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DRACUNCULIASIS IN BURKINA FASO

PREPARED FOR THE MINISTRY OF HEALTH
GOVERNMENT OF BURKINA FASO

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by

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This is the final report of a consultant epidemiologist from the Centers for Disease Control, who visited Burkina Faso from February 9- March 7, 1987, at the request of the Ministry of Health (MOH) and USAID/Ouagadougou. This technical assistance was sponsored by the Vector Biology & Control Project under contract to the A.I.D. Office of Health, Bureau for Science and Technology. The purpose of the mission was to review a proposal for a National Plan of Action (POA) for control and elimination of GWD in Burkina. The consultant's scope of work is found in Annex 1.

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ABBREVIATIONS USED IN THIS REPORT

ACDI.....Agence Canadianne Developpement International
BID.....Banque Islamique Developpement
BOAD(-FEER).....Banque Ouest Afrique Developpement (Fonds de l'eau et de l'Equippement Rural)
BOSTID.....Board on Science and Technology for International Development (National Research Council)
CARE.....Corporative for American Relief Everywhere
CCE.....Caisse Centrale de Cooperation Economique
CDC.....Centers for Disease Control
CDR.....Committee for the Defence of the Revolution
CE.....Points d'eau Consel Entente
CEAO.....Communante Economique de l'Afrique Occidentale
CESAO.....Centre des Etude Sociale de l'Afrique
CHW.....Community Health Worker
CNR.....National Revolutionary Council
CSPS.....Centre de Sante' et de Promotion Sociale
DCFS.....Direction Central de Formation Sante (National Center for Health Structure-MOH)
DEP.....Direction des Etudes et Planification (National Center for Study and Plan-MOH)
DESA.....Direction d'Education Sanitaire et Assainissement (National Center for Health Education and Sanitation-MOH)
DES.....Direction De Epidemiologie et Statistiques (National Center for Epidemiology and Statistics-MOH)
EC.....50% Emulsifiable Concentrate - Abate
FAO.....Food and Agriculture Organization
FED.....Fonds European Developpement
FS.....Fonds Saudian
GNP.....Gross National Product
GOBF.....Government of Burkina Faso
GTZ.....Gesellschaft fur Technische Zusammenarbeit, West Germany (Office of Technical Cooperation)
GW.....Guinea Worm (Dracunculus medinensis)
GWD.....Guinea Worm Disease (Dracunculiasis)
IHW.....Itinerant Health Worker
IWSSD.....International Water Supply and Sanitation Decade
KAP.....Knowledge, Attitude, and Practice Survey
MOH.....Ministry of Health
MOW.....Ministry of Water
National Plan...Government of Burkina Faso. Premier Plan Quinquennal de Developpement Populaire 1986-90
NGO.....Non-government Organization
OCCGE.....Organization de Coordination et Cooperation de Luttes contre Grandes Endemies
OUA.....Organization Unite' African
PAYS BAS.....Netherlands Donor Organization
POA.....Plan of Action
PSP.....Poste Sante' Primaire (Primary Health Posts)
SG.....1 or 2% Sand Granule Preparation - Abate
SHPC.....Strengthening Health Planning Capacity Project/USAID
TBA.....Traditional Birth Attendant
UNICEF.....United Nations International Children's Emergency Fund
USAID.....United States Agency for International Development
VHW.....Village Health Worker
WHO.....World Health Organization

1. EXECUTIVE SUMMARY

1.1 Human dracunculiasis (guinea worm disease, Ver du Guinee') is a parasitic disease acquired solely by drinking grossly contaminated water. This infection is highly endemic in Burkina Faso. It is reported from 27 of the 30 provinces; in actuality, the entire country is probably affected. Cases reports received through the passive surveillance system markedly underestimate the true incidence, and represent only 1-2% of cases. The consultant estimates the national annual incidence to be between 75-115,000 cases; this figure represents 2-3% of the country's adult population. The cost of the disease to the country, in terms of loses in agricultural production and medical expenses, is about 1 billion CFA per year (4 million US dollars).

1.2 The elimination of dracunculiasis is an important health goal of the government of Burkina Faso (GOBF). In May, 1986, GOBF officials sponsored World Health Assembly Resolution 39.21, which calls for the global elimination of dracunculiasis in association with the rural activities of the International Drinking Water Supply and Sanitation Decade (IDWSSD). The 5 year plan of the GOBF (1986-1990) offers the "Lutte contre la Dracunculose" as a line item goal (Government of Burkina Faso. Premier Plan Quinquennal de Developpement Populaire, Vol. II, pp 326), albeit one which must be funded through external (donor) sources. Although in 1984 a project for a national program for eliminating dracunculiasis in Burkina Faso was proposed, it has yet to be funded.

A major goal of this consultancy was to discuss the proposed elimination program with government officials and national experts and to provide suggestions to aid in its establishment and implementation.

1.3 The proposed national elimination program was prepared in Bobo-Dioulasso by Drs. AA Yada, RT Guiguemde, and BS Coulibaly for consideration by the GOBF Ministry of Health (MOH) (Section 7 and Annex 2). The central strategy of the two-year elimination program (Program B), which is to be implemented through the primary health care system, is one of health education and personal prophylaxis (through providing inexpensive water filters to villagers in affected areas). In addition, the plan calls for intersectoral cooperation from rural water projects in supplying sources of clean water to affected villages. The core strategy is generally well thought out and thorough. The cost of this program is estimated at 1.3 million US dollars.

In addition to the core strategy, another, more expensive, program (Program A) is proposed, which includes 1) chemical suppression of intermediate host populations in certain areas, and 2) use of audiovisual equipment by mobile teams, which would visit affected villages as part of the health education/personal prophylaxis program. The budget for this proposed program is 1.7 million US dollars.

1.4 Researchers at the Centre Muraz of the regional medical research organization OCCGE (Organization de Coordination et Cooperation de Luttes contre les Grandes Endemies) have demonstrated the efficacy of the proposed health education and water filtration techniques in pilot control areas located in Comoe' Province. Training techniques,

educational materials, and effective filters have been developed which are cost effective, and which can form the basis for national training of the grass roots health worker. Water filtration methods have been found to be accepted by local populations.

Important issues, however, remain to be resolved regarding the effectiveness and operational use of chemical control measures. Some research in this area is now in progress at the Centre Muraz. Other work remains to be done before the effective and safe operational use of intermediate host control measures can be delimited. Most important is to determine, under the conditions which exist in Burkina Faso, the formulation of temephos (Abate™*), which can suppress vector populations for acceptable periods (4-6 weeks). The formulation selected [1-2% sand granules (SG) or 50% emulsifiable concentrate (EC)] will have important cost and logistical implications for a national elimination program.

1.5 Water is a principle concern in Burkina. For a successful Guinea Worm Elimination Program to be realized, the Ministry of Water and international donor organizations with rural water supply projects need to be sensitized and incorporated into the guinea worm campaign. The current national proposal does not provide a strategy which would harness the potential of funded water and sanitation projects, or other related efforts (e.g., primary health care, rural agricultural development, and disease control activities in schistosomiasis and onchocerciasis).

*Use of trade names and commercial sources is for identification only and does not constitute endorsement by the Public Health Service or the U.S. Department of Health and Human Services.

2. RECOMMENDATIONS: OVERVIEW OF A NATIONAL PLAN OF ACTION

Regarding the control and elimination of dracunculiasis in Burkina Faso, the consultant requests the MOH to consider the following proposals:

2.1 A NATIONAL PLAN OF ACTION (POA) FOR THE CONTROL AND ELIMINATION OF DRACUNCULIASIS

2.1-1. Revisions of the document prepared by Drs. YADA, GUIGUEMDE, AND COULIBALY (See Section 7 and Annex 2):

a) A single action plan, rather than two, should be promoted. This should center on a strategy of health education and personal prophylaxis.

b) The elimination of dracunculiasis can be achieved through implementation of a phased program. The phases consist of the various objectives of the plan of action; these have been listed as separate modules (Figure 2.1). A budget should be developed for each module. Interested donor organizations can be approached to fund one or more modules, rather than having a few groups bear the burden of the entire program, thus promoting increased funding. Establishing priorities for the various activity modules for such funding will maintain a logical progression for the overall POA.

c) Electronic audio-visual equipment should not be proposed as a necessary component of the POA.

d) Costs of supplying wells or protected water sources to affected villages should not be included in the budget.

e) The core of the control project might be changed to include the use of chemical control measures for the intermediate host (Abate) after operational research indicates the most appropriate manner for its use. At this time, field operations using chemical control should be listed as a separate module, with independent funding.

f) The operational and logistical details of manufacturing and distributing filters and health educational materials need to be addressed. In addition, organizational activities involving training of CSPS and village health workers should be further described.

2.1-2. Improvement of national surveillance information is vital as a first step in controlling dracunculiasis. One method for improving available data would be a mailed questionnaire to all PSP/CSPS (Post Sante' Primaire-Primary Health Center/Centre de Sante' et Promotion Social-Center for Health and Social Promotion) units. The purpose of this questionnaire would be to provide information about disease distribution at the CSPS and perhaps lower levels (number and names of affected villages). A survey of this kind is costly and consumes manpower and scarce financial resources. To lower costs, the questionnaire might be linked to another nationwide (CSPS level) survey. One possibility is the use of a questionnaire planned by DESA (Direction d'Education Sanitaire et Assainissement-National

FIGURE 2.1 -9-

1987	1988	1989	1990	1991	1992	1993	1994
DIRECT MOH INTERVENTIONS AND ACTIVITIES							
NATIONAL (MO) QUESTIONNAIRE	MO WITH ACTIVE CONFIRMATION IN PILOTS	ACTIVE SEARCH IN 10 PROVINCES	ACTIVE SEARCH IN 20 PROVINCES	NATIONAL SEARCH	NATIONAL SEARCH	SURVEILLANCE	SURVEILLANCE
PROJECT EVALUATION BULLETIN	PROJECT EVALUATION BULLETIN	PROJECT EVALUATION BULLETIN	PROJECT EVALUATION BULLETIN	PROJECT EVALUATION BULLETIN	PROJECT EVALUATION BULLETIN	PROJECT EVALUATION BULLETIN	
NATIONAL MEETING				NATIONAL MEETING			NATIONAL MEETING
FUNDING FOR PILOT ACTIVITIES	1-2 PROVINCES PILOT HE AND FILTER CONTROL	PILOT USING ABATE	FINAL PILOT OPERATIONS	PILOT ZONES DECLARED FREE OF INFECTION			
	FUNDING FOR EXTENSION PHASE I	EXTENSION OF HE TO 10 PROVINCES	ABATE USE IN 10 PROVINCES	FINAL PHASE I OPERATIONS	PHASE I DECLARED FREE OF INFECTION		
		FUNDING FOR EXTENSION PHASE II	EXTENSION OF HE TO TOTAL OF 20 PROVINCES	ABATE USE IN 20 PROVINCES	FINAL PHASE II OPERATIONS	PHASE II FREE OF INFECTION	
			FUNDING FOR EXTENSION	EXTENSION OF HE TO ENTIRE COUNTRY	ABATE IN FINAL AREAS	FINAL PHASE III OPERATIONS	COUNTRY DECLARED FREE OF INFECTION
	OPERATIONS RESEARCH IN PILOTS	OPERATIONS RESEARCH IN PILOTS	OPERATIONS RESEARCH IN PILOTS				
ABATE OPERATIONS RESEARCH	ABATE OPERATIONS RESEARCH	ABATE OPERATIONS RESEARCH					
INDIRECT MOH INTERVENTIONS							
SENSITIZE WATER AND HEALTH PROJECTS	DEVELOP GW COMPONENTS IN LARGEST WATER PROJECTS IN HEAVILY AFFECTED AREAS	DEVELOP GW COMPONENTS IN ALL MAJOR WATER PROJECTS	MONITOR GW COMPONENTS	MONITOR GW COMPONENTS	MONITOR GW COMPONENTS	MONITOR GW COMPONENTS	

Center for Health Education and Sanitation-MOH), for a survey in April. The consultant strongly recommends one page of the DESA questionnaire be devoted to dracunculiasis (Annex 3). Use of mailed questionnaires should be considered as a way of collecting such information on a regular (perhaps yearly) basis.

2.1-3. The consultant recommends that the MOH designate one central level official to work full-time for the next year on establishing the POA. The official would begin the job immediately and major duties would include the following:

a) Preparing the final version of the POA's.

b) Working with DESA on the mailed CSPS questionnaire. Analyzing the results, and then maintaining and continually updating a national map of disease distribution at the CSPS level. Correlating the map of disease distribution with currently funded and active water and health education schemes.

c) Organizing the National Meeting (2.1-4).

d) After the meeting, acting as liaison to water donor agencies, with particular emphasis on encouraging use of dracunculiasis as an indicator of health impact of providing safe water. In addition, seeking donors who might provide funding for elements (modules) of the POA (Figure 2.1).

e) Promoting closer MOH contact with operational research activities at the Centre Muraz, and eventually developing a national operational plan for the use of abate for intermediate host control.

f) developing protocols for operational research in methods of active surveillance (2.2-1).

2.1-4. A one day national meeting should be held with the objective of promoting the POA among government officials and donor organizations. This meeting would provide a forum for enlisting the support of donor agencies involved with water supply projects and health. A principal objective would be to develop linked control efforts in these project areas, and funding for activity modules of the pilot projects (2.1-5). Subgoals of the meeting might include the following:

a) Discuss the problem of GWD in Burkina Faso. The program should include a review of the lifecycle, epidemiology, socioeconomic impact, and successful control efforts in the pilot villages of the Centre Muraz, OCCGE. National surveillance information should be presented from various sources, including the data collected through the DESA questionnaire survey.

b) Introduce the national strategy for controlling and eliminating the infection.

c) Introduce the MOH official responsible for the program.

It is suggested that Direction Central de Formation Sante (DCFS), National Center for Health Structure, MOH; Direction des Etudes et Planification (DEP), National Center for Study and Planning, MOH; Direction De Epidemiologie et Statistiques (DES), National Center for Epidemiology and Statistics, MOH and OCCGE be involved in the planning and implementing of this meeting. Participants should include the following: Federal Ministry of Health officials, Provincial Ministry of Health officials, the United Nations Development Program (UNDP), World Bank (WB), the World Health Association (WHO), the United Nations Children's Fund (UNICEF), the United States Agency for International Development (USAID) and other donor representatives (especially those active in health and rural water supply), selected politicians, Ministry of Water (MOW) personnel, and selected national and foreign academicians.

2.1-5. PILOT PROJECTS: The consultant recommends that the national MOH control efforts begin in the spring of 1988 as pilot projects in one or two provinces. The cost per project would be about $50,000 (Table 2.1). Such projects would pioneer the POA in highly endemic regions of Burkina Faso where control of dracunculiasis has not been a priority. These activities should probably not be in the Banfora area, since Centre Muraz control efforts and operational research are already underway in this region.

MOH pilot efforts should not preclude the promotion of similar control efforts linked to primary health and water projects throughout the country.

2.2 OPERATIONAL RESEARCH

2.2-1. MOH operational research: In pilot provinces of the first years of the POA, the MOH staff should develop a program of operational research. The consultant recommends that the MOH focus their research on dracunculiasis surveillance. Separate funding should be sought for an activity module which would develop techniques for active surveillance. This work would entail:

a) The critical evaluation of the quality of passively reported data.

b) The critical evaluation of active search techniques which would economically locate affected villages. These methods might include radio broadcasts requesting villagers or the village CDRs to report endemic villages, market search techniques, and linkage of GWD surveillance to other existing programs which utilize mobile units to visit villages.

c) Development of methods which would provide statistically valid incidence rates, or estimates of numbers of cases. These techniques could also be used as a means of quality control, where reports received through the passive or questionnaire surveillance systems (all or a subsample of reported affected villages) could be visited and evaluated by a mobile surveillance unit.

Table 2.1

PRELIMINARY BUDGET
FOR ONE PILOT PROVINCIAL PROJECT FOR THE CONTROL OF DRACUNCULIASIS
IN BURKINA FASO

		Costs in US dollars for one PROVINCE, 3 years
MATERIEL		
Survey Forms and Guides		1,000
Filters (50.000)		33,000
Posters	(30)	2,500
		36,700
TRANSPORT		
[1 All-terraine auto		7,000]
4 Mobilettes		5,500
Vehicle Maintenance		2,000
Fuel		4,000
car: 16.000km =	3200 liters	
mobilette:16.000km=	320 liters	
	3520 liters	
		18,500
[without car		11,500]
PERSONNEL		
Per Diem-training		2,000
33 CHW		
10 IHW		
10 CSPS nurses		
TOTAL (with car)		$57,200
(without car)		$50,200

Note: Costs for maintenance of an all-terraine vehicle must still be included regardless of requirement for purchase.

2.2-2. Centre Muraz research activities: The important research activities in dracunculiasis require continued support. In particular, the consultant recommends that the research be directed toward resolving the operational issues of the use of Abate in the conditions of Burkina Faso (Annex 4). Other areas of interest for operational research might include the following:

a) Continued efforts in collaboration with health economists to demonstrate the socioeconomic impact of dracunculiasis. Use of new techniques to allow researchers to determine agricultural output per family might be applied.

b) Clinical studies to examine the effect of new drug treatment (ivermectin) on the reducing disability and transmission of infection.

c) Impact of migration on reintroduction of dracunculiasis in areas where control measures have been instituted.

d) Studies of urinary Abate levels to determine if water being used by villagers is from treated sources.

2.3. FUNDING

2.3-1. In the immediate future (1987-1988), modules to be funded include the following:

a) The national questionnaire survey;

b) The National Meeting on Dracunculiasis;

c) The pilot province(s); and

d) MOH operational surveillance research.

The most expensive of these would be (c) and (d).

2.3-2. Funding for the pilot provinces: The consultant suggests that funding preproposals be prepared for United Artists for Africa and the Global 2000 Program of the Carter Center (Annex 5). These should be about 5 typed pages, in English, and sent with a cover letter from the MOH (Annex 6).

2.3-3. Funding for MOH Surveillance research. Another preproposal should be written (in a similar manner to the above) to solicit funding from Board on Science and Technology for International Development (BOSTID) for surveillance research (See Sections 2.1-3b and 2.2-1 and Annex 5). To stimulate interest, this preproposal should include an analysis of the mailed questionnaire survey and the national map of disease distribution by CSPS.

2.4 Proposed Schedule of Activities

MARCH-SEPT, 1987

1) Choose national director. Formulate, send and analyze questionnaire. Determine population at risk, affected CSPS, most affected provinces; list of villages if possible. Prepare map.
2) Revise National Plan for control of Dracunculiasis.
3) Secure funding for, and plan, National Meeting.
4) Operational research on Abate.
5) Submit preproposals for funding pilot projects.

OCTOBER, 1987

1) National Meeting.
2) Enlist support of water agencies in ongoing projects.
3) Select Pilot Provinces. Prepare final versions of grant proposals, etc.
4) Seek funding for other modules in POA, especially the module for research in active surveillance techniques.
5) News bulletin describing progress sent to CSPS and donor organizations.

NOVEMBER,1987-MARCH, 1988

1) Begin production of filters for pilot provinces.
2) Design and organize training program for CSPS-level personnel of affected provinces.
3) Continue to seek funding.
4) Enhanced surveillance in pilot CSPS areas to confirm presence of infection.
5) Train CSPS and village agents.
6) Distribute filters to pilot provinces

APRIL-SEPTEMBER, 1988

1) Village health education sessions in pilot provinces. Posters left in visible places around villages. Filters distributed to those attending sessions.
2) Second national questionnaire.
3) Operational research on Abate at Centre Muraz complete and recommendations made on the way in which it should be used.
4) Evaluation of filter use and health education impact in a sample of affected villages.
5) Implement active surveillance research module.

OCTOBER-DECEMBER, 1988

1) Analysis of second national questionnaire responses.
2) Bulletin with report of progress.
3) Select next provinces for control and seek funding for this expansion
4) Evaluation of participation of water projects in the POA.
5) Final operational plan for Abate use completed. Funding sought for piloting its use in pilot provinces.
6) Burkina Faso delegate to the World Health Assembly reports progress of National Control Program.

JANUARY-MARCH, 1989

1) Purchase Abate for use in pilot projects.
2) Training of provincial health workers in use of Abate. Selection of villages for application based on certain criteria.
3) Enhanced surveillance in new provinces.
4) Training programs in new provinces for provincial, CSPS, and ASV workers.
5) Production and distribution of filters and health education materials.

APRIL-SEPTEMBER, 1989

1) Village health education session in all provinces (new and pilot) where activites are planned. Filter distribution or replacement.

2) Abate applications in pilot provinces.

3) Third national questionnaire.

4) Evaluation of impact of the first year of control in pilot provinces.

OCTOBER-DECEMBER, 1989

1) Analysis of questionnaire.

2) Evaluation of participation of water projects, etc., in effort.

3) Bulletin.

1990

1) Continue in manner outlined, expanding to involve all affected provinces by 1993.

2) Second National Meeting to report progress in achieving goals of the POA.

3. INTRODUCTION

Human dracunculiasis (Dracuntiasis, guinea worm disease, Ver de Guinee, Filaire de Medine) is caused by the parasitic worm D. medinensis. Infection with this agent afflicts an estimated 10 million persons annually in Asia, Arabia, and Africa. Human infection is acquired by ingesting water contaminated with a microcrustacean of the genus Cyclops, which acts as the intermediate host for D. medinensis. Cyclops is usually found in wells, ponds, and other stagnant water bodies. Infectious larvae of the parasite contained within the cyclops are released into the human intestine, from which they migrate to deep subcutaneous tissues. During the one-year incubation period no symptoms occur, but when the worms reach maturity, the gravid female worm (which may be up to one meter in length) migrates to a position under the skin. There, most often in the lower extremities, she elicits a painful blister. When this blister bursts, part of the female worm is exposed. Upon immersion of the limb in water the worm can then release many thousands of larvae. The larvae may be ingested by cyclops, where they mature to the infectious stage (usually within two to three weeks) in the body cavity of the crustacean. The larvae can continue the life cycle by infecting the next human host that ingests them in drinking water.

3.1 SYMPTOMS, GENERAL EPIDEMIOLOGICAL FEATURES, AND CONTROL

Guinea worm disease (GWD) is symptomatic only when the female worm emerges from underneath the skin. The female dies shortly thereafter, although it remains for the patient to slowly extract her body from his person. The open ulceration and physical extraction of the parasite usually lasts from one to three months. Pain and secondary bacterial infection often prevent the patient from standing or walking. In some cases, deep abscesses, septic arthritis, and tetanus ensue due to the chronicity of the open lesion. Fatalities are rare, but permanent disability occurs in an estimated one percent of cases.

Seasonality is an important aspect of the epidemiology of Dracunculiasis. Transmission from human to cyclops and from cyclops to human frequently occurs during just a few months of the year. The transmission season is limited by the presence of shallow pools of stagnant water. These are most influenced by rainfall, and tend to occur during the rainy season in arid areas (when surface water is at its maximum, and cyclops populations bloom), and during the dry season in regions with higher rainfall (when rivers and streams form shallow, non-flowing pools). GWD is generally considered an infection of dry regions, where water sources are few, and shared by many.

The seasonal disability among the almost exclusively rural victims has dramatic economic impact. In West Africa, GWD incidence may reach its maximum during the labor intensive rainy season, adversely affecting agricultural output in affected villages to the probable detriment of the economic and nutritional status of the community.

No evidence has been found of acquired immunity to dracunculiasis, and the endemic communities usually suffer annual attacks. However, the infection is self-limiting because the worm dies after the year's incubation period; a person must be reinfected annually for the cycle to continue. Non-human

hosts are not believed to be involved in transmission of the disease to humans. Thus, interruption of transmission for only one year can theoretically eradicate the disease from a community.

No effective drugs are available for preventing or treating infection by D. medinensis. Dracunculiasis transmission can be avoided by (1) the provision of uncontaminated drinking water; (2) treatment of contaminated water by periodic addition of chemicals such as (temephos) to control populations of the intermediate host; (3) education of villagers to boil or filter their drinking water (personal prophylaxis); or (4) prevent infected persons with active lesions from entering sources of drinking water, by covering or walling the perimeters of water sources.

3.2 THE STRATEGY FOR CONTROL AND ELIMINATION OF DRACUNCULIASIS

The Steering Committee of the International Drinking Water Supply and Sanitation Decade (IDWSSD) (1981-1990) has adopted the incidence of dracunculiasis as an indicator of the effectiveness of efforts to provide potable water. Successful strategies for control of GWD include a combination of (1) enhanced surveillance to identify affected villages; (2) designation of these villages as priority for new sources of drinking water; or for chemical intermediate host (Cyclops) control; and (3) community health education programs to develop understanding of the GW life-cycle, personal prophylaxis and prevention of contamination of drinking water. A key element in the global strategy to control GWD is the coordination, in each endemic country, of existing government and/or donor health, development, and water activities. A vital first step in achieving this coordinated effort is to prepare a national plan of action.

3.3 A NATIONAL PLAN OF ACTION (POA)

Implementing and funding a POA for dracunculiasis control and elimination should be considered a short-term investment which takes advantage of the special opportunity afforded by the IDWSSD. Control of GWD is possible with the tools available, but will not be achieved without proper organization and management and a high degree of operational efficiency. A national POA should blend the available tools with the components and programs of government ministries. Important components of a national control or elimination program are the formal commitment of resources toward well-defined goals, an implementation schedule, and subsequent evaluation of the effort. The POA must attain recognition as a priority governmental goal at the highest levels of the ministries responsible for health and for water supply. Demonstrating firm governmental commitment to the goals of the POA is also an important factor in attracting additional program funding by bilateral and international organizations. Although intersectoral responsibility is key, the POA must also identify appropriate governmental institutions which will assume leadership responsibility for the final implementation.

4. BACKGROUND INFORMATION ON THE REPUBLIC OF BURKINA FASO

Burkina Faso (Figure 4.1) is a land-locked, West African state with an area of about 105,00 square miles (274,000 square kilometers). The country was formerly called Upper Volta. It is bounded to the north and west by Mali, to the south by Cote d'Ivoire, Ghana and Togo and to the east by Benin and Nigeria. The capital city, Ouagadougou (estimated population 236,000), is centrally located. The second major city, Bobo Dioulasso (estimated population 140,000), is located in the southwest. Burkina Faso is a former French colony which gained independence in 1960.

4.1 GEOGRAPHY AND CLIMATE

Burkina Faso consists of an extensive plateau with an elevation ranging between 198 to 305 meters. The terrain consists of fields, bushes and scattered trees. The land is green in the south, with some forests. In the north it is principally desert and sahel. Annual rainfall varies between 100 centimeters in the south to less than 25 centimeters in the extreme north and northeast of the country (Figure 4.2). Burkina Faso has a distinct dry season (November to May) and rainy season (June to October). The country has three principal river systems. The Black Volta, the Red Volta and the White Volta converge in Ghana (to the south) to form the Volta river. Great seasonal variation occurs in the flow of these rivers, and none are navigable.

4.2 DEMOGRAPHY

The 1985 population of the country was estimated at 7.9 million. About half of this population belongs to the Mossi tribe. Other ethnic groups include the Bobo, Samo, Senoufo, Dagara, Gourounsi, Bissa, Gourmantche, Lobi, Peuhl, Hausa, Fulani and the Tuareg (Figure 4.3). The language of the Mossi (More') is spoken by most of the population. Diula is the language of commerce. French is the official language of the country. About 70% of the people are of traditional African religion. Islam is practiced by about 27% of the population. Catholicism is the principal Christian religion and is relatively rare.

Compared to neighboring countries, Burkina Faso is populous. The average population density is 40 to 60 persons per square mile. The population is unevenly distributed in the various regions of Burkina Faso, the eastern and central regions of Burkina Faso being the most populous (Figure 4.4). More than 85% of the population is rural, living in some 7,700 villages. Other basic population and health information is summarized in Table 4.1.

An estimated 1 million Burkinabes migrate for seasonal agricultural work to Cote d'Ivoire, Ghana, or Mali. In comparison, Burkina Faso receives a smaller seasonal influx of about 20,000 persons, mostly from Nigeria and Mali.

4.3. ECONOMY

The gross national product in 1981 was estimated at 1.2 billion U.S. dollars, with a per capita income in 1982 of $210. The market and cash economy in Burkina Faso is small and the country suffers economically from a lack of a

Figure 4.1

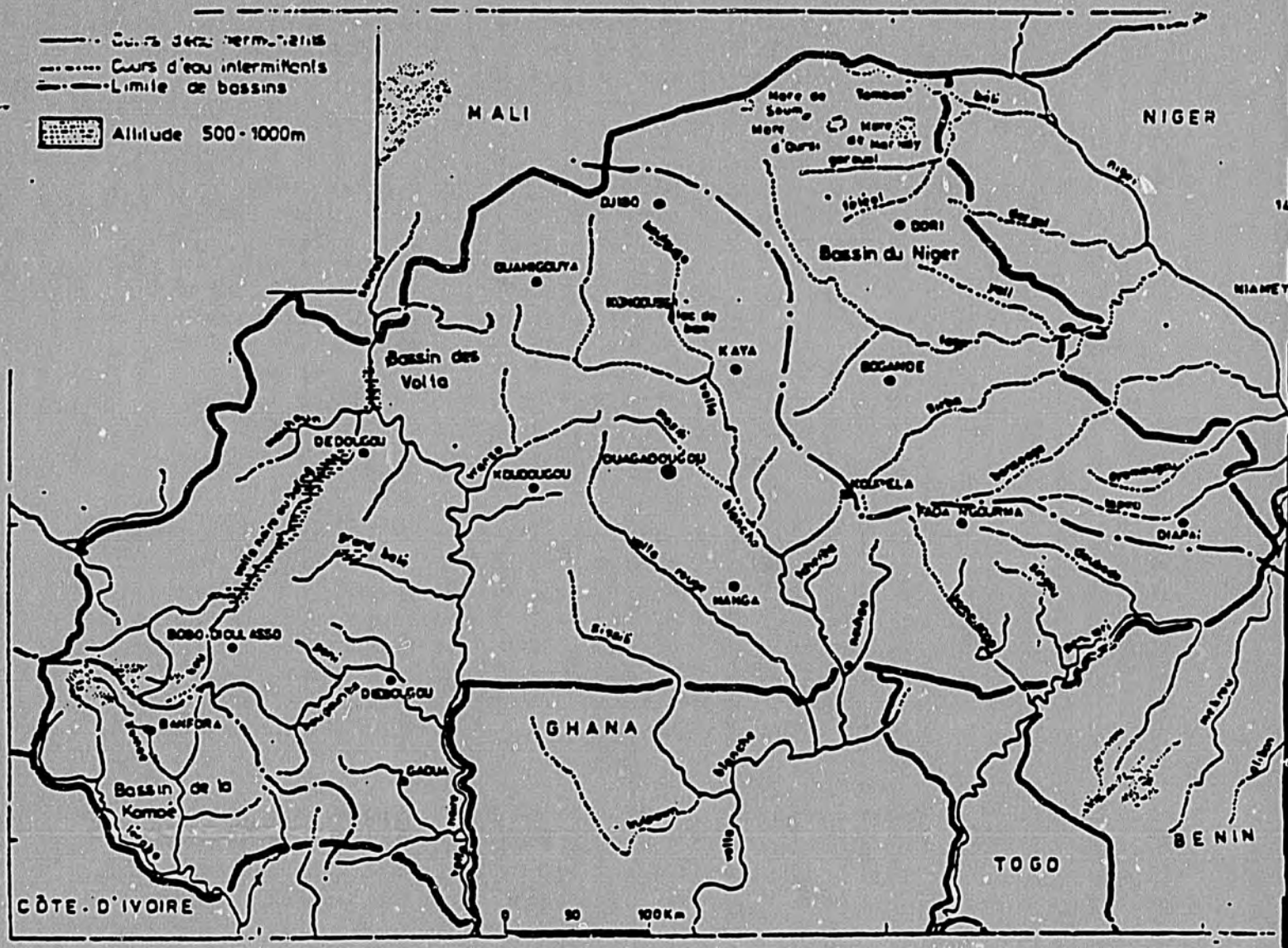

Cours d'eau permanents
Cours d'eau intermittents
Limite de bassins
Altitude 500 - 1000m
MALI
NIGER
GHANA
TOGO
BENIN
CÔTE-D'IVOIRE
Bassin du Niger
Bassin des Volta
Bassin de la Komoé
DJIBO
DORI
KAYA
BOGANDE
OUAGADOUGOU
KOUDOUGOU
DEDOUGOU
MANGA
FADA N'GOURMA
DIAPAGA
BOBO-DIOULASSO
BANFORA
GAOUA
0 50 100 Km

Figure 4.2

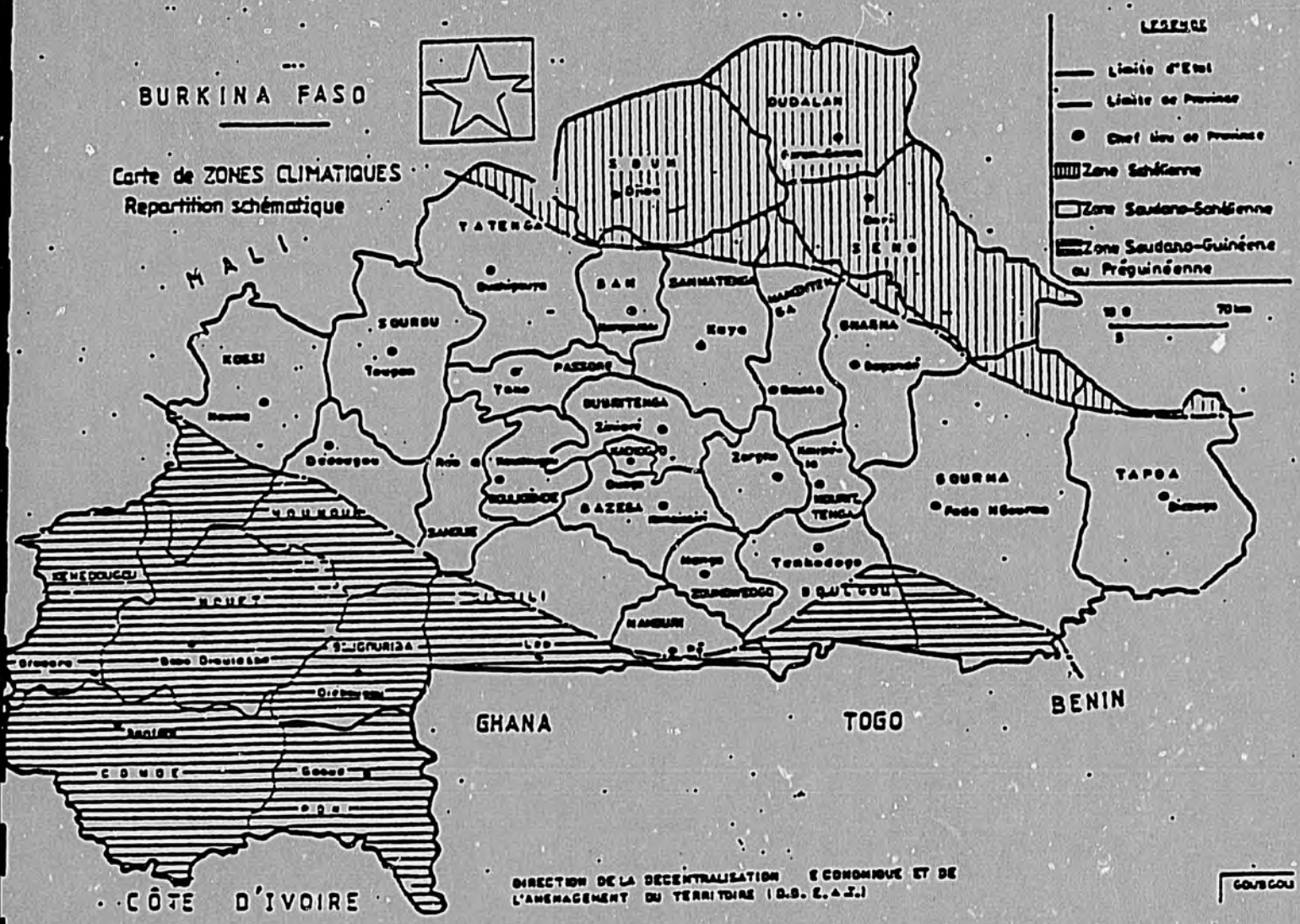

BURKINA FASO
Carte de ZONES CLIMATIQUES
Repartition schématique
LEGENDE
Limite d'Etat
Limite de Province
Chef lieu de Province
Zone Sahélienne
Zone Soudano-Sahélienne
Zone Soudano-Guinéenne ou Préguinéenne
DUDALAN
SOUM
SENO
OUDALAN
TAPOA
MALI
GHANA
TOGO
BENIN
CÔTE D'IVOIRE
DIRECTION DE LA DECENTRALISATION ECONOMIQUE ET DE L'AMENAGEMENT DU TERRITOIRE (D.D.E.A.T.)

