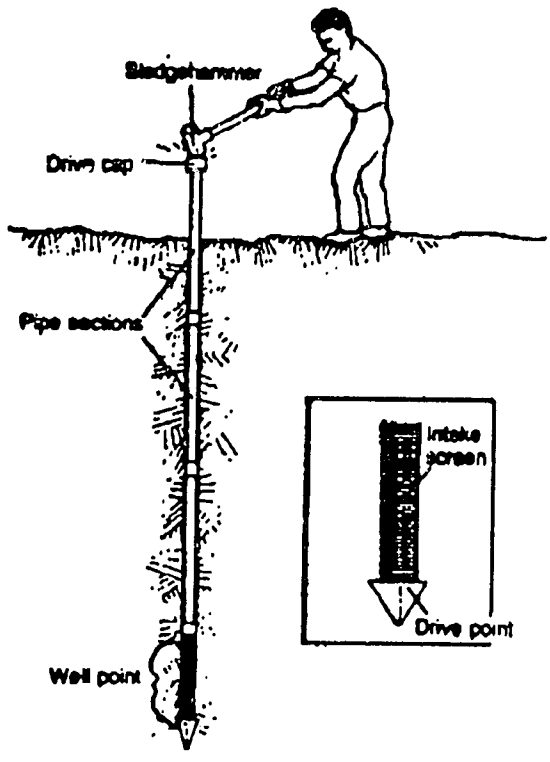
After the casing is in place, the wellhead is constructed on the mound around the top of the well. It usually has a concrete apron to drain away surface water. If the well is to be equipped with a pump, the wellhead is fitted with a concrete cover that has an opening for the pump and an

inspection port or manhole (see below, "Finishing a Well").

Because of the simple tools and materials needed, hand-dug wells are the most common type built.

Driven wells are the simplest to construct. A pointed strainer, called a well point, is connected to sections of pipe and driven into the ground until it reaches the aquifer, as shown below. The well point and pipes are 30-50mm in diameter, and the well is generally driven no more than about 8m deep. The well point serves as the intake for the well and the pipe is the casing.

Driven Well

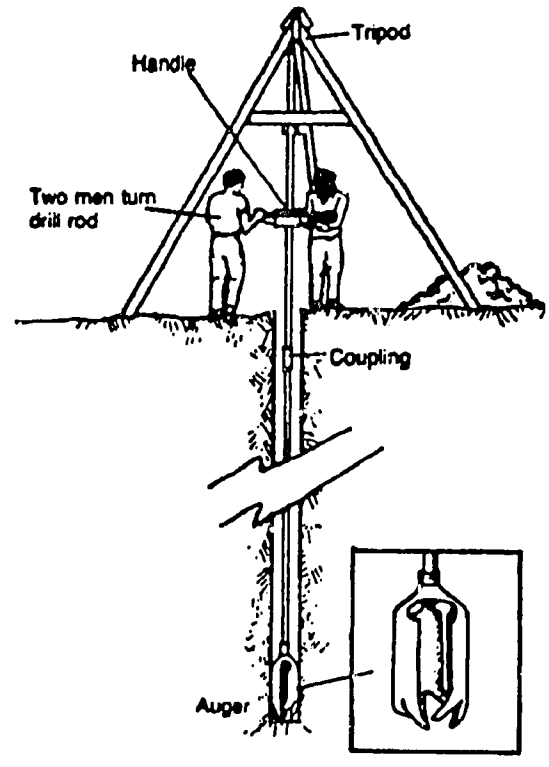


Source: Methods of Developing Sources of Groundwater, *Water for the World.*

After the well point is driven into the aquifer, earth is removed from around the pipe to a depth of at least 2.5m. Grout is tamped into the space around the pipe. When this hardens, it seals out surface contamination and holds the pipe firmly in place. A mound and concrete platform are then built and a pump is attached to the top of the pipe.

Bored wells are also called augered or tube wells. They are dug by manually rotating an earth auger that penetrates the ground and fills with soil. The full auger is pulled out of the ground and emptied. As the hole gets deeper, additional sections of drilling line are added. To facilitate operating and emptying the auger, an elevated platform or tripod is constructed over the well site.

Bored Well



Source: Methods of Developing Sources of Groundwater, *Water for the World.*

When the shaft has sufficiently penetrated the aquifer, the auger is removed and the casing and well screen are lowered into the shaft. If the soil is so soft that it frequently caves in, the casing is lowered as the shaft is dug.

To finish the well, the space between the casing and the earth shaft is filled with concrete grout to a depth of about 3m. An earthen mound and a concrete wellhead or apron are built for drainage. Then a pump is installed.

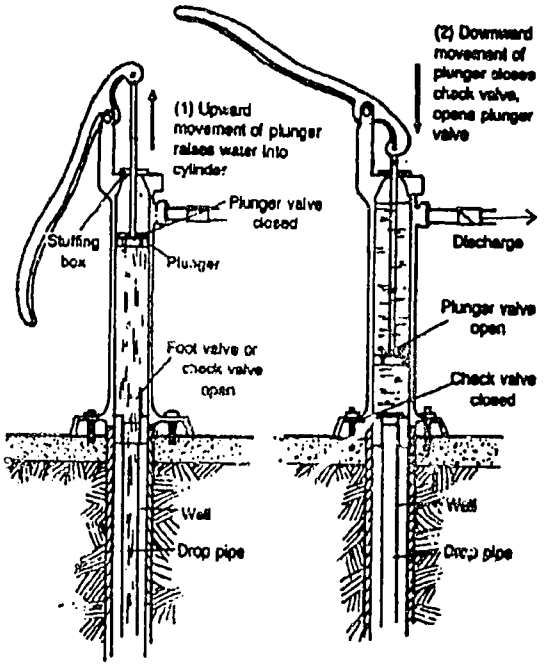
In general, bored wells are 50-200mm in diameter and no deeper than about 15m. Larger and deeper wells have been bored using a power source and specialized augering equipment.

Finishing a well

protects the water from contamination, prevents people and animals from falling into hand dug wells, and ensures maximum effficiency of drawing water. Finishing a well involves constructing a head wall, an apron, and perhaps a cover and installing a water-lifting device. (See "Protecting Wells," in Chapter Four for illustrations.)

For wells that will have a pump, the pump must be at the well site before the well can be completed. **Positive displacement hand pumps** are the pump of choice if only human energy is available. This pump consists of a cylinder containing a piston and is called a positive displacement pump because it displaces an amount of water equal to the distance the piston travels.

