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645-0087

PD-AAG-110

SWAZILAND

Rural Water Borne Disease Control

Project Paper

645-0087

BEST AVAILABLE DOCUMENT

UNCLASSIFIED

ACTION MEMORANDUM FOR THE ASSISTANT ADMINISTRATOR FOR AFRICA

/s/ John W. Koehring

FROM: AFR/DR, John W. Koehring

Problem: Your approval is required to execute a grant of $640,000 from the FY 1979 Health Appropriation (Section 104 of the FAA of 1961, as amended) to the Government of Swaziland (GOS) for the Rural Water Borne Disease Control Project (645-0087) and to authorize a life-of-project funding of $3,296,800.

Discussion: The proposed project addresses the problem of high morbidity and mortality associated with water-related diseases in rural Swaziland. As is true in most developing countries, rural Swazis suffer from a number of diseases which are the result of poor environmental sanitation, improper excreta disposal and contaminated water supplies. Basic health services in the form of rural clinics provide reasonable coverage but are still curatively oriented and do not address the cause of the problem. Water systems are being provided to some areas of the country with little attention to health considerations. In fact, agricultural water schemes are actually increasing the prevalence of water-based diseases such as schistosomiasis. Finally, very little is being done to demonstrate to rural Swazis that there are simple, affordable methods for improving their water and sanitation related practices which could make a significant improvement in their personal and family health.

The proposed project will establish a continuing mechanism for basic health education which will motivate rural Swazis to use improved water and sanitation related practices, demonstrate the construction of low cost technically appropriate pit latrines, and institutionalize the capacity within the GOS to incorporate health criteria into the design of water systems, dams, reservoirs, irrigation systems and other major water works. To help establish priorities for the provision of these services, a nation-wide water-related disease survey will be conducted to identify communities most in need. By the end of the project, the GOS will be capable of implementing on-going health education, basic sanitation, and public health engineering programs responding to the needs of the rural population.

To accomplish the objectives of the project, $640,000 is requested for obligation in FY 79. The life-of-project funding for the project is $3,296,800 which will be expended over a five-year project life. The following table illustrates the specific areas in which funds would be required:

	Project Expenditures		
	FX	L/C	TOTAL
Technical Assistance	$2,000,000	$312,600	$2,312,600
Construction	250,000	32,700	282,700
Academic Training	95,800	---	95,800
Vehicles	62,100	---	62,100
Commodities/Equipment	115,100	---	115,100
Evaluation	80,800	---	80,800
Other	40,000	8,000	48,000
Contingency	280,000	19,700	299,700
TOTAL	$2,923,800	$373,000	$3,296,800

The Government of Swaziland will contribute $1,319,200 to this project. This contribution will finance staff salaries, vehicle support and maintenance as well as laboratory, office and housing furnishings. Additionally, participating rural communities will provide local materials and voluntary labor with an approximate total value of $10,000.

It has been concluded from the analyses included in the Project Paper that:

1. The project approach is technically and economically sound, socially acceptable, administratively feasible, and environmental concerns are fully addressed and incorporated into project implementation;

2. The technicial design and cost estimates are reasonable and adequately planned pursuant to Section 611A of the FAA;

3. The timing and funding of project activities are appropriately scheduled;

4. Sufficient planning has been made for the monitoring and evaluation of project progress;

5. All satutory criteria have been satisfied; and

6. The GOS can meet the recurrent costs associated with the project.

The Mission recommends a negative determination for the Initial Environmental Examination (IEE). Your signature is required on the IEE (attached) for final approval.

The Project Agreement will contain the customary conditions to disbursement which are acceptable to the GOS. These are described below.

Prior to the disbursement of funds for each construction activity financed under the Grant (except disbursement of funds for the preparation of plans and specification), or to the issuance of any commitment documents with respect thereto, the Cooperating Country shall furnish to A.I.D. the following in form and substance satisfactory to A.I.D.:

(a) Detailed plans, specifications, bid documents and construction schedules with respect to such activity;

(b) A description of the arrangements made for providing construction services for such activity, including, where appropriate, an executed contract for construction services with a firm acceptable to A.I.D. unless such services are being provided by force account;

(c) A description of the arrangements made for providing engineering supervisory services for such construction activity, including an executed contract with a firm satisfactory to A.I.D. unless such services are being provided by agency of the Cooperating Country; and

(d) Evidence that adequate sites have been identified and allocated for the construction of the staff housing.

There are four covenants which, in substance, are described in section VIII of the project paper.

Two waivers are required to enable the procurement of construction materials valued at $155,000 and five project vehicles, five trailers and four motorcycles valued at $68,300 from A.I.D. Geographic Code 935 countries. Justification for these waivers is contained in Annex O of the Project Paper.

The Project Review Meeting was held on August 10, 1979 and the only unresolved issue, relating to a waiver for the procurement of five project vehicles from code 935, was discussed and resolved in your office of August 17, 1979. It was agreed that these vehicles should be procured from Code 935 countries pursuant to the mission's recommendation. No Congressional Notification is required for this Project. The responsible A.I.D. officer in the field will be Connie Collins, USAID/Swaziland and the AID/W backstop officer will be Williams Jones, AFR/DR/SA.

Recommendation: That you sign the attached PAF II, thereby authorizing the Grant and the requested waivers, and that you sign the IEE indicating approval of the negative environmental determination.

Attachments:

1. PAF II
2. IEE
3. Project Paper

Clearances:

DAA/AFR, WHNorth _____
AFR/DP, RStacy (draft)
AFR/SA, EWilson (draft)
AFR/DR, NCohen _____
AFR/DR/SDP, BBoyd (draft)
AFR/DR/HN, TGeorges (draft)
GC/AFR, AWilliams [illegible]
AFR/SA, LTaylor (draft)
AFR/DR/SA, WWolff (draft)
SER/COM/ALI, JWall (subs)

AFR/DR/SA: DKline:agb:8/23/79:X28818

PROJECT AUTHORIZATION AND REQUEST FOR ALLOTMENT OF FUNDS

PART II

COUNTRY: Swaziland

PROJECT: Rural Water Borne Disease

PROJECT NO.: 645-0087

Pursuant to Part I, Chapter 1, Section 104 of the Foreign Assistance Act of 1961, as amended (the "Act"), I hereby authorize a Grant to the Government of the Kingdom of Swaziland (the "Cooperating Country") of not to exceed Six Hundred Forty Thousand United States Dollars ($640,000) to assist in financing certain foreign exchange and local currency costs of goods and services for the project as described in the following paragraph.

The project consists of financing technical assistance construction and other related services, participant training and commodities to assist the Cooperating Country to (a) establish a continuing mechanism for basic health education in the Cooperating Country to foster the use of improved water and sanitation related practices, (b) to demonstrate the feasibility of and to institutionalize a capacity to incorporate health criteria into the design of water systems and projects in the Cooperating Country and (c) to conduct a nation-wide water-related disease survey (the "Project").

I approve the total level of A.I.D. appropriated funding planned for this Project of not to exceed Three Million Two Hundred Ninety-Six Thousand Eight Hundred United States Dollars ($3,296,800), Grant, during the period FY 1979 through FY 1983, including the funding authorized above, and additional increments of grant funding during that period up to $2,656,800 subject to the availability of funds and in accordance with A.I.D. allotment procedures.

I hereby authorize the initiation of negotiation and execution of the Project Agreement by the officer to whom such authority has been delegated in accordance with A.I.D. regulations and Delegations of Authority subject to the following essential terms and covenants and major conditions, together with such other terms and conditions as A.I.D. may deem appropriate:

a. Source and Origin of Goods and Services

Goods and services, except for ocean shipping, financed by A.I.D. under the Grant shall have their source and origin in the Cooperating Country or in the United States except as A.I.D. may otherwise agree in writing. Ocean shipping financed under the Grant shall be procured in the United States, except as A.I.D. may otherwise agree in writing.

b. Conditions Precedent

Prior to the disbursement of funds for each construction activity financed under the Grant (except disbursement of funds for the preparation of plans and specifications), or to the issuance of any commitment documents with respect thereto, the Cooperating Country shall furnish to A.I.D. the following in form and substance satisfactory to A.I.D.:

(a) Detailed plans, specifications, bid documents and construction schedules with respect to such activity;

(b) A description of the arrangements made for providing construction services for such activity, including, where appropriate, an executed contract for construction services with a firm acceptable to A.I.D. unless such services are being provided by force account;

(c) A description of the arrangements made for providing engineering supervisory services for such construction activity, including an executed contract with a firm satisfactory to A.I.D. unless such services are being provided by agencies of the Cooperating Country; and

(d) Evidence that adequate sites have been identified and allocated for the construction of the staff housing.

c. Covenants

~~The Project Agreement~~ shall contain covenants providing in substance as follows:

1. The Cooperating Country agrees to provide, on a timely basis, qualified candidates for participant training.

2. The Cooperating Country agrees to establish official government posts for the Swazi Sanitary Engineer and other staff of the Health Education Unit ("HEU") or Ministry of Health as these will be identified in the amplified Project Description. The Cooperating Country further agrees that the HEU will be established as an official unit within the Ministry of Health, with a separate line item in the budget.