Figure 4.3

PRINCIPAL ETHNIC GROUPS
IN BURKINA FASO

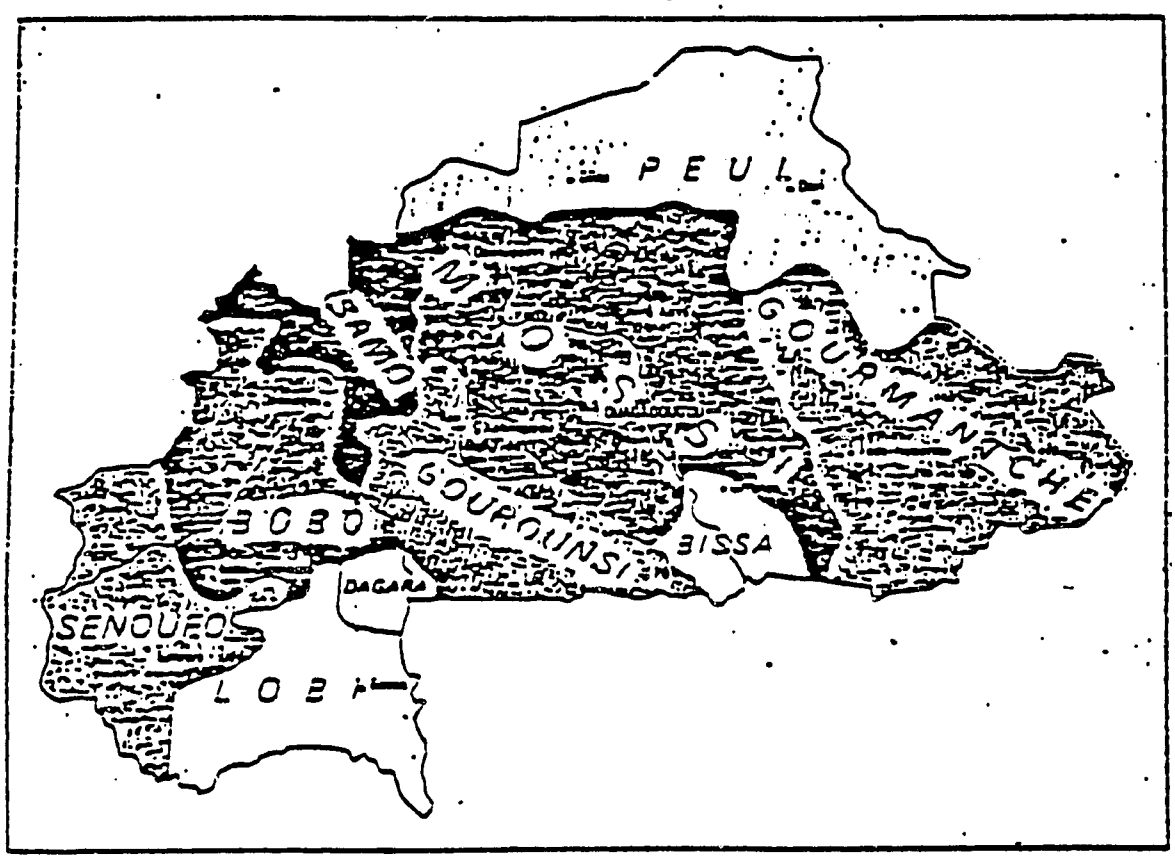
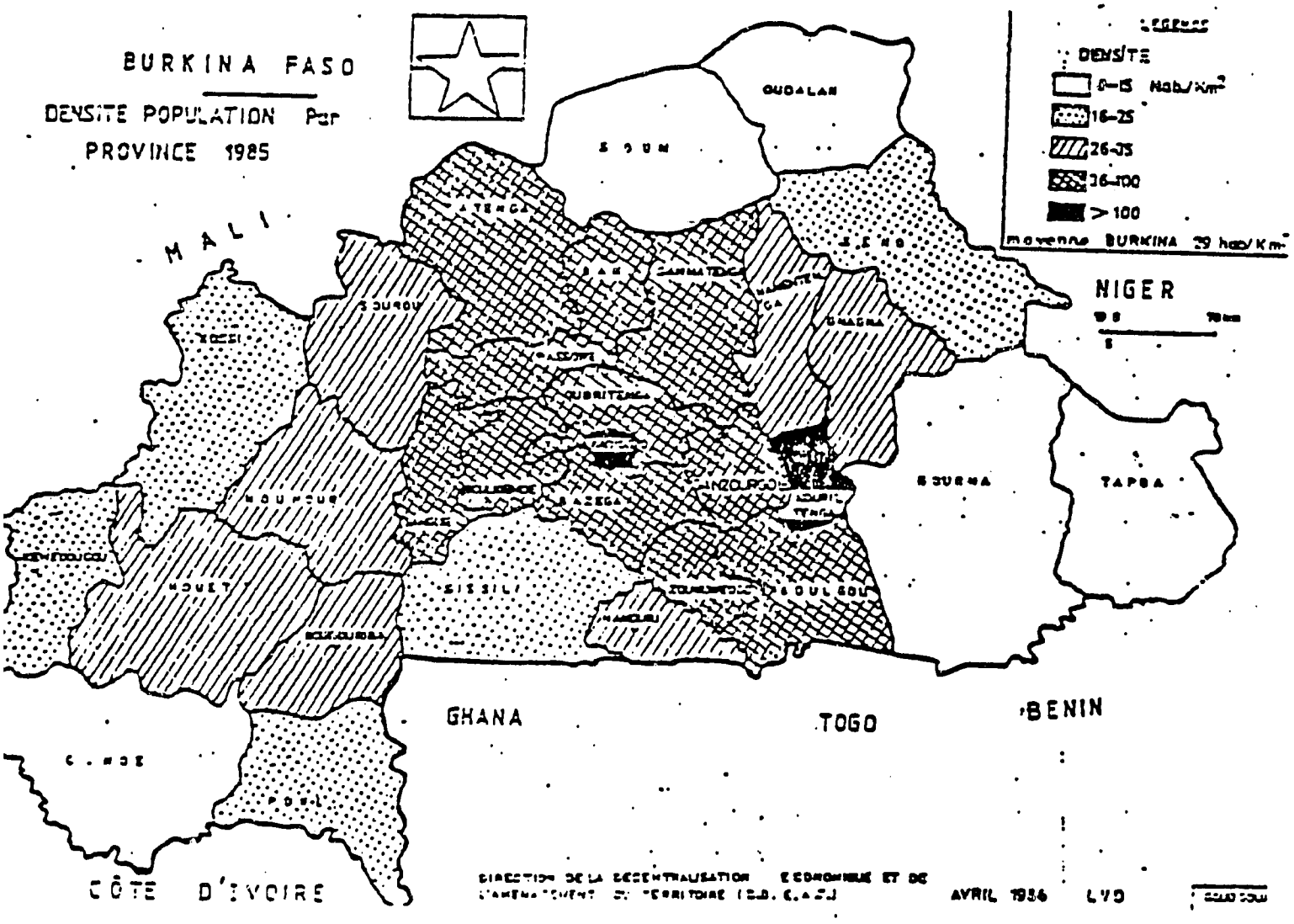


Figure 4.4


BURKINA FASO
DENSITE POPULATION Par PROVINCE 1985
DENSITE
0-15 Hab/Km²
16-25
26-35
36-100
> 100
moyenne BURKINA 29 hab/Km²
MALI
NIGER
GHANA
TOGO
BENIN
CÔTE D'IVOIRE
OUDALAN
SOUM
SENO
GNAGNA
GOURMA
TAPOA
NAHOURI
SISSILI
KOMPIENGA
BOULGOU
AVRIL 1986

GENERAL INFORMATION

BASIC POPULATION AND HEALTH INDICATORS

Area	274,122 sq km (8)
Resident population (1985)	7,919,895 (6)
Resident population (1975)	5,638,203 (5)
Population doubling time	27 years (1)
Percent urban (1983)	11% (2)
Percent under 15	45% (1)
Percent over 64	3% (1)
Total fertility rate	6.5 live births per woman (3)
Rate of natural increase	2.6% (1)
Crude birth rate	47 per 1000 pop. (3)
Crude death rate	22 per 1000 population (1)
Life expectancy at birth (rural area)	33 years (4)
Life expectancy at birth (urban area)	45 years (4)
Maternal mortality rate for unassisted delivery (80%)	6 per 1000 live births (4)
Infant mortality rate	182.3 per 1000 live births (4)
Proportion of children dying before age 5	310 per 1000 population (5)
Population per physician (1984)	67,691 (3)
Population per nurse (1984)	19,316 (3)
Population per midwife (1984)	40,824 (3)
Population per hospital bed (1984)	1,104 (3)
Percent of population with access to safe water	25% (5)
Daily per capita calorie supply	79% of required standard (2)
Average daily per capita protein consumption	56 grams (as of late 1970s) (100% of standard)
Average daily per capita animal protein consumption	4 gm (as of late 1970s)
Average daily fat consumption	17 gm/day (34% of standard) (9)
Male literacy rate (1984)	11.4% (8)
Female literacy rate (1984)	3.6% (8)
Percent enrollment in primary school (1984)	20.4 (3)
GNP per capita (1982)	US $210 (5)
Government and other Donors per capita expenditures in health (1981)	US $9.00 (7)
GOB expenditures in health as percentage of national budget (1981)	US 6.6% (7)
Exchange rate (early 1986)	US $1 = 340 F CFA

(1) 1985 World Population Data Sheet, Population Reference Bureau, Inc. 1985.
(2) World Development Report, World Bank 1985.
(3) Annuaire Statistique du Burkina Faso - INSD, Ministry of Plan, Dec. 1985.

Table 4.1 (cont.)

(4) Plan Quinquennal de la Sante, Ministry of Health, Mars 1985.
(5) Upper Volta Health and Nutrition Sector Review, World Bank, November, 1982.
(6) Preliminary 1985 census figure, Ministry of Planning, 1987.
(7) Directorate of Planning and Health Statistics.
(8) National Institute of Statistics and Demography, MCP.
(9) Enquete Anthropometrique et de Consommation Alimentaire dans l'ORD l'Est Fada N'Gourma, 1981, Service d'Alimentation et Nutrition, Min. Develop. Rural.

direct outlet to the sea, although the capital is linked by rail to the port of Abidjan in Cote d'Ivoire. The country, however, has the most extensive road network in proportion to its size of any French West African state. There are about 10,500 miles of roads, 25% of which are passable during the rainy season.

About 85% of the population is engaged in raising crops or livestock. Considerable unemployment exists in rural areas, and every year as many as 45,000 persons leave their villages to seek work in the urban centers. Agriculture comprises about 35% of the gross national product (GNP) and is concentrated in the production of grain such as millet, sorghum, rice, livestock, peanuts, sesame seeds and cotton seed. Industry comprises about 20% of the GNP and is basically limited to agricultural processing of plants, brewing of beers, processing of rice, vegetable oil, animal hides and manufacturing of soap and textiles.

Major trade links are with Cote d'Ivoire, the European Community and China. The currency (CFA) of Burkina Faso is common to other francophone West African states and is directly linked to the French franc. Extensive foreign aid is provided by France, although additional assistance is provided by West Germany, the United States, China, Italy and Israel. Burkina Faso also receives assistance through several United Nations agencies.

4.4. ADMINISTRATION

Executive powers are conferred upon a chief of state who is president of the National Council for the Revolution (CNR), which has been in power since 1983. Throughout the country, bodies known as the Committees for the Defense of the Revolution (CDR) mobilize the masses and implement the CNR's revolutionary goals. In 1986, the government elaborated its first five-year guidelines of capital expenditure and administrative effort (Government of Burkina Faso. Premier Plan Quinquennal de Developpement Populaire. 1986-1990. Vols. I and II).

Until 1983, Burkina Faso was administratively divided into 10 departements, which were further divided into 44 sous prefectures. An administrative reorganization in 1984 converted most sous prefectures into autonomous provinces. Thirty provinces (each further subdivided into 300 departements) report directly to central authorities in the capital city. The CNR selects high commissioners who govern each province, and prefets who govern each departement. The major cities and boundaries of the 30 provinces are given (Figure 4.3). Population data by province are also shown (Table 4.2)

Table 4.2

POPULATION RESIDENTE PAR SEXE ET DENSITE SELON LA PROVINCE

PROVINCE	POPULATION RESIDENTE			PROPORTION		Densité Habts/km²
	Ensemble	Hommes	Femmes	Hommes	Femmes	
01 - BAM	164.263	76.923	87.340	46,8	53,2	41
02 - BAZEGA	306.976	143.691	163.285	46,8	53,2	58
03 - BOUGOURIBA	221.522	106.056	115.464	47,9	52,1	31
04 - BOULGOU	403.358	194.421	208.937	48,2	51,8	45
05 - BOULKIEMDE	363.594	165.382	198.212	45,5	54,5	88
06 - COMOE	250.510	120.457	130.053	48,1	51,9	14
07 - GANZOURGOU	196.006	91.943	104.063	46,9	53,1	48
08 - GNAGNA	229.249	112.183	117.066	48,9	51,1	27
09 - GOURMA	294.123	146.287	147.836	49,7	50,3	11
10 - HOUET	585.031	293.372	291.659	50,1	49,9	35
11 - KADIOGO	459.138	238.528	220.610	51,9	48,1	393
12 - KENEDOUGOU	139.722	68.501	71.221	49,0	51,0	17
13 - KOSSI	330.413	165.076	165.337	50,0	50,0	25
14 - KOURITENGA	197.027	91.116	105.911	46,2	53,8	121
15 - MOUHOUN	289.213	142.220	146.993	49,2	50,8	28
16 - NAHOURI	105.273	51.154	54.119	48,6	51,4	27
17 - NAMENTENGA	198.798	96.598	102.200	48,6	51,4	26
18 - OUBRITENGA	303.229	139.454	163.775	46,0	54,0	65
19 - OUDALAN	105.715	52.233	53.482	49,4	50,6	11
20 - PASSORE	225.115	103.685	121.230	46,1	53,9	55
21 - PONI	234.501	113.684	120.817	48,5	51,5	23
22 - SANGUIE	218.259	102.603	115.656	47,0	53,0	42
23 - SANMATENGA	368.365	172.051	196.314	46,7	53,3	40
24 - SENO	230.043	115.280	114.763	50,1	49,9	17
25 - SISSILI	246.844	119.370	125.974	48,6	51,4	18
26 - SOUM	190.464	93.299	97.166	49,0	51,0	14
27 - SOUROU	267.770	129.910	137.860	48,5	51,5	28
28 - TAPOA	159.121	78.304	80.817	49,2	50,8	11
29 - YATENGA	537.205	246.326	290.877	46,2	53,8	44
30 - ZOUNDWEOGO	155.142	73.703	81.434	47,5	52,5	45
Ensemble BURKINA FASO	7.976.019	3.846.518	4.129.501	48,2	51,8	29

5. DRACUNCULIASIS IN BURKINA FASO

5.1 A REVIEW OF THE LITERATURE RELATED TO DRACUNCULIASIS IN BURKINA FASO

Published and unpublished reports concerning dracunculiasis in the provinces of Comoe, Kossi, Yatenga, Bam, and Soum (Figure 5.1) are summarized in this section.

5.1-1 Lamontellerie, A.M. Resultats d'enquetes sur les filarioses dans l'ouest de la Haute-Volta (Cercle de Banfora). Ann Parasit hum com 1972; 47(6): 789-838.

Through interrogation of chiefs of villages and/or heads of households, Lamontellerie found 71 of 147 (48.3%) villages surveyed in the Cercle of Banfora (Province of Comoe, Figure 5.1) to be affected by dracunculiasis. All subdivisions and cantons had at least one village affected. A listing of affected villages is provided (Annex 7). The author concluded (my translation):

> ...at the present time, within the Banfora Cercle, dracunculiasis is the human filariasis that plays, in economic considerations, the most important role, since it temporarily renders an important fraction of the population inactive, even considering that the zone is strongly endemic for onchocerciasis.....the blindness rate remains relatively low.* (page 827)

5.1-2 DesFontaine, M. and Prod'Hon, J. Repartition Geographique de la Dracunculose dans les etats de L'OCCGE. XXI OCCGE Technical Conference (13-17 April 1981-Bamako) Doc. No. 7.739/81/Doc.Tech.OCCGE.

This report reviews the geographic distribution of dracunculiasis in the states of OCCGE based on reports received at the 1981 Conference. A map of the OCCGE states (Figure 5.2) suggested that Burkina is the most seriously affected of the eight states of OCCGE (Benin, Burkina Faso, Cote d'Ivoire, Mali, Mauritania, Niger, Senegal and Togo).

3. Steib, K. Epidemiology and vector ecology of dracontiasis in Upper Volta as a prerequisite for control measures (unpublished report). Institute for Tropenhygiene, Heidelberg (circa 1982), Deutsche Forschungsgemeinschaft.

This very important paper reported an epidemiological and vector ecological survey in Western Burkina in what is now the province of Kossi (Figure 5.1). Three villages were investigated from 1977 to 1980. During the course of the study, GWD infection rates ranged from 1.7% to 10.2% among the villages (Table 5.1). Peak GW season (91.4% of all guinea worm eruptions) occurred during the rainy months of May-August. In the early part of the rainy season (June and July), 67% of worm emergence occurred. The greatest incapacitation thus occurred in the season when planting and weeding fields was a major economic activity. The disease impact appeared to be less during harvesting in October and November.

*N.B. It would be interesting to return to these villages and perform a followup survey to determine the current extent of dracunculiasis.

Figure 5.1

LOCATIONS OF PUBLISHED STUDIES ON DRACUNCULIASIS IN BURKINA FASO

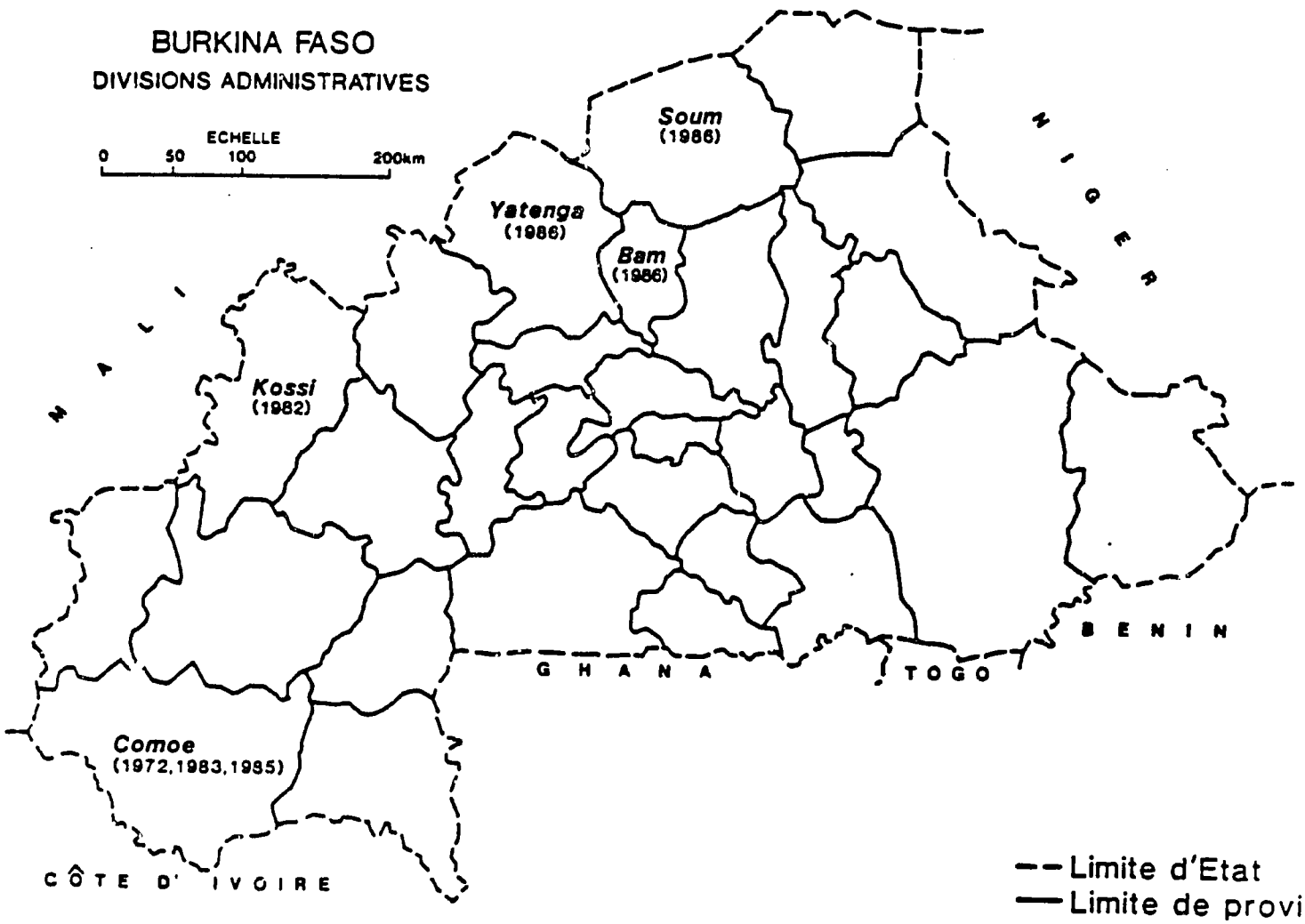
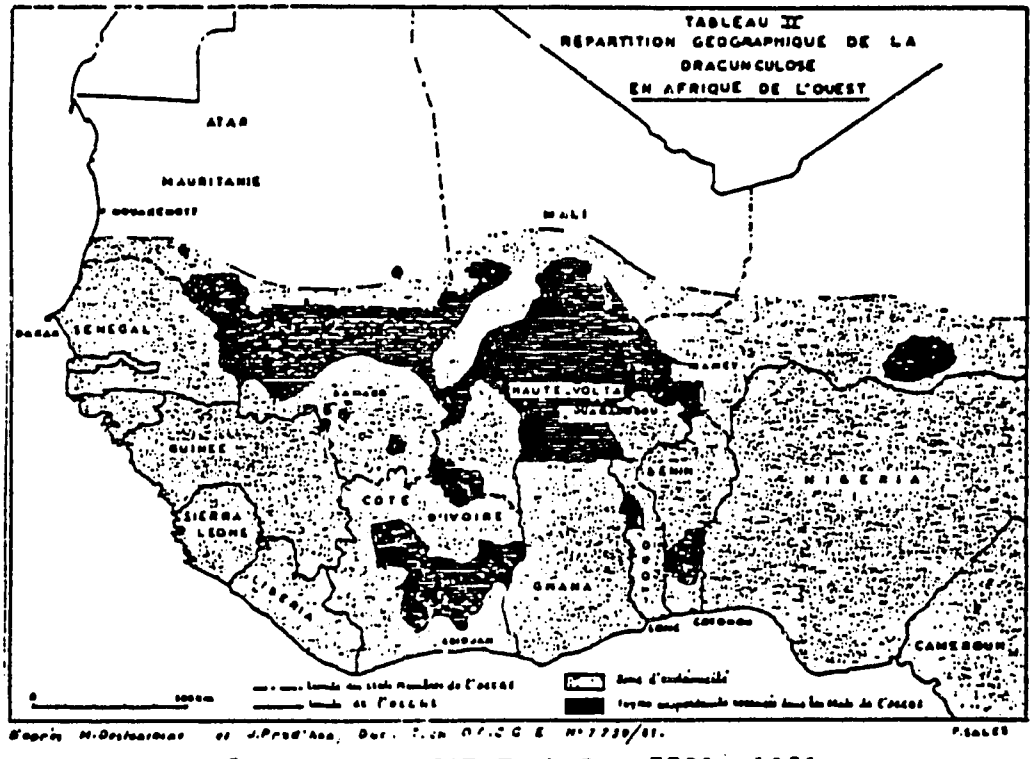


Figure 5 2



From: Desfontaine, OCCGE Tech Doc 7739, 1981

Table 5.1

village / year	Dara			Tana			Kamadena		
	N	n	%	N	n	%	N	n	%
1977*	1,129	136	10.2	-	-	-	1,064	70	6.6
1978*	1,155	127	9.4	836	63	8.1	1,086	28	2.6
1979	1,183	109	7.9	853	58	6.8	1,124	43	3.8
1980	1,211	122	8.7	870	15	1.7	1,146	29	2.4

Table 1: Prevalence of dracontiasis in three villages.
N: total population of the villages according to the census, 1975, considering an annual increase of 2 %,
n: patients suffering from dracontiasis.
*Results obtained from Dr. P. Mayer, German Volunteer Service.

The paper describes six different sources of water in the study area:

(1) Draw wells.
(2) Periodic streams.
(3) Relatively large natural ponds covered with surface water lilies.
(4) Large natural ponds serving for livestock watering without a water lily coverage.
(5) Small and shallow natural ponds which are transient and generally dry by October or November. (These ponds are used by relatively few persons for drinking purposes.)
(6) Small, relatively deep, artificial ponds constructed by the villagers to provide water to families in certain areas. These ponds are also transient, drying up in the dry winter months.

Cyclops were found in all water sources except (2) periodic streams. Of the thirteen species of cyclops found, only four were identified as naturally infected with larvae of Dracunculus medinensis. These included Thermocyclops inopinus, Thermocyclops incisus, Mesocyclops leuckarti, Metacyclops exsulis. All four species of cyclops serving as natural host for D. medinensis were identified in (6) artificial ponds. With one exception, all cyclopods found to be naturally infected were obtained from these artificial ponds.

The artificial ponds also contained the highest population densities of cyclops, up to 5000 specimens/10 liters. Large natural ponds (3) had population densities of up to 100 specimens/10 liters of pond water, the cattle watering (4) natural ponds 200 specimens/10 liters, the small and shallow natural ponds (5) 100 specimens/10 liters of water. The draw wells (1) had low concentrations of cyclops.

The authors concluded that the most important transmission sites were the small artificial ponds (type 6), since these had high densities of cyclops and served as principal sources of drinking water. Over 80% of people infected with guinea worm admitted to drinking from these sources while working in the fields.

Abate was applied during the rainy season (June and August) to four artificial ponds in doses of 0.5, 0.66, 0.75, and 1.0 ppm. The formulation of Abate used (emulsifiable concentrate or sand granule preparation) was not mentioned. Only in ponds dosed with 1.0 ppm did cyclops disappear completely and rapidly. After four weeks the initial population densities were restored.

Despite these results, Steib concludes regarding the use of cyclopscides in Burkina Faso:

> The epidemiological situation in the project area is not favorable for the use of insecticides in prevention of dracunculiasis. Not a single pond per village is responsible for the transmission of dracunculiasis as reported to be the case in Ghana (Lyons, 1973). The number of transmission foci of type 6 (man-made ponds) may be up to 10 in the fields of most villages. Besides the difficulties in identifying these different transmission sites, it would be almost impossible for a control team to reach the ponds during the rainy season when the small roads are in bad condition and often impassable. This would be the time when Abate would have to be applied. Therefore, chemical water control cannot be recommended as a practical method in the endemic region of western Upper Volta. (pp. 10)

In 1977 and 1978, as an alternative control method, the inhabitants of the infected villages were informed through health education programs of the need to filter water. Difficulties at first were encountered with the use of cotton filters. The time required for filtering generated impatience among the villagers. The cotton fibers would swell when wet, resulting in decreased diameter of the pores, increased retention of debris, and slow rate of filtration. Use of a monofilament nylon (which did not swell when wet) was found to be a great improvement over cotton. Nevertheless, Steib reported continued poor acceptance of filtration by villagers. It was unclear if the decrease in prevalence noted in the years 1977 and 1981 (Table 5.1) reflects an impact of these health education programs on disease incidence.

5.1-4. Guiguemde, T.R. Epidemiologic studies and control of Guinea worm in the wet savannah region (Niangoloko region). Annual Activity Report 1984. 25th Technical Conference OCCGE-Centre Muraz (15-19 April, 1985) Bobo Dioulasso.