Positive Displacement Pump



Source: Selecting Pumps, *Water for the World.*

The cylinder may be located above or in the water. When the cylinder is above water, suction is required to lift the water to the piston. This type of pump usually requires "priming" and is less desirable than a pump with the cylinder in the water.

The cylinder can be driven by a variety of power sources including a hand pump, windmill, or motor. The amount of water that can be produced is limited by the suction lift (if the cylinder is above water level), the diameter of the piston, the length the piston travels, and the number of times the piston is moved.

When the cylinder is located in the water, a sucker rod is required. This rod connects the drive mechanism to the cylinder and is usually made of steel. Due to the weight of the steel sucker rod, a pumping depth of 60-80m for a hand pump should be considered maximum. Motor-driven, positive displacement pumps can pump from depths exceeding 300m if sufficient power is available.

Disinfecting a well is necessary to eliminate contamination that was introduced by equipment, materials, or surface drainage during construction or repairs. A chlorine compound is generally used for the disinfectant. Disinfecting a well involves calculating the required amount of chlorine compound, mixing a chlorine solution, and applying the solution to the well. (See "Disinfecting Wells," in Chapter Four's references.)

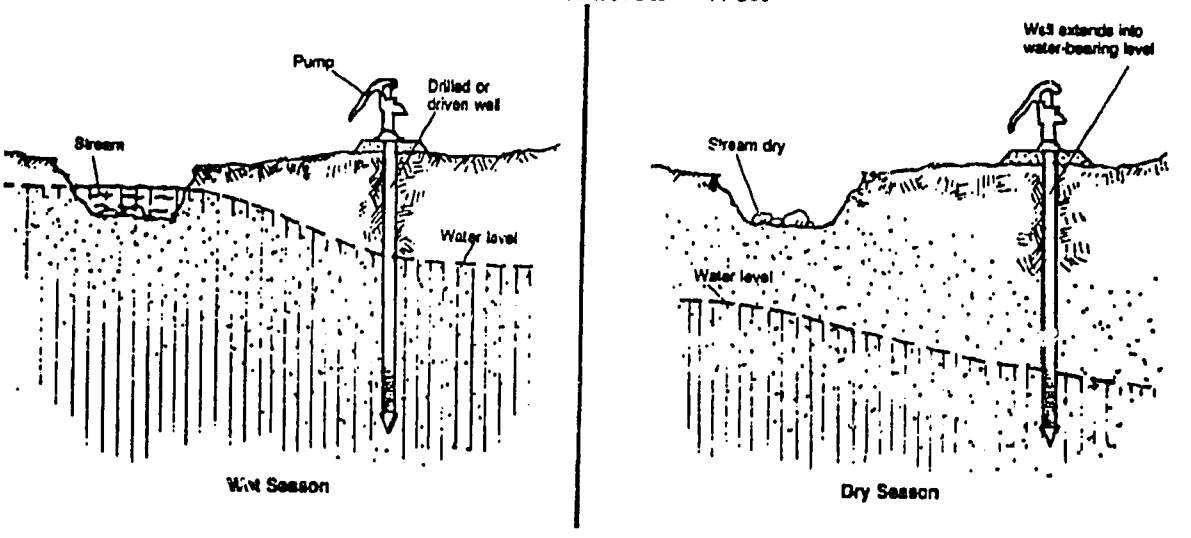
Appendix C-3 Developing Streams and Rivers

Infiltration Wells

Digging or drilling a well near the banks of a stream or river is the cheapest and simplest way to develop these sources. Generally this kind of well will provide a very good supply of water throughout the year. The well should be close enough to the river channel to collect both water flowing underground and water seeping in through the channel. If the river is likely to dry up and no other suitable source is available, be sure to dig lower than the bed of the stream and plan a well with a large storage capacity.

Water will be filtered naturally; water from the channel passes through the sand and silt in the river bank and impurities are removed. The purification process depends on the makeup of the soil in the river bank and the distance of the well from the river. If the soil is made up of large particles, the water will pass through it quickly. Soil containing finer particles of sand and silty clay slows the movement of water.

River Bank Infiltration Well



Source: Choosing Where to Place Intakes, *Water for the World.*

The slower the water moves, the less distance it must travel for purification by filtration to take place. In fine or compacted soils, the well could be placed as close to the river as 2 or 3m. In coarser soils, the well may have to be 20 or 25m from the river so that the water will flow underground long enough to be purified. In semicoarse soils, a distance of 10-15m should be sufficient. Be sure that the soil is not a highly compacted clay. Water moves very slowly through compacted clay, so well replenishment could be very slow.

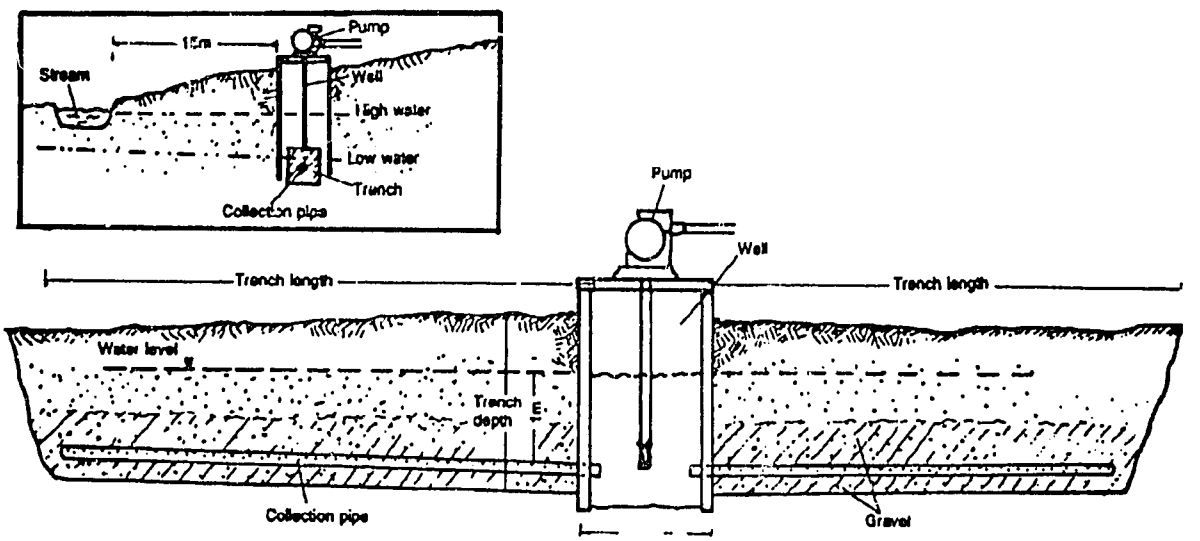
* Source: *Water for the World.*

Infiltration Galleries

The amount of water collected by an infiltration well can be increased by infiltration galleries. These can provide large quantities of water because they collect it over a large area.