3. The Cooperating Country agrees to utilize and apply the design and site selection criteria, developed in conjunction with the project-funded technical advisory team, in construction undertaken pursuant to the Project's pit latrine and demonstration program. The Cooperating Country further agrees that, unless A.I.D. otherwise agrees in writing, no project-financed pit latrine construction will be undertaken until the parties have reviewed and approved design and site selection criteria.

4. The Cooperating Country agrees to provide classroom facilities at the Institute of Health Sciences, or other adequate institution, for in-service workshops for health workers, conducted under the Project.

5. The Cooperating Country agrees to provide by October 1980 or such other date as A.I.D. may agree to in writing, four senior health assistants to work, primarily, with technical advisory personnel to implement the demonstration pit latrine construction component of the Project.

6. The Cooperating Country agrees that housing constructed under the Project will be reserved for use by A.I.D.-financed technicians and, upon completion of the Project, for use by A.I.D.-financed technical assistance personnel assigned to other projects in the Cooperating Country.

d. <u>Waivers</u>

Based upon the justifications set forth in Annex O of the Project Paper and notwithstanding paragraph a above, I hereby:

1. Approve a waiver of the requirements in Handbook 1, Supplement B limiting procurement of commodities under grant-financed projects to the United States to permit procurement of (a) construction materials at the approximate cost of $155,000, and (b) 5 project vehicles 4 motorcycles (125 TC) and 5 trailers at an approximate cost of $68,300 from countries included in A.I.D. Geographic Code 935.

2. Certify that exclusion of procurement from Free World countries other than the Cooperating Country and countries included in A.I.D. Geographic Code 941 would seriously impede attainment of U.S. foreign policy objectives and objectives of the foreign assistance program.

3. Find that special circumstances exist to waive, and do hereby waive, the requirements of Section 636(i) of the Act.

Date: AUG 23 1979

/s/ COLER T. BUTCHER

Coler T. Butcher
Assistant Administrator
for Africa

AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT PAPER FACESHEET

1. TRANSACTION CODE: A (1 = A ADD, 2 = C CHANGE, 3 = D DELETE)

PP

2. DOCUMENT CODE: 3

3. COUNTRY/ENTITY: SWAZILAND

4. DOCUMENT REVISION NUMBER:

5. PROJECT NUMBER (7 digits): 645-0087

6. BUREAU/OFFICE: A. SYMBOL: AFR; B. CODE: 06

7. PROJECT TITLE (Maximum 40 characters): Rural Water Borne Disease Control

8. ESTIMATED FY OF PROJECT COMPLETION: FY 85

9. ESTIMATED DATE OF OBLIGATION: A. INITIAL FY 79; B. QUARTER 4 (Enter 1, 2, 3, or 4); C. FINAL FY 83

10. ESTIMATED COSTS ($000 OR EQUIVALENT $1)

A. FUNDING SOURCE	FIRST FY B. FX	FIRST FY C. L/C	FIRST FY D. TOTAL	LIFE OF PROJECT E. FX	LIFE OF PROJECT F. L/C	LIFE OF PROJECT G. TOTAL
AID APPROPRIATED TOTAL	329.0	311.0	640.0	2881.3	415.5	3296.8
(GRANT)	(329.0)	(311.0)	(640.0)	(2881.3)	(415.5)	(3296.8)
(LOAN)	( )	( )	( )	( )	( )	( )
OTHER U.S. 1.						
OTHER U.S. 2.						
HOST COUNTRY	-0-	100.0	100.0	8.1	1321.1	1329.2
OTHER DONOR(S)						
TOTALS	329.0	411.0	740.0	2889.4	1736.6	4626.0

11. PROPOSED BUDGET APPROPRIATED FUNDS ($000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE C. GRANT	PRIMARY TECH. CODE D. LOAN	E. 1ST FY 79 F. GRANT	E. 1ST FY 79 G. LOAN	H. 2ND FY 80 I. GRANT	H. 2ND FY 80 J. LOAN	K. 3RD FY 81 L. GRANT	K. 3RD FY 81 M. LOAN
1. H	513	540		640.0		800.0		587.0	
2.									
3.									
4.									
TOTALS									

A. APPROPRIATION	N. 4TH FY 82 O. GRANT	N. 4TH FY 82 P. LOAN	Q. 5TH FY 83 R. GRANT	Q. 5TH FY 83 S. LOAN	LIFE OF PROJECT T. GRANT	LIFE OF PROJECT U. LOAN
1. H	700.0		569.8		3296.8	
2.						
3.						
4.						
TOTALS						

12. IN-DEPTH EVALUATION SCHEDULED: MM 10 YY 82

13. DATA CHANGE INDICATOR. WERE CHANGES MADE IN THE PID FACESHEET DATA BLOCKS 12, 13, 14 OR 15 OR IN PRP FACESHEET DATA BLOCK 12? IF YES, ATTACH CHANGED PID FACESHEET

1 (1 = NO, 2 = YES)

14. ORIGINATING OFFICE CLEARANCE

SIGNATURE: Julius E. Coles

TITLE: Director, USAID/Swaziland

DATE SIGNED: MM 07 DD 31 YY 79

15. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION: MM DD YY

A.O. 1330-4 (3-78)

Table of Contents

Page

I. Summary and Recommendations

A. Recommendations 1
B. Problem 1
C. Project Description 1
D. Summary of Findings 3

II. Background

A. Introduction 4
B. The Macro case for Health Intervention 4
C. The Focus on Water-Related Diseases 4
D. Water-related Health Problems in Swaziland 5
E. Transmission of Water-related Diseases 6
F. Current Water-related Health Activities

1. Curative Program 9
2. Environmental Sanitation Program 9
3. Special Control Programs 10
4. Rural Water Supply Program 10
5. Health and Sanitation Education 11

G. Summary 13

III. The Project

A. Project Description Overview 13
B. Logical Framework Narrative

1. Goal 16
2. Purpose 17
3. Outputs 19
4. Inputs 21
5. Relationship to AID Efforts in the Health Sector 24

IV. Project Analyses

A. Technical Analysis

1. Health Education 27
2. Schistosomiasis Survey 30
3. Sanitation/Public Health Engineering 32

B. Social Soundness Analysis

1. The Setting 38
2. Spread Effects 40
3. Social Consequences and Beneficiaries 41

C. Environmental Considerations 44
D. Economic Analysis

1. Introduction 45
2. Benefits of the Project 45
3. Cost Effectiveness of Project Approach 47

Page

4. Homesteader's ability and willingness to pay for Latrines 48
5. Summary 49

V. Financial Analysis

A. Project Funding Summary 49
B. The MOH Recurrent Budget 52
C. Project Impact on the MOH Budget 53

VI. Implementation Plan

A. Implementation Schedule 56
B. Implementation Responsibilities

1. GOS 58
2. AID 59
3. Contractor 60

VII. Evaluation Plan

A. Annual Evaluations 60
B. External Evaluations 60

VIII. Conditions and Covenants 61

ANNEXES

A. GOS Application for Assistance

B. PID Approval Cable

C. Draft PAF

D. Health Services Swaziland

E. Social Soundness Analysis

F. Schistosomiasis Survey - Technical Description

G. Sanitation Program - Technical and Cost Details

H. Training Program

I. Building Construction Engineering Analysis

J. Logical Framework

K. Job Descriptions

L. Financial Tables

M. Initial Environmental Examination

N. Equipment List

O. Waiver Justifications

P. Statutory Checklist

Q. The Responsibilities of the Rural Water Supply Board

R. Other-Donor Programs

S. Government and Mission Hospital Data

RURAL WATER-BORNE DISEASE CONTROL PROJECT

I. Project Recommendations and Summary

A. Recommendations

Authorization of a grant of $3,296,800 is recommended along with the following waivers:

1. Procurement source origin waiver to permit the procurement of project vehicles estimated at $68,300 from countries included in AID Geographic Code 935; and

2. Procurement source and origin waiver to permit the procurement of construction materials estimated at $155,000 from AID Geographic Code 935.