This document provides an overview of the OCCGE projects in the Banfora Region of the Comoe province (Figure 5.1). A series of papers has been generated through the important research activities of this group, which is headed by Dr. T.R. Guiguemde and based at the Centre Muraz in Bobo Dioulasso. The field studies are centered in the province of Comoe, near the city of Banfora, the same general area of previous studies by Lamontellerie. The activities, which have enjoyed WHO and USAID funding, have been developed in the following phases:

Phase I: Epidemiologic studies of guinea worm, including sampling for cyclops, clinical studies, treatment costs and estimates of agricultural losses. (Completed)

Phase II: Field studies of impact of health education in association with the supply of protected drinking water (well drilling), and health education with the provision of water filters for personal prophylaxis. (Completed)

Phase III: Field studies of the effect of health education and of chemical treatment of water sources and the combined effect of these two actions. (In progress)

This report reviews the success of Phase II activites (see below for a review of Phase I results). Health education is provided by village health workers using pictures and posters to inform residents. The course was designed by Dr. Guiguemde to stimulate use of personal prophylactic measures (nylon-mesh water filters) and promote an understanding of the transmission cycle of the parasite (Annex 8). The village sessions are held biweekly and consist of a ninety minute discussion/dialogue with the rural people. Dr. Guiguemde has demonstrated a marked decrease in disease incidence using health education alone or combined with supplying protected drinking water in three villages in the Banfora region (Table 5.2).

TABLE 5.2

IMPACT OF PHASE II CONTROL MEASURES ON GUINEA WORM DISEASES
IN OCCGE PILOT VILLAGES
COMOE' PROVINCE, BURKINA FASO

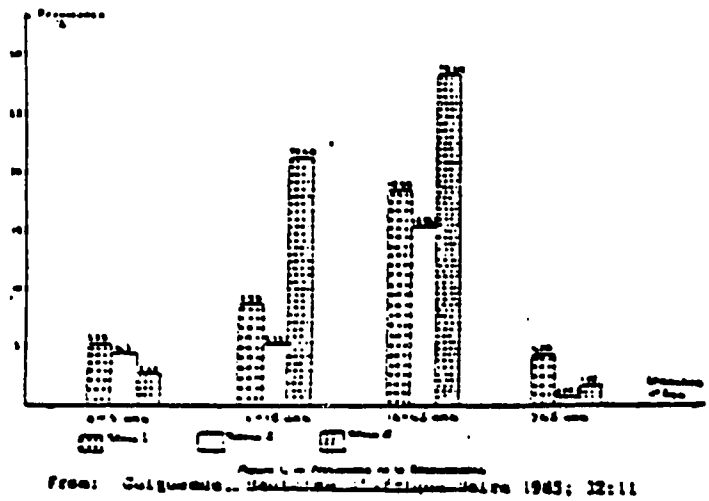
VILLAGE (pop.)	PREVALENCE BEFORE CONTROL	PREVALENCE AFTER CONTROL	CONTROL MEASURES
Panga (713)	37%	1.5%	WELLS & HE*
Mitieredougou (667)	24%	3.5%	HE
Nofesso (309)	54%	8.4%	HE

*HE = Health Education

5.1-5. Guiguemde, T. R., Sokal, C.D., Roux, J. Dracunculose: Etudes epidemiologiques en zone de Savane (Haute-Volta): I. Consequences clinique. Medecine d'Afrique Noire 1985; 32(1): 9-14.

This published report summarizes the results of the Phase I clinical studies in the Banfora region. In a retrospective study in three villages, the yearly GWD incidence ranged from 24% - 53%. The adjusted age-specific prevalence was highest in the 16 - 45 year old group; those most likely to be involved in agricultural activities (Figure 5.3A).

Figure 5.3A



From: Guiguemde... 1985; 32:11

Lesions were most commonly found on the lower extremities (92%). Eighty-six percent of infected persons with lower extremity lesions were totally immobilized for an average of 17 days (range 10 - 150) (Table 5.4B). The average duration of complete immobilization was longer for affected individuals in the 16-45 year age group (23.8 days). Permanent disability occasionally resulted from severe joint involvement and secondary bacterial infections.

Figure 5.4B

Répartition des malades selon la durée d'invalidité totale.

Nombre de jours d'invalidité totale	1 jour	2-10 j	11-30 j	31-60 j	61-90 j	91-120 j	121-150 j	TOTAL
Nombre de malades	50	160	141	35	14	6	6	413
% malades	14 %	42 %	33 %	9 %	3 %	1 %	1 %	100 %

Durée invalidité totale = 31 = malades n'ayant eu qu'une invalidité partielle.
N. B. : 56 % des malades ont donc eu une invalidité totale dont la durée varie entre 1 et 150 jours.

From: Guiguemde, Medecine d'Afrique Noire 1985; 32:12

Among the three villages, the total number of work days lost was estimated to be 7,596 days.

5.1-6. Guiguemde T.R., Kagone M., Compaore T., Meda P., Lozac'Hmeur, Sokal C.D., Roux J., Orivel F., Millot B. Projet d'etudes epidemiologique et de controle de la dracunculose en zone de savane humid, Resultats de la lere annee d'etude III. Les consequences socio-economique de la dracunculose: Esquisse d'une methode d'evaluation du cout economique de cette maladie. XXIII conference Technique OCCGE, (April 1983-Ouagadougou) Doc. No. 8 377/83/Doc Tech OCCGE, pp. 50-90.

This report, generated from Phase I activities, endeavors to determine costs (in terms of agricultural losses and treatment requirements) of GWD. A formula is developed and applied to the 3 villages of the study area. Detailed description of these calculations is beyond the scope of this presentation.

A. Estimate of agricultural productivity: the formula considers (1) the amount of land cultivated, (2) the productivity (based on fertility) of the soil, and (3) the value of cereal produced (a cost/kilogram of a crop is given to allow an estimate of cash value of production). In addition, the formula determines (4) "active worker equivalents," which accounts for the age of the various family members and their individual productivities (those aged 0-16 or over 45 years were considered to provide only one half of the output of adults aged 17-45). The results provide an estimated annual earnings/active equivalent of $256.00 per year. The expected productivity of the three villages, assuming no GWD is $566,528 [my calculation based on authors' figures (not given in the paper) is 2213 active equivalents X $256 = $566,538].

B. Estimation of agricultural loses from GWD: formulas consider (1) the type of invalidity (partial or total), (2) the duration of invalidity, (3) the moment of arrival of the invalidity during the period of agricultural activities (planting, cultivating and harvest), (4) the age of the person afflicted, (5) the intervention from other members of the community to assist the stricken family. For the 3 villages studied, the total agricultural loss due to GWD was estimated at $20,906.

C. Estimation of costs of treatment: A formula was derived to calculate cost of treating guinea worm disease (including anti-inflammatory agents, antibiotics, analgesics, tetanus immunization, and bandaging). Costs of routine and complicated cases were considered.

A total economic cost of GWD to the 3 villages studied was $39,196 (about 4% of the gross production of the villages). The authors conclude with application of the figures to the entire country of Burkina Faso by making the following assumptions:

D. Comoe' Province (where the study was completed) has 21 villages of similar GWD prevalence to that of the 3 villages studied.

E. Burkina Faso has approximately 15 provinces with equivalent prevalences to Comoe'.

Therefore:

F. $39,000/3 x 21 x 15 = $4,330,000 lost per year due to GWD.

5.1-7. Gbary, A.R., Guiguemde, T.R., Ouedraogo, J.B. Dracunculose: Etude des croyances et attitudes des population en zone endemique de savane (Burkina Faso). (1986) Doc. No. 8.921-86/Doc Tech.

A knowledge, attitude and practices (KAP) survey was carried out in six villages in the Comoe study area. Responses varied greatly among villages. Sixty-eight percent of villagers did not know how GWD was acquired; 30% of villagers correctly associated the illness with water. A supernatural cause for GWD was cited only rarely. Traditional treatment was diversified and based on application of plant extracts. Eighty-three percent of villagers did not know any way to prevent the infection. Ponds were the most commonly used water sources during the rainy season, despite of the presence of modern wells. Reasons for using pond water were the better taste and proximity (convenience) of pond water when available.

5.1-8. De Lorenzi, G. and Volta, C. Influence de l'implantation de forages our la prevalence de la dracunculoses. Projet Eau Potable. 1986 (unpublished research for Medical Student Thesis).

This report was generated from a larger project entitled Application de Programmes d'Hydraulique Villageoise et de Soins de Sante Primaires aux Microproject de Developpement Rural (Burkina Faso) of the Organisation Internationale de Cooperation pour la Sante. The project has been active since 1983 in the areas of village water supply and provision of health education. Physician consultants and medical students have been provided for this project by l'Hopital de la Pitie Salpetriere in Paris, in collaboration with the MOH.

In 1984 a baseline survey to determine the GW infection status of 101 villages was performed in the provinces of Yatenga and Soum (Figure 5.1). The infection was well identified and known by the population (In the local languages, the name for guinea worm in Arabic-Yini, in Pouhl-Bureti, in More'-Anegue, and in Bambara-Segele). A single question (had cases of GWD occurred in the village in the last year?) was posed by mobile teams to chiefs, village health workers, village midwives or CDR agents). In addition, if any other villagers who were present during the interview, they too were asked. No effort was made to quantify numbers of cases which had occurred; villages were qualitatively classified.

This report was a follow up to the 1984 survey. Repeat visits were made to determine the impact of the provision of protected water supplies on the (village) incidence of infection. Most (if not all) villages had been supplied with protected water sources. The followup survey was accomplished by a medical student (Gilles De Lorenzi) and a project technician (Christine Volta) in September, 1986, at the end of a rainy season.

Globally, there was a positive effect on the incidence of GWD. In 1984, 53 of 101 (52%) villages were affected. In 1986, 34 of 101 (34%) villages were affected. Among the 53 villages affected by GWD in 1984, 35 were now clear, a clearance of 56%. However, 16 of 48 villages that had not been affected in 1984 now reported being affected. This indicated an attack rate among previously spared villages over the two year period of 33%.

The authors note that no health education component was included in the village water projects active in the areas surveyed. The impact measured

reflected the effect of placing wells without attempts at changing water use habits of villagers. Continued use of these traditional water sources particularly by individuals working in the fields, was believed to explain the continued transmission of GWD in villages supplied with protected water sources. Villagers still drank from contaminated traditional water sources if it was convenient. Some noted that water from open sources had a better taste compared with water obtained from draw wells and tube wells. In addition, villagers thought that it was better to obtain water from open water sources rather than ground water during the rainy season because this would preserve water in the wells for use during the dry season. The authors stressed the importance of health education components in all water projects to sensitize the villagers of the health risks associated with drinking from unprotected water sources.

5.1-9. LeBras, M. Indicateurs sanitaires et utilization de l'eau en zone soudano-sahelienne (a propos dans la region de Bam-Kongoussi, Burkina Faso). Rapport d'activite scientifique No. A24-83 L 0950. U.E.R. de Medicine et Hygiene Tropicale. Departement Sante et Development. Universite' de Bordeaux. 27 March 1986.

Researchers from the University of Bourdeau report urinary schistosomiasis and dracunculiasis in the province of Bam (Figure 5.1). The purpose of the study was to measure improved health associaated with use of clean water by villagers. Schistosomiasis haematobium and dracunculiasis were picked as indicator diseases because they could be rapidly and simply assessed. The study area was a plateau with a population density of 40 inhabitants/km^2 (principally Mossi) A sample of 20 study villages were selected for survey. Sampling procedures considered environmental diversity of villages. A total of 1,717 persons were interviewed. The Mossi ethnic group comprised 88.6% of the sample, the Pouhl 7%. Urine examinations were performed to measure S. haematobium infection. Guinea worm infection was determined by examining for cutaneous lesions and by history.

The results are given in Table 5.4. Overall prevalence was 12.5% per guinea worm among the sample; 12.8% of the Mossi reported having had GWD within the last year, 24.8% of the Pouhl, and 0% of the other ethnic groups represented in the sample. No explanation was given for the difference in incidence among the various ethnic groups. Children ages 0-4 years were rarely affected.

The study found an average of 3,083 days of work were lost each year per 10,000 persons to guinea worm infection. In the village most affected, 9,000 days of work per 1,000 individuals were lost. In contrast, although the overall sample prevalence of schistosomiasis haematobium (30.7%) was greater than that of GWD, the days lost attributed to schistosomiasis was less: 494 days per 1,000 inhabitants per year.

Table 5.4

Prevalence of Guinea Worm Disease in Bam Province

By Village Location

Location	No villages	Population	GWD Prev	Range
Plain	4	367	13.3%	0 - 29.7%.
Lake	5	401	24.9%	.8% - 35.1%.
Hilly (no water)	4	381	18.7%	6.5% - 35.7%.
Hilly (with water)	1	153	0.0%	
Lowlands (poor drainage)	4	252	12.2%	6.5% - 23.8%
Lowlands (good drainage)	2	163	11.3%	0 - 22.6%.
TOTAL	20	1717	12.5%	0 - 35.7%

Population flux was notable, with movements of people both within the region and from entry of migratory populations from elsewhere, particularly neighboring countries of Cote d'Ivoire and Ghana. These population movements often made it difficult to determine areas where the infections were acquired.

5.4 PASSIVE CASE REPORTING OF DRACUNCULIASIS

Some 46,000 cases were reported in Burkina Faso during the 16 year period 1971-1986 (average of 2876 cases/year). The exact case count is unclear (Table 5.5). The trend suggests that the number of cases is decreasing (Figure 5.4). This trend is supported by additional information sources which suggest that the incidence of GWD has declined in the endemic areas in Comoe (Lamontellerie, 1987, Guiguemde personal communication), Kossi (Steib, 1982), Yatenga (DeLorenzi and Volta, 1986), and Soum provinces (DeLorenzi and Volta, 1986). The reasons for the decline, if it has occurred, are unknown, although it might be explained by increasing use of improved water supplies, or by recent drought (which may also influence transmission).

For the years 1984 and (the first 2 trimesters of) 1986 ,a total of 2366 cases were reported. Reports were unavailable for 1985. Twenty-seven of the 30 provinces reported GWD in one or both years (Table 5.6). The 3 provinces not reporting cases (Bazega, Zoundweogo, and Sourou) border with endemic areas, and so might be suspected to also be endemic. Seasonal variations in reporting were noted and were consistent with trends reported in the medical literature (Section 5.1). The greatest number of cases (68%) occurred during summer months (May-September), corresponding with peak rainfall in Burkina Faso (Figure 5.7).

The ten provinces with the highest annual incidence are given in Table 5.7. The incidence in the province of Sanmatenga (7/10,000) was 1.5 times that of the next seven provinces, approximately 3-4/10,000. The annual incidence of GWD by province (Figure 5.6) is shown.

5.2-1. Precautions in interpreting official statistics

It is likely that many cases occur that are not reported in the passive reporting system. Several reasons for this are as follows: 1) GWD is seldom fatal and therefore commands little attention at the reporting units. 2) The disease is extremely focal in space; one village may be severely affected year after year while neighboring villages are completely spared. This results in a tendency for unreported foci to remain unreported. 3) The infection occurs almost entirely in rural areas, where health facilities are sparse. 4) Many of its rural victims are crippled and cannot reach even nearby health facilities. 5) Finally, no simple and effective treatment exists for an erupting guinea worm. When the villagers realize that little more can be done for the condition, many lose the incentive to attend clinics. In addition, intrinsic errors in the reporting system itself, usually in the form of incomplete filing by the CSPS or Primary Health Center (PSP) units, can result in underreporting. For example, the 20 reporting centers of the province of Kadiogo filed 83 of 240 monthly reports (65%), and the 13 reporting centers of Passore Province filed 47 of 156 monthly reports (30%) (Annex 9).

TABLE 5.5

DRACUNCULIASIS IN BURKINA FASO

NATIONAL CASE REPORTS 1971 - 1986

YEAR	NUMBER OF CASES REPORTED	(ALTERNATE FIGURES)
1971	5822[1,2]	
1972	4404[1,2]	
1973	4008[1,2]	
1974	6277[1,2]	
1975	1557[1,2]	
1976	— [1,2]	(830)[5]
1977	2885[1,2]	
1978	2694[1,2]	(2938)[5]
1979	2565[1,2]	(2418)[5]
1980	2620[3]	(2157)[5]
1981	— [3]	(2134)[5]
1982	— [3]	(3485)[5]
1983	4362[3]	(2031)[5]
1984	1739[4,5]	
1985	— [4]	
1986 (Incomplete)	627[4]	

1) DesFontaine, M. and Prod'Hon, J. Repartition Geographique de la Dracunculose dans les etats de L'OCCGE. XXI OCCGE Technical Conference (13-17 April 1981-Bamako) Doc. No. 7.739/81/Doc.Tech.OCCGE. pp. 6
2) World Health Organization. Dracunculiasis surveillance. Wkly Epidem Rec 1982; 57, 65-7
3) World Health Organization. Dracunculiasis: Global surveillance summary—1985. Wkly Epidem Rec 1986; 61, 29-36.
4) World Health Organization. Dracunculiasis: Burkina Faso. Wkly Epidem Rec (in press)
5) De Lorenzi, G. and Volta, C. Influence de l'implantation de forages our la prevalence de la dracunculoses. Projet equ potable. 1986 (unpublished).

FIGURE 5.4

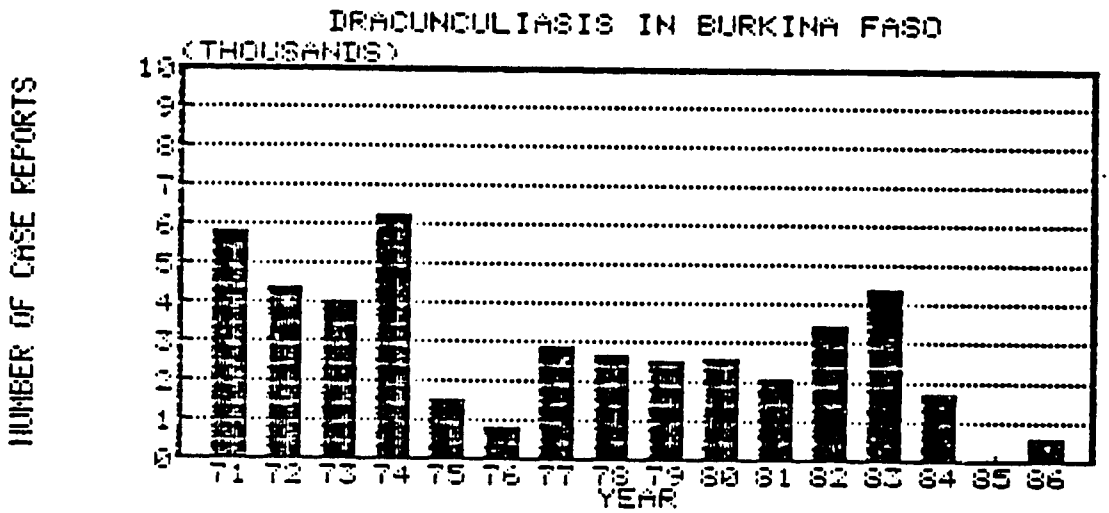

DRACUNCULIASIS IN BURKINA FASO
(THOUSANDS)
NUMBER OF CASE REPORTS
0
2
4
6
8
10
71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86
YEAR

Table 5.6

DRACUNCULIASIS: ANNUAL INCIDENCE
BY PROVINCE IN BURKINA FASO

PROVINCE	POPULATION	NUMBER OF CASES 1984	1986*	TOTAL	INCIDENCE PER 10.000	RANGE
1. BAM	164,263	77	18	95	3.5	6
2. BAZEGA	306,976	0	0	0	0.0	29
3. BOUGOURIBA	221,522	0	19	19	0.5	20
4. BOULGOU	403,358	229	6	235	3.5	5
5. BOULKIEMDE	363,594	53	0	62	1.0	14
6. COMOE	250,510	59	92	151	3.6	4
7. GANZOURGOU	196,006	4	12	16	0.5	21
8. GNAGNA	229,249	93	—	93	2.4	9
9. GOURMA	294,123	11	3	14	0.3	23
10. HOUET	585,031	47	44	91	0.9	15
11. KADIOGO	459,138	237	51	288	3.8	3
12. KENEDOUGOU	139,722	1	1	2	0.1	25
13. KOSSI	330,413	0	3	3	0.05	27
14. KOURITENGA	197,027	3	11	14	0.4	22
15. MOUHOUN	289,213	35	2	37	0.8	18
16. NAHOURI	105,273	3	2	5	0.3	24
17. NAMENTENGA	198,798	36	12	48	1.4	11
18. OUBRITENGA	303,229	72	21	93	1.8	10
19. OUDALAN	105,715	0	10	10	0.6	19
20. PASSORE	225,115	30	9	39	1.0	13
21. PONI	234,501	64	41	105	2.7	8
22. SANGUIE	218,289	0	2	2	0.05	26
23. SANMATENGA	368,365	295	134	429	7.0	1
24. SENO	230,043	148	9	157	4.1	2
25. SISSILI	246,844	24	12	36	0.9	16
26. SOUM	190,464	11	27	38	1.2	12
27. SOUROU	267,770	0	0	0	0.0	28
28. TAPOA	159,121	16	6	22	0.8	17
29. YATENGA	537,205	191	71	262	2.9	7
30. ZOUNDWEOGO	155,142	0	0	0	0.0	30
TOTAL	7,976,019	1,739	627	2,366	1.8	

*For 1986 the data represents only the first and second trimesters

FIGURE 5.5

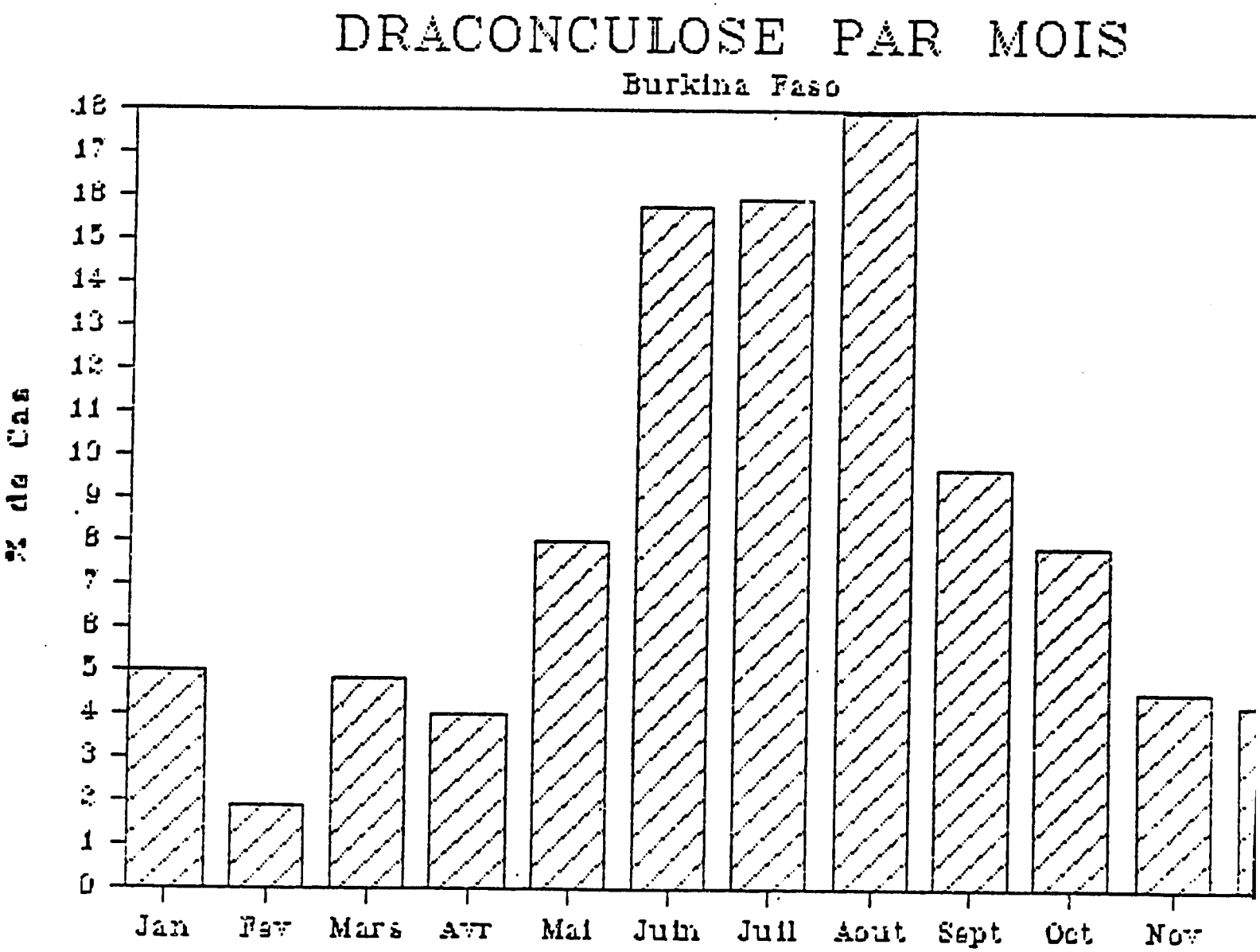

DRACONCULOSE PAR MOIS
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Table 5.6

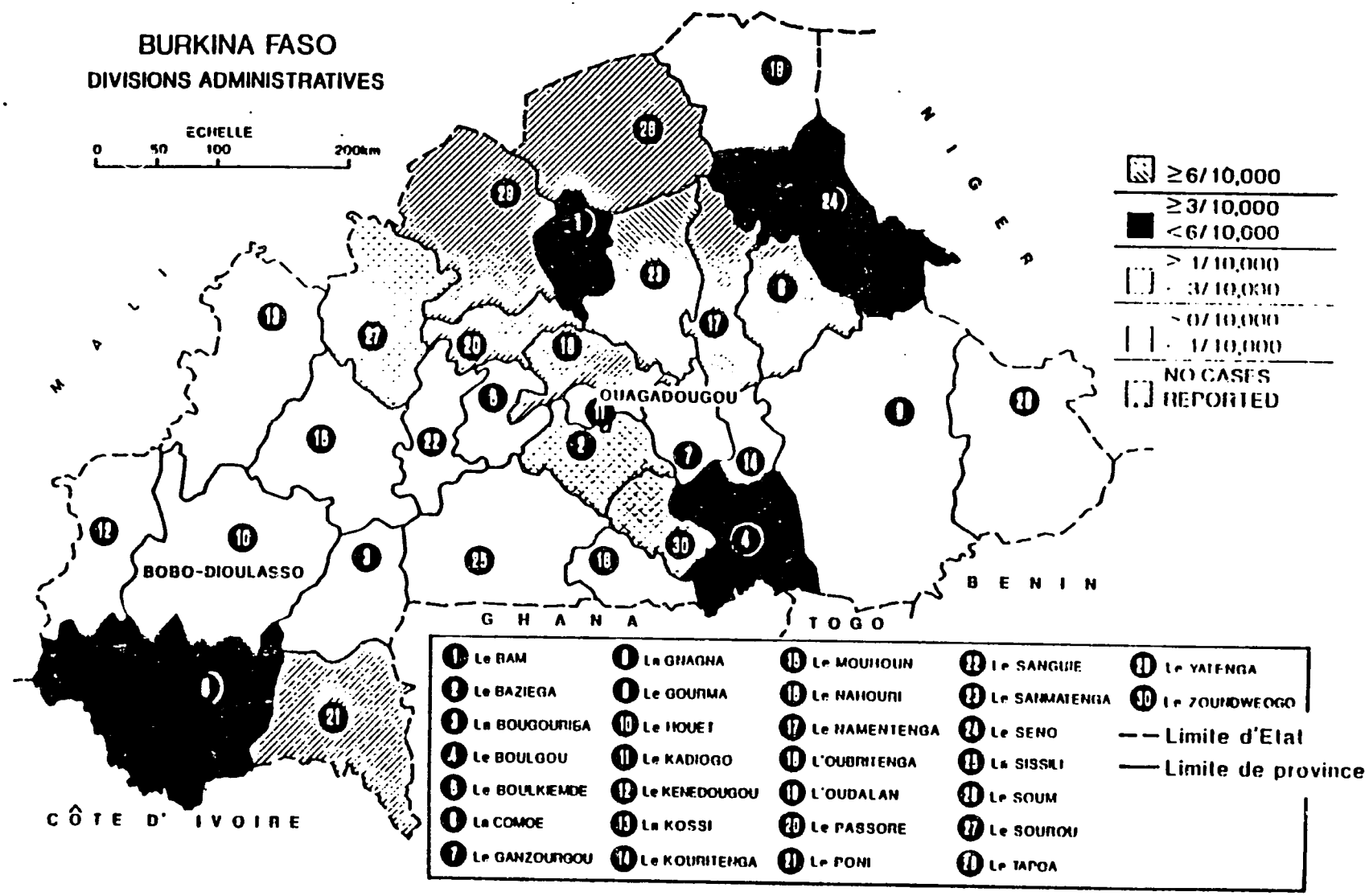
ANNUAL INCIDENCE OF DRACUNCULIASIS:

TOP TEN PROVINCES IN BURKINA FASO

CALCULATED FROM PASSIVE REPORTING SYSTEM (YEARS 1984 AND 1986)

	PROVINCE	INCIDENCE/10,000
1.	Sanmatenga	7.0
2.	Seno	4.1
3.	Kadiogo	3.8
4.	Comoe	3.6
5.	Boulgou	3.5
6.	Bam	3.5
7.	Yatenga	2.9
8.	Poni	2.7
9.	Gnagna	2.4
10.	Obritenga	1.8

DRACUNCULIASIS: AVERAGE ANNUAL INCIDENCE BY PROVINCE BASED ON PASSIVE CASE REPORTING IN 1984 AND 1986



5.4-2 Estimates of actual numbers of cases in Burkina Faso

Estimates were made of actual numbers of cases of GWD which occur annually in Burkina Faso. These were based on the available data from the Comoe Province [where the OCCGE research project maintains some degree of active case detection activities (Sections 5.1 and 6.4)] and extrapolated to the entire country as follows:

Comoe' province

Active case detection in 1984

3 villages surveyed in Comoe' province have 591 cases in 1984: average number of cases/village = 197

Comoe' has 39 affected villages

[Note: total villages in Comoe' = 203 Therefore 39/203 = 19% of villages affected. Of interest is the report (Section 5.1-1) by Lamontellerie who found 71 of 147 (48.3%) villages surveyed in the general region of what is now Comoe' Province (Cercle of Banfora)]

39 villages X 197 cases/village = 7683 cases estimated in 1984

7683 cases/250,510 population of Comoe' = 307 cases/10,000

Passive reporting system reports 59 cases in 1984 for the entire Comoe' province (Table 6.3.3)

Therefore, 59 cases reported/7683 estimated actual cases = 0.8% (less than 1% of cases are reported through the passive reporting system)

Extrapolation to all of Burkina Faso

Estimate 1

Dr. TR Guiguemde estimates 15 provinces in BF with similar incidence to Banfora (Section 5.1-6)

15 X 7683 = 115,245 cases year (144/10,000)

Estimate 2

Using surveillance rankings, Comoe is in the middle of the top ten provinces reporting dracunculiasis (Table 6.3.2)

10 X 7683 = 76,830 cases/year (96/10,000)

Importance of dracunculiasis as a health problem

Population of BF = 8,000,000

Population at risk = 8,000,000 X .55 (proportion of population over 15 yrs)

X .85 (proportion of population rural)

= 3,740,000

Percent of rural adults infected/year

Estimate 1

115,245/3,740,000 = 3.1%

Estimate 2

76,830/3,740,000 = 2.1%

Clearly, these estimates need much refinement and are acceptable only to make general statements of the importance of GWD in Burkina Faso. Additional intelligence about numbers of cases and precise disease distribution is required to target the departments and villages in need of control efforts. The POA should devote resources to strengthen surveillance activities in the MOH. This would best be accomplished through active surveillance methods based on village by village visitation in a manner similar to that described by Lamontellerie (Section 5.1-1) and DeLorenzi and Volta (Section 5.1-8). Mailed questionnaire surveys (Section 2.1-2) and improved passive surveillance techniques (Section 6.2-3) are alternatives for improving methods of detecting GWD.

6. INSTITUTIONS RELEVANT TO A POA

6.1 Committee for the Defense of the Revolution (CDR)

The national CDR service maintains community delegates in many villages throughout Burkina Faso. The primary function of this infrastructure is political, although the POA (Section 7 and Annex 2) proposes to use the CDR for surveillance activities. If the national political structure embraces GWD as an issue, then the use of this infrastructure could be extremely important to the POA.

6.2 MINISTRY OF HEALTH [discussion from Reeser C.G. (1986) Nutrition Surveillance in Burkina Part I--A compendium of information on nutritional status and planning in Burkina, November, 1986, USAID report]

The organogram of the MOH (Figure 6.1) indicates the different services and bureaus in relation to each other and to each level of the health delivery system. Four national MOH organizational structures would be of greatest importance to the plan of action for eliminating dracunculiasis.