The galleries are trenches dug in the bank parallel to the stream or below ground water level. (Infiltration galleries can also be constructed next to ponds.) Tile, concrete, or perforated plastic collecting pipes are placed in the gravel-lined trenches and connected to a storage well. The gravel in the trench filters out sediment and prevents clogging of the pipes. As the water moves from the stream to the trenches, bacteria are filtered from it. The water is pumped from the storage well in the same way as described for infiltration wells.

Infiltration Galleries



Source: Methods of Developing Sources of Surface Water, *Water for the World.*

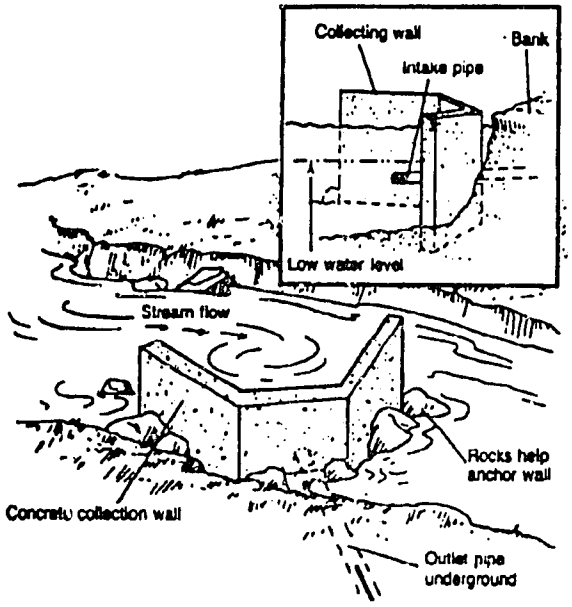
River banks with firm soil that do not contain a lot of clay are good for infiltration galleries. If the soil is sandy, the sand may clog the collection pipes and cut off the flow of water. Also, sandy soil is not firm, which makes deep excavation dangerous because of the possiblity of cave-ins.

Gravity Flow Intakes

Water from a stream in a mountainous or lightly populated area may be made accessible through a gravity flow system.

This method is suitable if there is enough difference in elevation to allow gravity to move water from an intake to a storage tank. A concrete collection box with winged sides is constructed to catch water and direct it into a screened intake. The intake should be placed on the stream bed and anchored to the bank.

Stream Bank Gravity Flow Intake



Source: Methods of Developing Sources of Surface Water, *Water for the World.*

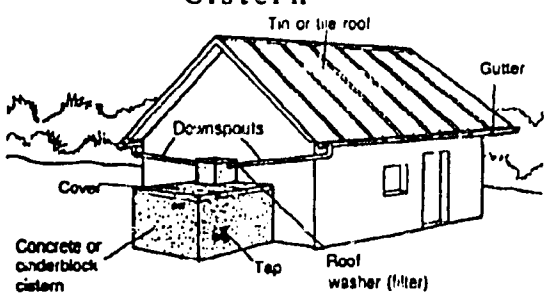
Water will pass from the intake into storage. No pumping is necessary to supply a community with water, so little maintenance is required. However, highly skilled technicians are needed to design and construct a gravity flow system. Treatment may be necessary unless the area above the collection point is uninhabited.

Infiltration wells and galleries and gravity flow intakes will require the expertise of your APCD, water/sanitation Volunteers, or the appropriate national ministry.

Appendix C-4 Rainwater Catchment*

Roof catchment systems offer a simple and fairly inexpensive method of providing water to individual homes. Roof catchments differ from other sources of surface water because responsibility for operation and maintenance rests with the individual user rather than the community. Water quality will depend on the user cleaning the pipes and gutters and disinfecting stored water. When rainfall catchments are installed, users must be thoroughly trained in techniques of operation and maintenance.

Roof Rainfall Catchment System with Concrete Cistern



Source: Evaluating Rainfall Catchments, *Water for the World.*

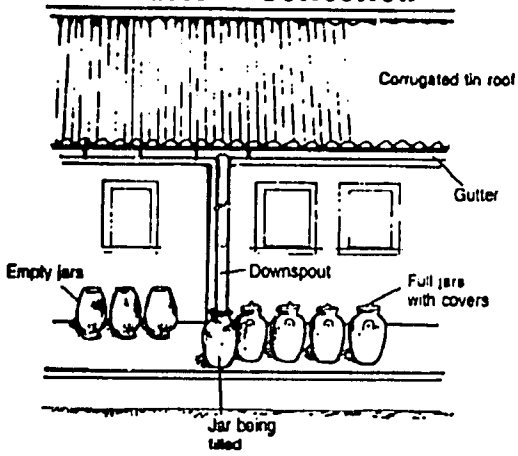
Roof catchments can only be used where roofing materials are suitable: tiles, slate, corrugated plastic, tin or aluminum sheets. Generally, sheet metal is preferable because of its light weight and strength. Tiles can be made locally, but they are heavier than sheet metal and need a strong roof structure to support them without sagging. Do not plan to develop rain catchments on thatched, painted, or lead roofs; the water running from them is likely to be very contaminated.

A roof catchment is worthwhile only if rainfall is sufficient to fill users' needs. A region's amount and monthly distribution of annual rainfall should be available from a local agricultural or other governmental agency, or from an airport. If you know the amount of annual rainfall, it will be easy to determine the amount of water available from the catchment for consumption (see Appendix C-1).

A cistern must be placed either above or below ground to collect water from the catchment. The size of the cistern will depend on (a) the amount of water needed, (b) the amount and frequency of rainfall, (c) the size of the collecting surface, and (d) cost. A cistern can be as simple as a 200-liter barrel, a tank constructed from reinforced concrete, or clay jars. If rainwater is collected for drinking and cooking only and another source used for washing and bathing, smaller, less expensive cisterns can be built. The basic design features of a household cistern are discussed in "Designing a Household Cistern," referenced in Chapter Four. Cisterns should be closed to avoid surface contaminants and may need to be disinfected periodically.