B. Problem

The problem addressed by this project is one of the high morbidity and mortality associated with water-related diseases in rural Swaziland. As is true in most developing countries, Swaziland suffers from a number of diseases which are the result of poor environmental sanitation, improper excreta disposal and contaminated water supplies. Basic health services in the form of rural clinics provide fairly reasonable coverage but are still curatively oriented and have not adequately addressed the cause of the problem. Water systems are being provided to some areas of the country with little attention to health considerations. Agricultural water schemes are actually increasing the prevalence of water-based diseases such as schistosomiasis. And finally, very little is being done to demonstrate to the rural people that there are simple, affordable methods for improving their water and sanitation- related habits which could make a significant improvement in their personal and family health.

This project proposes to establish a continuing mechanism for basic health education which will motivate people to use improved water and sanitation related practices, demonstrate the construction of low-cost, technically appropriate pit latrines, and institutionalize the capacity within the GOS to incorporate health criteria into the design of water systems, dams, reservoirs, irrigation systems and other major water works. To help establish priorities for the provision of these services, a nation-wide schistosomiasis survey will be conducted to identify communities in the most need.

By the end of the project in 1985, the GOS will be capable of implementing on-going health education, basic sanitation, and public health engineering programs responding to the needs of the rural population.

C. Project Description

The project consists of three major inter-related components:

1. Health education. The project will expand and support the health education plans of the MOH at the national level and will provide for an immediate impact on the rural people (especially those receiving water and sanitation systems) by training community-based health workers in water and sanitation education techniques. The health education component of the project is specifically tailored to suit the cultural and social traditions of Swaziland. It also provides for further explora-

tions of the knowledge, attitudes and practices (KAP) of rural Swazis with regard to health and water topics in order to ensure that health education plans made at the national level mesh with the realities of rural life. AID will provide long-term technical assistance in health education and a social scientist to implement the KAP study. Academic training will be provided for three staff members of the central Health Education Unit (HEU) and in-country training programs will be designed and implemented for the community level health education personnel. Additionally, an office will be constructed for the HEU and vehicles and commodities will be provided to support the health education program.

2. Sanitation and public health engineering. In order to interrupt the transmission cycle of water-related diseases, a sanitation program will be launched. Affordable, environmentally safe pit latrines will be constructed on a demonstration basis to provide rural people with the ability to construct their own latrines with assistance from the community health personnel to be trained under the project. In addition, a public health engineering capacity will be developed to ensure that health criteria become an integral part of the design of major water works. AID will provide a long-term environmental sanitarian and a public health (sanitary) engineer for this component of the project. On-the-job training will be provided for Senior Health Assistants who will conduct the latrine demonstration program while training other health assistants and community sanitation committees in the siting, construction, and proper use of latrines; one participant will be trained at a U.S. university and will be the counterpart to the AID-funded sanitary engineer. Finally, commodities will be provided for the demonstration latrines along with vehicles for the Senior Health Assistants who will operate as District Sanitarians.

3. Schistosomiasis and Water Related Disease Survey

In order to provide information on the prevalence of schistosomiasis, the project will include a national survey under the direction of an AID-funded epidemiologist. The survey results will be used to identify communities deserving priority provision of water supplies (implemented by the Rural Water Supply Division), health education, and pit latrines. To support the survey, the GOS Bilharzia Laboratory will be renovated and equipped and laboratory staff will receive training in surveillance and diagnostic procedures.

The project components are closely inter-related in that the health education will provide an essential background and continuing motivation for the sanitation program, the schistosomiasis survey will help the public health engineer to recommend priority placement for water and sanitation systems, and the demonstration latrine construction gives the broader health education message a tangible and very practical entree into the rural communities.

In summary, the GOS and AID will provide the following inputs to achieve the desired results:

AID Grant		$3,296,800
Technical Assistance	2,312,600	
Academic Training	95,800	
Construction	282,700	
Vehicles	62,100	
Commodities/Equipment	115,100	
Evaluation	80,800	
Other	48,000	
Contingency	299,700	
GOS		$1,319,200
Salaries and Wages	993,500	
Vehicle Support	202,100	
Laboratory, office and Housing Furnishings	42,900	
Other	80,700	
Local Communities		$10,000
TOTAL		$4,626,000

D. Summary of Findings

It has been concluded from the analyses included in this Project Paper that:

1. The project approach is technically and economically sound, socially acceptable, administratively feasible, and environmental concerns are fully addressed and incorporated into project implementation;

2. the technical design and cost estimates are reasonable and adequately planned pursuant to Section 611A of the FAA;

3. the timing and funding of project activities are appropriately scheduled;

4. sufficient planning has been made for the monitoring and evaluation of project progress;

5. all statutory criteria have been satisfied; and

6. the GOS can meet the recurrent costs associated with the project.

II. Background

A. Introduction

This background section presents a logical sequence that establishes the rationale for the current project. First the general case for health intervention in Swaziland is established. This is followed by a summary discussion of the major diseases in Swaziland and the rationale for intervention in water-related diseases. The prevalence of the major water-related diseases that exist in Swaziland and the transmission mechanism of these diseases are discussed in the next two sub-sections. Finally the current status of water-related disease interventions in Swaziland is discussed and the rationale for the specific areas of intervention of this project is presented.

B. The Macro case for Health Intervention

While Swaziland had a per capita GNP of $550 in 1977 (probably a substantial underestimate of true per capita GNP) ranking it as a lower middle income country, the quality of life of the average Swazi is much lower than these GNP figures would indicate. Using the Overseas Development Council's Physical Quality of Life Index (PQLI), Swaziland, with an index of 36 (on a scale of one to 100) falls far below the average index of 59 for countries in the same income range. In fact Swaziland's PQLI falls below the average of the 49 lowest income countries (countries with a per capita GNP below $300.) Within the region Swaziland has the highest income in the three BLS countries but the lowest PQLI.

Swaziland's literacy rate (30%), one factor in the PQLI, exceeds the average of the lower middle income countries (defined as countries with per capita GNP figure of between $300 and $700). It is the health factors in the PQLI which drag the overall index for Swaziland below what the economic development level of the country should support.

Life expectancy at birth in Swaziland is 44 years compared to an average of 61 for the other lower middle income countries and 48 for the lower income countries. Infant mortality in Swaziland is estimated (officially) to be 149 per 1000 live births compared to 70 per 1000 in the lower middle income countries and 134 per 1000 in the low income countries. (Preliminary indications from the 1976 Census are that the infant mortality rate may exceed 160/1000 live births.) In short, the health status of Swaziland's population is so poor that it falls in the fourth quartile of all countries with incomes similar to that of Swaziland. Thus the importance of interventions in health in Swaziland is clearly established.

C. The Focus on Water-Related Diseases

Reliable data on the health status in general for Swaziland and for children in particular, are virtually non-existent. There are,

however, a host of inter-related health problems which contribute to the high mortality rate among young children and in general to the poor health conditions in the country.

The first broad area of concern is related to maternal and child health (MCH). The high fertility rates, short birth intervals, and probable widespread subclinical malnutrition contributes to mothers and children with little resistence to various communicable diseases. Secondly, although true incidence rates are not known, hospital records indicate that many people, especially children, become sick and sometimes die from diseases including TB, measles, whooping cough and other childhood diseases which could be prevented through immunization. Thirdly, the morbidity and mortality associated with diseases related to water quality and environmental sanitation is very high. Finally, certain problems related to rapid social transition further complicate the health picture and contribute to mental disorders, alcoholism, and increasing rates of sexually transmitted diseases.

Of these broad areas, the focus of this project will be on the water-related diseases for the following reasons:

(1) Water-related diseases have a major impact on the health status of the country. Gastroenteritis is probably a major killer of children when compounded with other health problems. Schistosomiasis is also a major public health problem and is increasing as new agricultural water systems are developed. Water-related microbial infections and other parasitic diseases are also probably widespread and contribute to poor health conditions.

(2) Significant amounts of resources are currently being put into the provision of water systems in rural Swaziland without much attention to the health consequences. There has been little focus on other environmental sanitation and education measures to complement the water systems. There is, thus, a physical base upon which to work and interventions can be made to enhance, dramatically, the benefits of the water systems investments without large new capital outlays.