6.2-1 DCFS (Direction Central de Formation Sante-National Center for Health Structure):

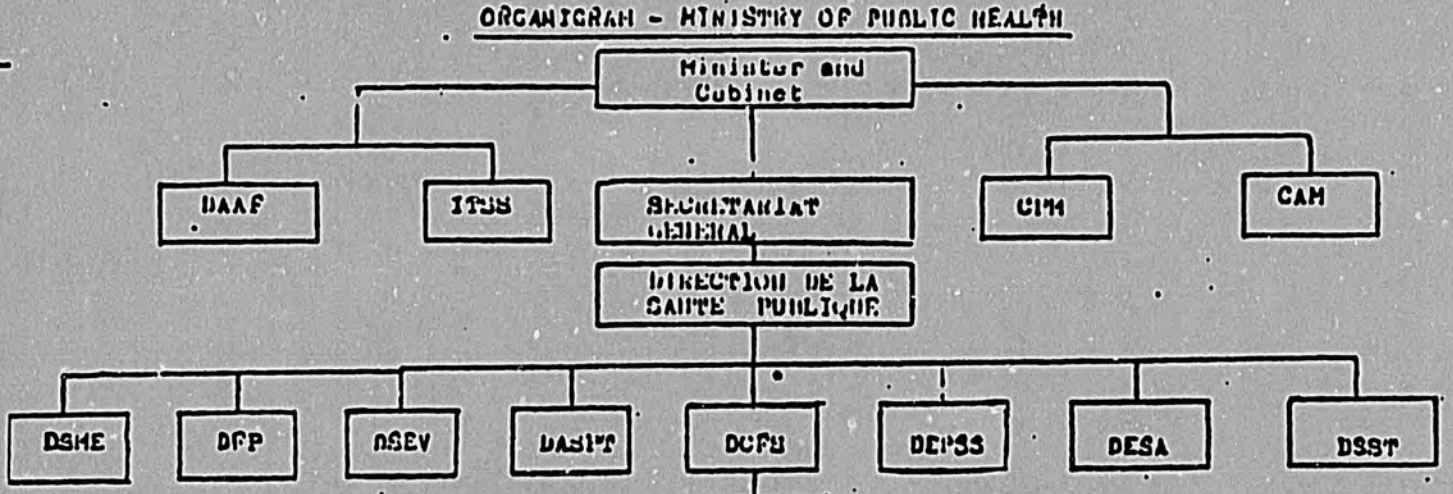
This administrative structure has central responsibility for the primary health care (curative health) services from the central level to the basic health care units and the hospitals. Although the provincial level medical services are expected to serve populations of about 250,000, the Burkinabe health care delivery system focuses on primary units called Centers for Health and Social Promotion (CSPS) and Primary Health Posts (PSP). Each CSPS unit is expected to serve a population of 15 to 20,000. About 281 CSPS units and 1,184 PSPs are now operating in the country. CSPS units are the lowest level that is professionally staffed (registered nurses or nurse practitioners). PSP's are smaller than CSPS units and function essentially as dispensaries.

The CSPS have outreach programs which support village level community health workers (CHWs) who are trained as (general) village health workers (VHWs) or as traditional birth attendants (TBAs). A VHW and a TBA are expected to serve a population of about 1,000. A goal of the MOH is to provide CHWs to all villages.

About 25 villages are included within an "action radius" (catchment area) of a given CSPS. Mobile itinerant health workers (IHWs) form the basis of the CSPS outreach activity to the CHWs. The IHWs, who are supervised by registered nurses at the CSPS, use small motor bicycles to make monthly visits to their assigned villages. The IHWs focus on community development for improved health by: (1) assisting in the provision of curative services and health education, (2) encouraging health-related community activity, and (3) supporting and resupplying CHWs.

The POA should be directed to mobilizing the DCFS, which is the largest of the MOH sections. IHWs and CHWs should be the grass roots workers

Figure 6.1
ORGANOGRAM OF THE MOH



LEGENDE:

DAAF - Direction des Affaires Administratives et Financières
ITSS - Inspection Technique des Services de Santé
CIM - Commission du Temple Chargée du Secteur Ministériel
CAM - Comité d'Administration Ministériel
DSME - Direction de la Santé de la Mère et de l'Enfant
DFP - Direction de la Formation Professionnelle
DSEV - Direction de la Surveillance Epidémiologique et Vaccinations
DASIT - Direction de l'Approvisionnement Sanitaire et de la Pharmacopée Traditionnelle
DCFS - Direction Centrale des Formations Sanitaires
DEPSS - Direction des Etudes, Planification et des Statistiques Sanitaires
DESA - Direction de l'Education pour la S et Assainissement
DSST - Direction des Services de Santé du Travailleurs
DPS - Direction Provinciale de la Santé
CHR - Centre Hospitalier Régional
CM - Centre Médical
CSPS - Centre de Santé et Promotion Soci
PS - Poste de Santé Primaire

who will provide surveillance information, the locations of potentially infected water sources (for Abate treatment) and actively participate in health education programs and personnel prophylaxis directives. These workers often are illiterate, however, and probably could not serve as applicators for Abate.

6.2-2 DES (National Center for Epidemiology and Statistics):

DES collects and analyses statistical data reported through the passive surveillance system.

Operation of the surveillance system: PSP and CSPS are the principal reporting units for the national surveillance system. The system is based on diagnoses of patients seen at the health care facilities of the DCFS. Extensive (8 pages) report forms (Annex 10) which include 31 (often complicated) diagnostic categories, are sent by these units and regional hospitals to provincial MOH headquarters. Cases of dracunculiasis are reported on these forms.

The DES unit of each of the 30 provincial headquarters compile the results into a single provincial report which is submitted quarterly to the central MOH DES headquarters in Ouagadougou. In 1986, 29 out of 30 provinces sent all (four) of their reports in to the central compiling service. However, it is unclear what percentage of primary units reported monthly to the provincial headquarters [this information is not compiled at the central level. In a review of reports sent to the Kadiogo provincial headquarters, 83 of a possible 240 reports from 20 primary reporting units were received in 1986--a reporting rate of only 65%. Similarly, the 13 reporting centers of Passore Province filed 47 of 156 (30%) monthly reports (Annex 9).]

DES activities in a POA should include coordination of active search activities. These activities should be developed in pilot projects through operations research in new rapid epidemiological and surveillance techniques (Section 2.2-1). Routine review of statistics and publication of periodic bulletin on progress of the national elimination effort are also activities for which the DES is responsible.

6.2-3 DEP (National Center for Studies and Planning):

DEP was created with a mandate to establish an improved data base necessary for improving decision-making as related to health. In addition, the DEP is charged with designing projects and plans of action in accordance with national health policies. The DEP monitors implementation of such projects through evaluation activities. Important among its duties are the development of better management and coordination of health programs and strategies.

USAID/Burkina currently funds a major health project (Strengthening Health Planning Capacity) through DEP offices. The project became operational in January 1985 and is funded for 5 years. The goals of the project are consistent with the mandate of the DEP, i.e., establishing an improved data base from ministerial decision-making which will improve MOH contributions to the national planning effort and to develop well-managed programs and strategies, particularly for the primary goal of delivering primary health services to rural areas.

DEP occupies a central position in the planning and execution of a POA for eliminating GWD in Burkina Faso. This organization would produce the final form of the POA, assist in finding finances, participate in the implementation of pilot phases, and evaluate progress of the nationwide effort.

One important activity of the SHPC project could be extremely helpful in solving the need for an improved (passive) case reporting and surveillance mechanism for GWD. SHPC is evaluating a new system which extends case reporting activities beyond the CSPS and PSP level to that of the village by using CHWs. This new system simplifies the number of diagnostic categories to be reported and uses an illustrated reporting form (Figure 6.2). Among the diagnostic categories requested is guinea worm disease. These forms are collected monthly from the CHWs by the visiting IHW. The CSPS then provides report of these statistics for all villages in its action radius to the provincial health director. In this way, numbers of cases at the village level are counted and selection biases which result from reporting only diagnoses of patients seeking consultation are avoided. This new DEP system will become operational in pilot areas of the country in the near future. It could serve as an important method for identifying affected villages with guinea worm disease in the pilot areas. It might also provide a vastly improved method for counting for GWD cases. On the other hand, parallel reporting demands from DEP and DES can be expected to generate extra paperwork at the CSPS level. Reporting percentages may be further depressed as a result.

6.2-4 DESA (National Center for Health Education and Sanitation):

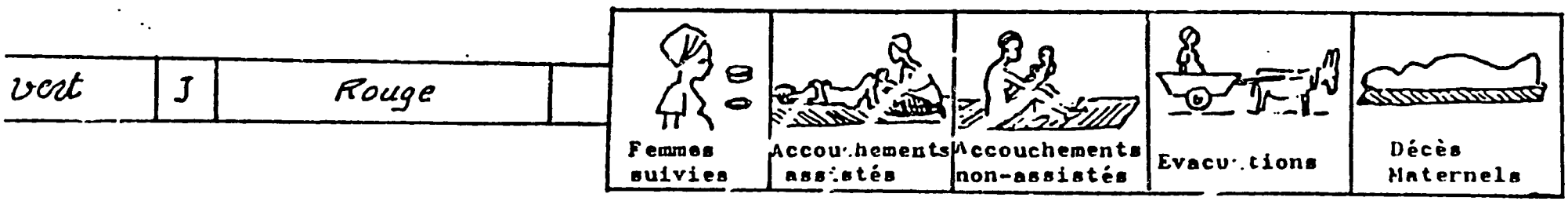
DESA consists of three services: health education, sanitation and audio-visual. Activities to promote health awareness are directed primarily toward villages and schools. A variety of simple health education booklets, posters and pamphlets have been published by the DESA which are used as resources by health personnel at PSPs and CSFSs, schoolteachers, and others. The mass media are also used at times.

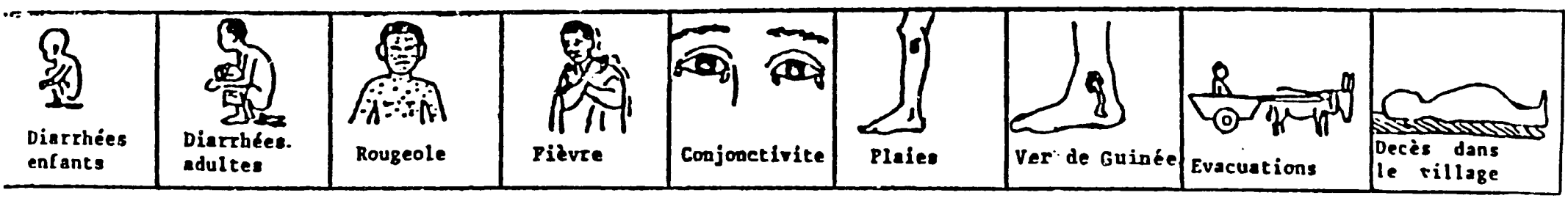
To date, the DESA has not been involved in producing educational materials concerning guinea worm disease. DESA could have POA activities associated with development of materials for use in villages, and provision of personnel to provide training for IHWs and CHWs (who could provide health education and personal prophylaxis instruction to villagers). A planned national DESA questionnaire directed to all CSPS units should have a page devoted to GWD (Section 2.1-2).

Figure 6.2

SHPC/DEP VILLAGE LEVEL REPORTING SYSTEM:

NUMBERS OF EVENTS PER MONTH ARE RECORDED BY CHW





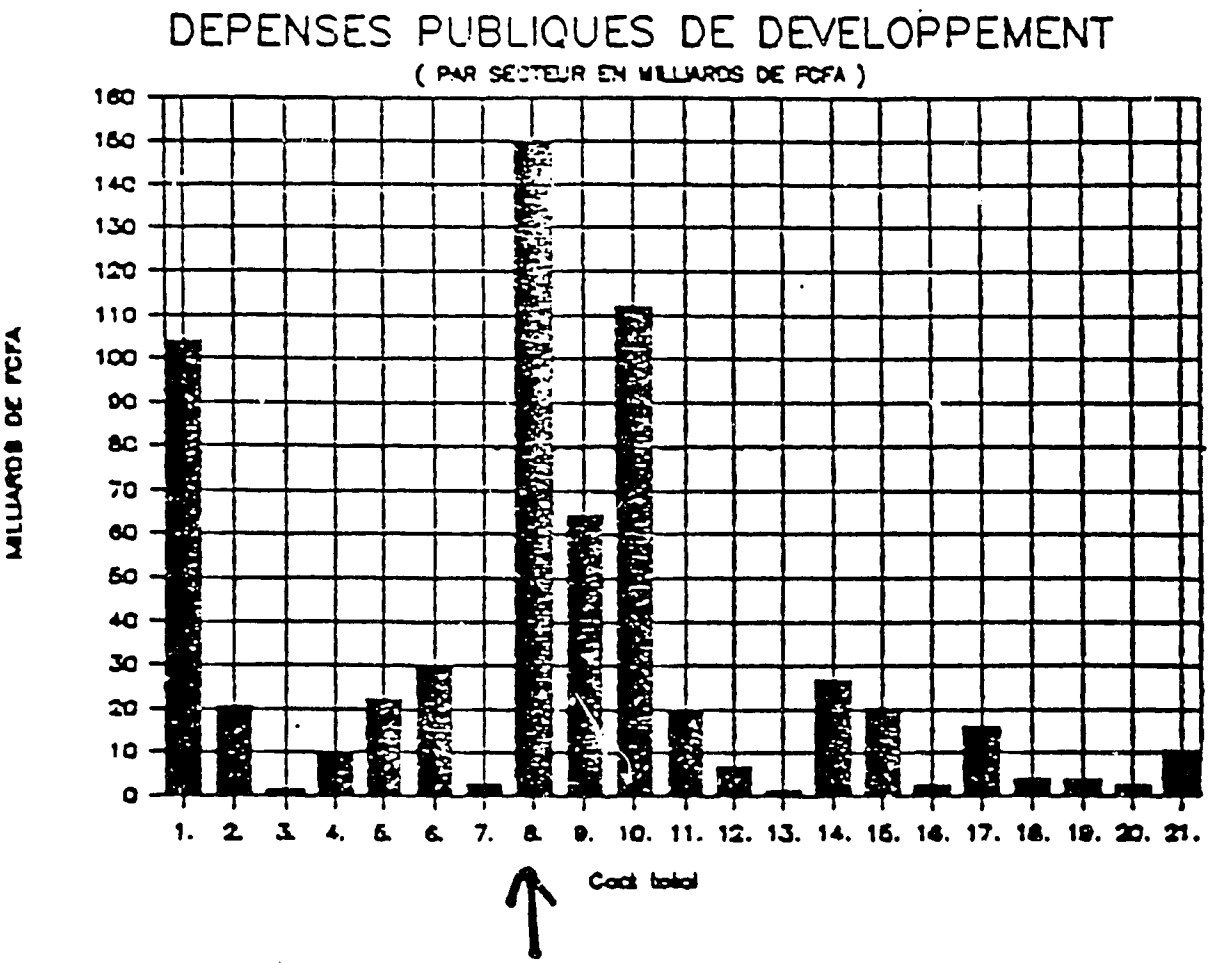
6.3 THE MINISTRY OF WATER

The Ministry of Water (MOW), which was created in 1985, oversees all urban and rural water schemes and provides a direct means for new policy development which impact the water sector. Water related activities represent 23.8% of national expenditures in Burkina Faso, the largest percentage of any sector (Figure 6.3). The National Office of Wells (Office National des Puits et Forages) is responsible for village water supply operations. This office has had heightened responsibility since 1970 given the major decreases in rainfall which have occurred throughout sub-Saharan Africa.

The government of Burkina Faso subscribes to the IDWSSD goal of providing rural people with a minimum of 10 liters/person/day of potable water. Since 1981 over 5771 wells have been placed (average of 1,154/year) at a cost of 21.5 billion CFA (72 million U.S. dollars). In the course of the current Five Year Plan (1986-1990), the office has objectives of establishing 8,200 new wells and rehabilitating 3,000 others. The funding for most rural water supply operations in Burkina Faso is provided by donor organizations. The major donor organizations with current or projected rural water supply efforts are listed in Table 6.1. Provinces where these activities (and other water projects) are occurring are provided in Figures 6.4 and 6.5, and in Annex 11.

The POA must outline certain responsibilities of the MOW in promoting a policy of priority provision of protected rural water supplies to villages endemic for GWD. The MOW should promote intersectoral coordination between the surveillance and health activities of the MOH with the water supply activities donor organizations in the various provinces. A first step toward securing this cooperation should be at the proposed National Meeting on Dracunculiasis (Section 2.1-4).

Figure 6.3



1.	.Agriculture	103,635
2.	.Elevage	20,641
3.	.Pêche	1,601
4.	.Faune-bois-forêt	9,813
5.	.Mines	22,329
6.	.Industries	29,224
7.	.Artisanat	2,898
8.	.Hydraulique	150,245
9.	.Energie	64,507
10.	.Transports	112,047
11.	.Communications	19,183
12.	.Commerce	6,831
13.	.Tourisme et hôtellerie	1,213
14.	.Education et formation	26,383
15.	.Santé	20,145
16.	.Action sociale	2,369
17.	.Habitat et urbanisme	15,356
18.	.Information	4,113
19.	.Arts et culture	3,901
20.	.Sports et loisirs	2,115
21.	.Equipements	10,492
	TOTAL	629,380

TABLE 6.1

MAJOR AGENCIES FUNDING VILLAGE WATER PROJECTS IN BURKINA FASO

COMMITTED FUNDS

AGENCY	MILLIONS CFA	MILLIONS US DOLLARS
1) FONDS SAOUDIEN	4,725	15.8
2) SAHELIAN HYDROLICS - GERMANY	3,909	13.0
3) FONDS EUROPEAN DEVELOPPEMENT	1,971	6.6
4) CAISSE CENTRALE DE COOPERATION ECONOMIQUE	1,600	5.3
5) UNICEF	1,525	5.1
6) WORLD BANK	675	2.3
7) UNDP	333	1.1
8) BANQUE OUEST AFRIQUE DEVELOPPEMENT	300	1.0
	15,038	50.2

ADDITIONAL FUNDING EXPECTED

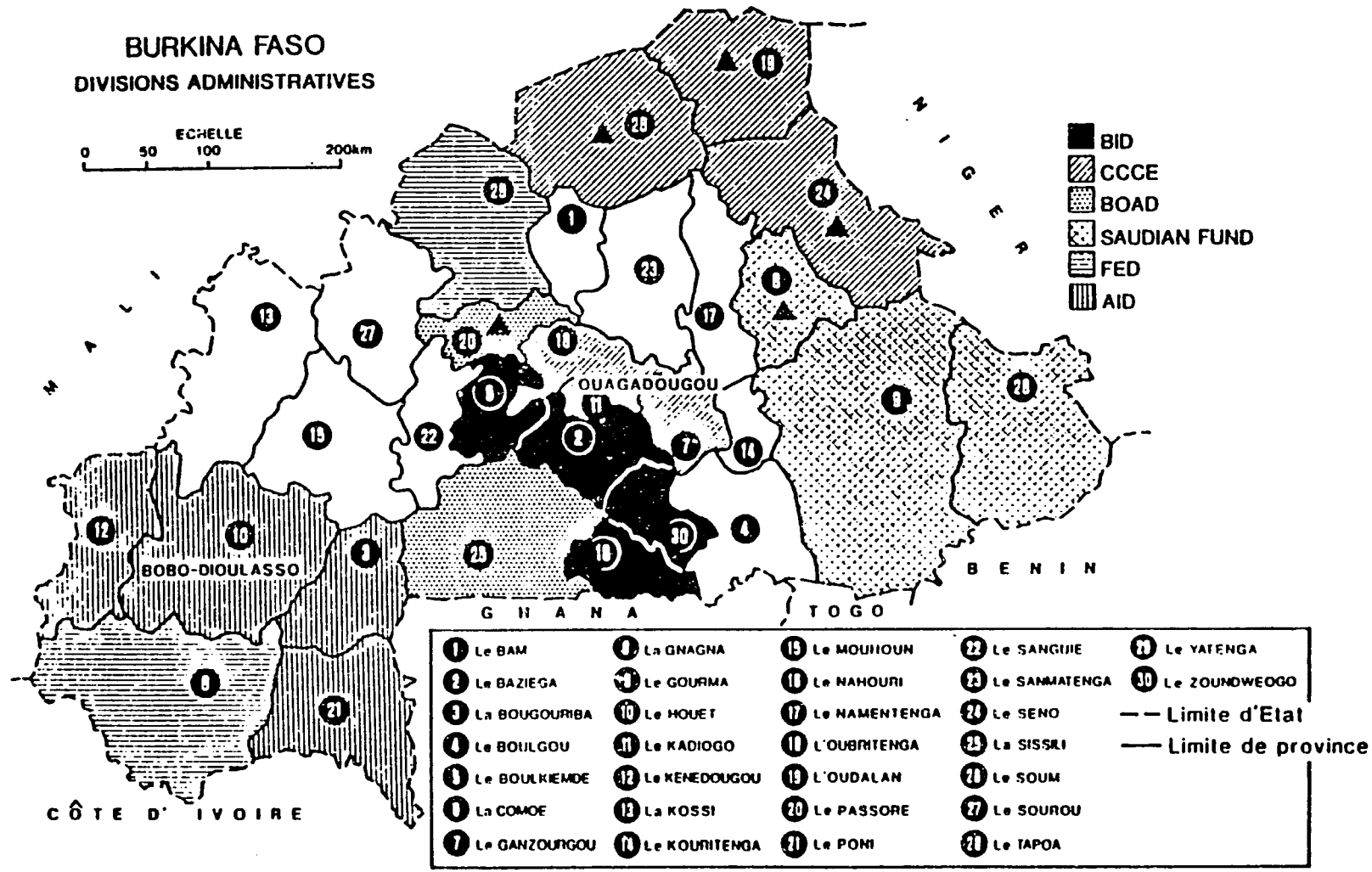
1) WORLD BANK	4,871	16.2
2) CAISSE CENTRALE DE COOPERATION ECONOMIQUE	2,329	7.8
3) CONSEIL ENTENTE	1,739	5.8
4) BANQUE OUEST AFRIQUE DEVELOPPEMENT	1,476	4.9
	10,415	34.7

*Based on information obtained from Government of Burkina Faso. Premier Plan Quinquennal de Developpement Populaire. 1986-1990. Vol. II.

FIGURE 6.4

AGENCIES FUNDING MAJOR RURAL WELL PROJECTS IN EXECUTION OR RECENTLY COMPLETED BY PROVINCE

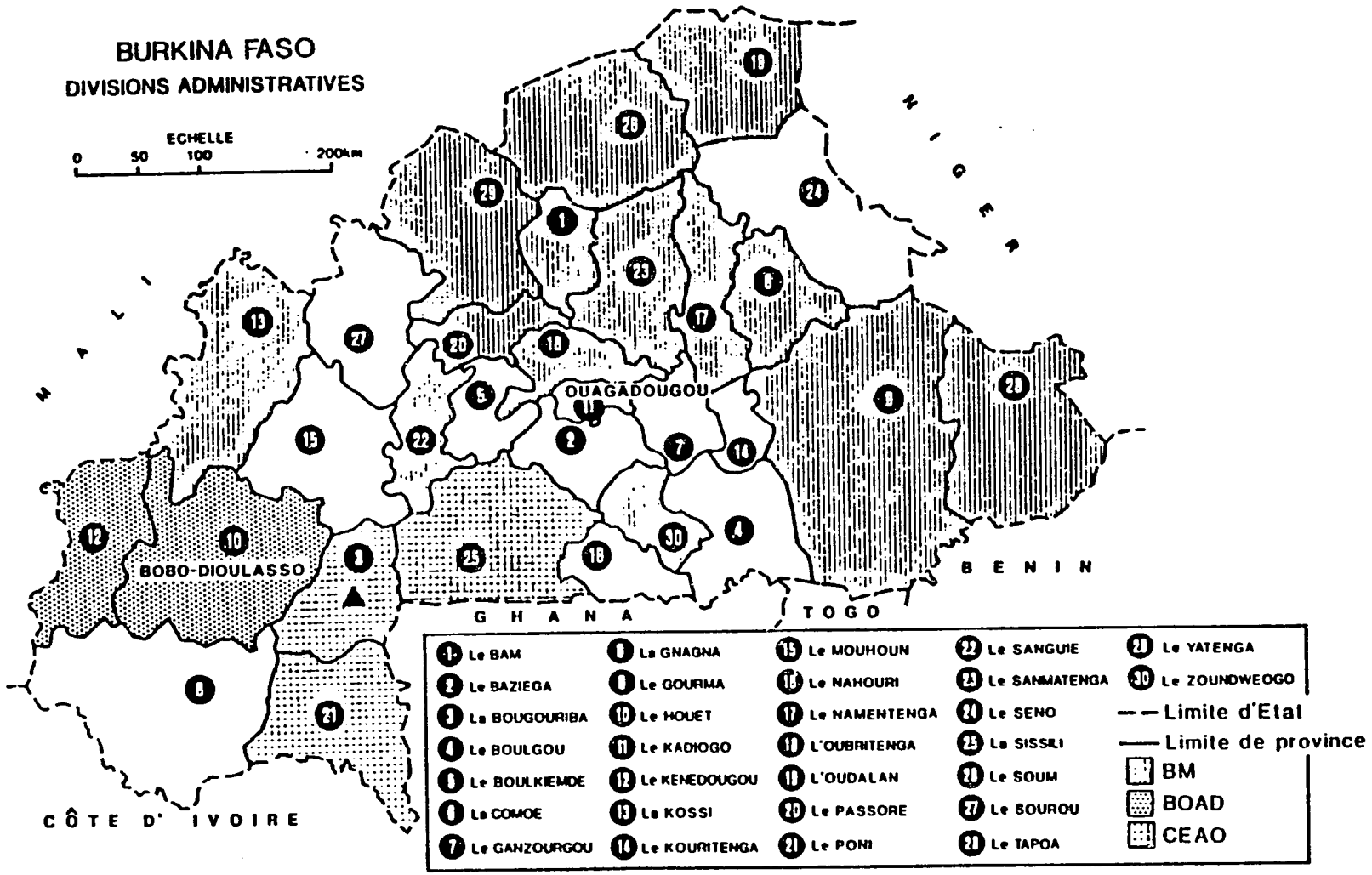
(*BASED ON PUBLISHED INFORMATION FROM THE 5 YEAR PLAN OF BURKINA FASO 1986–1990)



▲ BID projects also in these provinces

AGENCIES FUNDING MAJOR RURAL WELL PROJECTS TO BE COMPLETED BEFORE 1990 BY PROVINCE

(*BASED ON PUBLISHED INFORMATION FROM THE 5 YEAR PLAN OF BURKING FASO 1986-1990)



▲BM projects also in these provinces

6.4 OCCGE

The OCCGE is the intergovernmental African medical organization established in 1960 by the Ministers of Health of the eight African member states(the Republic of Benin, Ivory Coast, Burkina Faso, Mali, Mauritania, Niger, Senegal, and Togo). The organization was formed to provide for regional coordination and cost effective control of health concerns in the West African region. Similar concerns in other African Regions have given birth to the Organisation de Coordination pour la lutte contre les Endemies en Afrique Centrale (OCEAC) in Central Africa and the West African Council of Medical Research in Anglophone West African countries.

The principal conditions with which OCCGE is concerned include trypanosomiasis, malnutrition, measles, diarrheal diseases, onchocerciasis, tuberculosis, leprosy, malaria, yellow fever, meningitis, sexually transmitted diseases, dracunculiasis, and schistosomiasis. The mission of the organization includes applied medical research; surveys; missions and operations where epidemics occur; formation of professional expert committees; and collaboration with other national and international scientific organizations.

The Secretary General of the OCCGE is based in Bobo-Dioulasso. Several OCCGE institutes of research are located in each of the member states of the organization. One of these institutes is the Centre Muraz, located in Bobo-Dioulasso and specializing in biology, parasitology, immunochemistry and entomology. The Centre Muraz has research programs in dracunculiasis, enteric diseases, malaria, sexually transmitted diseases, yellow fever and nutrition.

Some research activities in dracunculiasis at the Centre Muraz have been described (Sections 5.1-4 through 5.1-7). These include epidemiological studies of the disease, taxonomic determinations of the intermediate host, studies of the parasite, economic and social impact of the infection, and promotion of techniques for health education and personal avoidance of the infection.

The background of two studies are of particular importance to the recommendations of this consultancy.

6.4-1 Studies of Socioeconomic costs:

These investigations are of great importance to the global GWD eradication initiative. They are being carried out with the assistance of the Center for Economics and Social Studies in West Africa (CESAO). Questionnaires have been administered which are designed to determine the social and economic activities of individuals in the community (based on age, sex and position in the community). The principal question to be answered by the study is "who would take over the responsibilities of an individual in the community when that individual is struck by a debilitating condition?" The questionnaire is also designed to determine collective costs of such debilitation to the village. It is hypothesized that the impact of the infection (in economic terms) is lessened by an efficient communal shifting of productive and social responsibility. At the beginning of the illness, it is postulated that the individual recognizes the impending emergence of the guinea worm, and, accordingly, delegates his responsibilities to others in anticipation of a period of disability. Due to the open-ended nature of the questions, however, variable responses recorded on the questionnaire are proving difficult to analyze. Additional expert assistance would probably be valuable

in analyzing the study results and initiating additional studies directed at measuring economic impact of disease.

6.4-2 A comparative study on the effect of health education and chemical control of cyclops populations on the incidence of dracunculiasis:

The general goal of this study is to compare the cost-effectiveness of these different modalities (singly and in combination) on disease control. This study is of particular importance since the manner in which Abate will be used to control GWD in Burkina Faso has not been defined.

A sample of 8 villages has been chosen in Comoe Province. Four villages have protected water sources (capped tube-wells). Four villages have no protected water sources. Among the four villages with wells, two will have health education courses, one will have Abate treatment of nearby "traditional" water sources only and another village will have both control modalities applied. In the villages without protected water supplies, a similar scheme will also be used. Health education is based on the use of village health workers and pictures in a course designed by Dr. TR Guiguemde (Annex 8).

In the villages where chemical control is used, Dr. Guiguemde has had poor success in suppressing Cyclops populations with Abate. He has found the 50% emulsifiable concentrate (EC) solution ineffective during the rainy season, but effective during the dry season. He postulates that this is because the ponds become temporary running streams during heavy rains, washing away the applied chemical. He has noted that populations of cyclops return to normal within 3 days after the chemicals have been applied and when rains occur. Resistance to Abate in the area does not occur since similar application to ponds during dry seasons is effective in suppressing cyclops populations for 4 to 6 weeks. As a result of this experience, Dr. Guiguemde feels that SG preparations of Abate are required, and has recommended this in the proposed POA (Section 7 and Annex 2).

Great difficulties can be forecast in recommending the use of SG as part of the POA in Burkina Faso; these include the following:

Only limited supplies of SG are available.

Preparation of the material in-country would require heavy equipment (Annex 12) and measures for quality control to determine if proper concentrations have been attained during the manufacturing process. If the concentrations vary among lots, then there must be a mechanism for determining what concentration actually exists; application procedures will need to be adjusted for each lot based upon actual concentration of the chemical. This would cause much difficulty among the field staff responsible for applying the chemical.

The cost of EC is one third to one sixth the cost of the EC. In addition, the EC is readily available, widely used throughout Africa by the Onchocerciasis Control Program, easily packaged and distributed, requires no quality control, and can be purchased directly from any of number of manufacturers. The disadvantages associated with SG have resulted in the Indian control program's recent change from SG to EC preparations.

The Centre Muraz should play the key role in research necessary to resolve the Abate formulation issue (Annex 4) and in the development of safe and effective distribution and application methods(Section 2.2-2).

7. REVIEW OF THE POA PROPOSAL BY DRS. AA YADA, RT GUIGUEMDE, AND BS COULIBALY (PROJECT DE PROGRAMME NATIONAL DE LUTTE CONTRE LA DRACUNCULOSE AU BURKINA FASO)

[Note: Comments are by section number in the accompanying document (Annex 2). The reader is referred to Annex 2 and Section 2.1 (Recommendations) of this report.]

Section I: Introduction

I suggest only one plan with a single budget (rather than two--Program A and Program B) be developed. The plan should propose a strategy of improved surveillance, health education, and personal prophylaxis (aided by distribution of filters). Activity will be commensurate with the sensitization and enlistment of donor organizations funding water projects or rural health activities. The duration of the POA should be extended from 2-3 years to encompass 5-8 years. Funding could be divided into modules (representing certain related activities) which can be individually financed.

Section II: General Information on Dracunculiasis

In this section I would include a discussion of the interest of the Government of Burkina Faso in the control and elimination of dracunculiasis and provide an estimate of numbers of cases/yr and annual costs to the country. For example, >70,000 cases/yr, 1,300,000 CFA/yr lost.(Refer to Section 1.1 of this report, as an example).