* Source: *Water for the World.*

Small Clay Jars for Rainwater Collection

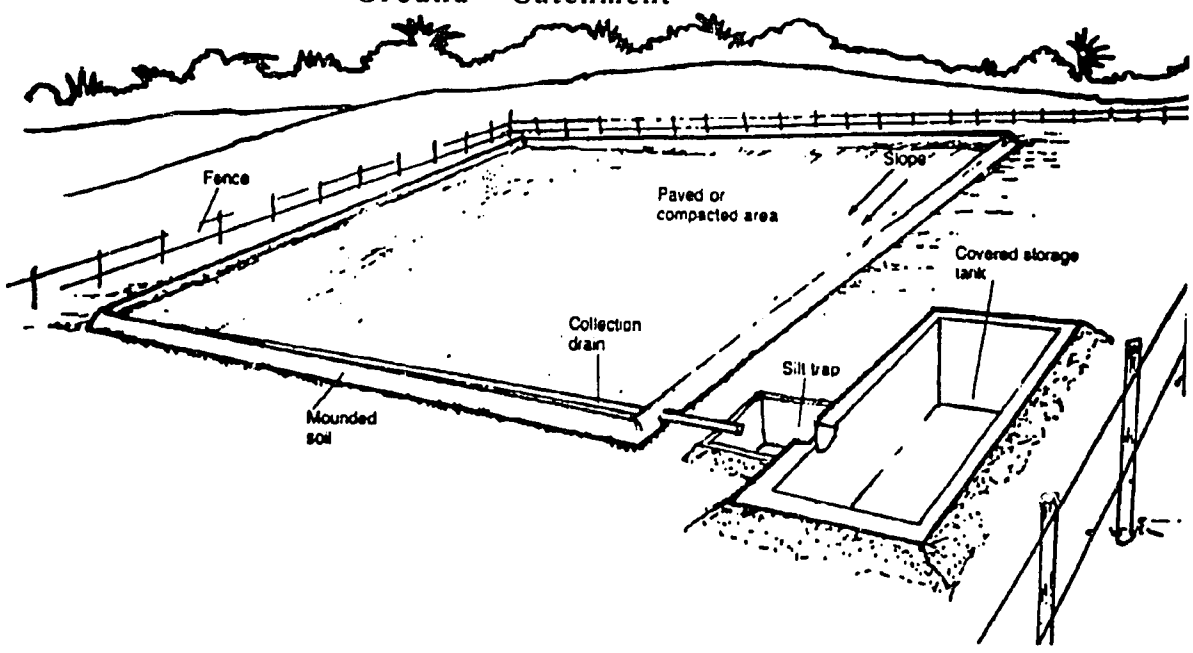


Source: Evaluating Rainfall Catchments, *Water for the World.*

Water from roof catchments needs some quality control management. First, roofs and gutters must be kept clean, and leaves and other debris must be screened from the downpipe (the pipe that carries water from the gutter into the cistern). Second, some sort of "first wash" or "foul wash" system must be devised. The first flow of water from the roof should be diverted from the cistern because its quality will be poor.

A ground catchment is an area of sloping ground measuring several hundred meters square, cleared, graded, and preferably paved to form a catchment for precipitation. Paving an area reduces water loss due to evaporation and infiltration and reduces erosion. A drain is placed at the downward end of the slope to collect the water and deliver it into a storage tank via a sedimentation basin.

Ground Catchment



Source: Methods of Developing Sources of Surface Water, *Water for the World.*

Compacted clay soils also make good catchment surfaces because the clay is relatively impervious and will need little or no treatment to seal soil pores. In areas where there is no impervious soil, various materials can be used to cover pervious ground surfaces to prevent water loss. Cement, asphalt or even polythene sheeting can be laid over the ground's surface to prevent seepage and infiltration.

The major problem with ground catchment systems is that the materials used to cover the ground surface are very expensive and may not be available in many rural areas. The need for storage in a cistern and for treatment adds to the total cost. Ground catchments also require large tracts of land and must be carefully maintained.

The amount of water that can be collected will depend on the amount of rainfall, the area of the catchment, and the runoff characteristics of the surface (see Appendix C-1 for measuring yield). Ground catchments, if prepared properly, will provide more water than roof catchments since more surface area is used for collection. If rainwater is the primary water source, ground catchments are more economical for a small community than are roof catchments.

Rainwater catchments can be constructed with some training from your APCD.

Appendix C-5
Community Involvement in Marketing of Monofilament Filters*

MARKETING STRATEGY
- GWD control is a community-felt need
- PHWS†, who are local volunteers, participate in all phases of marketing monofilament filters
- Filter marketing is integrated into a multi-strategy approach to disease control

PRODUCT
- PHWS discuss design issues determines
- PHWS identify local production resources
- Local tailors modify and produce the filter
- PHWS help monitor production quality

PRICE
- Community survey

  range of acceptable prices
- PHW association deliberates issue of fair price and sets acceptable profit limit

DISTRIBUTION
- PHWS sell filters as a normal part of their duties
- PHWS recruit other sellers such as market women
- All salespeople educate consumers on proper use

PROMOTION
- PHWS hold village demonstrations and home visits
- PHWS make announcements in churches and mosques
- PHWS urge chief to send out town criers

† Primary Health Workers

---

* Source: W.R. Brieger, J. Ramakrishna, and J.D. Adeniyi. 1986. Community involvement in social marketing: Guineaworm control. *Int. Quart. Comm. Health Ed.* 71(1):19-31.

D. Measuring the Problem Appendices

Appendix D-1
Interview Guide on Community Beliefs

This interview guide for conducting interviews about community knowledge, attitudes, and practices related to GWD may be used for individual interviews or group discussions.

1. What is the local name for GWD?

2. People's beliefs about the causes of GWD
   What is GWD and where does it come from?
   Why do some people get it, while others don't?
   Who is most susceptible and when?
   Does diet affect GWD? Does the time of year? What else affects it?

3. Recognition
   What are the early signs of GWD? What is the sequence of signs?
   How do you know that you actually have GWD?
   How do you tell GWD from other diseases?
   How do you know when it is time to get help/treatment?

4. Treatment
   What are the traditional remedies for GWD?
   How well do these remedies work?
   How do most people in this village treat GWD?
   Do you believe that GWD can be cured?
   Do you think modern medicine can cure GWD?

5. Prevention
   Do you think GWD is preventable?
   What has the health worker told you?
   Have you seen any successful preventive measures?
   What preventive measures do you prefer and why?

Awareness of a problem is one of the first conditions for solving the problem; awareness that a problem can actually be solved is second. If people believe that GWD can be prevented, they may be motivated to take action to eliminate it.