(3) Swaziland is rapidly developing its agricultural water resources (creating ponds, reservoirs and canals) and thus increasing new human contact points with water which is leading to an increase in water-related diseases such as schistosomiasis and malaria.

Moreover the GOS is currently receiving assistance from donors in other health programs such as mental health, the immunization program and in MCH work (see Annex D). Under current conditions, the greatest weakness in health service in Swaziland is in the field of water-related diseases and environmental sanitation.

D. Water-related Health Problems in Swaziland

It is difficult to discuss the actual distribution of water related diseases because of the scarcity of information on the prevalence

of these diseases. The Central Statistics Office data and other clinic related data, are not reliable measures of either the distribution of these infections or the numbers of persons actually infected in either the urban or rural sectors.

The following is a summary of what is known about the kinds of water-related diseases occurring in Swaziland. (For more details see Annex S.)

Malaria, which had previously been controlled, (less than 200 cases in 1962) increased in 1972 to 491 cases. The usual helminthic infections such as hookworm have been demonstrated in school health surveys and from the central laboratory. Intestinal protozoan infections such as amebiasis and giardiasis are also believed to be fairly common. A school survey in Hhoho district in which stools were examined for parasites showed only 15% of the children parasite-free. Water-related microbial infections such as typhoid, paratyphoid, bacillary dysentery, typhus and enteric viruses have also been recorded in the admissions records of the GOS and mission hospitals.

Data on the prevalence of schistosomiasis, while available from more sources than data on other diseases, are still sketchy, but at least useful to indicate the general magnitude of the problem. GOS school health teams have been testing school children throughout the Kingdom. Over the period 1971-77/8 this unit reported a 36 percent prevalence rate for urinary schistosomiasis (S.hematobium) and a 26 percent prevalence rate for intestinal schistosomiasis (S.mansoni). The nature of bilharzia indicates that its prevalence will vary widely from area to area; to reach the mean indicated prevalence rates implies that, in some areas of the country, schistosomiasis prevalence has reached hyper-endemic proportions.

E. Transmission of Water-Related Diseases

Water has been shown to contribute, in some fashion, to the transmission of the infectious diseases listed in Table 1. The relationship between these infections and water are widely recognized and have been classified into four principle categories that describe a mechanism of transmission and appropriate control. It is important to understand that, whereas water may be related to the transmission of these diseases, some of them also have alternate routes or mechanisms. Furthermore, the state of the art of epidemiological methodology has yet to elucidate clearly the primary transmission routes of many of these infections in the water-borne category. This is especially true of rota-virus infections, a common worldwide cause of infant diarrhea.

As listed by Feachem in Table 1, the water-related diseases categories are:

1) Fecal-oral (water-borne and water-washed)

2) Water-washed

TABLE 1

Water-Related Diseases with their Water Associations and their Pathogenic Agent

Water-related disease	(a) Category	(b) Pathogenic Agent
Amoebic dysentery	1	C
Ascariasis	1	D
Bacillary dysentery	1	A
Balantidiasis	1	C
*Cholera	1	A
Diarrhoeal disease	1	H
Enterobiasis	1	D
Enteroviruses (some)	1	B
Gastro-enteritis	1	H
Giardiasis	1	C
Hepatitis (infectious)	1	B
Leptospirosis	1	E
Paratyphoid	1	A
Trichuriasis	1	D
Tularaemia	1	A
Typhoid	1	A
Infectious skin disease	2	H
Infectious eye disease	2	H
Louse-borne typhus	2	G
Louse-borne relapsing fever	2	E
*Clonorchiasis	3	D
*Diphyllobothriasis	3	D
Fasciolopsiasis	3	D
*Guinea worm	3	D
*Paragonimiasis	3	D
Schistosomiasis	3	D
Arboviral infections (some)	4	B
Dengue	4	B
*Filariases	4	D
Malaria	4	C
*Onchocerciasis	4	D
*Trypanosomiasis	4	C
*Yellow fever	4	B

*Not currently transmitted or recorded in Swaziland.

(a) Categories are:
1. fecal-oral
2. water-washed
3. water-based
4. water-related insect vector

(b) A = Bacteria
B = Virus
C = Protozoa
D = Helminth
E = Spirochaete
F = Fungus
G = Pickettsiae
H = Miscellaneous

SOURCE: R. Feachem et al, Water Health and Development, Tri-Med Books, London, 1978, page 142.

3) Water-based

4) Water-related insect vector

In general, the fecal-oral diseases are transmitted by people drinking water or eating food which has been contaminated with fecal material or, in the case of children, by placing hands or other contaminated objects inside their mouths. For example, typhoid and diarrheal diseases may be transmitted, in addition to water, by flies, contaminated food, inanimate objects or in general through the so-called fecal-oral route. (Examples of such diseases are found in Table 1 under category No. 1.) Improved personal hygiene, clean water supply and proper excreta disposal are critical in interrupting the transmission cycle of these diseases.

Water-washed diseases which include infectious skin diseases (e.g., scabies) and eye diseases (e.g., trachoma) and louse-borne typhus, can be greatly reduced by improving water accessibility and quantity. Incidence of these diseases can be significantly reduced by frequent bathing, hand washing and improved personal cleanliness.

Water-based diseases are those having intermediate hosts which live in or near water, as is the case of schistosomiasis and fasciolopsiasis (giant blood fluke), both of which are found in Swaziland. These diseases can be reduced by eliminating human contact with infected waters, providing alternative clean water sources, eliminating intermediate hosts, and preventing indiscriminate defecation.

Finally, the water related insect vector borne diseases are ones such as malaria and dengue. The principle intervention for this group of water-related diseases is to destroy breeding sites for the mosquitoes which carry both the malaria and dengue parasites. Destroying the breeding sites involves proper waste water management, spraying of larvacide in bodies of water and other interventions.

As can be seen by the transmission routes of the various water-related diseases, there are several interventions which can be made to achieve a reduction in the incidence of water-related disease. People should have access to sufficient quantities of clean water, feces should be disposed of in a proper manner, human access to transmission sites for certain water based diseases needs to be controlled or eliminated, and environmental controls at breeding sites need to be instituted. In addition, those people already ill with water-related diseases should be treated or prophylactic agents should be administered. Most importantly, the at-risk population must have the information and motivation necessary to allow them to produce and maintain a healthy environment. In an optimal situation all of these interventions would be made at the same time. The following section contains a brief description of the current system to make these various interventions in Swaziland.

In the urban areas of Swaziland much of the required infrastructure is already in place. Approximately 87 percent of the people in urban areas have piped water as compared to 20 percent for the rural population. Similarly, 88 percent of the urban people have latrines while less than 16 percent do in the rural areas. The curative health services exist mostly in urban areas. The urban population is probably also more aware of adequate water and sanitation habits, although more motivation is undoubtedly warranted. The rural population does lag behind. Thus, interventions to combat water-related diseases must focus on rural areas.

F. Current Water-Related Health Activities

1. Curative Program

The Swaziland Government health system today through the MOH is based on an old colonial model which emphasizes curative services and is administratively very centralized. Registered nurses form the backbone of the health care delivery system due to the shortage of both physicians and mid and lower level health care workers. The majority of rural clinics - which are fairly evenly distributed around the country - are staffed by one registered nurse, a nurse assistant and an orderly. By the beginning of calendar year 1984, most rural Swazis will live within a 5-mile radius of a rural clinic. Through the Institute of Health Sciences (AID-funded project), clinic nurses will be trained with the ability to make accurate diagnoses and proper treatment of common diseases including the water-related ones. Given the current status of the health system in Swaziland, curative services component is progressing satisfactorily.

Along with the MOH services, traditional healers also represent a powerful and as yet untapped resource. They are utilized, mostly in a curative capacity, by most rural Swazis usually in conjunction with the MOH system.

2. Environmental Sanitation Program

The MOH has a small inadequate environmental sanitation program in the rural areas. The Health Inspectorate consists of six Health Inspectors assigned to the major towns in Swaziland and 52 posts for Health Assistants (of which 7 remain unfilled). Health Assistants are trained for one year in communicable disease control, community environmental sanitation, sewage and waste disposal, health education and food and housing sanitation. Because of some very severe support constraints, this cadre of health workers has been underutilized in environmental sanitation work. Housing is rarely available, supervision from the Health Inspectors is scanty and the support services are very poor. There are transport problems for commodities needed for toilet construction and for protecting water supplies and personal transportation difficulties which hamper their efforts. Currently, probably less than 15 percent of the rural population has access to any adequate excreta disposal system. Unfortunately, under present circumstances, this situation is unlikely to improve significantly in the near future.