Section III: Epidemiological Data on Dracunculiasis in Burkina

I suggest use of some of the data, tables, figures and discussion provided in this report, including:

A graph of case reports/mo (Figure 5.5).

Provinces most affected by dracunculiasis based on cases reported through the national passive surveillance system (Table 5.6 and 5.7 and Figure 5.6) Twenty-seven of 30 provinces report cases, and probably all of the 30 provinces of the country are affected by the infection. Underreporting of cases is estimated to be 98-99%.

Passive case reporting /yr--1972-1986 (Table 5.5 and Figure 5.4).

Section IV: National Program for the Control of Dracunculiasis

Subsection 1.1 (Ultimate Objective): I suggest giving a date to this objective, such as 1994 or 1995.

Subsection 1.2: (Intermediate Objectives) I suggest the following changes:

a) Identify all CSPS/PSP with villages within action radius struck by dracunculiasis. Then identify all villages struck by dracunculiasis. Within these villages, determine the degree of endemnicity of the infection.

b) Choose a strategy of control/elimination.

c) Choose an MOH organisation and a person with final responsibility for the program.

d) Obtain, through a National Meeting, collaboration with national officials in Health, Water and Education sectors, the mobilization of international organizations with water projects, and external funding to provide support for the POA.

e) Train the personnel in the methods of control chosen.

f) Execute the program, beginning with a pilot project encompassing 1-2 provinces, preferably in the center of the country.

Subsection 2.1

I suggest the following additions:

Subsection 2.1.a: Passively reported cases

Improvement of national surveillance information is vital as a first step in the control of dracunculiasis. A mailed questionnaire will be sent to all PSP/CSPS unit during the transmission season (MAY-AUGUST), when cases are likely to be occurring. This questionnaire will be one page in length and require but a short time to complete. It will be accompanied by an official letter from an MOH office explaining the purpose of the questionnaire and the beginning of a national elimination program. The questionnaire will provide information about disease distribution at the reporting unit, and perhaps lower levels (number and names of affected villages). Returns should be used to calculate the population at risk, and to map, by location of reporting CSPS/dispensaire, the distribution of the disease. The map should also note those units which failed to report so that appropriate follow up can be undertaken.

The mailed questionnaire may be repeated annually. Further studies should take place in the CSPS/Dispensaire areas reporting dracunculiasis to confirm the villages affected and estimate numbers of cases which occur.

Subsection 2.1 b: Active screening:

This subsection is well-written. I would suggest adding: "To support the active surveillance efforts of the local health workers, and for collection of surveillance data, mobile health workers (alone or at times in teams), based at the provincial health headquarters, will need to routinely visit endemic areas."

Subsection 2.2 should be deleted as a section and incorporated in its entirety into 2.1.b. The degree of endemicity can be determined by CHWs and CDR agents. I suggest the village form used be the one already prepared by DEP (Figure 6.2). The form proposed by the POA (page 23) is overly detailed (it requests names, ages, sex, numbers of worms, etc) for the requirements of the operation. Determination of numbers of NEW cases per month would be best, but determination of numbers of cases in a village during the transmission season would be completely sufficient and require much less work.

Suggest new sub-subsection-2.1.c. Reporting of Surveillance activities

A small newsletter with the report of the questionnaire should be sent to the CSPS/Dispensaire to encourage further reporting. If this is not possible, an alternative would be to publish periodic articles in communications commonly sent to health personnel.

Suggest additional sub-subsection-2.1.d. Operational research

Operational research will be developed in a pilot province to review surveillance mechanisms and to allow recommendations to improve their sensitivity. In 1987 and 1988, this research should center on developing and testing rapid methods for active surveillance. Methods would include: 1) confirmation of CSPS reports; 2) development of market and school search techniques to identify affected villages; 3) linkages of dracunculiasis POA active surveillance to other existing programs that have mobile agents who routinely visit villages; 4) Use of radio broadcasts to solicit information on affected villages.

I suggest two new subsections to be placed in the document at this point. Subsequent subsections in the document can be reordered accordingly:

Subsection A National Meeting on Dracunculiasis

A one-day national meeting will be held to promote the POA among government officials and donor organizations. This meeting would provide a forum for enlisting the support of donor agencies involved with water supply projects and health. A principal objective will be to link control efforts with these projects. Subgoals of the meeting include: a) Discussion of the problem of guinea worm disease in Burkina Faso. The program should include a review of the lifecycle, epidemiology, socioeconomic impact, and successful control efforts in the pilot villages of the Centre Muraz. National surveillance information should be presented from various sources, including the data collected through the questionnaire survey. b) Introduce the national strategy for controlling and eliminating the infection in the form of the revised POA. Copies should be provided to invited ministries and donor organizations. c) Introduce the MOH official responsible for the program.

Subsection Central Authority

The MOH will designate one central level official who will be responsible for implementing the POA. His major duties will be to: a) act as liaison to water donor agencies, with particular emphasis on encouraging use of dracunculiasis incidence as an indicator of health impact of providing safe water; b) monitor surveillance reports and correlate these with active water projects and funded health education schemes; c) prepare a national map of disease distribution and continually update this; d) promote closer MOH contact with operational research activities at the Centre Muraz. (The above section might also be placed in the section of the document concerning duties and responsibilities of various officials.)

Section 2.3 Choice of Strategy

1) Prophylactic Measures:

I suggest that the POA include the manufacturer of the filter recommended and its specifications, durability of the filter and the required frequency of replacement, the responsibility for their construction (Centre Muraz DESA), and the basis for estimated numbers of filters needed per province, as given in the budget. In addition, the MOH should consider the use of a more durable filter material which would not require frequent replacement. Resupply of filters to remote rural areas will be difficult and the cost for more expensive filter material would probably be cost effective. I suggest NITEX, a material currently in use in the Pakistan GWD Control Program. Details about the material and supplier are as follows:

WILDLIFE SUPPLY COMPANY
301 CASS STREET
SAGINAW, MICHIGAN 48602 USA
(517) 799-8100
Order: BOLTING CLOTH NYLON
"NITEX"
CATALOG NO. 24-C40
52 INCH WIDTH, 202 MICRON PORE
PRICE: $31.60 per running yard

The material is more durable than that available in Burkina. The calculated costs using NITEX would be $2.80 per filter, four times the cost of using local materials (200 CFA/filter=$0.67)

2) Health Education

I suggest that electronic audio-visual equipment not be used. It is expensive, and maintenance could be a problem. CHWs and CDRs are not trained in use of such equipment. In addition, it is proposed to have a health education (HE) team make 3 visits to each village. This, too, is costly. I suggest having 1-2 health sessions given to villagers by CHWs (supervised by IHWs). The sessions would be promoted by posters illustrating the lifecycle of the parasite and the use of filters Filters would be given to those who attend these sessions as an incentive to use them.

A training program and schedule must be devised to provide training materials and filters to affected CSPS units. Some of the groundwork has been done by OCCGE (Annex 8). The logistics of a larger operation must be outlined and tested in pilot projects.

3) Chemical Treatment with Abate

The very important issues which need to be resolved regarding the use of Abate in Burkina Faso have been discussed. Operational research is required to determine the formulation of Abate which can suppress intermediate host populations for acceptable periods (4-6 weeks). Until operational research resolves some of these issues, particularly that of SG vs EC formulations, I believe the chemical control section should be removed from the national POA implementation plan entirely. Research on Abate should be an important (but separate) item in the POA. It should be stressed that Abate

should become a component of the national POA promptly after research shows it is an effective control measure.

4) Drilling of Wells

This section should be developed extensively. Enlisting of support from water donor agencies is a critical component of the POA. The strategy for obtaining such enlistment consists essentially of sensitizing donor agencies through the National Meeting and by the activities of National Coordinator.

Section 2.4 Program Personnel

I suggest adding DESA, DSE, DEP to this list. More detail should be given on the structure, activities and mandates of these organisations.

Section 2.5 Personnel duties

2.5.1 I suggest adding some of the duties mentioned in Section 2.1-3.

2.5.2: I suggest removing the duties involving film and slide production.

2.5.3-5 Add to these duties the distribution of filters to the next (lower) level of organizational activity and collecting, reviewing and sending surveillance reports to the next (higher) level.

Section 2.6 Training of personnel

The responsibilities (with respect to training) of central and provincial level personnel should be better described.

A flow diagram is recommended which would illustrate the proposed training process. When and how training will be carried out at the central, provincial, CSPS and village levels must be described.

Consideration should be given to preparation of a detailed training manual for personnel involved in the elimination program. This might be developed during one the pilot projects.

Section 3 Evaluation

I suggest that Dr. Guiguemde of OCCGE be mentioned as an expert consultant. In addition, outside consultation is available through the WHO Collaborating Center for Research, Training and Control of Dracunculiasis, Centers for Disease Control, Atlanta, GA. 30333 USA. Consultants can be requested through the Vector Biology and Control Program of USAID.

Subsection 4 Resources:

This is an excellent list. To enlist the support of these groups, however, an enormous political weight must be given to the GWD campaign.

Subsection 5 Budget:

A budget proposal for a pilot project is given in Table 2.1. Other modules for funding are shown in Figure 2.1.

Subsection 6 Activities:

A proposed schedule of POA activities is given in Section 2.4 (See also Figure 2.1).

Annex 1

SCOPE OF WORK:

DRACUNCULIASIS IN BURKINA FASO

The Vector Biology and Control Project (VBC)/United States Agency for International Development (USAID) will respond to the request of the USAID Mission/Ouagadougou and the Government of Burkina Faso (GOBF) for technical assistance (REF CABLE R241102Z OCT 1986). VBC will provide a medical epidemiologist who will review with the Ministry of Health (MOH), GOBF, the National Control Program for dracunculiasis in that country. The consultant will be TDY from the Centers for Disease Control (CDC). This is consistent with CDC's role as World Health Organization (WHO) Collaborating Center for Research, Training and Control of Dracunculiasis. CDC has frequently provided expert personnel to assist with epidemiologic assessments of dracunculiasis in endemic countries.

In addition to a review of the National Control Program, the scope of work would entail a review of available information on dracunculiasis in Burkina Faso, site visits to some endemic areas, and evaluation of data collection and surveillance methods. Activities will be accomplished with the cooperation and input by MOH officials, USAID personnel, and workers associated with organizations or academic institutions with relevant interests or experience in the endemic areas.

To accomplish the scope of work the consultant will need 2-4 weeks incountry. The proposed time for duty is February-March, 1987.

SPECIFIC TASKS:

A. The consultant will review the current National Control Program for dracunculiasis. Based on this review, the consultant will assist the GOBF in developing a national Plan of Action (POA) for the control and elimination of dracunculiasis in Burkina Faso. Realistic objectives for the program will be proposed. Potential sources for funding and collaboration to meet the goals of the POA will be addressed.

B. The consultant will confer with Dr. T.R. Guigemde (Centre Muraz, Organization de Coordination et de Cooperation pour la Lutte Contre les Grandes Endemies (OCCGE), Bobo-Dioulasso) regarding previous and current control and research efforts in the country. Dr. Guigemde is a leading expert on dracunculiasis in Burkina Faso. Site visits will be made to some of the endemic areas which have been studied by OCCGE. The consultant will review what is known of the regional aspects of disease transmission and the relative applicability in Burkina Faso of the various measures available for control of dracunculiasis.

C. The consultant will review written materials, statistics, publications and oral reports pertaining to dracunculiasis in Burkina Faso. He will assess the current epidemiologic surveillance system relative to the endemic areas. Ways of improving nationwide surveillance for the dracunculiasis will be addressed.

D. The consultant will assess the existing health infrastructure and the status of current water and sanitation projects in the country. To accomplish this task, he will interview representatives of national, donor, bilateral and international organizations.

E. The consultant will provide draft conclusions and recommendations (in English) to the USAID Mission/Ouagadougou outlining the findings of the consultancy. These will be discussed with USAID, MOH and OCCGE officials before the consultant departs Burkina Faso.

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ANNEX 2

PROJECT FOR A NATIONAL PROGRAM FOR THE CONTROL OF DRACUNCULIASIS IN BURKINA FASO

(By Drs. A.A. YADA, R.T. GUIGUEMDE, B.S. COULIBALY)

PLAN

P R O G R A M A

1. Objectives
   - 1 - 1 Ultimate objective of the program
   - 1 - 2 Intermediate objectives

2. Methodology
   - 2 - 1 Census of all villages affected by dracunculiasis
   - 2 - 2 Determination of the degree of the epidemic in these villages
   - 2 - 3 Choice of a control strategy
     - 2 - 3 - 1 Possible control methods
     - 2 - 3 - 2 Chosen strategy
   - 2 - 4 Program personnel
   - 2 - 5 Personnel duties
   - 2 - 6 Personnel training

3. Evaluations
4. Resources
5. Budget
6. Plan of execution

P R O G R A M B

I - INTRODUCTION

This proposal for a national program for controlling dracunculiasis in Burkina, presented by the Commission, is intended, above all, to conform to national realities. It is known that in any control activity, the chances of succes are also a function of the forces committed to the activity and therefore, two strategies are envisaged.

- Short term control (2-3 years), requiring significant resources due to the material to be acquired : Program A
- Long term control (4-6 years) with a smaller annual budget: Program B.

II - GENERAL INFORMATION ON DRACUNCULIASIS

Dracunculiasis is a filariasis, generally benign, due to the habitual presence of the Filaria medinensis or "Guinea worm" in the sub-cutaneous cellular tissue.

This disease remains a danger for between 10 and 48 million people in Africa, India and the Middle East.

In Burkina Faso, more than 2,000 cases of Dracunculiasis are reported annually. These figures are far from the reality of the disease, because numerous additional cases, (representing a majority of them) are not reported to the Health Services.

In countries where it is widespread, the reported cases cannot give an accurate reflection of the disease because most patients do not come to Health Centers.

The Guinea worm, the parasite which is responsible for the disease, penetrates an uninfected (healthy) human organ during the ingestion of contaminated water by means of the cyclops containing the larvae of the Dracunculus medinensis

The development of the worm takes place in an insidious fashion, generally with neither signs or symptoms.

The clinical signs of dracunculiasis do not appear until the female worm reaches maturity, or is ready to emerge from the surface of the body.

The complications of the disease are:

- an aseptic abscess following the premature death of the worm and its resorption during its journey.
- severe septicemia resulting from secondary infections of the ulceration.
- joint stiffness, or ankylosis, while the worm is located in the joints.
- unusual locations of the worm: genital organs, eye, etc.

It is important to point out the fact that up to now, no medication has been found to be effective in destroying the worm prior to its emergence from the skin.

Experiments with certain anti-inflammatory agents appear to be promising as far as facilitating the extraction of the worm.

The majority of persons infested do not come for medical treatment and do not receive the care of doctors or nurses. They go to healers or use the traditional method of removing the worm "on a stick."

In sum, once the disease is established, treatment will not bring a miracle.

Filiaria medinensis (Guinea worm) principally affects rural populations and transmission reaches a peak during the period when agricultural activity is most intense.

Due to the extent (both demographically and economically) of the portion of the population affected, the disease can constitute a significant obstacle to development, because of the loss of man/days which it causes in a rural agricultural setting. The impact is even greater in an endemic area; the rate of infection during a season varies between 10 and 70% of the population, and the loss of working time can reach several weeks. In widely infected villages, the loss of agricultural production is significant.

Thus, dracunculiasis in endemic areas is a real public health problem, even if its repercussions are not reflected in the mortality rate.

III - EPIDEMIOLOGICAL DATA ON DRACUNCULIASIS IN BURKINA

Burkin is situated in the Sudan/Sahel region, characterized climatically by a long dry season and a short rainy season (3 to 5 months).

Water is an essential factor in the transmission of the disease, this transmission being limited generally to a few months during the rainy season, during the time when there are numerous shallow ponds from which drinking water obtained.

The greatest numbers of dracunculiasis cases are recorded during the months of June, July, August and September.

The areas most affected are the provinces of:

- Kadiogo (Ouagadougou)
- Yatenga (Ouahigouya)
- Bulkiemdé (Koudougou)
- Comoé (Banfora)
- Séno (Dori)
- Boulgou (Tenkodogo)
- Passoré (Yako)
- Sanmantenga (Kaya)
- Poni (Gaoua)

Actually, all 30 provinces of the country are affected by the disease.

The number of reported cases being much lower than the number of cases actually occurring, we can estimate that only 5 to 10% of cases are seen and reported by health facilities.

See attached

Table I- Distribution by sector and by month of dracunculiasis in 1977
Table II- Distribution by sector and by month in 1978
Table III- " " " " " " " 1979
Table IV- Distribution by province and by month 1983
Graph of average number of cases by year and by sector for: 1975 - 1977 - 1978 - 1979

IV - NATIONAL PROGRAM FOR THE CONTROL OF DRACUNCULIASIS

P R O G R A M A

1. Objectives

1. 1 Ultimate objective of the program
To control or eradicate dracunculiasis in Burkina Faso

1. 2 Intermediate objectives
* identify all villages affected by dracunculiasis
* determine the degree of the dracunculiasis endemicity
* select a strategy for controlling dracunculiasis
* train personnel in the control methods chosen
* carry out the established control program

2. Methodology

2.1 Identify all villages affected by dracunculiasis in Burkina Faso

In order to do this, it is necessary to carry out, as thoroughly as possible, a census of all the villages involved based on:

a) passively reported cases:
These cases coming spontaneously to the treatment room of the dispensary or health center may increase if the population's awareness is increased and the village nurses are well-informed. The rate of passive reporting may also be increased by the Village Water services, whose collaboration is needed in controlling dracunculiasis.

b) active screening
It is necessary to search for cases where they are found, from door to door if need be. Since the population at risk lives in a rural setting, Community Health Workers make up the first link of the chain of active screening.

The village nurse will improve this screening. In villages where there is neither nurse nor Village Health Worker, the C.D.R. structures may be an active help.

2.2 From the determination of the endemicity of dracunculiasis, based on the passive reporting data, it will be possible to determine the monthly incidence rate and the annual prevalence. These two parameters, upon evaluation, will permit a determination of the degree to which villages are affected. A standard reporting sheet will be established and directed to the A.S.V., Nurses, or alternatively, to C.D.R. of counted villages (see attached sheet)

2.3 Choice of a control strategy.

2.3-1 Possible control methods

A) Prophylactic measures

a) Individual prophylaxis:

* Boil drinking water:
This is a measure which can be effective, but it has problems regarding application and acceptability. (farmers who quench their thirst in their fields cannot make use of this measure).

* Filter drinking water:
If followed, this measure could reduce the incidence of dracunculiasis considerably in endemic areas, if proper filters are used:

- sand and carbon filters: these are ineffective because they do not stop the cyclops;

- Plug filters: while highly effective, they cannot be used in the field due, to a large extent, to their cost.

- cloth filters (strainers): they are effective if appropriate cloth is used (synthetic cloth, resistant, tightly woven to 100 microns laboratory tested). The advantage of this technique is that, in addition to effectiveness, strainers are less costly (200 F CFA/unit).

b) Collective prophylaxis:
Forbid persons afflicted with Guinea worm to drill unprotected wells in stagnant water or to climb the sides of same.

This technique is effective but difficult. It may nevertheless be implemented if health education of the population is strongly insisted upon.

B) Chemical treatment of unprotected wells

- Temphos (abate): this is an effective product, having low toxicity for mammals, low cost, stable and which can be used for control of other vectors (mosquitoes and similar larvae).
- Concentrated hypochlorite: equally effective and with low toxicity, its disadvantages are that it is unstable in the tropics and costly.

C) Drinking water supply

consists of supplying inhabitants the means of supplying themselves with safe water, free of infected cyclops.

D) Health education

Indispensable support in any large scale health activity.

2.3 - Selected strategy

1) Prophylactic measures

* Water filtration with cloth strainers; cloth purchased in the local markets with the following characteristics: synthetic, woven tightly, in the order of 100 microns, permitting easy passage of water, resistant to wear.

Local construction with a piece of wood.
Cost - 200 F CFA

* Collective prophylaxis for avoiding contamination of sources of drinking water

2) Health education

This makes up an essential element of the control program against dracunculiasis because whatever prophylactic method is adopted, it is not certain that villagers will abandon their behavior related to traditional practices from one day to the next . It is important that the the most closely involved (populations of affected villages) be convinced of the advantages of the measures adopted. A health education program (H.E.), is therefore necessary, planned and integrated with other control activities conducted against dracunculiasis. The success of activities can only be assured if villagers knowledgeably participate in all decisions.

Health education measures will be adapted to the objectives to be attained and to the population concerned.

* The mass-media :
Television and press will increase the awareness of the population in view of the entire population joining the disease control program, but their impact is limited. Radio broadcasts and cassette tapes in the languages of the affected villages will have a larger impact.

* Community organizations :
The social-political organizations and associations already in place in these villages (villager groups, associations of mutual aid and C.D.R's are appropriate settings for these informative sessions). Discussions and demonstrations at the village level, backed up by audiovisual material (Posters and films or slides) are the best health education strategy for this program. Three sessions could be planned:

- 1st visit : Discussion with posters explaining the relationship between drinking water and dracunculiasis (life cycle and transmission).
- 2nd session: film on dracunculiasis and slides with commentary.
- 3rd session: discussion and demonstration of individual or group prophylactic measures (filtering of drinking water with a cloth strainer or chemical treatment of an unprotected well).

3) Chemical treatment with (abate)

Choice of village:

. Dwellings should be sufficiently close to each other
. Water supply at no more than five (5) well defined waterholes, quite close to the village.
. Presence of a community health worker or of a health center close to the village for the application of the product.

Choice of product and application :

- 1% Temphos in granulated form in 25 kg drums.
- Treat all the surface wells for drinking water at least one month before the period of maximum incidence and repeat procedure weekly until incidence falls to its minimum level.
- The approximate dimensions (length, width and depth) of each drinking water well should be measured and the exact quantity of chemical to be used calculated, at the rate of 1 g of active ingredient per cubic meter of water (1mg/liter).
- Distribute the product uniformly over the water surface, by hand or mechanically.

Safety monitoring:

- In the event of massive overuse during the application of Temphos, the unwanted side effects which may appear in the population (e.g. nausea, vomiting, bronchial spasms, abdominal pains, diarrhea) should be identified as soon as possible .
- Be prepared to calm the fears of the community.

Quality control :

- Keep records on the affected the wells (their number, their nature, their dimensions and the way they are being used).
- Keep records on the application of product. For each application, indicate the level of the water table or of the stream, its volume, the quantity of chemical used and the date on which the product was applied.
- Keep records on the presence of cyclops before and after the treatment.

Management of the chemical treatments :

It is possible to store the Temphos either in the villages or at the health centers.

The management of the stocks, of the acquisitions and of the distribution is essential at the central, regional and local administrative levels in order to guarantee a supply of Temphos during the transmission season.

4) Drilling of wells

Priority should be given to villages affected by dracunculiasis so that wells can be drilled sufficient number.

Coordination between the health services and and the village water department is crucial.

2.4 Program personnel

The dracunculiasis control program distinguishes between several types of personnel:

- personnel directly involved: Department of Public Health and the the Water Department.
- persons indirectly involved: Departments of Information, of Development, of National Education, of Territorial Administration and the National bureau of C.D.R.

A) The personnel directly involved

1) The national program coordinator
2) The D.E.S.A.H.
3) The central administration of health facilities:
   a) The regional public health directors of the regions affected by dracunculiasis
   b) The doctors and nurses of the health centers in the affected regions.
4) The community health workers in the affected villages
5) The agents of the village Water Department
6) The instructors and their students.

2.4 Personnel duties

2. 5-1 The coordinator of the national control program will have the responsibility of:

- supervising the regional management involved in the program,
- coordinating the activities of the regional directors involved in the program
- ensuring the coordination between the regional Water Department and the other government agencies involved.
- ensuring that the necessary supplies for the program are ordered.

2. 5-2 The director of the DESAH will have the responsibility of assuring:

* the production of health education films on dracunculiasis.
* the production of a series of slides dealing with the disease.
* the production of tapes intended for radio broadcasting
* that the material for health education is ordered.

2. 5-3

The regional public health directors will oversee:

- the supervision of the regional program.
- the training of regional nurses and community health workers (C.H.W.).
- the planning of film and slide presentations in the different districts and villages.
- the choice of villages and the number of wells to be drilled.

2. 5-4

The nurses at the health centers will be responsible for:

- the planning of H.E sessions in the villages.
- the scheduling of visits to the villages by the regional H.E team.
- the supervision of the community health workers.

2. 5-5

The village health workers:
Will collaborate with the village health committee. They will make sure that the prophylactic measures are observed and will be in charge of chemicals distribution.

They will record the persons affected by the disease on survey cards.

2. 5-6

Instructors and students:

Will physically help the village health workers with the implementation of the disease control measures in the villages.

2. 5-7

The village water department
Will be in charge of drilling the wells in the affected villages.

2. 6 Training of personnel

The personnel involved in the program (disease control activities and health education) should receive training on antifilarial control.

2. 6. 1 Training of regional directors.

A 1 (one) day seminar will allow them to familiarize themselves with the dracunculiasis problem and the national disease control objectives.

2. 6. 2 Training of the nurses in each district

* Their training in disease control methods and the health education program will be assured by the regional directors and can last up to two (2) days. It will include:

  - A review of dracunculiasis epidemiolology.
  - A description of the National Disease Control Program and of the the duties assigned to the nurses.

2. 6. 3 Training of the community health workers in each region by the regional director and by the C.S.P.S nurses: seminars of 2 days which will include :

- Courses on dracunculiasis.
- The roles and duties of a community health worker in the program.

2. 6. 4 Training of the instructors, of the students and of the young farmers

will be done by the community nurses by means of conferences and discussions.

3. - Evaluation

3. 1 Evaluation of the activities and of the duties

- For each person involved in the program:
  * review the planned tasks
  * evaluate the tasks carried out

- Schedule of the evaluations:
  * End of the health education sessions (May)
  * End of transmission period (October)
  * End of a year of activity (April)

3. 2 Evaluation of disease control effectiveness

This evaluation is based on :

- The number of patients recorded before the control program.
- The number of patients recorded after 1 year, 2 years etc. of the control program.

3. 3 Final Evaluation

Evaluation of the cost/effectiveness of the program

- Total spending of the program
- Cost of the losses due to dracunculiasis and avoided by its control.

4. - Resources

4. 1 Nationaly available resources

* Government agencies involved in the disease control program.
  - . The department of public health
  - . The water department
  - . The department of information
  - . The department of territorial administration
  - . The department of national education
  - . The department of rural development
  - . The national C.D.R. service.

* Human resources
  - . Ministry of Public Health:
    Provide a national coordinator
    D.E.S.A.H
    30 regional directors
    Community health workers
  - . Ministry of Water:
    + Management of the community water service
    + Community water projects
  - . Ministry of Information:
    Responsible for broadcasts in the national languages.
    Broadcasts of health education tapes.
  - . Ministry of Territorial Administration:
    + Chief inspectors
    + Commissioners
  - . The Ministry of National Education:
    + Inspection of primary education
    + High schools and colleges
  - . The Ministry of Rural Development:
    Training center for young farmers (TCYF)
  - . The national C.D.R. service.
    C.D.R. community delegates.

* Material resources:
  - Logistical means: All-terrain vehicles for the DPSP
    Mopeds for the S.S.P in the DPSP
  - Technical resources:
    + National Broadcasting
    + Electrical generators of the DPSP

4. 2 Technical material to be acquired (external resources)

- Unspecified supplies:
  + 30 Movie projectors (1/DPSP)
  + 60 Slide projectors (2/DPSP for 2 H.E teams)
  + 60 Electrical generators.
- Material specific to the program :
  + 30 films on dracunculiasis (1 per DESAH)
  + material for the making of a movie by the DESAH
  + 60 series of slides on dracunculiasis
  + 1000 chart sets on dracunculiasis (1 per affected village)
  + approximatly 1,500,000 strainers.

5. - Program Budget

- Movie projectors			
30 X 400,000 F	=	12,000,000	F
- Slide projectors			
60 X 50,000 F	=	3,000,000	F
- Electrical generators			
60 X 300,000 F	=	18,000,000	F
- Making of the movie:	=	1,000,000	F
- Copies of the movie: 30 X 100,000 F	=	3,000,000	F
- Shooting of the movie "Let's eliminate the guinea worm"		280,000	F
- Strainers			
1,500,000 X 200 F	=	300,000,000	F
- Health education charts on the guinea worm.			
1000 X 25,000	=	25,000,000	F

- Fuel costs

One expects 1000 villages to be affected

$\frac{1000}{30}$ = 33 villages per district - theoretically

Average distance between the chief town and the village = 80 km (One way)

Number of missions by the DPSP/per village = 3 (160 km)

-Distance travelled by the DPSP

3 X 160 Km X 33 (villages) = 16,000 km

+ Total distance to be travelled by the DPSP

30 X 16,000 km = 480,000 km

+ Distance to be traveled by the national coordinator (supervision): approximately 24,000 km

+ Unexpected 1,000 km

Total distance = 480,000 + 24,000 + 1,000 = 505,000 km

Fuel consumption of the all-terrain vehicles : 20 l/100 km

Fuel : = 20 X $\frac{505\,000}{}$ = 101,000 liters

Fuel costs	101 000 l X 300 =	30,300,000 F
*	Maintenance of vehicle per year	5,000,000 F
*	cost of cards and paper	500,000 F
*	Miscellaneous costs	300,000 F
*	Evaluation	2,000,000 F
*	Abate	10,000,000 F

SUMMARY : 12,000,000 F + 3,000,000 F + 18,000,000 F + 1,000,000 F + 3,000,000 F + 280,000 F + 300,000,000 F + 500,000 F + 300,000 F + 2,000,000 F + 10,000,000 F =

410.380.000

* Additional drilling (eventually as part of the program)

200 X 5,000,000 = 1,000,000,000 F

SUMMARY CHART YEAR 1 PROGRAM A

Item	Amount	Unit Price	Total Cost
1) Movie projector	30	400,000	12,000,000
2) Slide projector	60	50,000	3,000,000
3) Electrical generators	60	300,000	18,000,000
4) Training guide on the guinea worm			280,000
5) Strainers	1,500,000	200	300,000,000
6) Health education charts	1,000	25,000	25,000,000
7) Fuel	101,000	300	30,300,000
8) Vehicle maintenance			5,000,000
9) Cards			500,000
10) Miscellaneous			300,000
11) Evaluation			2,000,000
12) Abate			10,000,000
13) Drilling	200	5,000,000	1,000,000,000
TOTAL			1,410,380,000

* The year 1 overall cost of program A with 200 drillings amounts to : 1,410,380,000
(ONE BILLION FOUR HUNDRED TEN MILLION THREE HUNDRED EIGHTY FIVE THOUSAND FRANCS).

PROGRAM A YEAR II

- Fuel (idem)	30,300,000	F
- Vehicle maintenance	5,000,000	F
- Cards	500,000	F
- Miscellaneous	300,000	F
- Evaluation	2,000,000	F
- Abate	10,000,000	F
Total	48,100,000	

PROGRAM A YEAR III

Same as year II

6. - Program execution plan

(October 1985 - September 1989 : 4 years)

NOTE : In the case of dracunculiasis, one should be aware of the fact that a control program has to start on an exact date which depends on the cycle of the disease in the particular climactic zone considered.

Dates	ACTIVITIES
- October 1985	Meeting of the involved government agencies and the DPSP and the national commission - Establishment of a list of affected villages.
- November 1985	Training of the DPSP Creation of the H.E media (making of the movie, of the slides and of the radio broadcasts). Ordering and preparation of the granulated 1% Abate
December 1985	Training of the Community Nurses in affected villages by DPSP. Training of the Community Health Workers and of the census taker.
- Jan/May 1986	Additional drilling of wells
- February 1986	Training by means of conferences and movie /slide presentations of the CFJA, the students and instructors
- March 1986	Tranining of Village Health Committees (where they don't already exist)
- March/end Apr.86	H.E sessions
- Starting may 86	Active and continuous census of cases by Community Health Workers and nurses to the end of the program.
- May/Oct. 1986	Abate chemical treatment in the selected villages.
- June 1986	Evaluation of H.E. activities by the DPSP
- February 1987	Evaluation of Year I activities by all the government agencies combined.
- March/April 87	Repetition of H.E. sessions
End Apr. 1987	End of first year of active census by the Community Health Workers.
May/Oct. 1987	2nd. series of chemical treatment of water sources.
- February 1988	Evaluation of Year II activities.
- April 1988	Evaluation of the effectiveness of the first year's control.
- February 1989	Evaluation of Year II activities by all the government agencies combined.