6. Seriousness
   Is GWD a problem in this village? Is it a serious problem?
   Is it more or less serious than other common diseases?
   How much GWD is in the village?
   How does it affect the village, families, individuals?

The answers to these questions will indicate how important GWD elimination is to a community. Information on how GWD effects the lifestyle and productivity of the community may be used to mobilize people to action.

Additional social and cultural issues that can affect GWD control activities and might be discussed with an interview guide include

- past development project "histories" involving community participation projects and self-help projects;
- the attitude of community members to health education, preferences for water supplies, and beliefs and taboos on sanitation, drinking water, and water sources;
- community perceptions of benefits of improved water supply systems;
- community members' willingness to pay or contribute in kind for improvements.

Source: *Helping Communities to Eradicate Guinea Worm: A Training Guide*, WASH Field Report No. 322. [Draft.]

Appendix D-2
Formal Interview on Water Source Use

An interview on water use can yield a great deal of information on community water sources, needs, and use patterns. This interview might be conducted by members of a community women's group. The information could be used in conjuction with the national case search.

- Where do you get drinking water for your household?
- Can you get your water there all year long or only during the rainy season?
- If only during the rainy season, where do you get drinking water during the dry season?
- Do you get water for all your household needs from this source? If not, where do you get water for other purposes? (List source and use for water.)
- How much water do you get for drinking and cooking for your household each day?
- How much water does your household use each day for other uses?
- Who carries this water to the house?
- If water is purchased, from whom and at what price?
- How far away from the house is each source of water? (List water source, distance, and how long it takes to go and return.)
- Are these good sources of water? (List source, good or bad, and why.)
- Do you have any problems obtaining water from these sources? If yes, what are the problems? (List source, problem.)
- Do you believe the water you drink is healthy for you and your family? (Yes ___ No ___ Don't know ___Why?_____)

From these interviews you can identify

- the community's water sources;
- the reliability of these sources;
- the water demand (drinking vs. total);
- the target population of water collectors;
- the preferences and attitudes toward current water sources; and
- current problems with (and hence motivations for improving) water sources.

Appendix D-3
Water Contact Observational Study

Part A: Characteristics of water source
Location of water source:_____
Dimensions of source:_____
Number of points to enter:_____
Evidence of source protection:_____
Plant and animal life:_____
Observed water quality:_____
[*make enough forms for each source observed*]

Part B: Contact with water source
[mark parts of body of figures below that contact water]

PERSON

```
[1]      [2]      [3]      [4]      [5]
 o        o        o        o        o
ooo      ooo      ooo      ooo      ooo
o o o    o o o    o o o    o o o    o o o
 o        o        o        o        o
o  o     o  o     o  o     o  o     o  o
o    o   o    o   o    o   o    o   o    o
```

TIME IN	_____	_____	_____	_____	_____
TIME OUT	_____	_____	_____	_____	_____
TOTAL(DURATION)	_____	_____	_____	_____	_____
ACTIVITY	_____	_____	_____	_____	_____
SEX	_____	_____	_____	_____	_____
AGE	_____	_____	_____	_____	_____
GUINEA WORM	_____	_____	_____	_____	_____

[*make the number of forms needed to observe and record every visitor to the water source in the specified period of time*]

The data can be summarized to give

- total number of people, by age (approximate) and sex, coming to the water source during the period observed;
- percentage of people who come to source with GWD;
- number and percent engaging in certain activities: washing clothes, bathing, fetching water, fishing, recreation/playing;
- parts of body that come in contact with water: % people who wade in up to their ankles, % up to knees, % who get arms wet, % who immerse whole body.

Appendix D-4
Village/Town Monthly Summary Form

(1) Month_____ 19_____

(2) Number of households searched for GWD this month _____
(3) Number of households that filter their drinking water _____
(4) Number of new cases of GWD this month _____

Name of Persons with Newly Emerging Guinea worm(s) this month (A)	Age (B)	Sex M/F (C)	Type of Drinking Water Source Used by Household (See List Below) (D)

1. Unprotected well or pond
2. River/stream/canal/spring
3. Protected well or borehole
4. Rainwater catchment
5. Piped water
6. Other (specify above)

Source: *Village/Town Summary Book of Community Guinea Worm Surveillance Volunteer*, Ghana Ministry of Health/Global 2000/Bank of Credit and Commerce International.

Appendix D-5
Clinic Data Summary Forms

Form A: GWD Patient List

Month _____

Clinic _____

Date of first visit	Sex	Age	Place of Residence

This form is used to record basic information usually contained in clinic records. It will provide a list of patients by age, sex, and location within a village who have been identified as having GWD. Patients should be recorded only once, using the date of the first visit during the period of record reviews.

Source: *Helping Communities to Eradicate Guinea Worm: A Training Guide*, WASH Field Report No. 322. [Draft.]

Form B: Total Clinic Attendance Summary

Age	Male Total	Female Total	Not known
< 5 years			
School Age			
Adult			
Not Known			
Total			

Form B can be used to summarize *all* patients attending the clinic during the period of record review. It can also be made out separately for each ward in larger villages.

The term "adult" must be consistent with eradication program definitions, e.g. everyone older than 15. Those between the ages of 5 and 15 years would be classified as "school-age."

Form C: GWD Patient Summary

Draw a form just like Form B, but fill in the spaces with data on only GWD patients who are listed in Form A. Note that the forms can be modified to compare age versus address (ward) or sex versus ward. One may also calculate the proportion of patients with GWD by age, sex, or ward by dividing cell numbers in Form C by cell numbers in Form B. For example:

7 = # of adult males with GWD who attended clinic during period being reviewed (from form C);

19 = # of adult males who attended clinic for any reason during this period (from form B);

$\frac{7}{19} = 0.368.$ The statement may be made that 36.8 percent of adult males attending clinic during the specified period sought medical care for GWD.

Appendix D-6
Case Search Form

Instructions: Complete Part A for all villages. Complete Parts B and C for villages with cases now or in past year.

Date_____

PART A

1. Region_____
2. District_____
3. Village_____
4. Source of village information (Name)_____

5a. Number of drinking water sources during transmission season_____

5b. Check sources of drinking water used in transmission season
Pond [ ] Dam [ ] Lake [ ] Stream [ ] Pool [ ] Spring [ ]
Bore Hole [ ] (pump) Well [ ] (hand dug) Other_____ (Describe)

5c. What is the estimated village population?____ Unknown [ ]
The above estimate is based on Census [ ] Year _____
Tax Role [ ] Year _____
Other Estimate (Specify)_____

5d. Ask: Is there GWD in this village or has there been GWD in this village during the past year?
Yes [ ] No [ ]
If **no**, go to next village.
If **yes**, get an estimate of the total number of cases, or do a house-to-house survey and complete PARTS B and C.