3. Special Control Program

Specific control programs for schistosomiasis and malaria are based at the central laboratory in Manzini. Historically, the emphasis has been on one disease or the other, depending on the perceived prevalence of each and on the MOH leadership. The malaria control work has been in the forefront recently with the schistosomiasis control efforts at a virtual standstill. In areas of the lowveld, 26 Health Assistants are involved in malaria surveillance (including treatment of positive cases), hut spraying and some prophylactic treatment. The schistosomiasis control team formerly consisted of a nine-person team, under the direction of a senior Health Assistant, who carried out a surveillance program for school children including treatment of positive cases. In 1978 this program was discontinued and the personnel transferred to the malaria control effort. Mollusciciding has also been carried out since 1970 in selected areas (see Annex F for details). At the present time, the malaria control efforts are adequate; however, the schistosomiasis control capabilities are seriously lacking.

4. Rural Water Supply Program

Currently, three institutions are involved in providing water in rural areas: the Ministry of Health (MOH), the Rural Development Areas Program (RDAP), and the Rural Water Supply Division (RWSD) of the Water and Sewerage Board.

The MOH program focuses on simple techniques of spring protection and does not involve piping water to areas near homesteads. Presently, the program's achievement rate is in the range of 45 springs protected annually. The number of people benefiting from this program is unknown.

As part of the RDAP, water supply systems are installed in relocation areas after detailed land use plans are developed. Essentially, these plans delineate arable and grazing land with homesteads resettled to provide access to both. These resettled areas are then provided with schools, clinics, water systems, and other services.

To date, there is little reliable information on the number of water systems installed in the various RDAs, but an inventory is underway. Rough estimates indicate that approximately 27 systems, covering about 4,500 people, have been constructed and the 1979 work plan calls for an additional 35. The annual rate of installation varies widely due to the phased development approach used in the RDAs. On the average, perhaps 5,000 people per year will gain access to improved water systems through RDA activities.

Most water systems in the RDAs are simple, gravity fed systems constructed by the beneficiaries with supervision provided by RDA personnel. If the situation requires a complex or non-standard design, it is referred to the Land Use Planning Section of the Ministry of Agriculture for detailed design. Otherwise, it is designed by RDA field staff based on standard designs previously used.

Outside the RDAs, rural water supplies are installed by the RWSD established in 1975. The Division is responsible for the installation of water supply systems for rural communities and government institutions in rural areas, e.g., schools and clinics. The Division is supported by a technical assistance team provided by CIDA and capital funding from the U.K. Since its inception, the Division has constructed 33 systems and has identified 34 communities to receive systems over the next three years. Approximately 26,000 people have gained access to pipe-borne water from the RWSD and by 1985, RWSD plans call for piped water to be available to approximately 170,000 rural people.

The RWSD provides assistance on the basis of community requests through the District Commissioner. A Community Development Officer visits the community to assist local leaders in the explanation of why and how the system will be installed and organizes a community work force for system construction. Designs are based on least-cost criteria with simple gravity-fed systems receiving higest priority. More complex systems using bore-holes and pumps are installed only if simpler ones are impractical. (Details on the organization and functions of the Rural Water Supply Division are provided in Annex Q.)

Currently, perhaps 20 percent of the rural population have access to pipe-borne water. Even allowing for rural population increase, by 1985 50 percent of the rural population should have access to pipe-borne water; by 1990 virtually the entire reachable rural population would have pipe-borne water if current planned implementation rates for the early 1980s are continued. No additional interventions would appear to be needed for the actual delivery of pipe-borne water.

5. Health and Sanitation Education

The present system for health education is such that the Ministry of Health is the key agency with other government entities providing support through related programs. The Health Education Unit (HEU) of the Ministry of Health (MOH) is charged with supporting all services of the MOH - maternal and child health, family planning, environmental health, communicable diseases, as well as the health-related programs of the Ministry of Education. The HEU is currently staffed by a Director, two public health nurses, a visual aids assistant and a Peace Corps Volunteer who is a graphic artist.

The HEU has no official status within the GOS. The Swazi staff are seconded from other units within the MOH and the Director is a WHO consultant funded by UNFPA. The HEU has no official budget of its own, its expenses being paid through the Public Health Unit which has also loaned two rooms in the Public Health Clinic in Mbabane to the HEU. The Director is due to terminate his consultancy in early 1981, and the PCV artist is expected to leave towards the end of 1979.

The efforts of the HEU, to date have concentrated on maternal and child health and family planning. This reflects the priorities of the MOH both at a policy level and within the health care delivery system. The principal resource available to the HEU in rural areas is the nursing staff at rural health clinics. These nurses are encouraged to display educational posters in the clinics and to give health education

talks to waiting customers. However, the time available to do this is short and enquiries suggest that nurses in rural clinics seldom can spare more than 15-30 minutes per day for health education activities. Public Health Nurses from the Public Health Unit, the district hospitals and the rural health centers, supplement the efforts of the rural clinic nurses when they are able to do so, but the numbers of Public Health Nurses are not, at present, sufficient to suggest that they are a major resource for health education. Nursing assistants, similarly, have a public health orientation but there are so far too few of them trained and employed in the rural health clinics.

In addition to the clinic nurses (and the Health Assistants who also have health education responsibilities), the MOH employs Rural Health Visitors (RHVs) who are being trained as primary care workers for rural areas. The RHV, selected by the community, is given an 8-week training program in her area. The RHV is responsible for 40 homesteads and works half-time for a salary of E 20 per month. There are more than 200 of these primary health care workers in selected areas of the country. The long-term plans of the MOH call for a total of 800 RHVs at the end of 5 years, resulting in a RHV to population ratio of 1:1000.

Aside from the Ministry of Health programs, several other government agencies have field workers involved in sanitation education. The Ministry of Agriculture employs 40 "Domestic Science Demonstrators" (DSDs) trained in child care, nutrition, home improvement, family planning and other topics, who work with local women's clubs. These DSDs are supplied with a pamphlet on home improvement (in siSwati) which discusses water collection, storage and use. Filmstrips are also available for use by the DSD and the Ministry has a mobile film unit which travels around the country and is said to be very popular.

The Ministry of Education has a school health program using MOH personnel consisting of four district teams who assess the health status of children entering school. The teams give health education talks which presumably include personal hygiene and environmental sanitation; however, there is little enthusiasm for the program and so far it has not been a very powerful education tool.

There are several other groups which represent potential avenues for water and sanitation education such as the Rural Education Centers (MOE), Farmers Training Centers (MOA), Sebenta national adult literacy program) and various private (mission and industrial) organizations.

In general, there is an urgent need to orientate priorities for development in the health area away from conventional institutional facilities centered in urban areas to those in the rural areas. Health education activities are not well organized within the MOH and not coordinated with other agencies. Field workers responsible for health education which would affect water-related diseases are too busy, poorly supervised or not given the adequate back-up support to make them really effective. There is recognition that different kinds of programs are needed which are cheaper, more simplified and closely geared to the preventive aspects of rural health in order that greater results may be obtained in attempts to solve the health problems of the rural population at large.

G. Summary

From the above discussion, it is clear that health education, sanitary waste disposal and special schistosomiasis interventions are the most critical missing elements in a comprehensive approach to interrupting the transmission cycles of water-related diseases in Swaziland. In the longer run, this is undoubtedly the surest way to permanently change water related behavior of the Swazi population. The current project focuses on interventions in these areas in a direct effort to attack the problem of a very high and probably rising prevalence of water related diseases in Swaziland. This high prevalence of water related diseases is in turn probably closely linked to the unacceptably high rate of early childhood mortality in the country and thus the most critical of all health problems in the country is, at least indirectly, attacked.

III. The Project

A. Project Description Overview

This project is designed to address the problem of water related diseases by supporting GOS national programs to influence health practices at the homestead level. The project's approach is essentially three-pronged: (1) support to expand the current health education program to increase both its coverage and relevance; (2) support to the MOH environmental sanitation program including pit latrine construction on a demonstration basis and public health engineering assistance; and (3) the provision of a national schistosomiasis survey and analysis. A fourth, critically important component to the achievement of goal level objectives is the provision of potable water, which is currently being implemented at satisfactory rates by the GOS with assistance from the U.K., Canada, the U.N., and the African Development Bank (ADB).