Dates	ACTIVITIES
March-April 88	Repetition of H.E. sessions
End April 88	End of second year of active census by the Community Health Workers and evaluation of the effectiveness of the second year of control.
February 1987	Evaluation of Year III activities
End April 88	End of third year of active census by the Community Health Workers and evaluation of the effectiveness of the control after 3 years of H.E.
May 89	End of program Final evaluation Final report.

PROGRAM B

Program B is slightly different (illegible)

1. The audio visual support of the H.E sessions consists solely of educational charts. There are no movie or slide presentations.

2. The Abate chemical treatment has been eliminated.

3. The additional drilling of wells is not included in the cost of the program

Budget Program B

YEAR 1

Item	Amount	Unit Price	Total Cost
1) Training guide for Guinea worm			780,000 F
2) Strainers	1,500,000	200	300,000,000 F
3) H,E Posters	1,000	25,000	25,000,000 F
4) Fuel	101,000	300	30,000,000 F
5) Vehicle maintenance			5,000,000 F
6) Cards			300,000 F
7) Miscellaneous			300,000 F
8) Evaluation			2,000,000 F
Total			363,380,000

The budget of Program B amounts to THREE HUNDRED SIXTY THREE MILLION THREE HUNDRED EIGHTY THOUSAND FRANCS

PROGRAM B YEAR II

- Fuel	30,300,000 F
- Vehicle maintenance	5,000,000 F
- Cards	500,000 F
- Miscellaneous	300,000 F
- Evaluation	2,000,000 F
Total	38.100.000 F

This document was prepared by the following doctors :

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Dracunculiasis

FACILITY	J	F	M	A	M	J	J	A	S	O	N	D	TOTAL	
Bam														
Basèga														
Bougouriba														
Boulgou Sect 10	10	4		29	8	24	28	4	3	6		7	123	Tenko
Boulkiemdé Sect 5					4	11	11	7	11	1	3	1	148	Koudougou
Comoé S/S 7	1	1	1	2	42	38	72	28	4	2	1	11	203	Banfora
Ganzougou														
Gnagna														
Gourma Sect 2	2	11	1	6	40	9	29	28	21	1	17		145	Fada
Houet Sect 7		1		3	2	6	0	0	2	8	1		22	Bobo
Kadiogo														
Kénédougou														
Kessi														
Kouritenga														
Mouhoun Sect 6			1	1	1								3	Dédougou
Mahoury														
Mamentinga														
Oubritenga Sect 1	5	7	5	22	33	28	73	21	11	15	0	6	226	Ouaga
Oudalan														
Passoré S/S 5			2	7	6	30	36	45	19	30		0	175	Yako
Péni Sect 3	2	4			16	48	44	33	14	6	3	1	171	Gaoua
Sanguié		14											14	
Sammantenga Sect 8	15	14	8	53	55	73	86	98	57	36	37	20	472	Kaya
Séno Sect 9	3			2	6	11	14	15	23	15	11	7	115	Dori
Sissili														
Soum														
Sourou														
Tapoa														
Yatenga Sect 4		2	1	4	10	22	51	52	21	8	17	2	190	Ouahigouya
Zemmwéégo S/S 1						3							4	Manga
Service d'hygiène Ouaga														
Ouagadougou Hospital		10											10	
Urban dispensary Ouga	1	1	7	4	16	17	22	16	27	16	17	2	130	
P.M.I. Ouagadougou														
Ouagadougou Maternity														
E. Ouagadougou	11						2	2	3		4		22	
T. Ouagadougou														
M. Ouagadougou														
Bobo - Daso Hospital														
Urban dispensary Bobo														
I. Bobo-Daso														
Bobo - Daso Maternities														
E. Bobo-Daso	50	69	26	133	209	320	468	349	227	162	119	57	T 2189	

DRACUNCULIASIS CENSUS

D.P.S.P.....DISTRICT.....

VILLAGE (SECTOR).....C.H.W.....

.....

Sequence Number	Census Date	Name	First name	Sex	Age	Starting Date	Remarks

DRACUNCULIASIS OR GUINEA WORM

DISTRIBUTION BY SECTOR AND BY MONTH
1978

SECTORS AND S/Sectors	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	TOTAL
Ouamadougou	17	14	72	20	123	84	166	91	70	43	15	16	731
S/S 1 Manga	-	4	-	-'	-	-	11	12	15	20	8	40	110
2 Fada	26	12	20	3	18	19	32	68	32	34	31	32	333
3 Gaoua	2	-	-	3	6	12	9	21	5	3	29	14	104
4 Ouahigouyou	2	1	2	14	26	48	56	69	36	40	24	3	321
5 Kondougou	2	7	6	35	30	21	24	64	62	36	36	4	327
S/S 5 Yako	16	2	-	6	9	46	14	44	12	16	4	3	172
6 Dédougou	-	-	-	-		12	2	3	1	3	-	-	21
7 Bobo-Diculasso	-	-	4	-	-	-	2	1	3	1	-	-	11
S/S 7 Banfora	16	5	11	10	5	26	12	12	14	1	1	3	116
8 Kaya	...	...	...	...	...	...	...	...	...	...	...	...	...
9 Dori	...	...	...	...	...	120	120	120	...	...	...	...	360
10 Tenkodogo	-	-	-	-	-	23	16	8	13	25	2	1	88
TOTAL	81	45	115	91	217	411	464	513	263	222	150	122	2694

.... Report not received

HEALTH STATISTICS
EPIDEMIOLOGY

DRACUNCULIASIS OR GUINEA WORM

DISTRIBUTION BY SECTOR AND BY MONTH 1977

SECTORS	MONTH 1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
Ouamadougou	47	5	11	27	24	50	7	46	52	34	11	5	322
S/S 1 Manga	-	4	-	-	-	-	-	20	20	20	-	-	64
2 Fada-N'Gourma	-	-	-	-	14	6	15	29	39	36	23	11	173
3 Gaoua	14	-	1	1	4	3	3	2	3	8	1	2	42
4 Ouahigouyou	17	3	5	14	26	52	53	42	38	23	15	7	295
5 Kondougou	14	2	3	6	10	19	18	63	38	4	12	6	195
S/S 5 Yako	1	-	4	3	4	46	11	16	33	9	2	5	134
6 Dédougou	-	-	-	-	-	2	2	1	1	1	-	-	7
7 Bobo-Diculasso	2	-	-	-	-	-	1	3	3	-	5	-	13
S/S 7 Banfora	18	20	3	26	17	30	19	13	10	12	2	6	176
8 Kaya	16	6	24	9	73	133	124	143	75	28	-	-	631
9 Dori	4	1	5	21	10	162	149	180	-	-	-	-	539
10 Tenkodogo	54	13	102	7	21	25	24	25	14	-	6	10	301
TOTAL	187	54	158	158	114	203	531	426	503	180	74	52	2885

HEALTH STATISTICS

EPIDEMIOLOGY

DRACUNCULIASIS OR GUINEA WORM DISTRIBUTION BY SECTOR AND BY MONTH

1979

SECTORS	MONTH												TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	
1. Ouaga	47	42	52	171	121	80	87	64	102	50	22	12	851
S/S 1 Manga	2	-	...	...	...	...	...	...	-	-	-	1	3
2 Fada-	11	10	5	13	1	-	3	-	4	8	13	19	89
3 Gaoua	13	-	-	11	7	9	81	21	17	6	3	5	173
4 Ouahigouyou	2	9	4	16	23	66	113	86	49	...	9	10	422
5 Kondougou	4	28	7	22	45	59	33	31	27	31	-	8	295
S/S 5 Yako	-	-	5	3	8	...	...	20	10	15	11	34	106
6 Dédougou	2	18	-	2	4	7	4	-	2	-	4	...	43
7 Bobo-Diculasso	-	1	4	2	2	9	-	-	1	1	3	-	23
S/S 7 Banfora	1	2	...	4	17	16	14	14	5	7	2	2	84
8 Kaya	13	4	32	...	...	...	...	...	77	85	9	5	235
9 Dori	7	14	12	6	9	31	4	24	74	...	...	9	190
10 Tenkodogo	-	-	6	8	11	...	...	28	...	...	...	...	53
TOTAL	102	128	105	290	248	277	339	288	368	238	76	106	2565

... Reports not received.

AVERAGE NUMBER OF CASES.PER YEAR AND PER SECTOR FOR THE YEARS: 1975

1977

1978

1979

ANNEX 3

DATE_____

CSPS_____

DEPARTEMENT_____

PROVINCE_____

1) COMBIEN DE VILLAGES SE TROUVENT DANS VOTRE RAYON D'ACTION

_____

2) EST'CE QUE SE TROUVE LA DERNIERE ANNEE' LE VER DU GUINEE' (LA DRACUNCULOSE) DANS VOTRE RAYON D'ACTION

(A-T-IL ETE' TROUVE; AU COURS DE L'ANEE ECOULEE DANS VOTRE RAYON D'ACTION)

OUI_____ NON_____

3) SI LA RESPONSE EST OUI, CITEZ PAR ORDRE D'IMPORTANCE LES VILLAGES TOUCHES' PAR LA DRACUNCULOSE DANS LE RAYON D'ACTION DE VOTRE CSPS

1)_____

2)_____

3)_____

4)_____

5)_____

etc.

TIMBRE

ANNEX 4

PROPOSAL FOR OPERATIONAL RESEARCH:

EFFECTIVENESS OF TEMEPHOS (ABATE^{TM}) PREPARATIONS.

We propose to compare Temephos in the 1% sand granule preparation (SGP) with 50% emulsifiable concentrate (EC) to determine their relative efficacy, in monthly applications, for suppressing cyclops populations. The experiment will be carried our in the Banfora area (Comoe' Province) in Burkina Faso in May-August, 1987 during the rainy season. This area is endemic for dracunculiasis and has been well characterized by researchers at the Centre Muraz.

Goal:

General To study and compare the duration of effect of chemical treatment of water sources on cyclops populations.

Specific To survey the potential study areas for water sources of the type that are recognized to support cyclops populations and transmission of dracunculiasis in Burkina Faso. These water sites need not be in an endemic area, since human prevalence will not be measured. The classification system given by Steib (1981) should be used to categorize the water sources as follows:

Type 1: Unprotected draw wells

Type 2: Periodic Streams

Type 3: Large natural ponds, surface covered with water lilies

Type 4: Large natural ponds used for water livestock, water lily coverage

Type 5: Small and shallow natural ponds with a variety of water plants

Type 6: Small artificial ponds used specifically for water sources.

Types 5 and 6 are thought to be most important as transmission sites.

Method:

Select a project area(s) which will provide access throughout the rainey season to field teams. The water sources to be studies will be types 5 and 6. Study sites selected must show the presence of cyclops by filtration of a 10 liter sample of water, drawn from the usual entry into the source by local people seeking to fill water jars. Choose six sites for each water classification (total=12).

Establish baseline cyclops density and water volume (May) -Apply Abate EC to two sites in each category (4 and 5) Apply Abate SGP to two sites in each category. No Abate will be applied in the remaining areas, which will serve as controls.

Area rainfall will be monitored (weekly precipitation) during the study period (May-August).

Study area will be visited weekly to measure water volume, cyclops density and to collect a five cc sample of water for eventual determination of temephos concentrations. A total number of 192 specimens will be collected for these analyses (16 weeks X 12 sites). In addition, other notations will be made at this visit, such as water flow, plant growth, etc.) Samples for abate levels should be kept in glass containersl, sealed, cool, and in the dark, at the Centre Muraz.

A Vector Biology and Control (VBC) consultant (USAID) will come to Centre Muraz to assist the principal investigator in the analysis of the results in October, 1987. He will take specimens to the United States for analysis of temephos levels at the Centers for Disease Control (CDC) in Atlanta.

Motive:

It has been determined through research at the Centre Muraz and elsewhere, that dracunculiasis is a serious health problem with important socioeconomic impact. The Government of Burkina Faso is currently planning a control and eradication program against this infection. Chemical control of the intermediate host is an important tool for the prevention of the infection. Temephos has been used extensively in endemic areas, especially India, for this purpose.

The effectiveness of the EC formulation under the conditions present in Burkina Faso (according to preliminary results from the Centre Muraz pilot control villages) are discouraging. Although during the dry season the cyclops populations are suppressed for four weeks after application, the EC is only effect for a few days during the rainy season. It has been suggested that the rapidly changing volumes of water due to rains, or the intermittent flow of water with precipitation, substantially dilute, or remove, the chemical. SGP has been suggested as an alternative which may be more efficacious under these conditions. The residual effect may be longer due to "slow release" of the active ingredient, and less affected by washout phenomena of heavy rain.

Implication:

Equivalent amounts of Abate in the SGP costs 3-6 times that of the EC. The sand ;is heavy and difficult to transport. Quality control to check concentration levels is always essential for the SGP since adherence of Abate may vary greatly from batch to batch. Finally, while EC is readily available through West Africa through the WHO Onchocerciasis Control Programme, SGP must either be specially ordered and imported, or prepared in country. Such difficulties arising from cost, supply, quality control and logistics has resulted in the abandonment of SGP (in favor of EC) in the Indian National Guinea Worm Eradication Programme. These considerations may also be prohibitive for the extensive use of SGP in Burkina Faso. Therefore, this research is critical for the planning of efficient and cost effective use of Abate as a component of the proposed Burkina Faso Eradication Program.

Activities:

For each well type (5 and 6) six study sites will be chosen and studied for 15 weeks..

	WEEK														
Well	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1-2	X	.	.	.	X	.	.	.	X	.	.	.	X	.	.
3-4	Y	.	.	.	Y	.	.	.	Y	.	.	.	Y	.	.
5-6	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

KEY: "."=water body measurements, volume calculations, cyclops/10 liters, sample for temephos levels, and observations.
"X"=activities above plus addition of EC at 1 ppm
"Y"=activities above plus addition of SGP at 1 ppm.

Calendar:

April: Select study sites. Acquire Abate (SGP will be a special problem).

May-August: Carry out study

October: VBC consultant. Testing for Abate levels at CDC.

November: Final analysis and report

Coordination:

Centre Muraz: Principal researchers. Will provide transport, personnel, field work and cyclops studies.

Centers for Disease Control: Will provide consultant, assist with SGP procurement, and will provide Abate testing.

VBC: Will provide Consultant travel.

USAID/Burkina Will provide operational research funds

Anticipated difficulties:

Procuring a sufficient quantity of reagent grade 1% SGP. SGP may have to be prepared at Centre Muraz using Abate (technical grade). Method of production is attached (Annex). Quality control for determination of precise percentage of sand produced locally must be considered, since this research rests on the proposition that equal amounts of active ingredient will be applied (variable measured is not amount, but formulation.

ABATE STUDY

FIELD REPORT FORM

SITE_____

DATE_____

WATER SITE DIMENSIONS:

Length_____ Sketch below

Width _____

Depth _____

Volume_____

SAMPLE TAKEN AND LABELED? _____

10 LITERS FILTERED FOR CYCLOPS? _____

OBSERVATIONS:

Covering Vegetation:

Stagnant or running water:

Running since previous visit:

TREATMENT (supervisor level personnel should go to the field during the treatment weeks to make sure treatments are properly carried out)

EC (cc)= 2 X m3 =_____

SGP (kg)= m3

Annex 5

SOURCES OF FUNDING CONSULTATION, AND INFORMATION FOR MODULES OF THE POA

Instructional Materials

For Project Planning

National Research Council, 1983. Opportunities for Control of Dracunculiasis: Report of a Workshop. National Academy Press, Washington, D.C.*

National Research Council, 1983. Opportunities for Control of Dracunculiasis: Contributed Papers. National Academy Press, Washington, D.C.*

Division of Helminthology, National Institute of Communicable Diseases, 1982. Operational Manual of the Guinea Worm Eradication Programme in India. Delhi: NICD.

For flip charts and village instructional materials

World Neighbors, Divison of Communication and Education. 5116 North Portlant Av., Oklahoma City, OK. 73112.

Teaching Aids at Low Cost (TALC): Foundation for Teaching Aids at Low Cost, Institute of Child Helath, 30 Guilford Street, London WCIN IEH, England.

Motion Picture Films

"Avicenna's Thread," Scottish Central Film Library (Downhill, 74 Victoria Crescent Road, Glasgow G12 9JN, Sctoland, U.K.), Catalogue No. 2FS3252. Also available in French and English from JPR Productions, 5 rue Broussais, Paris, France 75014

"Dracunculose," Office National du Film du Canada (Case postale 6100, Montreal, Quebec H3C 3H5), Serie Sante-Afrique No. 16.

*Copies can be obtained from: Board on Science and Technology for International Development, National Research Council, 2101 Constitution Av NW, Washington , DC 20418.

Annex 5

SOURCES OF FUNDING CONSULTATION, AND INFORMATION FOR MODULES OF THE POA

CONSULTATION:

Vector Biology and Control Program
USAID
S&T/Health
Room 709, SA-18
Washington, DC 20523
USA

or

Project Director
Vectory Biology and Control Project
1611 North Kent Street
Suite 503
Arlington, Virginia 22209
USA
(703) 527-6500
TELEX 248812 (MSCI UR)
CABLE: MSCI Washington, DC

[A suggested Scope of Work (SOW) document requesting VBC/USAID technical assistance for the economic studies of dracunculiasis (OCCGE-Dr. Guiguemde) has been prepared. The MOH/OCCGE may wish additional technical assistance in the analysis of the results of the Abate study and the preparation of a plan for its operational use based on study results.]

FUNDING FOR PILOT PROJECTS

Mr. Joseph Giordano
Carter Presidential Center
GLOBAL 2000 PROJECT
Atlanta, Georgia USA

Irwin Redlener, M.D.
Medical Director
UNITED SUPPORT of ARTISTS FOR AFRICA (USA for Africa)
100 East 85th Street
New York, New York 10028
USA

[A preproposal which could be sent through the MOH to both USA for Africa or the Global 2000 Program has been prepared for MOH consideration.]

HEALTH, HUNGER AND HUMANITY PROGRAM
The Rotary Foundation of Rotary International
1600 Ridge Avenue
Evanston, Illinois 60201
USA

[Requests must be submitted through either the Burkina Faso Rotary Club officers:

Boniface Sodatonou
President, Rotary Club
BP 4733
Ouagadougou

or

Issouf Saadhio
Secretary, Rotary Club
BP 5432
Ouagadougou

The MOH coordinator of the National POA may wish to provide copies of the final (approved) POA document to these individuals to develop Rotary Club interest. Rotary Club officials could also be invited to the National Meeting.]

FUNDING FOR OPERATIONAL RESEARCH IN RAPID EPIDEMIOLOGICAL ASSESSMENT

Dr. Michael P. Greene
Associate Director/Research Grants
The Board on Science and Technology for International Development
BOSTID Research Grants Program
Office of International Affirs
National Academy of Sciences/National Research Council
2101 Constitution Avenue, NW
Washington DC 20418
USA
(202) 334-2675

TELEX: 353001 BOSTID WSH
CABLE: NARECO Washington

[A preproposal for this POA module requires further discussion and development. It would be best if prepared after the completion of the questionnaire survey, in September-October, 1987. The preproposal should include the results of this survey, and the new surveillance questionas which have arisen from it. The MOH may wish additional VBC consultation in the preparation of the final proposal if there BOSTID expresses interest in the preproposal.]

DRAFT

PREPROPOSAL: A PILOT PROJECT FOR GUINEA WORM CONTROL IN BURKINA FASO

ABSTRACT: The Ministry of Health of the Government of Burkina Faso proposes an initiative to control dracunculiasis in one or two provinces of the country. The program would begin in the spring of 1988. The estimated cost per pilot project is between $50-60,000, depending on the availability of MOH vehicles. The program will be based on health education and provision of inexpensive water filtration devices to affected populations. The pilots would mark the initial operations of the national plan for the elimination of this condition in Burkina.

STATEMENT OF THE PROBLEM

Human dracunculiasis (guinea worm disease, Ver du Guinee') is a parasitic disease acquired solely by drinking grossly contaminated water. This infection is highly endemic in Burkina Faso. It is reported from 27 of the 30 provinces; in actually, probably all of the country is affected.(WHO Weekly Epidemiological Record, 1986, in press) Cases reports received through the passive surveillance system markedly underestimate the true incidence, and represent only 1-2% of cases. Conservative estimates put the national annual incidence between 65-115,000 cases; this figure represents about 3% of the country's adult population. The cost of the disease to the country, in terms of loses in agricultural production and medical expenses, is easily 1-2 billion CFA per year (4-8 million dollars) (Guiguemde, TR. Medicine d'Afrique Noire, 1985; 32:9-14; Guiguemde, OCCGE Technical Document no 89(12);1984. p. 73-90).

The elimination of dracunculiasis is an important health goal of the government of Burkina Faso (GOBF). In May, 1986, GOBF Ministry of Health (MOH) officials sponsored World Health Assembly Resolution 39.21, which calls for the global elimination of dracunculiasis in association with the rural activities of the International Drinking Water Supply and Sanitation Decade. The 5 year plan of the GOBF (1986-1990) offers the "Lutte contre la Dracunculose" as a line item goal, albeit one which must be funded through external (donor) sources [Burkina Faso: Premier Plan Quinquennal de Developpement Populaire (1986-90) Vol. II, p. 326]. Although in 1984 a project for a National Program for the Elimination of Dracunculiasis (POA) in Burkina Faso was proposed, it has yet to be funded. A USAID consultant, funded through the Vector Biology and Control Program of that agency, has recently worked with the GOBF in revising this document in hopes of promoting donor agency interest and funding.

The proposed POA was prepared principally by Dr. RT Guiguemde [Master of Research, the Centre Muraz, Organisation de Coordination et de Cooperation pour la Lutte Contre les Grandes Endemies (OCCGE), Bobo-Dioulasso], in collaboration with the MOH. Dr. Guiguemde is an internationally known figure in the field of dracunculiasis, and has performed extensive research in villages in the COMOE' province of southwest Burkina Faso [Guiguemde, Medicine d'Afrique Noire, 1983; 30:419-26; Guiguemde, OCCGE Technical Document, 1984, No. 8.431; Guiguemde, Bull. Soc Path Ex, 1986; 79:89-95; Gbary and Guiguemde, OCCGE Technical Document, 1986; No 8.921.; (also see references above)].

The central strategy of the POA is one of health education and personal prophylaxis (through providing inexpensive water filters to villagers in affected areas). Dr. Guiguemde has demonstrated the efficacy of these interventions against dracunculiasis in a small number of affected villages in Comoe'. The health education message and the water filtration methods were found to be accepted by local populations, and dramatically effective in reducing the incidence of infection within a relatively short time.

IMPACT OF CONTROL MEASURES IN PILOT VILLAGES [Guiguemde (unpublished) Annual Activity Report, 1984, Centre Muraz: Project--Epidemiological studies and control of Guinea worm in the wet savannah region (NIANGOLOKO REGION, BURKINA FASO)].

VILLAGE (pop.)	PREVALENCE BEFORE CONTROL	PREVALENCE AFTER CONTROL
Panga (713)	37%	1.5%
Mitieredougou (667)	24%	3.5%
Nofesso (309)	54%	8.4%

Through this project, training techniques, educational materials [Guiguemde, "Getting Rid of Guinea Worm: A guide for the primary health care worker" (please find attached a translation from french)], and effective filters have been developed which are cost-effective, and which form the basis for training of the grass roots health worker.

THE POA

The MOH hopes to "link" much of the POA activity to the international and donor organizations with rural water supply projects. An attempt will be made to convince these organizations that guinea worm is an ideal health impact indicator of water supply programs. Active projects will be requested to develop "dracunculiasis components" which might include priority placement of wells in affected villages. To improve understanding of the life cycle of the parasite among villagers, the MOH also wishes to harness the potential of NGOs working in primary health care, rural agricultural development, and other disease control activities.

In addition to the above activities (i.e., apart from the "linkage" strategy), the POA also calls for the MOH to seek modest independent funding. In the immediate future (1987-1990), funding "modules" have been constructed, each aimed at goals elaborated in the POA. Among these modules: a) a national questionnaire survey to better delimit the distribution of infection to enable targeting of scarce resources; b) development of MOH pilot control efforts in one or two highly endemic province(s); and c) MOH operational research to improve surveillance techniques. Donor interest in funding one or more of these modules is being canvassed through preproposals. Agencies with potential interest in guinea worm control

efforts include United Support of Artists for Africa, the Global 2000 Project of the Carter Presidential Center, the Board on Science and Technology for International Development (BOSTID), and others.

PREPROPOSAL FOR PILOT PROJECTS

The MOH, GOBF proposes to expand on the successes demonstrated at the Centre Muraz through the implementation, in one or two provinces, of a program composed of health education and personal prophylaxis. The activity will take place within the context and infrastructure of the national primary health care system. The program would entail:

1) The training of health personnel at the provincial level;

2) The identification of affected villages through active and passive epidemiological techniques;

3) Brief training of the local health personnel who will be involved with village-level health education sessions. [These include the nurses of the local primary health units (CSPS) (which serve 20-30 villages within their operating radius) and the village health workers from the affected villages];

4) The production and distribution of small water filters to villagers attending the health education sessions;

5) Quality control measures by a provincial level team which monitor village level activities; and,

6) Annual program evaluation, which would utilizing the resident expertise of Dr. Guiguemde, and possibly outside consultants.

ADMINISTRATION

Government Supervision of the proposed project will be through the National Centers of Surveillance and Epidemiology (DSE), Studies and Planning (DEP) and Education and Sanitation (DES). The MOH, GOBF will designate one central level official to work 25% of his time on the project.

BUDGET

The proposed duration of funding would be 3 years. The estimated cost per pilot project is between $50-60,000, depending on the availability of vehicles (see below). Costs of the program would include health education materials [including posters for health education, production of booklets (attached)], production of filters, gasoline, and modest consultant fees for Dr. Guiguemde. In-country evaluation of the pilots by outside experts will be achieved through support from the USAID Vector Biology and Control Program and will not be included in the budget.

It will be necessary to include monies for the purchase of 4 small motorbikes/province to allow monitoring of village activities by provincial team members. Purchase of an all terrain vehicle is desirable, but not absolutely necesssary, particularly if there is already a provincial government vehicle with a reasonable degree of availability. Personnel and

salaries are to be provided by the MOH, although a small amount has been budgeted for per diem of workers during training sessions. A overview of the budget considerations is attached.

If there is interest in this preproposal at the Global 2000 Project of the Carter Presidential Center, please send any suggestions or comments on the proposed methodology, and instructions and materials necessary to make formal application. A final document will be promptly prepared which will address: provincial location(s); operational, administrative and logistical details of training, identification of affected villages, manufacturing and distribution of filters and health educational materials; and names and Curriculum vitea of officials to be involved to the provincial level.

Thank you, in advance, for considering this preproposal.

ANNEX 7

ANNEXES

Résultats d'enquêtes filariennes dans l'Ouest de la Haute-Volta
(Cercle de Banfora) Résultats par villages

I — Subdivision SINDOU

1.1 Canton LOUMANA

Village	Recensés	Visités	Taux de présentation	Onchocercose dépistés	Onchocercose taux	Bancroft dépistés	Bancroft taux	Perstans dépistés	Perstans taux	Ver de Guinée
1 Baguera	1 938	994	51.2	564	55.9	8	0.8	186	18.7	0
2 Bindougou	557	308	55.2	127	41.2	1	0.3	159	51.6	0
3 Cissegue	539	310	57.5	278	89.6	0	0.0	70	22.5	0
4 Faon	286	134	46.9	73	54.6	5	3.7	27	20.1	0
5 Farmagara	128	57	41.5	48	84.2	0	0.0	5	8.8	0
6 Fourkoura	1 248	546	43.7	262	48.1	4	0.7	214	39.1	0
7 Kangoura	934	332	35.5	122	25.1	14	4.1	202	41.9	0
8 Lera	252	137	54.3	84	61.4	0	0.0	14	10.2	0
9 Loukouara	115	86	74.8	65	75.5	0	0.0	4	4.6	0
10 Loumana	1 735	798	46.0	662	82.9	0	0.0	27	3.3	0
11 Negueni	1 014	587	57.9	341	58.0	67	11.4	91	15.5	0
12 Niankorodougou	5 636	2 215	39.3	782	35.3	16	0.7	130	5.8	+
13 Niansogoni	405	205	50.7	159	77.5	3	1.4	67	32.6	0
14 Noussoun	612	467	76.3	263	56.1	29	6.2	97	20.7	0
15 Ouahirmadougou	194	102	52.5	3	2.9	0	0.0	19	18.6	0
16 Outourou	287	108	37.9	76	70.3	8	7.4	81	75.0	0
17 Sourani	95	35	36.8	26	74.2	0	0.0	4	11.4	0
18 Tagouassani	1 005	478	47.5	171	35.8	2	0.4	106	22.1	0
19 Tamassari	345	245	71.0	200	81.6	1	0.4	37	15.1	0
	17 323	8 144	47.0	4 306	52.8	158	1.9	1 540	18.9	très rare

1.2 Canton SINDOU

Village	Recensés	Visités	Taux de présentation	Onchocercose dépistés	Onchocercose taux	Bancroft dépistés	Bancroft taux	Perstans dépistés	Perstans taux	Ver de Guinée
20 Dinaoro	410	125	30.5	64	51.2	2	1.6	45	36.0	0
21 Diomso	268	141	53.8	47	32.6	1	0.6	43	29.7	+
22 Douna	4.942	1.280	25.1	124	9.6	8	0.6	166	12.9	0
23 Kankalaba	3.499	2.166	61.9	808	37.2	36	1.6	630	26.9	+
24 Kamagara	513	298	58.0	76	25.5	3	0.9	96	32.2	0
25 Koraia	1.339	591	44.1	179	30.5	10	1.6	203	34.3	0
26 Konandougou	5.389	1.309	24.3	216	16.5	47	3.5	343	26.2	0
27 Malon	639	295	46.1	166	56.2	1	0.3	61	24.0	0
28 M'Para	219	139	63.4	112	80.5	2	1.4	50	35.9	0
29 M'Pogona	99	60	60.6	43	71.6	0	0.0	20	33.3	0
30 Niantono	655	439	67.0	285	64.9	13	2.7	240	54.6	0
31 Niofila	1.189	344	28.9	105	30.5	9	2.6	166	48.2	0
32 Sindou	1.681	689	40.9	79	11.4	8	1.1	82	11.9	0
33 Sindoukoroni	513	208	40.5	133	63.8	6	2.8	100	48.1	0
34 Tiniba	198	108	54.5	79	73.2	0	0.0	64	59.2	0
35 Tourny	1 706	608	41.5	303	49.8	23	3.7	154	25.3	0
36 Wolonkto	1 682	992	58.9	359	36.0	90	9.0	344	34.6	0
37 Toumousseni	2 032	532	26.1	81	15.2	112	21.0	286	53.7	+
	26 973	10 336	38.3	3.259	35.1	371	3.5	3 093	29.9	très rare

II — *Subdivision* BANFORA

II 1 Canton HEREGADOUGOU

Village	Recensés	Visités	Taux de présentation	Onchocercome		Bancroft		*Persans*		Ver de Guinée
				dépistés	taux	dépistés	taux	dépistés	taux	
37 Heregadougou	1 610	744	46,8	169	22,7	59	7,9	356	47,8	0
38 Dalina	130	62	47,7	23	37,1	12	19,3	37	59,6	+
39 Dapri	106	53	50,0	20	37,7	4	7,5	23	43,3	0
40 Diamon	(256)		(inaccessible, non prospecté)							
41 Fabedougou	770	392	50,9	242	61,8	56	14,2	161	41,0	0
42 Kafiguel.	904	436	48,2	253	57,7	66	15,1	80	18,2	0
43 Kolokilo	1.199	385	32,1	256	67,0	26	6,7	131	34,0	0
44 Manion	278	38	13,6	26	68,1	9	23,6	27	71,0	0
45 Mirodon	1.038	378	36,4	165	44,1	25	6,6	171	45,2	0
46 Mousodougou	4.760	1.355	28,5	931	68,1	27	1,2	461	34,0	0
47 Niankodougou	106	62	58,4	5	8,0	9	14,5	25	40,3	0
53 Bodadougou	1.234	427	34,6	296	57,7	44	10,3	185	43,3	0
	12.135	4.334	35,7	2.390	55,1	339	7,8	1.659	38,2	très rare

II 2 Canton BANFORA

48 Banfora	(4 481)		(non prospecté)							
49 Karibina	871	446	51,2	26	5,8	127	28,4	39	8,9	0
50 Kassara	736	389	41,8	26	6,4	81	20,7	66	21,8	0
51 Tangora	1.155	537	46,4	50	9,3	113	21,0	217	40,4	+
52 Tatana	321	194	63,5	8	4,1	22	11,3	67	33,5	+
	3.086	1.486	48,1	110	7,3	343	23,0	389	26,1	très rare

II 3 Villages indépendants comptabilisés avec les Cantons SINDOU (55 Tourmousseni), HERICADOUGOU (53 Bodadougou) et KARABOROLA (54 Sorefedougou)

II 4 Canton NASSIAN

Village	Recensés	Visités	Taux de présentation	Onchocercome		Bancroft		*Persans*		Ver de Guinée
				dépistés	taux	dépistés	taux	dépistés	taux	
56 Bounouna	1 350	806	58,9	65	8,0	207	25,6	218	27,1	0
57 Lemouroudougou	667	355	53,2	68	19,1	103	29,2	47	13,2	0
58 Nassian	1 [illegible]	828	51,0	73	8,8	237	28,6	140	16,9	-
59 Tafiné	990	626	63,2	126	20,1	130	20,7	190	30,3	0
	4 663	2 615	56,1	332	12,6	678	25,9	595	22,7	très rare

II 5 Canton TINGRELA

60 Diongolo	922	476	51,6	57	11,9	141	29,8	276	57,9	0
61 Siaena	1 230	606	49,2	44	7,2	232	38,2	94	15,5	0
62 Tiecouna	632	363	57,4	17	4,7	155	42,6	42	11,5	0
63 Tingréla	2 728	1 720	62,3	169	9,8	546	31,7	270	15,9	+
	5 512	3 165	57,4	287	9,0	1 074	33,9	682	21,5	très rare

II 6 Canton SIENANA

Village	Recensés	Visites	taux de présentation	Onchocercose dépistés	Onchocercose taux	Bancrofti dépistés	Bancrofti taux	Perstans dépistés	Perstans taux	Ver de Guinée
64 Diarabakoko	1 007	619	61.4	151	24.3	210	33.9	213	34.3	0
65 Dionouna	737	405	54.9	67	16.5	88	21.7	138	34.0	0
66 Kiribama	146	85	58.2	10	11.7	34	38.7	47	55.2	0
67 Korocora	172	109	63.4	24	22.0	23	21.1	41	37.6	0
68 Marebama	87	43	49.4	0	0.0	14	32.5	24	55.8	+
69 Niankar	1 006	537	53.3	40	7.4	182	33.9	123	22.9	0
70 Niatebama	128	86	67.1	26	30.2	30	34.9	51	59.3	0
71 Sienana	2 062	1 167	56.6	141	12.0	320	27.4	363	31.1	0
72 Tienpagora	333	230	71.4	72	31.3	55	23.9	144	62.6	+
73 Toumousna	361	192	53.1	20	10.4	81	42.1	78	40.6	+
74 Titomiana	118	81	77.1	18	22.2	24	29.6	41	50.6	0
	6 157	3 554	57.7	589	16.0	1 061	29.6	1 263	35.5	rare

III — *Subdivision NIANGOLOKO*

III 1 Canton SOUBAKANIEDOUGOU.