PART B

6. Household number_____
7. Head of household (name)_____
8. Length of residence in village_____
9. Do you migrate out of this village seasonally? Yes [ ] No [ ]
10. What is/are your source(s) of drinking water?_____
11. Do you filter your drinking water?
Always [ ] Sometimes [ ] Never [ ]

Source: *Guinea Worm/Dracunculiasis Eradication Program: Training Course for Guinea Worm Coordinators*, CDC.

Appendix D-7
Village Summary Form

Region _____ Village population _____
District _____ Name of village chief _____
Village name/ no. _____ Date _____
Surveyor's name _____

Total number of cases* for this village_____ Check if none____
Source of information
__ Interview (interviewee: _____)
__ HH survey __ Other (specify: _____)
Time frame for number of cases reported above _____
(Specify the one-year period during which current and past cases have occurred.)

Drinking water source(s) for this village (check all sources used)
Pond _____ River _____ Tube well with hand pump _____
Dam _____ Pipes _____ Lake _____ Rain catchment _____
Stream _____ Well (hand dug) _____
Other (specify) _____

Please provide the following information, if known.

Interventions used in this village in last year:
None _____ Health Education _____
Filtering (cloth used by more than half of village) _____
Application of temephos (Abate) _____
Provision of safe water supply _____
Other (specify) _____

*Case Definition: a) Any person who now has an emerging GWD, or b) any person who reports having had an emerging Guinea worm during the past year.

Source: *Guinea Worm/Dracunculiasis Eradication Program: Training Course for Guinea Worm Coordinators*, CDC.

Appendix D-8 Suggestions for Selecting Meaningful Samples

Surveys may be complete (100 percent of persons covered) or based on samples drawn from the population. Complete surveys are usually done only in small communities with less than 200 households (HH), unless resources permit complete surveying of larger communities.

In addition to assuring statistical confidence in survey results, complete surveys can have social and political advantages because absolutely no HH is left out. If only a sample of a small community is taken, those not interviewed may think they were not chosen for some reason, e.g. their disease problems are not important to the project. Bad feelings can result that will follow the project to its end.

In larger communities and urban areas, where 100 percent coverage is impractical, choosing which and how many HH to survey can be a complicated procedure. But it doesn't have to be.

First we'll discuss first the issue of *which* HHs to survey. The most important thing to remember is that your sample *must* be representative of the larger population you are assessing. A sample chosen in a haphazard fashion, or because it is convenient, is unlikely to be a representative one.

The type of sample considered to be most representative is the **random sample**. By definition, it means that each HH has an equal chance of being selected. The first step is to define the universe from which the sample will be drawn. The community map or registry described in Chapter Five is the perfect tool for this job. A map or registry will indicate how many HHs are in the community to be surveyed and where the interviewer(s) can find them.

Selection of the sample requires that every single HH in the community be assigned a number from 1 to X. Assume that there are 561 HHs in your community — too many for 100 percent coverage. From the random numbers table at the end of this appendix, select a starting point by dropping the point of a pencil somewhere on the table. After deciding where to start, begin with the first three digits (three because 561 contains three digits). If one of your 561 HHs has been assigned a number that corresponds to those first three digits, this HH becomes the first in your sample. If the next three digits are 892, this number is outside your universe and should be passed over to the next set of three, and so on. Continue reading in sequence (do not vary this sequence) until the total number of HHs you intend to include in the sample have been selected. We'll talk about how many is enough later on.

If there is absolutely no way to map HHs in the community, a reasonably random sample can be obtained without assigning numbers to each HH. You will still need some sort of list of

HHs (or families) from which to designate every nth one for inclusion in the sample. It may be every third, fifth, tenth, twentieth, depending on what percentage of the population you plan to sample.

For example, if a community is believed to have 1,000 HHs, the decision to interview 10 percent of them should result in 100 interviews, taking every tenth HH. This is called **systematic sampling** and is considered essentially equivalent to random sampling, provided that the list from which selections are made is not arranged according to some system or cyclical pattern.

Communities often vary by ethnic group, social class, caste, and wealth, so you may want to draw the sample in a way that ensures adequate representation of minority groups. This is called **stratified random sampling** and is done by subdividing the groups and sampling each one separately, as described above. The smaller the group being sampled, the larger the proportion of HHs sampled must be to provide representation for that group. For example, a sampling ratio of 1 to 6 may be adequate for a large group, whereas a ratio of 1 to 3 may be needed for a smaller group. (The sampling ratio is the number of units in a sample divided by the number of units in the sampling frame or universe.)

Cluster sampling is likely to be used at the national level of the eradication program. In this case, a simple random sample of groups or clusters of villages or apartment buildings, or classes of schoolchildren rather than individuals of HHs, is selected from a sampling frame of clusters.

And now some practical rather than statistical advice about the **size of a sample**: if a sample is too small it may be impossible to make reasonably confident generalizations about the study population. Take the example of a survey to demonstrate the association between water filtration and freedom from GWD. Calculating a sample size that will assure the validity of survey results requires pieces of information that you may not have, e.g. rates of disease incidence in the population, the magnitude of the difference you want to be able to detect among filtration users and non-users, and how much power the statistical test to demonstrate a difference should have to be convincing. If the results of your survey must be stated with statistical confidence, the skill of someone with statistical training will be required during the design of the survey and analysis of results.

If someone with these skills is not available, remember that "samples that are too small can prove nothing; samples that are too large can prove anything." The larger the sample, the less the likelihood that the sample will produce misleading results about the survey topic. As a very rough guide, remember the usefulness of a sample is proportional not to its absolute size but to the square root of its size. To double the usefulness of a sample, you must increase its size fourfold. Above a sample size of about 200, the absolute size of the sample must be augmented considerably to

make an appreciable difference to its usefulness. This means that it may be necessary to balance increased cost (largely determined by the size of the sample) against increased usefulness (largely determined by the square root of its size).

REFERENCES

Simpson-Hebert, M. 1983. *Methods for Gathering Socio-cultural Data for Water Supply and Sanitation Projects*. TAG Technical Note No. 1. United Nations Development Programme. Interregional Project INT/81/047. World Bank.

Abramson, J.H. 1984. *Survey Methods in Community Medicine. An Introduction to Epidemiological and Evaluative Studies.* Churchill Livingstone. Third Edition.