Essentially, the project's major focus is health education, especially education in the proper storage, handling, and use of water; proper excreta disposal practices; and information concerning the avoidance of water contact in areas of high infestation of snails serving as intermediate hosts for schistosomiasis. The project's approach to achieve the desired results centers on the development of the institutional capacity within the GOS (particularly the Ministry of Health) to plan and implement programs that will affect rural people's attitudes and practices. Naturally, to support the desired behavioral changes, additional project activities are required to support the institutional development and, subsequently, the project goal. In this case, potable water supply systems and excreta disposal facilities are required to complement and reinforce what the rural people will be learning about water and sanitation. It is fully recognized that services such as providing water may yield benefits independent of other activities; this project postulates that exponential benefits can be expected from the simultaneous provision of health education, sanitary facilities, and potable water.

Technical assistance (one health educator) will be provided to the Ministry of Health's Health Education Unit (HEU) to assist in the development of a national health education strategy. To support the development of the HEU's plan, a social scientist will also be provided to implement a Knowledge, Attitudes, and Practices (KAP) Study upon which the content of the program as well as methods of communication will be based.

The social scientist will also assist the health educat in the design of the water and sanitation component of the education program. The health education advisor will develop a training plan for the field agents who will be involved in disseminating information and will work with the MOH on the organization and supervision of field activities (including placement). The primary field workers will be the MOH health assistants, rural health visitors, and the MOA domestic science demonstrators. During the course of the project, one participant will receive academic training in health education at the M.Sc. level and two at the diploma level.

Since health assistants are also the primary agents for the MOH environmental sanitation program, this component will be closely coordinated with and, in most cases, integrated into the health education process. A senior health assistant (one per district) will be responsible for supervision and training of local health assistants and community sanitation committees. The senior health assistants will receive basic, in-the-field training from the AID-funded technical advisor in environmental sanitation. The training will be preceded by an analysis of appropriate pit latrine designs and the development of a range of optional designs to be offered to rural homesteads. While the designs will have been set against minimum criteria which will not be violated, there will be enough flexibility to allow consumers a choice of materials, some design options, and size of units. After an initial, intensive training period, the senior health assistants will assume their posts as district sanitation leaders, where, through feedback from local health assistants and other field agents, they will, with the initial assistance of the technical advisor, plan and implement the district sanitation program.

The health education and sanitation programs will closely follow the work of the Rural Water Supply Division and the RDA water supply program to take advantage of the community interest associated with new water systems. In other cases where water systems are not yet in place, contact will be made by rural health visitors or local health assistants. Once motivational efforts are underway, the district health sanitarian will accompany the local field agent to a community where discussions will be held with community leaders on the purpose of the sanitation program. A meeting will be requested for the election of a community sanitation committee, the members of which will assist the local health assistant and the district sanitarian in the construction of demonstration pit latrines. The district sanitarian will provide training in siting and construction of the improved pit latrines in order that community level know-how will be available for future construction efforts. Local health assistants will expand the program to other communities within their purview and the community committees will be resident resources for supervision and construction assistance.

AID will provide the materials for approximately 2,000 demonstration pit latrines over the life of the project; materials for all additional units, either during or after the project, will be financed by the homestead. Purchased materials consist primarily of cement and ventilation pipe with materials for the superstructure and labor provided by the homestead. A delivery system for materials will be organized by the U.S. technical advisor and his counterparts. Delivery will be made

through the private market or the use for a fee, of government trucks such as those of the Central Cooperative Union, RDA or RWSD. District sanitarians will be responsible for periodic orders of materials if necessary; quantities will be determined on the basis of information from the local health assistants and the technical advisor will provide guidance on such matters as the scheduling of orders. (See Technical Analysis and Annex G for further details on sanitation programs.)

The project's components described above are the key ingredients, along with the provision of water, to finding lasting solutions to water-related disease problems. However, other important needs were identified during PP design that will support the project's objectives in a vital way. AID will provide a public health engineer for five years to advise the Rural Water Supply Board on the design of various water works in Swaziland. The RWSB, consisting of members from key GOS ministries dealing with water resources, will have overview responsibilities for all construction involving water, such as dams reservoirs, fishponds, water systems, and irrigation works. A clear lack within the current GOS water system design capacity is the capability to analyze designs for potential health impacts, especially in the case of schistosomiasis. The public health engineer would operate to review all major water works designs and recommend modifications as necessary; criteria would be developed to serve as a guide for future designs and a Swazi counterpart would be trained in the U.S. and return to serve as counterpart with the U.S. advisor for the final two years of his assignment.

To support the central theme of the project, a national survey will be conducted during the first three years of the project to determine the prevalence of schistosomiasis and other water-related diseases. An AID-funded epidemiologist will lead the three year survey with the assistance of six health assistants and one senior health assistant from the Ministry of Health Bilharzia Unit. The epidemiologist will provide training in survey and analysis and AID will provide a short-term consultant to develop the sample for the survey, in addition to funding the renovation of the laboratory and survey equipment. The effort will be conducted on a two team approach - one field team to collect samples and one laboratory analysis team. The information generated by the survey will provide a valuable insight into the prevalence and concentration of schistosomiasis and other parasitic disorders. As data are developed, it will be passed to the Ministry of Health member of the Rural Water Supply Board, the Health Education Unit, and the Environmental Sanitation Unit if necessary in order that appropriate services can be provided to hyperendemic areas on a priority basis. Obviously, the survey will also generate information that will be valuable to the GOS in other ways; for instance, in the development of a national communicable disease program which the MOH expects to implement with technical assistance from a WHO-provided epidemiologist.

Finally, a survey of water-related diseases has implication over and above the provision of water, sanitation, and health education. The GOS may wish to expand its treatment program in hyperendemic areas and measures such as fencing of water bodies and building of foot bridges may be indicated for better schistosomiasis control.

The project will have no direct interventions in the MOH treatment program since this will be the responsibility of the MOH epidemiol-

ogist provided by WHO. However the AID-funded epidemiologist may work with the MOH in developing training modules for the diagnosis and treatment of schistosomiasis to be used by the Institute of Health Sciences (IHS). These modules will be integrated into the basic nursing and health inspector training program and used for in-service training for clinic nurses now working in rural areas.

Details of the project components described above can be found in the Technical Analysis Section, Annexes F, G, and H, and in the Logical Framework Narrative which follows.

B. Logical Framework Narrative

1. Goal

While the ultimate goal of any health project is to improve the health conditions of Swaziland's rural poor, the PP team concluded that a more specific project goal should be identified in order to more accurately draw the linkages between project activities and objectives. In formulating a goal hierarchy, successive goals consistent with project objectives include the reduction of water related diseases and the improvement of the water use/contact and sanitation habits of the rural population. Naturally, variables outside the control of the project play an increasingly important role in higher order goal achievements and data are too unrealiable for reasonable measurement of achievement rates.

Given the rather obvious linkage between the reduction of diseases incidence and improved health status, it was decided that the immediate goal of this project is to improve the water use/control and sanitation habits of the rural population. While supporting activities are included in the proposed approach, the major emphasis is behavioral in nature - changing the way rural people handle, store, and use water as well as improving excreta disposal practices (including, in the case of schistosomiasis, avoiding contact with water infested with intermediate host snails and storage of water for periods long enough to kill cercaria). In order to reinforce the behavioral changes, project components ancillary to health education are included (see project purpose narrative).

Goal Measurement. At the project goal level, changes in water use and sanitary practices will be evaluated on the basis of information obtained from two KAP studies - one during the initial year of the project and another in the final year. It is expected that 75 percent of all households in areas receiving project assistance will be using improved water use/contact and sanitation practices. This implies that 40 percent of the rural population will be using improved water use and sanitation practices by 1985 and 75 percent by 1990. The desired behavioral changes will be measured by a second KAP study (See Section VII, Evaluation Plan). Practices to be evaluated include:

(a) use of improved pit latrines;
(b) ongoing protection of water sources;
(c) maintenance of piped water supply systems;
(d) avoidance of snail-infested water during peak transmission times;

(e) proper handling and storage of water;
(f) personal hygiene; and
(g) food handling and washing.

Even though the measurement of behavioral changes is related to the project goal, it is postulated that measured changes in behavior can also serve as a surrogate indicator for reductions in water-related diseases. If the health education program successfully persuades rural people to adopt healthier habits (reinforced by the provision of clean water and sanitary facilities), a reduction in the incidence of water-related diseases will follow.