Village	Recensés	Visites	taux de présentation	Onchocercose dépistés	Onchocercose taux	Bancrofti dépistés	Bancrofti taux	Perstans dépistés	Perstans taux	Ver de Guinée
75 Badara	171	81	47.3	3	3.7	16	19.9	54	66.6	0
76 Baniagara	321	118	36.7	16	13.5	39	33.0	70	59.3	+
77 Damana	476	194	40.8	84	43.3	7	3.6	61	31.4	0
78 Dakoro	3 728	2 299	59.7	514	22.3	112	4.9	941	40.9	0
79 Diarisso	581	344	59.2	30	8.7	11	3.2	125	35.8	0
80 Dougoudiou-lama	240	100	41.0	36	36.0	30	30.0	47	47.0	+
81 Fornolesso	134	79	59.0	31	39.1	16	20.2	36	45.5	+
82 Gouon[illegible]	[illegible]	561	61.0	[illegible]	13.0	180	30.9	393	67.5	+
83 Goundadou-gouba	1 295	557	43.1	71	12.7	129	23.1	367	65.9	+
84 Goundadou-goun	942	360	38.2	35	9.7	90	25.0	219	60.8	+
85 Katiera	164	129	79.0	101	78.2	12	9.3	51	39.5	0
86 Letietesso	868	522	60.1	240	45.9	137	26.2	257	49.2	+
87 Lomagora	440	273	62.0	31	11.3	35	12.9	144	52.8	+
88 Mambua	(?) 77	77	(?) 100	64	83.1	18	23.4	36	46.8	0
89 Moadougou	1 105	480	43.4	55	11.4	13	2.7	206	43.3	+
90 Moussougou Bofinfalidougou	188	108	57.4	13	12.0	3	2.7	46	42.6	0
91 Natoun	322	212	65.7	155	73.2	62	29.3	116	54.6	0
92 Paliga	1 500	781	51.4	98	13.4	172	22.0	354	45.3	+
93 Soubakanie-dougou	3 874	2 005	51.8	195	9.7	456	22.8	900	44.8	+
94 Zieadougou	992	524	52.8	82	15.6	44	8.3	258	49.2	+
	18 363	9 824	53.2	1 930	19.5	1 595	16.2	4 665	47.5	fréquent

III 2 Canton DILFOULA

Village	Recensés	Visites	taux de présentation	Onchocercose dépistés	Onchocercose taux	Bancrofti dépistés	Bancrofti taux	Perstans dépistés	Perstans taux	Ver de Guinée
95 Boko	222	140	60.0	100	71.4	5	3.5	40	28.5	+
96 Dangoua-dougou	187	148	79.0	108	72.9	17	11.4	65	43.9	0
97 Dielouna	208	115	55.0	84	73.0	4	3.4	34	29.5	+
98 Fonongo	236	152	64.4	114	75.0	4	2.6	7	4.6	0
99 Kakoumana	114	81	71.0	57	70.3	1	1.2	31	38.2	0

Village	Recensés	Visités	Taux de présentation	Onchocercose		Hansen		Pians		Ver de Guinée
				depistés	taux	depistés	taux	depistés	taux	
100 Karaborosso	561	374	67,0	126	33,6	91	24,3	179	47,8	+
101 Kimini	530	276	52,0	138	50,0	15	5,4	60	21,8	0
102 Kimitoura	1 741	999	57,0	216	21,7	255	25,5	440	44,0	+
103 Mitiredougou	964	587	60,0	181	30,9	153	26,0	345	58,8	+
104 Niangadiako	3 647	2 161	59,0	482	22,0	477	21,8	750	34,3	+
105 Nimfesso	324	208	64,0	106	50,9	5	2,7	120	57,6	0
106 Tieridéni	124	79	63,0	63	79,8	2	2,5	31	39,1	+
107 Tierkoura	(?) 113	116	(?) 100	90	77,6	1	0,8	26	22,4	0
108 Tinpérébé	981	581	59,0	370	63,6	48	8,2	219	37,6	+
109 Toundoura	373	292	78,0	127	43,4	33	11,3	172	58,8	+
110 Wangolodougou	720	432	60,0	304	70,3	6	1,3	85	19,7	0
111 Yenderé	370	275	74,0	166	60,4	38	13,8	89	32,2	0
	11 405	7 036	61,6	2 834	40,2	1.155	16,4	2.693	38,1	fréquent

IV — *Subdivision SIDERADOUGOU*

IV 1 Canton KARABOKOLA.

112 Bondorola	620	171	27,5	41	23,9	25	14,6	74	43,2	+
113 Boussara	838	321	38,3	109	33,9	27	8,4	106	33,0	+
114 Daramfondougou	2.018	751	37,4	57	7,5	137	18,2	224	29,8	+
115 Fandiara	1.506	402	26,9	36	8,9	74	18,4	182	45,2	+
116 Hounkiera	530	230	43,3	108	46,9	20	8,1	125	54,3	+
117 Kangounaba	2.139	530	24,7	93	17,5	74	13,9	252	47,5	+
118 Kangounadéni	654	210	32,1	114	54,2	37	17,6	124	59,0	+
119 Lobola	976	1.060	17,7	138	13,0	231	21,7	407	38,3	+

120 Sanfara	2.268	322	14,2	114	35,4	76	23,6	111	34,4	+
121 Sarara	437	238	54,4	195	81,9	11	4,6	43	18,0	+
122 Sankata	451	213	47,2	153	71,8	26	12,2	97	45,5	+
123 Sarena	176	67	38,0	54	80,5	4	6,1	15	23,0	+
124 Tiefara	2 567	573	22,4	76	13,2	139	24,2	229	39,2	+
54 Serefedougou	499	312	62,7	34	10,9	71	22,7	86	26,2	0
	20 047	5 480	26,1	1.322	24,4	952	17,6	2.073	38,3	très fréquent

IV 2 Canton BAS KOMONO

125 Banakélé	77	63	80,0	31	49,4	1	1,6	27	42,1	+
126 Bandiakoura Diossa	132	19	14,4	15	78,9	0	0,0	5	26,3	+
127 Bandiakoura Dessa	387	155	40,0	122	78,0	3	1,9	44	28,3	+
128 Dabakiri	25	5	21,7	4	80,0	0	0,0	1	20,0	+
129 Dandiagou	261	180	74,7	103	57,2	2	1,1	93	51,6	+
130 Diarakorosso	91	33	36,2	22	66,6	3	9,0	21	63,6	+
131 Diara	104	26	25,0	23	88,4	0	0,0	5	19,2	+
132 Dioumandougou	58	16	27,6	13	81,2	0	0,0	7	43,7	+
133 Farakorosso	248	163	65,7	99	60,0	1	0,6	43	26,3	+
134 Gouso	268	148	55,2	38	25,6	1	0,6	66	44,5	+
135 Larabin	293	168	59,0	56	33,3	13	7,7	82	48,8	+
136 Lepomogou	300	93	30,0	80	86,0	0	0,0	26	27,9	+
137 Mangodara	490	327	66,7	130	39,7	23	7,0	109	33,5	+
138 Massadiekoro	59	31	52,5	25	80,6	0	0,0	9	29,0	+

	Recenses	Visites	Taux de présentation	Onchocercose		Bancroft		Persans		Ver de Guinée
				dépistés	taux	dépistés	taux	dépistés	taux	
139 Niantanko-dougou	71	34	46,5	26	76,4	2	5,8	13	38,2	+
140 Niantana-dougou	86	41	48,2	25	60,9	3	7,3	19	46,3	+
141 Niantanyo	100	48	48,0	22	56,4	5	10,5	25	52,1	+
142 Nouhoussa-dougou	544	261	47,9	101	38,7	7	2,6	148	56,7	+
143 Sakodougou	17	6	35,2	5	83,3	0	0,0	3	50,0	+
144 Sirakoro	370	237	64,0	155	65,4	3	1,2	88	37,1	+
145 Sokouna	526	300	57,0	172	57,0	3	1,0	150	50,0	+
146 Tiebalia	97	30	30,9	17	56,6	1	3,3	21	70,0	+
147 Tomikorosso	89	50	56,0	22	44,0	3	6,0	24	49,9	+
148 Torandougou	545	488	89,9	333	68,2	12	2,4	189	38,7	+
149 Torokoro	447	265	59,0	218	82,2	0	0,0	123	46,4	+
	5 712	3 188	55,6	1 857	58,4	86	2,7	1 341	42,2	présent partout

Résultats globaux pour l'ensemble de la zone prospectée

Nombre de villages prospectés	Recenses	Visites	Taux de présentation	Onchocercose		Bancroft		Persans		Ver de Guinée
				dépistés	taux	dépistés	taux	dépistés	taux	
147	131 476	59 082	44,7	19 196	32,4	7 812	13,2	20 011	33,8	+ dans 71 villages (48,3 %)


Eliminons
le ver de guinée

ELIMINONS

LE VER DE GUINEE

GUIDE POUR L'AGENT DE SANTÉ COMMUNAUTAIRE

Première Edition

Docteur Robert Tinga GUIGUEMDE
Maître de Recherches à l'O.C.C.G.E. *
Centre Muraz, B.P. 153, Bobo-Dioulasso
Haute-Volta.

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* Organisation de Coordination et de Coopération pour la Lutte contre les Grandes Endemies
B.P. 153 Bobo-Dioulasso, Haute-Volta.

1

INTRODUCTION

— Plusieurs méthodes de lutte peuvent être utilisées contre la dracunculose ou Ver de Guinée.

— Ce guide recommande deux mesures de prévention:

1) Prévention collective: ceux qui ont le Ver de Guinée ne doivent pas entrer dans les mares.

2) Prévention individuelle: chacun doit toujours filtrer l'eau avec un tamis-filtre avant de boire.

— Au niveau du village ce sont ces mesures qui sont les plus adaptées car elles coûtent moins chères.

— Elles peuvent être enseignées facilement par l'agent de santé au cours de séances d'éducation sanitaire.

— Ce guide explique:

1) Comment on attrape la maladie du Ver de Guinée.
2) Comment on peut éviter la maladie du Ver de Guinée.

1/8

2

RECOMMANDATIONS

- Lorsque la population du village est nombreuse ce n'est pas facile de faire comprendre les conseils à tout le monde à la fois.
- Il vaut mieux expliquer les leçons par quartier ou par sous-quartiers de sorte que le nombre de personnes ne dépasse pas 150 à chaque séance.
- Toute la population du village (c'est-à-dire enfants, femmes, hommes, vieux) doit participer aux leçons.
- A la fin des leçons du Guide, on peut réunir tout le village pour une séance de révision générale.

LEÇON 1

COMMENT NOUS ATTRAPONS LA MALADIE DU VER DE GUINEE

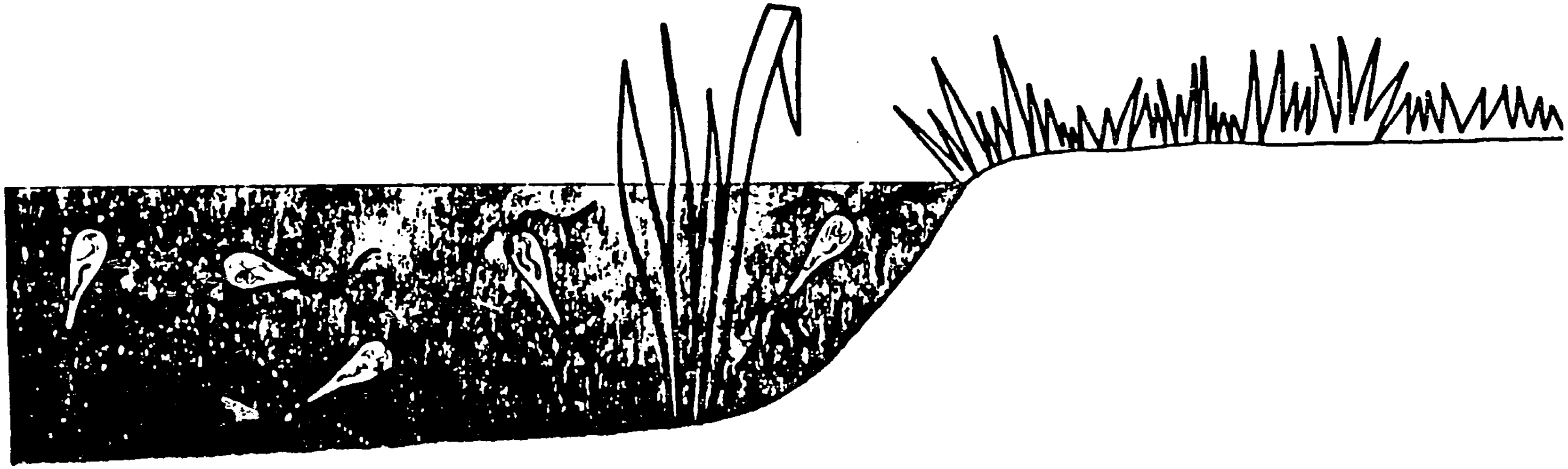
Avant de commencer cette leçon:

1) Je demande aux gens comment ils pensent que nous attrapons la maladie du Ver de Guinée.
2) J'explique ensuite comment nous attrapons la maladie selon la médécine moderne en utilisant si possible les mêmes dessins du guide refaits en plus grand.

— **Doudou a la maladie du Ver de Guinée.**

- Doudou est entré dans la mare avec son pied malade.
- Le ver a pondu ses petits qui sont avalés par des petits animaux appelés *cyclops*.
- Les *cyclops* sont si petits que nous ne les voyons pas à l'œil nu (pour les voir, il faut une machine appelée microscope).

— L'eau de la mare est maintenant dangereuse.
— Elle peut donner la maladie car elle contient des *cyclops* qui renferment les petits vers.
— On dit que l'eau de la mare est contaminée.



— Bintou puise l'eau contaminée.

— Alpha boit l'eau contaminée que sa femme Bintou a puisée.

— le petit ver va mettre un an (12 mois) pour grandir dans le corps d'Alpha.
— Donc 1 an après avoir bu l'eau contaminée, le ver devenu grand, va sortir et Alpha sera malade comme Doudou.

16
CONCLUSION DE LA LEÇON I

— Nous devons retenir que c'est l'eau contaminée des mares qui nous donne la maladie du Ver de Guinée.
— Si nous avons bu l'eau contaminée, cette année c'est l'année prochaine à la même période que le ver va sortir de notre corps.

LEÇON 2

COMMENT NOUS POUVONS EVITER LE VER DE GUINEE

Avant de commencer cette leçon:

1) Je m'assure encore que tout le monde a bien compris la leçon 1.
2) Je demande alors aux gens comment ils pensent que nous pouvons éviter le Ver de Guinée.
3) J'explique ensuite les conseils de la leçon 2 (pages 19, 20 et 21).
4) Et puis, je présente les images suivantes (pages 23 à 29) pour vérifier si les gens ont compris cette leçon 2 en leur demandant de commenter ces images.

19

NOUS POUVONS ELIMINER LE VER DE GUINEE DE NOTRE VILLAGE
S! NOUS NE BUVONS PLUS DE L'EAU CONTAMINEE.
POUR CELA:

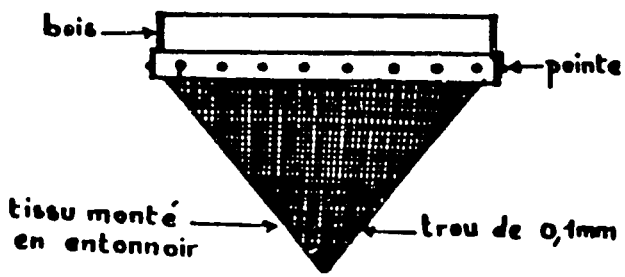
1) Quand nous avons le Ver de Guinée (hommes, femmes, enfants), nous ne devons pas entrer dans les mares.
2) Quand nous sommes au champ ou bien en voyage, nous ne devons pas boire l'eau de mare, si elle n'a pas été filtrée pour éliminer les *cyclops*.
3) Quand nous sommes au village, et s'il y a un bon puits où personne ne peut descendre, nous devons boire l'eau de ce puits.

20

COMMENT FILTRER L'EAU:

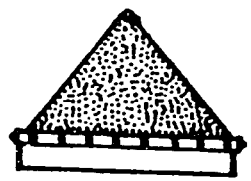
- Nous filtrons l'eau avec un tissu résistant, en nylon ou en tergal.
- Nous utilisons ce tissu sous forme de mouchoirs ou nous fabriquons des tamis-filtres avec.
- Les trous du tissu doivent être très petits (diamètre inférieur à 0,1 millimètre) si non les petits animaux peuvent passer avec l'eau et nous attraperons la maladie.
- Pour cela, nous devons demander au médecin de l'hôpital de nous choisir le bon tissu au marché afin que nous achetions la quantité nécessaire pour fabriquer des tamis-filtres pour tout le village.

SCHEMA DU TAMIS-FILTRE

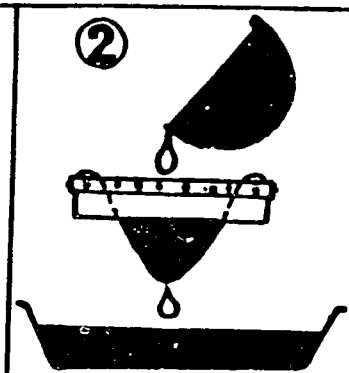


LA TECHNIQUE DE FILTRATION

①

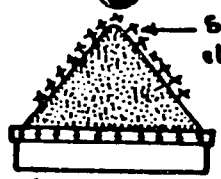


②



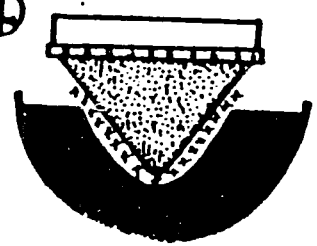
Je retourne le tissu pour filtrer l'eau

③



Aprés je le remets en position n°1

④



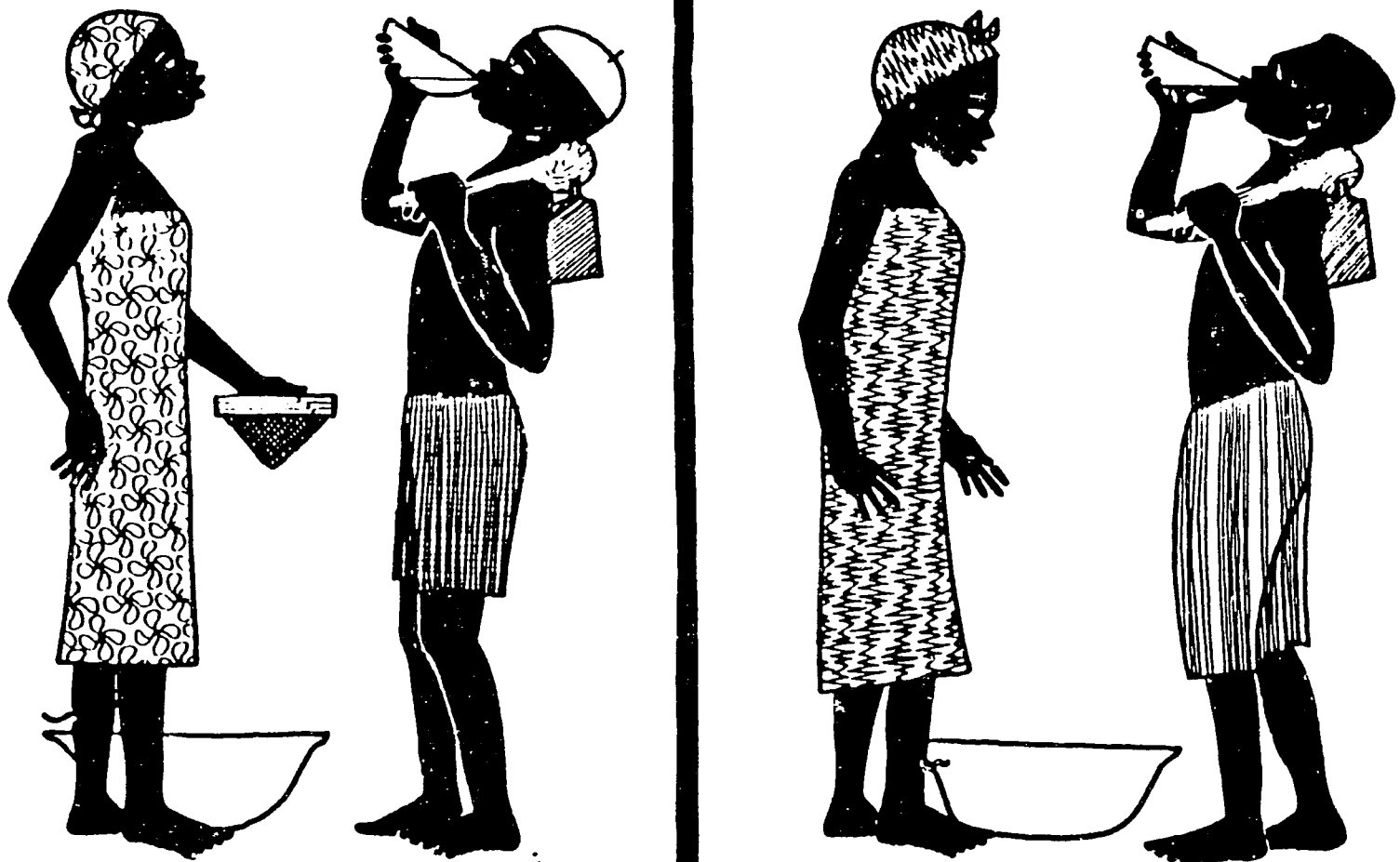
Ensuite je rince avec l'eau pour nettoyer les saletés.

— Maria et Fanta vont puiser l'eau à la mare.
— Maria et Fanta ont la maladie du Ver de Guinée.
— Maria apporte un tamis-filtre.
— Fanta n'a pas de tamis-filtre.
— L'eau de la mare contient les petits animaux qui nous donnent la maladie.

— Maria reste dehors pour puiser l'eau.
— Fanta est entrée dans la mare avec son pied malade.
— Le ver de Fanta pond des petits qui sont avalés par les *cyclops*.
— Maria filtre l'eau avec son tamis-filtre.
— Fanta ne filtre pas l'eau.

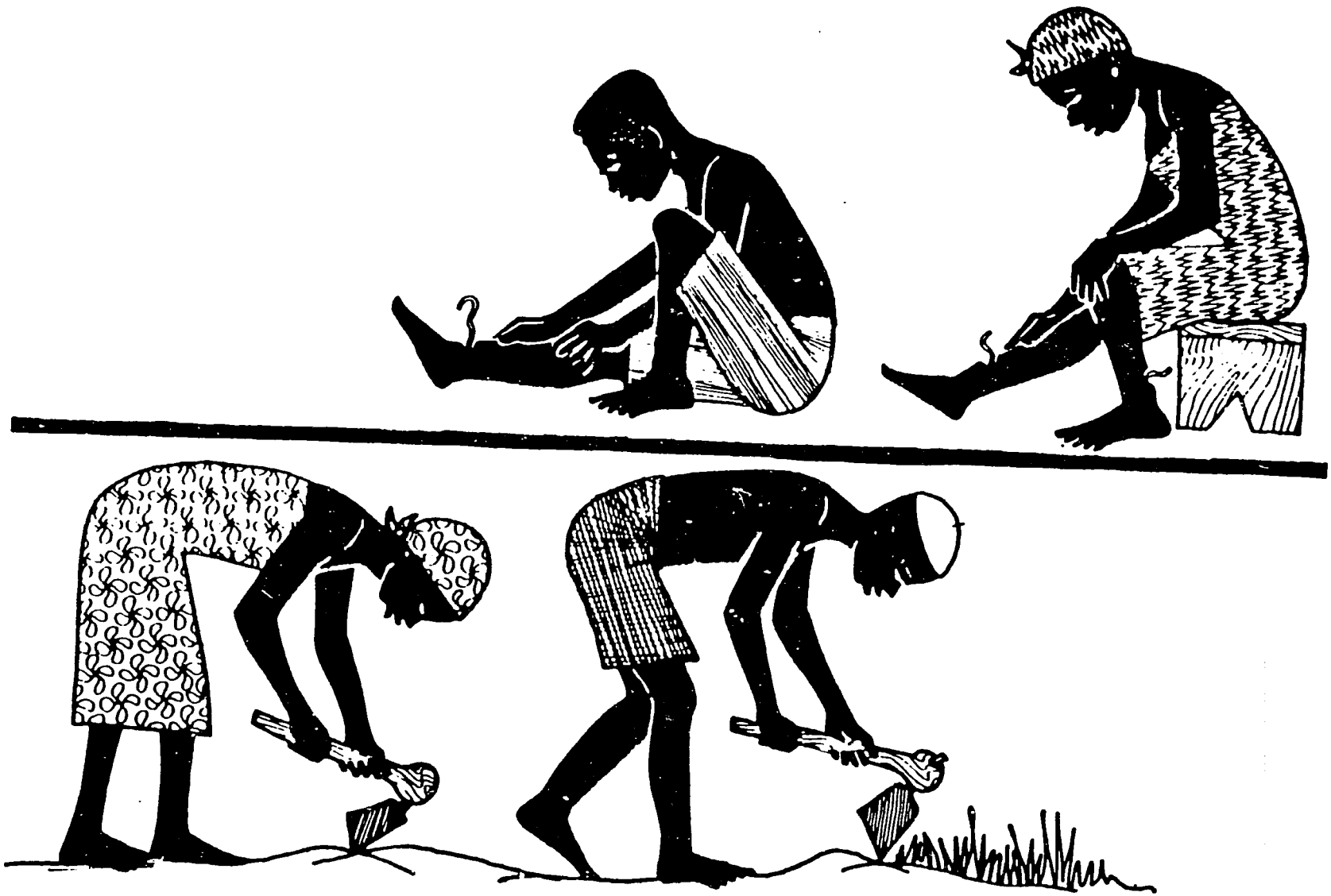
— Maria a apporté l'eau filtrée à son mari Abdou.

— Fanta a apporté l'eau dangeureuse à son mari Mamadou.



— L'année suivante, Maria et Abdou sont en bonne santé et cultivent leur champ.

— L'année suivante Fanta et Mamadou ont à nouveau le Ver de Guinée. Ils sont à la maison et ne peuvent pas cultiver.



Ce livret a été inspiré des études que nous avons
menées dans le cadre d'un projet de recherche
qui a été soutenu financièrement par le Projet S.H.D.S. *
et l'O.M.S.
Il a été préparé en collaboration avec le Docteur
Denis FAIVRE du Service d'Education Sanitaire du
Diocèse de Bobo-Dioulasso.

Les dessins sont de Mr François VEYRIE
du G.R.A.A.P. à Bobo-Dioulasso.

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* Projet for Strenghtnening Health Delivery Systems, Abidjan, R.C.I.

On peut se procurer ce Guide ainsi que les tableaux en toile correspondants aux dessins à:

Section Parasitologie
Centre Muraz
B.P. 153
Bobo-Dioulasso (H.V.)