20,000 Random Digits

08939	53632	41345	65379	20165	32576	13967	90616	17995	92422
92578	23668	08801	39792	59541	99117	58830	60923	36068	68101
83994	91054	90377	22776	23263	34593	98191	77811	83144	98563
43080	71414	40760	01831	44145	48387	93018	22618	98547	87716
39372	46789	26381	37186	85684	79426	05395	17538	56671	82181
83046	58644	04452	98912	53406	30224	00687	32099	86414	29590
99808	32539	96961	88917	60847	64826	41332	64557	15354	11111
28478	70870	68912	75644	33648	21097	23745	52593	01849	37760
09916	19631	28659	95093	12626	19919	05879	56003	83100	94572
19537	66067	20569	28808	87722	67059	12851	73573	25776	92500
23013	05574	26320	07754	09642	88068	41626	57139	68199	94938
55838	80585	80967	60540	34528	62310	63106	17843	39104	74036
92279	87344	93556	75233	09394	79265	91047	32891	77925	71530
27850	23332	89336	26026	52130	78544	02090	05645	15060	39550
01760	54605	11794	79312	69728	04554	99775	57659	47981	68954
81889	70751	87501	88247	41966	57574	67745	88304	20118	25964
74722	14654	15425	60665	25162	04987	03467	75915	24282	62456
56196	75068	44643	92240	51651	79743	13598	63901	61020	91003
96842	62021	00543	45073	65545	87612	35765	26079	34589	72821
25619	98328	59393	71401	93871	20611	78830	87477	15390	05044
91746	05084	04781	82933	54564	80986	94843	40178	87483	63288
92384	84706	76778	98313	98875	08427	60687	88272	83448	06237
86390	62208	95735	14535	25591	22730	06059	31786	36181	31016
60458	83606	57510	92609	38061	94881	26736	06489	98303	31419
03783	39922	05489	73630	92379	91602	18193	84741	44704	05556
31011	36035	37113	98362	56149	51634	04468	62096	32361	35301
20555	05621	48728	41776	12101	96615	70781	55151	93876	66892
56466	36766	12400	43510	49456	05140	85736	68155	37306	10438
26875	67304	61950	65962	38223	35676	70043	99178	64677	95457
90648	84770	92791	93814	27760	22232	83545	01183	55188	20482
26197	72840	01264	52019	00739	36259	10905	39097	36437	66743
72522	34445	53975	13840	97262	59007	78685	41044	38103	59216
12370	41270	36290	46307	51230	90614	82613	80148	37371	02895
81028	60112	31415	47478	02131	85480	93699	92876	13958	47867
61573	38634	77650	18189	10283	97999	95442	90657	84963	93863
98511	46300	91199	30492	62159	98525	31710	03540	35844	83200
76606	10834	75548	55779	54744	26450	66001	57949	53685	00567
20237	16311	15733	47599	43998	35594	17577	85113	52487	48900
21022	86025	26951	87480	82317	06580	98627	32536	07573	52612
47512	11564	41777	46581	03492	01722	78900	57901	37307	02727
80598	59041	28861	41793	91007	69907	00376	73086	35132	53014
01892	34226	88327	21926	36607	22307	04376	25491	13563	51955
89657	70349	15176	57916	10911	44218	67108	04678	24097	02476
97983	65616	11841	80504	76452	34176	16986	94328	13091	29592
59727	92033	14654	59622	25844	18460	78162	02832	13528	55683
12340	72894	26303	01771	73895	27432	99536	50328	06141	33886
48049	33318	67463	04914	22316	89663	37132	15825	60759	22131
85953	16537	25639	05004	99269	50577	10036	05022	39800	93605
03426	78111	37828	23967	03350	04397	96227	37787	60680	23993
97837	71085	45973	36073	02680	91425	24425	23725	22521	21601

Source: Fleiss, J.L. 1981. *Statistical Methods for Rates and Proportions*. 2nd Edition. Wiley Interscience.

PART C

Give the following information for all members of the household.

Important Notes:

1. "Current Cases of Guinea Worm" means the actual cases where the Guinea worm is seen by the surveyor.
2. "History of Guinea Worm," refers *only* to the occurrence of Guinea worms during the 12 months prior to the current survey.

HH No.	Family name	Current Cases of GWD		Age (Yrs)	Sex		HISTORY OF GUINEA WORM DISESASE														
							In past 12 months		Month worm seen												Total # worms emerged
		No	Yes		M	F	No	Yes	J	F	M	A	M	J	J	A	S	O	N	D	

12. Total no. of family members_____
13. Name of surveyor_____
14. Title of organization _____
15. Date of survey _____

E. Planning and Evaluation Appendices

Appendix E-1
Sample Budget Format

ITEM COST	AMOUNT	COST PER ITEM	TOTAL
I. Material			
Cement	20 bags	$20.00	$400.00
Gravel	1/2 tipper	donated	-----
Sand	1/2 tipper	100.00	100.00
Poster paper	20 sheets	1.00	20.00
II. Equipment			
Hand pump	1	1200.00	1200.00
Ring frame	1	borrowed	-----
III. Manpower			
Skilled geologist to site well	1 x one day	50.00 per day	50.00
Unskilled well diggers	4 x four days	10.00 per day	160.00
IV. Transportation			
Site visits by health staff	50 round trip visits	covered by ministry	-----
		TOTAL	

Source: *Workshop on Guinea Worm Control at the Community Level: A Training Guide*, WASH Technical Report No. 50.

Index

Abate
  see chemical treatment
addresses 140, 151
agriculture
  GWD effects on 22
APCD 8, 65, 98, 108, 121
aquifers 72, 74
  permeability 74
  porosity 74
  yield 74, 177
behavior 131
  health education 29, 33, 35
  influences on 34, 35, 145
    enabling factors 35, 145
    predisposing factors 35, 145
    reinforcing factors 35, 145
    resistance to change 35, 146
  target 35
beliefs about GWD
  see community, beliefs
blister 12, 13
boiling water 83
case definition 15, 111
  current case 15
case treatment 17, 162
  traditional 18
  western 19
chalkboard 149
chemical treatment 81
  donations 83
children
  community activists 59, 171
  GWD effects on 23
  health education 58, 143
  school attendance 113, 120
cistern 176, 185
committees
  see community organizations
community
  assessment 85, 96
    data gathering 105
  beliefs 16, 27, 84
    interview guide 190
  map 101
  participation 7, 27, 69, 97, 99
    health education 154
    planning 123
  priorities 101, 124, 190
  registry 101
  resources 104
  social structure 99
    leaders 99
    organizations 99
      planning 125
  water resources 85, 102
copepods 10, 28, 45, 74, 77, 82, 103, 157
  demonstration 48
data gathering 111
  community assessment 105, 155
  community participation 155
  information validity 120
  interviews
    see interviews
  observation
    see observation
  record review
    see record review
  selecting samples 200
  surveillance
    see surveillance
data summarization 116
demographics 114
demonstration
  see health education, methods
diagnosis of GWD 15
Dracunculiasis 1
Dracunculus medinensis 1, 157
easel 147
economic effects of GWD 22
enabling factors 35, 145
evaluation
  health education 32, 49, 144
  project planning 136
filtering water 77
  health education 34, 45, 143, 161
filters
  cloth 78, 79
    demonstration 46, 143
    donation 78
    health education 45, 50
    marketing 79, 188
    use 35
      data summary 118
  sand
    community slow sand 70
    household filters 80