An alternative method for measuring project goal achievement will be the number of pit latrines being installed and used by the rural people. It is anticipated that 5,000 latrines will be constructed annually by 1985 and that by 1990 75 percent of the rural homesteads will have improved pit latrines.

2. Purpose

The purpose of the project is to expand the capacity of the Government of Swaziland to deliver effective preventive health services to combat diseases related to water and poor sanitation.

Purpose to Goal Linkage. Institutional weakness poses a serious constraint to addressing the water-related health problems encountered by rural Swazis and is, therefore, the immediate focus of this project. Without institutional support, it is unlikely that the current GOS programs will be successful in achieving permanent changes in rural people's habits and, subsequently, in reducing water-related disease incidence. The institutional components of the project will serve to establish the ongoing capability to design, implement, evaluate, and redesign programs aimed at influencing the behavior of rural people in the use of water and sanitary facilities. Since adequate coverage cannot be accomplished during the 6 year project life, major emphasis will be placed on the development and organization of programs to be continued by the GOS. Concommitant with the institution building process, certain specific objectives leading toward the project goal will, of course, be accomplished and will serve as indicators of expanded GOS capacity.

The linkage between health education (supported by the provision of clean water and sanitary facilities) and reduced disease incidence is well accepted, although not statistically proven in the "pure" scientific sense. The direction of this project clearly indicates acceptance of this hypothesis and further postulates that the GOS needs substantial insitutional support in order to complete the chain of required events to eventually affect the health conditions in rural areas. The institutional emphasis is predicated on the fact that the behavioral change required to reduce water-related diseases is an on-going process that will require continual motivation by the responsible GOS institutions. It would be impossible to inform and motivate the entire rural population to change their water use or sanitation practices during the six year project life; likewise, supporting infrastructure such as improved pit latrines cannot be installed for everyone in such a short time frame. Similarly the ability to carry out bilharzia surveillance monitoring and

control as well as public health engineering input on water scheme designs will be required well into the future. For these reasons, the project's focus is institutional at the purpose level, realizing that specific accomplishments will be made during the project life that can serve as indicators of purpose achievement in addition to providing preventive health services to the rural people.

Purpose to Goal Assumptions. The following assumptions are considered critical for both the achievement of the project purpose and the eventual project impact on goal level objectives:

- given the appropriate information and proper motivation, there are no cultural factors beyond the scope of the project that will inhibit rural people from using improved water use and sanitary practices;

- the GOS will continue its rural water supply program to complement the activities of this project in order to reinforce the water component of the health education program; and

- the GOS will continue to support the Health Assistant and Rural Home Visitor Training Programs at levels sufficient to operate an effective health education and sanitation program.

End of Project Status. By September 30, 1985, when AID assistance terminates, it is expected that the Environmental Sanitation and Health Education Units of the Ministry of Health will be staffed with trained personnel, equipped, and functioning effectively. Additionally, the Rural Water Supply Board (RWSB) will be functioning to review all water construction works design from the health perspective. Specifically, the following conditions are anticipated by the end of the six-year project:

- 80 percent of the sanitation field workers of the MOH (principally Health Assistants) will be actively involved in the motivation, supervision, and training of rural people in the construction, maintenance, and proper utilization of improved pit latrines;

- relevant health and water education messages will be reaching 60 percent of the rural population on a continuing basis. The Health Education Unit (HEU) of the MOH will be capable of determining community needs and translating this information into a practically effective health education program. The capacity will also exist to evaluate program content as well as communication techniques to ensure continuing relevance to the needs of the rural people;

- health criteria will be incorporated into the design of water systems, dams, reservoirs, fishponds, irrigation schemes, and major water works on a continuing basis. The project-trained Swazi engineer will be serving as an advisor to the Rural Water Supply Board to ensure that the health criteria developed during the project are applied to the design and construction of water related activities; and

- data generated by the schistosomiasis survey will be used in setting priorities for the GOS health education, sanitation, and rural water supply programs.

3. Outputs

Public Health Engineering and Sanitation. All designs for dams, reservoirs, fishponds, water supply systems, irrigation schemes, and other major water works planned during the project life will be reviewed by the Public Health Engineer and counterpart. Recommendations will be made concerning the potential health implications of these designs (particularly related to schistosomiasis) and the engineer will suggest alterations and/or innovations to alleviate or minimize potential negative impacts.

One participant will be trained to the B.Sc level in civil engineering (specializing in water related activities) in a U.S. university for three years. Upon the trainee's return to Swaziland, he will serve as a counterpart to the U.S. technician and will receive two years of OJT in engineering with emphasis on the public health aspects of water designs. Ideally, a Swazi engineer should be sent for a masters in sanitary engineering with emphasis in public health. However, the current paucity of Swazi engineers precludes this approach and it will be necessary to train a University of Swaziland graduate in mathematics or science to the B.Sc. level in engineering. During the two year overlap with the AID-funded advisor, the counterpart will be trained in the publich health aspects of engineering design.

Sanitation Program. Approximately 2,000 demonstrations will be conducted in the siting, design, and construction of improved pit latrines. The demonstrations will be conducted by four Senior Health Assistants (one for each district) in conjunction with the local Health Assistants. Materials for the latrine slab and vent pipe will be provided by AID for the demonstration units; the homesteads receiving demonstration units will provide labor for digging the pit and materials and labor for the construction of the superstructure.

Forty-two health assistants will be trained in the siting and construction of improved pit latrines by the Senior Health Assistants; in each district the Health Assistants will also receive training in communication skills and community motivation to enhance their ability to inform rural people concerning the health benefits of the improved pit latrine as well as proper use and maintenance of the latrines.

Two hundred community sanitation committees will be selected by target communities to serve as on-going resource people for the sanitation program. During the demonstration phase, these community teams (2-3 people) will work with, and receive training from, the Senior Health Assistant and local Health Assistant in the construction of latrines. After the demonstration phase, the community team will be responsible for supervising and monitoring further latrine construction and will assist in the ordering of purchased materials; the Health Assistants will make periodic checks on work progress to ensure that proper procedures are being followed and to provide further instruction to the community teams in specific problem areas.

The AID-funded three-year advisor in appropriate sanitation technology (environmental sanitation) will investigate alternative pit latrine designs and propose a series of basic designs to be used; the

designs will allow for modifications to be made on the basis of the results of the demonstration program. Minimum design criteria will be developed for the program which, under no circumstances, should be violated. These criteria will cover such areas as siting and structural design. The technician will work with the 4 Senior Health Assistants for the first three month period in design and demonstration of pit latrines; this training will subsequently be passed on to health assistants and community sanitation teams during the demonstration program.

Selection criteria for choosing the homesteads to receive demonstration pit latrines will be developed by the AID-funded social scientist (for the health education program) in conjunction with the Senior Health Assistants. These criteria will serve as a guide for placing demonstration units and will include, among other factors, family income levels and the availability of family labor.

Schistosomiasis Survey. During the first three years of the project, a national survey of schistosomiasis prevalence will be conducted with the assistance of the AID-provided epidemiologist and the short-term statistician. In order to complete the survey all members of the survey and analysis staff will receive on-the-job training by the technical advisor and senior Swazi staff. In addition, laboratory and office facilities will be expanded and equipped to provide the capacity for an expanded analysis program.

As a result of the national schistosomiasis survey, a sampling frame work will be available to the MOH for further schistosomiasis or other public health surveys.

Information on schistosomiasis prevalence obtained during the national survey will be used to determine which communties deserve priority in the water, sanitation, and health education programs.

Health Education. During the first two years of the project, a Knowledge, Attitudes, and Practice (KAP) study will be completed and interpreted. The findings of the study will be used to design the content of the health education program and will provide information on which to base the communications process for both the health education personnel and the sanitation teams.

The AID-funded health education advisor will assist the MOH in the development of a national health education strategy and plan. Partly based on the KAP, the plan will include, inter alia, a system for health education content design, communication channels and methodologies, longrange training and staffing requirements. As part of establishing the national program, one participant will be trained to the M.Sc. level in health education, one nurse educator will be trained to the diploma level in health education, and a graphic artist will receive short-term training - all three participants will be trained in an African institution, probably in Ibadan, Nigeria.