Achevé d'imprimer par l'Imprimerie de la Savane
le 24 Juillet 1984

ANNEX 9

REPORTS OF DRACUNCULIASIS

KADIOGO PROVINCE - 1986

*reports from units in rural areas or on urban fringes

Reporting Units Mos	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
ONSL Dispensary	0	1	0	2(1)	0	0	1	0	-	-	0	-	4
Tampouy Secteur 32	1	0	0	0	0	1	0	0	-	0	0	-	2
Larle'	0	-	-	-	0	-	1	1	-	-	-	-	2
Kologh Naba	0	0	0	0	0	1	1	0	-	-	0	-	2
Gounghin	0	-	0	0	0	1	0	1	-	-	0	-	2
Dapoya	0	0	0	0	0	-	1	0	-	-	0	-	1
Dassago	0	0	0	0	0	0	0	0	-	-	0	-	0
Croix Rouge	0	0	0	0	1	0	0	1	-	-	0	-	2
Cissin	0	0	0	0	0	0	0	0	-	-	0	-	0
Centre d'accuel Sect. 23	1	3	0	2	2	1	0	2	-	-	0	-	11
Mission Protestant Sect.23	-	-	1	2	2	-	0	0	-	-	0	-	5
Wenginga (Secteur 29)	0	7	0	0	-	-	-	-	-	-	-		7
St. Camille	0	1	0	1	1	2	0	1	-	-	-	-	6
Kossodo *	1	0	0	0	-	-	0	0	-	-	-	-	1
Kamboinse' * (village)	0	0	0	0	0	0	0	0	-	-	0	-	0
Bissighin * (village)	0	0	0	-	0	0	0	0	-	-	0	-	0
Nougraba * Secteur 30	0	0	0	0	0	-	0	2	-	-	0	-	2
Zagthouli (village)	0	0	0	0	0	0	0	0	-	-	0	-	0
Paul VI	0	0	0	0	0	-	0	1	-	-	0	-	1
Samandin	-	0	-	0	0	1	0	0	-	-	-	-	1
TOTAL	3	12	1	7	6	7	4	9	-	0	0	-	49
(no reports filed--	2	3	2	2	1	7	1	1	20	19	5	20	83)

% reporting: 1 - 83/12.20 = 1 - 83/240 = 65%

*urban fringes report on 3/49 cases = 6%

Secteur 23 reports 17/49 cases = 33%

Dracunculiasis Case Reports for 1986
Passore Province, Burkina Faso

NAME OF REPORTING UNIT	TYPE OF UNIT*	NUMBER OF MONTHLY REPORTS FILED IN 1986	NUMBER OF CASES REPORTED (MONTHS OF REPORT)
GOMPONSON	D	6	0
BOKIN	C	7	4 (AUGUST)
KIRSY	D	4	0
YAKE	D	2	0
LA TODIM	C	6	2 (AUGUST)
SARMA	D	1	0
TEIMA	D	2	0
BAGARE	C	5	10 [3 - AUGUST [4 - SEPTEMBER [3 - OCTOBER
PILIMPOIKOU	D	3	0
TOESSIN	D	3	0
ARBOLLE'	C	3	0
OUISSIGA	D	1	0
SAMBA	C	4	0
TOTAL			16

*D = dispensaire
*C = CSPS

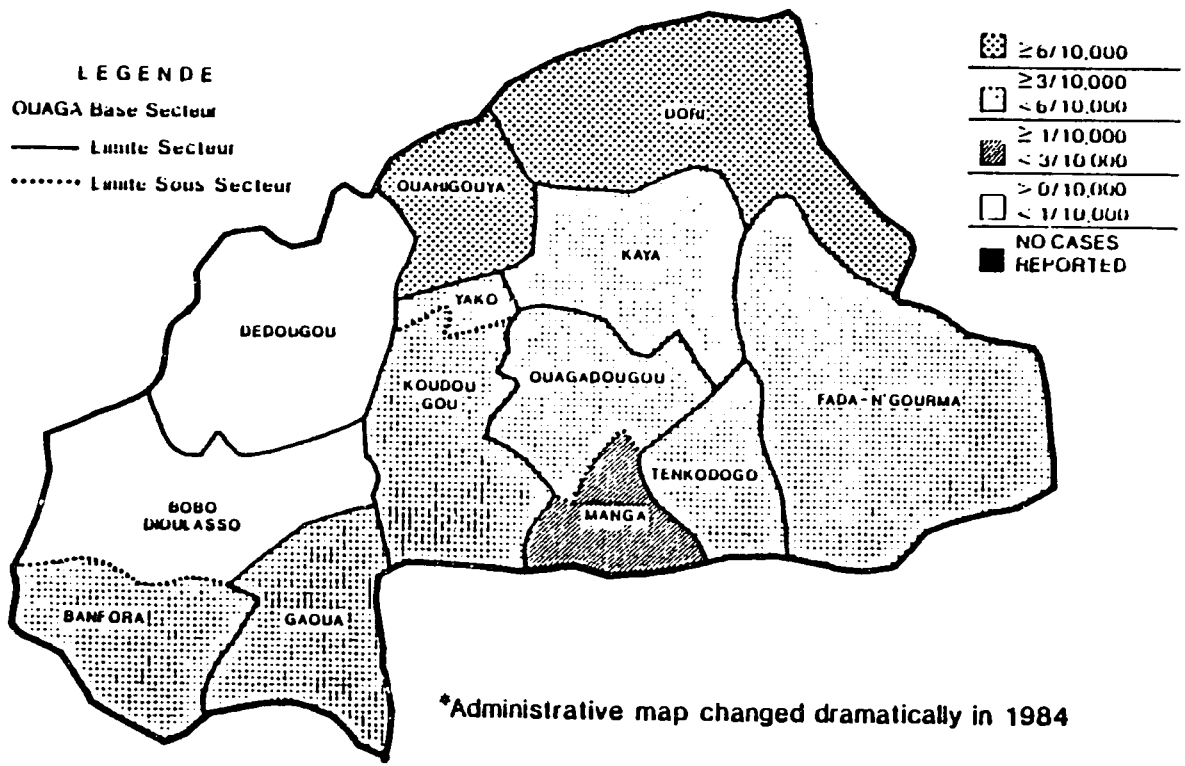
DRACUNCULIASIS - BURKINA FASO
AVERAGE NUMBER OF CASES PER YEAR 1975, 1977, 1978 AND 1979:BY SECTOR

SECTORS AND SUBSECTORS	AVERAGE CASES/YEAR	POPULATION* PER 10,000	ANNUAL INCIDENCE/100,000
1.OUAGADOUGOU	481.8	8.2	5.8
S/1 MANGA	46	2.9	1.6
2. FADA N'GOURMA	154.3	4.2	3.7
3. GAOUA	84.0	3.7	2.3
4. OUAHIGOUYA	431.8	5.3	8.1
5. KOUDOUGOU	381.0	7.2	5.3
S/5 YAKO	112.8	2.2	5.1
6. DEDOUGOU	21.3	6.6	0.3
7. BOBO-DIOULASSO	21	4.1	0.5
S/7 BANFORA	94	2.0	4.7
8. KAYA	288.7	6.5	4.4
9. DORI	272.3	3.7	7.3
10. TENKODOGO	147.3	4.1	3.5

*Calculated from an estimation of the population in 1977

DRACUNCULIASIS: AVERAGE ANNUAL INCIDENCE BY SECTEUR* BASED ON PASSIVE CASE REPORTING 1975, 1977, 1978, AND 1979

(BASED ON DESFONTAINE, 1981)



*Administrative map changed dramatically in 1984

MINISTERE DE LA SANTE

B U R K I N A F A S O
LA PATRIE OU LA MORT,
NOUS VAINCRONS !

CSPS, DISPENSAIRE, MATERNITE

RAPPORT MENSUEL

Province: _____ Mois de _____, 19____

Rayer les mentions inutiles:

CSPS / Dispensaire / Maternité de: _____

1. Activités de Supervision

Visites de supervision (de la DPS ou du CM)
Nombre de visites reçues pendant le mois par cette F.S.: _____

2. Maternité

2.1 Accouchements:	A Domicile	En Maternité	Total
eutociques			
dystociques			
total			
dont - gémellaires			
2.2 Naissances:			
2.2.1 Total de naiss. vivantes			
dont moins de 2500 gr. à la naissance			
2.2.2 Mortalité périnatale précoce			
nombre de mort-nés			
nombre d'enfants morts dans les 48 h après la naissance			

2.3 Avortements — Nombre d'avortements: _____

2.4 Interventions Obstétricales

Curages digitaux: _____ Curetages: _____

Délivrances artificielles: _____ Episiotomies: _____

Autres (à préciser): _____

2.5 Evacuations

Nombre de femmes évacuées: _____

dont - avant accouchement: _____

- après accouchement: _____

- après avortement: _____

2.6 Décès maternels

2.6.1 Nombre total de décès maternels: _____

dont venus d'autres provinces: _____

préciser les autres provinces: _____

2.6.2 Nombre de Décès Maternels par Cause

Disproportion féto-pelvienne	Présentations Vicieuses	Eclampsie	Rupture Utérine	Hémorragie	Retention Placentaire	Infections	Complications d'Avortements

Autres (à préciser): _____

3. Activités de Santé Maternelle et Infantile dans les Formations Sanitaires

3.1 Consultations Prénatales

Nouvelles consultantes: _____

Nbre d'anciennes consultantes revues: _____

3.2 Grossesses à Haut Risque

Nombre de grossesses à haut risque dépistées: _____

dont référées à l'échelon supérieur pour suivie: _____

3.3 Consultations Enfantines

3.3.1 Nbre total d'enfants de moins de 5 ans suivis en consultations.

	moins de 1 an	1 an et +	Total
Nouvelles inscriptions			
Anciennes inscriptions			

3.3.2 Surveillance nutritionnelle par la pesée

NB: Si cette formation n'a pas de balance, utiliser les bandelettes et remplisser les espaces "jaune" et "rouge"

Nombre total d'enfants pesés: _____

ou mesurés avec la bandelette: _____

dont - en dessous de la courbe normale (inférieure à 80% de poids pour age): _____	OU	jaune: _____
		rouge: _____

- avec xérophthalmie: _____

Nombre d'enfants référés pour malnutrition: _____

3.4 Activités de SMI Mobile

Nombre de villages et secteurs couverts dans le mois: _____

3.5 Activités du CREN

NB: La classification par poids et taille est préférable - néamoins, si la mesure de la taille n'est pas possible, utiliser la classification par poids et âge.

Nouvelles inscriptions, total:		Guérisons :
Classification par poids et taille	âge	Décès :
plus de 80% :	plus de 80% :	Abandons :
70 à 80% :	60 à 80% :	Evacuations :
moins de 70% :	moins de 60% :	Restants, fin mois :

3.6 Planning Familial

3.6.1 Méthodes contraceptives

	Spermicides	Pilule	Condom	Diaphragme	Stérilet	Méthodes naturelles	Total
Nouvelles utilisatrices							
Anciennes utilisatrices							
Grossesses accidentelles							

Nbre total de femmes sous surveillance à la fin du mois: _____

3.6.3 Nbre de nouvelles consultantes pour cause de stérilité - primaire: _____

secondaire: _____

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3.7 Vaccinations

3.7.1 Vaccinations du PEV

Vaccins	Tranches d'âge: moins d' 1 an	1 an et +	Total
BCG			
DTCoq + Polio orale	2 - 11 m		
1ère prise			
2ème prise			
3ème prise			
Rappel			
DTCP (polio injectable)	2 - 11 m*		
1ère prise			
2ème prise			
Rougeole	9 - 11 m		
Fièvre jaune			
Tétanos	**Femmes en âge de procréer**	**Femmes enceintes**	**Total**
1ère prise			
2ème pr. et rap.			

3.7.2 Autres vaccinations

Vaccins	Tranches d'âge: 0 à 14 ans	15 ans et +	Total
Tétanos *			
Méningite			
Rage			
Fièvre jaune *			
Cholera			
Autres:			

* Non-compris les vaccinations enregistrées dans le cadre du PEV.

3.7.4 Est-ce-qu'il y a eu une rupture de la chaine de froid? oui _____ non _____

Si oui, préciser la durée en heures: _____ ou jours: _____

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4. Consultations Externes

4.1 Tableau nosologique des consultations (non-compris les décès; les décès sont considérés comme hospitalisés, meme s'ils ont eu lieu à l'arrivée à la formation sanitaire.)

Code OMS	Affection ou symptome dominant	0-4 ans	5-14 ans	Adultes		Total
				hommes	femmes	
001	Choléra					
002	Fièvres typhoïde					
004, 006	Dysenteries amébiases					
009	Diarrhées, gastro-entérites					
022	Charbon					
033	Coqueluche					
036	Méningite					
037	Tétanos					
771.3	Tétanos du nouveau-né					
045	Poliomyélite					
055	Rougeole					
060	Fièvre jaune					
070	Ictère					
071	Rage					
084	Paludisme					
084.9	Palu avec accès pernicieux					
780.6	Fièvre indéterminée					
120	Schistosomiase urinaire					
125.7	Dracunculose (ver de Guinée)					
129	Parasitoses intestinales					
285	Anémies					
366.9	Cataracte					
076	Trachome					
372	Conjonctivite					
381-2	Otites					
462-3	Angine, pharyngite aigue					
486	Pneumopathies					
519	Autres affect. respiratoires					
521	Caries dentaires					
599	Infect. Urinaires					
729	Affections rhumatismales					
729.1	Myalgies					
870-97	Plaies					

4.2 Maladies sexuellement transmissibles

	Cas traités		Partenaires traités	
	Hommes	Femmes	Hommes	Femmes
Syphilis				
Gonorrhée:				

4.3 Tréponématoses endémiques

	Cas traités	Membres de l'entourage traités
Pian		
Syphilis endémique		

4.4 Nouvelles Consultations - Affluence et Origine des Malades
(Non-compris les activités préventives: consultations prénatales. vaccinations, etc.

4.4.1 Nouvelles consultations par tranches d'âge

	Tranches d'âge					
	moins de 1 an	1 - 4 ans	5 - 14 ans	Adultes Hommes	Adultes Femmes	Total
Nouvelles Consultat.:						

4.4.2 Anciennes consultations: _____

4.4.3 Origine des malades par zone (distance)

	Origine des malades par zone			
	centrale (0 - 4 km)	périphérique (5 - 9 km)	étranger (10 km +)	Total
Nouvelles Consultations				

5. Soins Hospitaliers

5.1 Causes d'hospitalisations (diagnostic à la sortie)
(Spécifier les causes en bas.)

Causes	Nombre des cas hospitalisés (C) dont décès (D)									
	moins d'1 an		1-4 ans		5-14 ans		Adultes Hommes		Adultes Femmes	
	C	D	C	D	C	D	C	D	C	D
TOTAL										

5.2 Movement des Malades

Présents début du mois	Entrants dans le mois	Sorties				Restants fin du mois
		Guéris	Evacués	Evadés	Décès	

5.3 Nombre de jours d'hospitalisations (non-compris la maternité): _____

6.0 Activités de laboratoire

	Total	Anormal
KOP		
Snip		
dont né depuis 1975		
Trypanosomiases		
Urines - culot		
- protéine (alb)		
- sucre		

7. Maladies d'Intéret Spécial

Maladie	Lèpre	Trypano	Oncho	TB	Hypert. art.	Diabéte	Asthme	Maladi mental
Malades inscrits au debut								
Entrees nouv cas								
rechutes								
transféré et autres								
Total								
Sorties libéré ou guéri								
DCD								
abandon								
transféré et autres								
Total								
Malades inscrits à la fin								

8. Séances d'Education pour la Santé

Thèmes traités	Nbre de séances dans la F.S.	Nbre de séances hors de la F.S.
Consult. prénatale		
Consult. enfantine		
Planning familial		
Vaccination		
Hygiene et assainissement		
Nutrition		
Maladies sexuellement trans.		
Autres		

9. OBSERVATIONS:

Nom du responsable: _____

Date: _____ Signature:

ANNEX 11

MAJOR VILLAGE WATER PROJECTS (>1 MILLION US DOLLARS)
FOR NEW WELL CONSTRUCTION - BURKINA FASO*

A. PROJECTS IN EXECUTION

AGENCY/PROJECT	PROVINCIAL LOCATION	COST IN MILLIONS OF CFA (MILLION US $)	PROJECT ENDS
BANQUE ISLAMIQUE DEVELOPPEMENT (480 WATER POINTS)	02 - BAZEGA 16 - NAHOURI 30 - ZOUNDWEOGO 05 - BOULKIEMDE 08 - GNAGNA 19 - OUDALAN 20 - PASSORE 24 - SENO 26 - SOUM	2084.00 (6.9)	1987
WORLD BANK (150 WATER POINTS)	URGENCE SAHEL	675.00 (2.3)	1987
CAISSE CENTRAL DE COOPERATION ECONOMIQUE (325 WATER POINTS)	07 - GANZOURGOU 11 - KADIOGO 18 - OUBRITENGA 19 - OUDALAN 24 - SENO 26 - SOUM	1600.00 (5.3)	1987
ITALY/FOOD AND AGRICULTURE ORGANIZATION (UN) (280 WATER POINTS)		?	
WEST AFRICAN DEVELOPMENT BANK (FOND DE L'EQU ET DE L'EQUIPEMENT RUEAL) (80 WATER POINTS)	20 - PASSORE 25 - SISSILI	300.00 (1.0)	1987
FONDS SAOUDIEN AND GTZ (800 WATER POINTS)	?	4725.00 (15.8)	1989
UNICEF/UNDP (325 WATER POINTS)	?	1525.00 (5.1)	1986
SAHELIAN HYDROLIC SERVICE - GERMANY (600 WATER POINTS)	08 - GNAGNA 09 - GOURMA 28 - TAPAO	3909.00 (13.0)	1990
FONDS EUROPEAN DEVELOPMENT (350 WATER POINTS)	06 - COMOE 29 - YATENGA	1971.00 (6.6)	1987
UNDP (90 WATER POINTS)	?	333.00 (1.1)	1986

d on information obtained from Government of Burkina Faso. Premier Plan Quinquennal de oppement Populaire. 1986-1990. Vol. II.

B. PROJECTS FINANCED BUT NOT STARTED

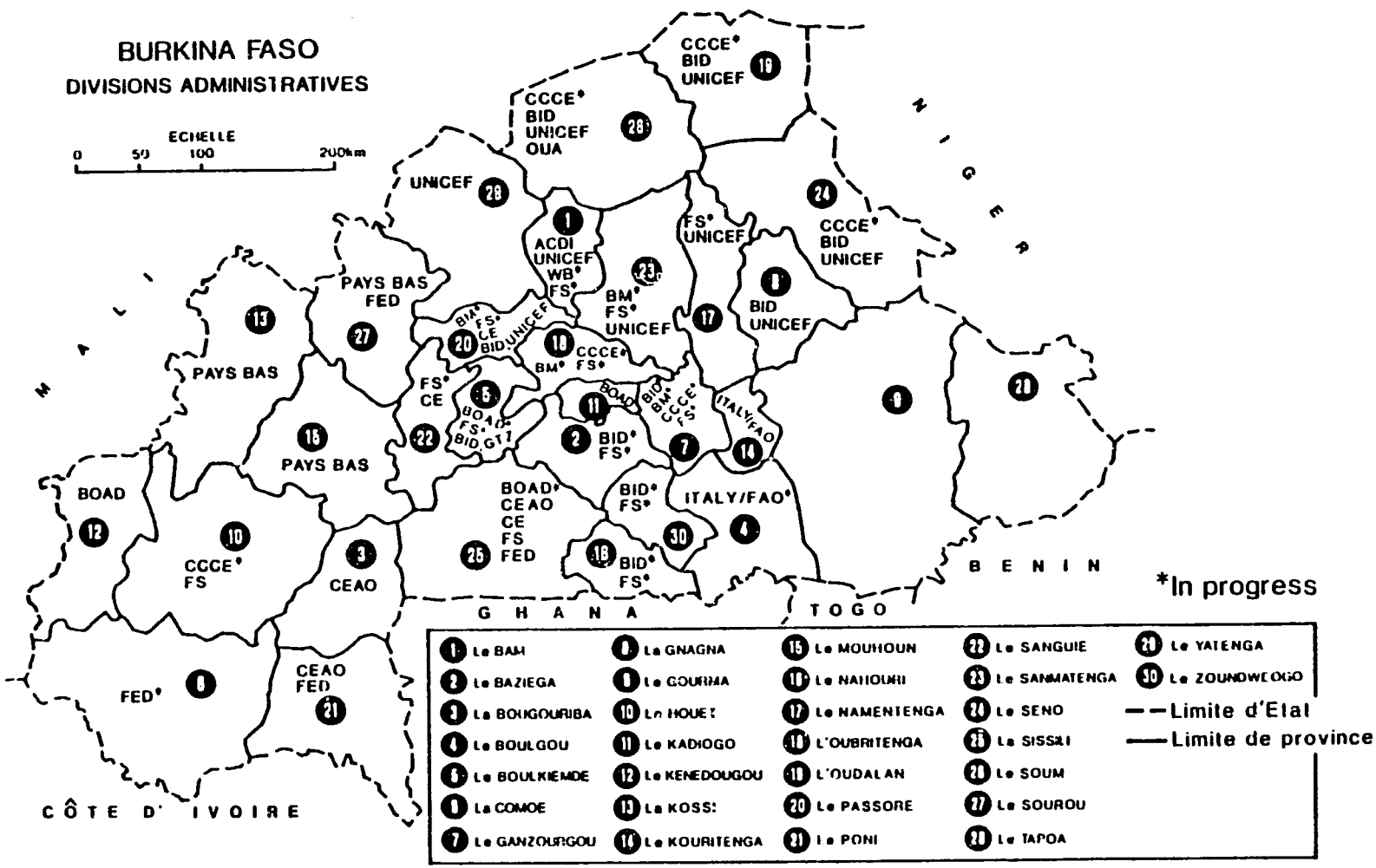
	AGENCY/PROJECT	LOCATION	COST IN MILLIONS OF CFA ($)	PROJECT DURATIO
1)	COMMUNITE' ECONOMIQUE DE L'AFRIQUE OCCIDENTALE - (500 WATERPOINTS)	03 - BOUGOURIBA 21 - PONI 25 - SISSILI	2,329.00 (7.8)	1989
2)	WEST AFRICAN DEVELOPMENT BANK (FOND DE L'EAU ET DE L'EQUIPPEMENT RURAL) - (250 WATERPOINTS)	10 - IIOUET 12 - KENEDOUGOU	1,476.00 (4.9)	1988
3)	POINTS D'EAU CONSEIL ENTENTE 2ND PHASE - (400 WATER POINTS)	?	1,739.00 (5.8)	1988

C. PROJECT PARTIALLY FINANCED - NOT STARTED

	AGENCY/PROJECT	LOCATION	COST IN MILLIONS CFA ($)	PROJECT DURATION
1)	WORLD BANK - AFRICAN DEVELOPMENT BANK	01 - BAM 03 - BOUGOURIBA 08 - GNAGNA 09 - GOURMA 13 - KOSSI 17 - NAMENTENGA 18 - OUBRITENGA 19 - OUDALAN 20 - PASSORE 22 - SANGUIE 23 - SANMATENGA 26 - SOUM 28 - TAPOA 29 - YATENGA 30 - ZOUNDWEOGO	4,871.00 (16.2)	1990

AGENCIES FUNDING MAJOR RURAL WELL CONSTRUCTION-BY PROVINCE

(BASED ON UNPUBLISHED INFORMATION PROVIDED BY THE OFFICE OF WELLS, MINISTRY OF WATER)



Cyanamid Price Quotation
11/29/82 $12.50/lb for technical grade.
11/30/82 est $200/lb for 17% SG
Soy plant will open in Italy in 1983

ANNEX 12

2

ABATE®

MANUFACTURING CONCENTRATE

INSECTICIDE

MANUFACTURERS' MANUAL

AMERICAN CYANAMID COMPANY
Agricultural Division
Princeton, New Jersey 08540

istered Trademark
5528

III. Formulations

ABATE has found use both as an emulsifiable concentrate and as a granular formulation to accommodate the various conditions of use associated with mosquito control operations.

A. ABATE Liquid Formulations

ABATE itself has very low water solubility and a very high specific gravity, thus having a tendency to settle rapidly unless formulated to form a very stable emulsion that will disperse with a minimum of agitation and remain suspended. The particle size of such an emulsion is in the 1 to 2 micron range.

A formulation that has been found satisfactory is an emulsifiable concentrate containing 4 lbs./gallon ABATE. The suggested formula is as follows:

ABATE 4 lbs./gal. Emulsifiable Concentrate

Ingredients	% by Weight
ABATE 90% Grade	49.2% (44.3% real)*
Aromatic petroleum solvent (aromatic content 85% or higher)	40.8%
Mal 77L	10.0%
	100.0%

* Includes 3% overage to insure label claim after extended storage.

Flash point is greater than 150°F.

Specific gravity of 4-E is 1.13, viscosity approximately 36 centipoises at 25°C.

One gallon of 4-E weighs 9.4 lbs.

Aromatic petroleum solvents suggested are:

Panasol AN-2 or AN-3	American Oil Company
Amsco-solv(T) E-98	American Mineral Spirits

Emulsifier suggested is:

Mal 77L	Wm. Cooper Nephews, Chicago

Relatively few emulsifiers have been found that meet the requirements for physical stability. Several emulsifiers are presently under test and information on these will be furnished on request.

Operating procedure:

1. Charge solvent to kettle.
2. Agitate and add emulsifier.
3. Add ABATE and agitate until homogeneous
4. Filter through a cartridge-type filter. Do not exceed 100°F if warming solution.

T) Manufacturer's Trademark

B. ABATE Solid Formulations

ABATE granular formulations are of interest for mosquito control over water surfaces and in areas where penetration of dense foliage is a problem.

Carriers for ABATE granules must not only have suitable physical characteristics such as particle size, bulk density, and sorptivity but must also be readily available, inexpensive, chemically stable, and give satisfactory release of ABATE.

Granular formulations that have been used include ABATE 1% granular on sand and 1%, 2%, or 5% granulars on Celatom (fresh water diatomite). The choice between these two carriers is dependent upon the type of application equipment to be used. Field experience indicates that either the sand or Celatom formulation is satisfactory for use in ground equipment, while the Celatom carrier may be preferred for aircraft applications.

For maximum biological activity of ABATE granulars, it is necessary to use a blend of ABATE with equal amounts of emulsifier. The most effective emulsifier found to date and the one recommended is Atlox 3409 F.

Based on the best information available, suggested specific formulas for ABATE granulars are as follows:

ABATE 1% granular on Sand

ABATE tech grade 90%	1.2%	(1.1% real)*
Atlox(R) 3409 F (Atlas Chemical Co.)	1.0%	
Celite(R) 209 (Johns-Manville)	2.8%	
Blasting Sand (18-40 mesh)	96.0%	
	100.0%	

*Includes 10% overage.

Bulk density (80-90 lbs./cu. ft.).

ABATE 1% granular on Celatom

ABATE tech grade 90%	1.2%	(1.1% real)*
Atlox 3409 F (Atlas Chemical Co.)	1.0%	
Celatom(R) granular (Eagle-Picher Ind.) (MP-77 or MP-78)	97.8%	
	100.0%	

*Includes 10% overage.

Bulk density (23-27 lbs./cu. ft.).

Celatom MP-78 - Essentially 30 to 60 mesh granules.
Celatom MP-77 - Essentially 8 to 20 mesh granules.

(R) Manufacturer's Trademark

ABATE 2% granular on Celatom

ABATE technical grade	2.4% (2.2% real)*
Atlox 3409 F (Atlas Chemical Co.)	2.0%
Celatom Granular (Eagle-Picher Ind.) (MP-77 or MP-78)	95.6%
	100.0%

* Includes 10% overage.

Bulk density (23-27 lbs./cu. ft.).

ABATE 5% granular on Celatom MP-78

ABATE technical grade 90%	6.1% (5.5% real)*
Atlox 3409 F (Atlas Chemical Co.)	5.0%
Celatom MP-78 (Eagle-Picher Co.)	88.9%
	100.0%

* Includes 10% overage.

Bulk density (25-30 lbs./cu. ft.).

In addition to sand and Celatom, ABATE is stable on other carriers such as pyrophyllites, calcium carbonates, calcium sulfate, Agra shell, and pecan shells. However, no performance data have been developed with these other carriers.

ABATE is not chemically stable on attapulgites, fullers earth, montmorillonites, and swelling type bentonites.

Procedure for Preparing ABATE Granulars

1. a) For sand granulars, make a 1:1 sand-Celite premix. Charge the sand-Celite premix and the remaining sand to a rotary-type blender. Blend for six minutes.

   b) For Celatom granulars, charge the Celatom to a rotary-type blender.

2. Prepare a blend of ABATE and the Atlox 3409F. Care should be taken to accurately weigh the ingredients. Spray the mixture onto the carrier, using Tee-Jet 8006 nozzles (or nozzles having an equivalent orifice diameter of 0.062 in.). Blending should be continued for five minutes beyond liquid addition but not more than eight minutes.

   Overblending will result in a product with poor flow characteristics and increasingly wet appearance. Small amounts of lumps can easily be broken up by passing the material through a coarse screen.

If viscosity of the ABATE-emulsifier blend is too high for the existing spraying systems, the viscosity may be reduced by heating the mixture to 50°C for short periods of time. ABATE and Atlox are miscible at all ratios; however, sufficient time is required to achieve homogeneity. If mixing equipment especially designed for blending high viscosity materials is available, an ABATE-Atlox master-blend for several batches of granular may be prepared. Otherwise, make individual blends for each batch and empty pipes by flushing with a small amount of methylene chloride. CAUTION: Methylene chloride fumes are poisonous when inhaled. Use only in well ventilated areas.

3. Discharge blender into a holding bin.

4. Package product. Samples should be taken during packaging and a composite made from them.

C. Packaging Information

1. Liquid Formulations:

The use of glass containers is presently recommended for the one-gallon package style. The gallon bottles should be packed in a regular slotted corrugated fiberboard box constructed of 275-pound test, "BC" flute, double-wall corrugated fiberboard. If a larger package style, such as a five-gallon container, is desired, a steel pail lined with a high baked pigmented phenolic resin is recommended. Continuity of lining is essential and all fittings must be completely coated. It is advisable to conduct storage tests on individual products before adopting a specific lining for commercial use. Your local pail supplier should be able to furnish a suitable lining for your formulation.

2. Solid Formulations:

It is recommended that sewn open-mouth multiwall draft bags of four-ply construction be used for package styles of 25 to 50 pounds. One of the inner plies should be either a one-mil polyethylene free film or a polyethylene coated kraft. The total basis weight of the kraft plies should be determined by anticipated handling and transportation abuse. For domestic use, it is recommended that a total basis weight of 170 pounds plus the polyethylene-free film be used for the 25-pound package style and 180 pounds plus the polyethylene free film for the 50-pound package style. Bag size is dependent upon the type and bulk density of the carrier used.

Annex 13

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Brief communications

The control of guineaworm with Abate: a trial in a village of North-West Ghana

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Abstract

In the village of Ghegru guineaworm infection is contracted by drinking the water of a man-made pond during the dry season. The lethal effect on the vector cyclops of each application of Abate to a concentration of 1 mg/litre lasted 5–7 weeks and was clearly reflected in the following year's incidence of guineaworm cases. This indicates that Abate is potentially useful in the chemical control of guineaworm infection.

The transmission of guineaworm in North-West Ghana, assuming an incubation period of around 1 year, is greatest during the dry season from November to March or April.

In the village of Ghegru (pop. 160), a pond is used by all the inhabitants and is regularly dug out so as to contain water for some months into the dry season; thereafter small dug wells are used that fill by seepage and from which cyclops are absent.

The monthly incidence of guineaworm cases in Ghegru appears to follow a similar pattern each year, the maximum number of infections having been recorded in February in 1969, 1970, and 1971. The Ghegru pond was confirmed as a transmission site by the finding of infected cyclops in April 1969. Because it is the principal source of water for the village, an attempt was made to interrupt transmission by chemical control of the vector in it. The chemical selected for this purpose was Abate.[2] It was applied during the dry season of 1970–71 and this report describes the results.

Methods

Previous work had indicated that very low densities of cyclops were capable of maintaining guineaworm transmission.[3] After the initial application of Abate, therefore, the pond was re-treated whenever periodic sampling yielded any live cyclops. The presence or absence of adult cyclops was determined on each occasion by filtering 20 litres of water obtained from the point at which the local women fill their water-pots.

The first application of Abate (1% on sand granules) was made to a concentration of 0.5 mg/litre on 1 December 1970, when the pond contained about 280 m³ of water and reached a maximum depth of 1.75 m. At this time, cyclops were very scarce, only about one adult (tall species) being present in every 5 litres of water. This was consistent with the previous years' observations of this habitat in which a steady increase in relative density occurred during the dry months.

In water sampled 24 hours after the first treatment, the cyclops were still alive and active. At 48 hours, most of the few cyclops that were seen were dead or sluggish, but as others appeared still to be unaffected it was decided to re-treat the water, once again at a concentration of 0.5 mg/litre.

Twenty-four hours after the second application, only two slow-moving cyclops were seen in the 20-litre sample. No cyclops were present in samples taken 1, 3, and 5 weeks later, but they had returned (at the pre-control density) by the 7th week. The pond was immediately re-treated on 23 January 1971 at a concentration of 1 mg/litre. Cyclops were absent 1 and 3 weeks later, but a single live specimen was found 5 weeks after the re-treatment. By this time (1 March 1971), only some 10 m³ of water remained at the bottom of the pond. As it was still being used by some of the inhabitants it was again dosed with Abate at 1 mg/litre. However, within a few days the pond dried up with only a trickle of water entering by seepage at one point.

Results

The data on guineaworm infections in Ghegru were derived from monthly house-to-house case-finding visits from December 1968 to September 1972.

In the 3 years prior to control, the numbers of

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[2] *O,O*-dimethyl-4,4-phenylene-*O,O,O',O'*-tetramethyl phosphorothioate.

[3] Lyons, G. R. L., *Bull. W. Afr. Sci. Soc.*, 47, 201–210 (1972).

persons infected with guineaworm in Gbegru were 53, 46 (with one month's data omitted), and 46, respectively. In the year following control 12 cases were recorded.

Taking as autochthonous cases those who were living in Gbegru a year previous to the appearance of their guineaworms, 41 of the 46 cases in the year prior to control were infected locally. Of the 12 cases of 1971–72, three were classed as imported. Five of the other nine lived in an isolated compound on the side of the village away from the pond and half-way to one of the larger rivers in the area, the Mangatanga. They, as well as the four remaining cases, when questioned, stated that in addition to the pond they obtained water from pools in the Mangatanga during some part of the dry season. It is reasonable to believe that all nine autochthonous infections in 1972 were contracted in these pools that were used by the inhabitants from several other villages as well.

Discussion

In 1970, Muller reported that Abate (technical product) at a concentration of 0·1 mg/litre added to a pond in Western Nigeria, maintained the pond free of cyclops for 6 weeks.[1]

[1] Muller, R. *Bull. Wld. Hlth. Org.*, 42 [illegible] (1970).

In the Gbegru pond, the first two applications of Abate to a total concentration of 1 mg/litre effectively freed the water of *mature* cyclops for 5–7 weeks. Immediate re-treatment then cleared the pond for a further 3–5 weeks. Because of the subsequent drying up of the pond, the third treatment could have had no influence on the course of events. The efficacy of the two dry season applications of Abate was clearly shown by the following year's incidence of guineaworm cases in Gbegru. There was no local opposition to the trial at any stage.

It is concluded that chemical control of cyclops by Abate is a useful addition to the existing means of preventing and controlling guineaworm infection and has a potentially wide application to other types of transmission site besides the one in which this trial was carried out.

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