financial resources 89, 104, 132
see also community, resources
flannelgrams
see flexi-flans
flexi-flans 148, 154
flipchart 165
focus groups 106
games 149
geographic distribution of GWD
see GWD, distribution
goals
see project planning
gravity flow intakes 76, 183
ground water 74, 177
Guinea worm
life cycle 10, 156
GWD
age of victims 22
diagnosis 15
disability 22, 24
distribution 1
see also map
impact 22
agriculture 22
children 23
family 22
women 22
number of reported cases 1
prevention 3
health education 26, 131
water resources 27, 64, 130, 159
seasonality 12
symptoms 13, 14, 162
transmission 3, 33, 157
posters 165
GWEP, PC 6
see also National GWEP
health education
adults 37
community 27, 69, 154
definition 29
evaluation 49, 144
games 149
media 54, 147
flexi-flans 148, 155
local 56
mass 54
posters 38, 56, 147, 154, 165
songs 57
town criers 58
messages 18, 29, 37
methods 37, 39
demonstration 45
drama 44
group discussion 49
stories 39, 154, 157, 160, 163
objectives 42, 46, 143
participatory approach 37, 154
planning 32, 143
pretesting 38, 147
puppets 150
school 58
curriculum 59
sample lesson plans 59, 156
strategies 35, 131
target audience 33, 37, 38
target behaviors 33
teaching tools 147
traditional approach 37
health educator 30
counselor 31
facilitator 31, 51, 52, 60
linker 31
trainer 32
household case search 113
see also national case search; surveillance
impact of GWD
see GWD, impact
infiltration galleries 70, 76,183
infiltration wells 76, 182
intakes
see wells
international agencies 4, 6, 78, 83, 100, 133, 140
interviews
focus group 106
formal 106, 114, 192
informal 105
conversational 105
interview guide 106, 190
map
GWD distribution 2
GWD transmission season 13
of community 101, 155
media
see health education, media
Ministry of Health
see National Ministry
monitoring
project planning 135
surveillance 120

monofilament cloth filters 78
national case search 8, 113, 192
forms 197
National GWEP 8, 17, 77, 78, 98, 108, 116, 121, 133
National Ministry 4, 55, 57, 65, 98, 100, 109, 121, 133
National Plan of Action 4, 7, 83
observation 98, 106, 119
water use 107
forms 193
ponds
infiltration galleries 70, 183
protection 69
slow sand filter 70
posters
see health education, media
potable water 74
predisposing factors 35, 145
pretesting 38, 115, 147
prevention
see GWD, prevention
project planning 100, 123
action plan 134
community participation 123, 155
local planning group 125, 138
evaluation 136
goals 127
capacity 128
production 128
health education 131
monitoring 135
objectives 128
capacity 128
production 128
problem statement 126
project milestones 129
project name 126
project purpose 127
report 138
resources 89, 104, 132
see also financial resources
responsibility roster 134
strategies 130
task analysis 130
health education 34
time line 135
water resources 84, 90
pumps 180
puppets 150
rainwater 73
collection 76
cistern 176, 185
ground catchment 186
quantity 176
roof catchment 185
treatment 186
record review 109, 112, 120
forms 195
registry 101
reinforcing factors 35, 145
reporting
project plan 138
surveillance 121
rivers
see streams
sand filters
see filters
sanitary survey 74
season of transmission
see GWD, seasonality
seeps
development 73
social effects of GWD 22
springs 70
measuring yield 174
retaining walls 72
spring boxes 70
story
see also health education, methods
Babu Wants to Prevent Guinea Worm 42
Guinea Worm Identification and Treatment 163
Prevention of Guinea Worm 160
The Life Cycle and Transmission of Guinea Worm 157
strategies 130
comparison 86
health education 35, 131
technological 86, 130
streams 73, 76
development 182
measuring yield 175
surface water 73, 177
surveillance 108
active 111, 113
case definition 111
data summarization 116
forms
case search 197
clinic data summary 195

village summary 194, 199
information validity 120
interviews
see interviews
monitoring 120
national case search 113
planning search 116
observation
see observation
passive 111
PCV role 109
phases of program 109, 120
record review
see record review
reporting 121
selecting samples 200
special case detection 120
student involvement 171
teacher's role 61, 113
symptoms
see GWD, symptoms
task analysis 130, 134
target audience
see health education, target audience
teachers 58, 61, 113, 120
temephos
see chemical treatment
traditional beliefs
see community beliefs
treatment
see case treatment
water resources
accessibility 86
assessment 85, 102
community education 69
comparison GWD control technologies 86
development 73
ponds 183
rainwater catchment 76, 176, 185
rivers and streams 76, 182
seeps 73
springs 70
gravity flow 183
ground water 74, 177
improvements, benefits of 64
planning 84, 90
potable 74
protection 65, 66
ponds and lakes 69
rivers and streams 73
springs 70
wells 67
quality 74, 85, 177
quantity 85, 174, 175, 177
sanitary survey 74
surface water 73, 177
treatment 77, 90, 182
boiling 83
chemical control 81
filtering 77, 80
see also filtering water, filters
use
interview 192
observation 106, 193
wells 74
augered 179
bored 179
casing 75, 178
construction 177
cover 68, 180
disinfecting 181
driven 179
finishing 180
hand-dug 178
head wall 68, 180
infiltration 76, 182
intake 75, 178
pumps 180
rehabilitation 67
selecting site 177
shaft 75
sloped apron 68, 178
tube 179
water-lifting device 76, 180
wellhead 75, 178
women
community participation 155
GWD effects on 22
health education 50