In addition to academic training, 312 community health workers will receive in-service training (230 Rural Health Visitors, 42 Health Assistants, 40 Domestic Science Demonstrators) on an annual basis beginning in January 1981. Initially, Health Assistants will receive a two-week workshop at the IHS to prepare them for participation in the sanitation program and annually thereafter, one-week seminars to discuss new methodologies and to discuss field problems. RHVs and DSDs will re-

ceive one-week seminars in small groups at district headquarters to enable them to participate in the water and sanitation activities within their communities. To support the activities of the HEU, a new central office will be constructed and equipped, including the provision of two vehicles for central office staff who will be heavily involved in field work.

Output to Purpose Linkages. Currently the MOH health education program is not adequately supported at the central level and lacks the trained personnel and equipment to design and implement an education program on the basis of community needs. Therefore, a critical need in the institution building process is the development of a national strategy including field organization, design of program content, and training programs. As a base for the development of the national plan, the KAP will provide essential information on rural practices, attitudes, and communication patterns.

In the case of rural sanitation, the institutional capacity required to sustain a national program will be developed at the community level. Project outputs, i.e. field demonstrations of appropriately designed pit latrines and on-the-job training of Health Assistants and community sanitation committees, will establish the base for a continuing program. The sanitation demonstration program, in conjunction with general health education efforts, will serve to motivate rural people to construct latrines on the basis of potential health benefits, will provide training in the construction of the units, and will inform rural people in the use and maintenance of the latrines. The major responsibility for the continuing construction program will rest with the health assistants and community sanitation committees. Finally, to overcome transportation constraints, the Senior Health Assistants will assist the community by establishing contact with local cement and pipe distributors and give training in calculating commodity needs and placing orders.

As previously noted, numerous water works such as dams, reservoirs, and irrigation schemes are currently under construction or will be constructed over the next several years. The review system and criteria developed by the project and the training provided will allow the GOS to institutionalize a process of pre-construction review of water work designs to ensure that potential health impacts are an integral part of the planning process at an early stage. Adequate design capacity for water works exists in Swaziland; the gap to be filled by this project is the much needed health perspective on the part of local engineers.

Finally, the schistosomiasis survey will produce information on communities in the most need of health services. In addition, the training and sampling techniques developed during the project can be used for further epidemiological studies that the MOH may wish to undertake.

4. Inputs

The following discussion and tables describe the inputs that will be required to produce project outputs and achieve the project purpose:

a. USAID ($3,296,800)

(1) Technical Assistance ($2,312,600). The project will provide 17 person years of long-term technical assistance and 8 person months of short-term consultancies as depicted in Table III.1. Of the advisors listed in Table III.2, all will have Swazi counterparts with the exception of the epidemiologist and the social scientist who will be involved in specific tasks (KAP study and schistosomiasis survey) and will not be involved in the institution building process directly. Like the other long-term advisors, however, the social scientist and epidemiologist will be assigned to governmental units and, by the nature of the studies they will produce, will, at least indirectly, affect the institution building purpose of the project through on-the-job training and the information generated by their prespective studies. One short-term consultant (4 months) will assist the MOH in developing the sample framework for the schistosomiasis survey in 1981 and will return in 1983 to assist in analyzing survey data and 4 months of consultancies are anticipated in health education (such as materials design and production). Further details concerning AID-funded technical assistance can be found in the preceding sections in the Project Description and in Annex K, Job Descriptions.

(2) Training ($95,800). Seven years of academic training has been included in the project design. Two participants will attend degree programs and two will be sent for diploma courses. It is anticipated that the participants being trained for the Health Education Unit (HEU) - 1 M.Sc. and 1 diploma in health education plus 1 diploma in graphic arts - will attend the University of Ibadan in Nigeria; the public health engineer will be trained at a U.S. university.

(3) Construction ($282,700). The construction component of the project consists of five houses for U.S. technical staff, the renovation of the laboratory for the Schistosomiasis Unit, and the construction of a central office for the Health Education Unit (HEU).

(4) Commodities ($177,200). Commodities purchased specifically for this project will include five vehicles for TA personnel, four motorcycles for the district sanitarians (Senior Health Assistants), five overnight trailers for field workers who will stay in the field for several days at a time, laboratory equipment and supplies, health education materials, and certain construction materials (cement and pipe) for the demonstration pit latrine program.

(5) Other ($428,500). $25,700 will be provided for the KAP study; $80,800 for external evaluation; and $299,700 has been added as a 10 percent physical contingency. A total of $22,300 is provided to cover local training costs and production costs of health education materials.

In addition to formal, academic training, short-term, in-service training will be provided to all field-level health education and sanitation personnel. During the first year of the project, field workers will attend a 1-2 week course/workshop on communication skills and health education/sanitation information. Afterwards, seminars and courses will be presented on a yearly basis with special sessions being conducted in the year following the development of a strategy based on the findings of the schistosomiasis survey and KAP study.

TABLE III.1

Schedule of Technical Assistance

Personnel	Oct. 79	Oct. 80	Oct. 81	Oct. 82	Oct. 83	Oct. 84	Oct. 85	Staff Years
Environmental Engineering and Sanitation Program								5
Public Health Engineer								
Environmental Sanitarian								3
Schistosomiasis Survey								
Epidemiologist								3
Statistician								0.33
Health Education								
Health Educator/ Administrator								4
Social Science Advisor								2
Consultancies								0.33
Total Staff Years	0	5.33	5.0	4.17	2.17	1.0		17.66

Table III.2

Participant Training

DISCIPLINE	1979	1980	1981	1982	1983	1984	STUDY YEARS
B.S. Civil Engineering							3
M.S. Health Education							2
Diploma (2) Health Education	WHO-Sponsored		AID-Sponsored				2
Diploma Graphic Art							1

Price contingencies have been included in the line item input costs.

b. GOS ($1,319,200)

(1) Vehicle Maintenance and Operation ($202,100).

(2) Salaries and Wages ($993,500). Includes salaries for counterparts, partial salaries for health education and sanitation field workers, full salaries for senior health assistants serving as district sanitarians and health assistants seconded for schistosomiasis survey, salaries for clerks, secretaries, wages for drivers and daily hire laborers, and temporary hire for the KAP study.

(3) In-Country per Diem ($13,200). For in-country (including overnight) travel of project technicians, senior health assistants, health assistants involved in survey work, and participants in local training courses.

(4) Laboratory, Office, and House Furnishings ($42,900).

(5) Travel Costs for Academic Training ($7,400).

(6) Health Education Materials and Lab and other Supplies (31,900).

(7) Contingency ($28,200).

Annex IX breaks the GOS contribution down by year, component, input, and differentiates between current expenditures ascribable to the project and incremental requirements.

c. Local Communities

Rural people who will receive demonstration pit latrines will contribute $10,000 in local materials and labor. Local material and labor costs for the units that will be constructed in addition to the demonstration units are not included in the project total.

I. Relationship to AID Efforts in the Health Sector

There is important interfacing between this project and the only other AID-funded health project in Swaziland. AID's Health Manpower Training Project is assisting the GOS in the construction and staffing of an Institute of Health Sciences (IHS) which eventually will train most categories of health personnel. The first groups of graduates from the IHS will be nurses (1983), Health Inspectors and Health Assistants. The nurses will receive three years of general nursing background and then specialize as either MCH/FP practitioners or as diagnostic nurses. Nurses graduating from the IHS will be well-prepared to staff rural clinics because their curriculum and practical work emphasizes preventative health care, skills in accurate diagnosis and treatment of common illnesses and community health work in contrast to the hospital-orientation of previously trained nurses.

WHO is recruiting for and will provide later this year, one or more Sanitarian Tutors to begin training Health Inspectors and Health Assistants. The MOH estimates the need for eventually training 19 Health Inspectors and 103 Health Assistants.

The Water Related Disease Control Project will rely in part on the new graduates of the IHS to participate in all three components of the project. Clinic nurses will treat water-related diseases (including schistosomiasis) and provide simulataneous health education to their patients. Health assistants, as they graduate and are placed in rural assignments, will further extent the sanitation program of this project. Health Inspectors will provide the necessary supervision and technical support to the Health Assistants in the field. The IHS will also serve as the site for in-service training sessions for a variety of community health workers. In addition to the IHS, the Rural Health Administrator and Health Statistician funded under the Health Manpower Training Project will provide field level coordination for the sanitation program and the schistosomiasis survey respectively.

IV. Project Analyres

A. Technical Analysis

1. Health Education

Water borne and water related diseases, probably more than any other group of diseases are intertwined with human behavior, beliefs and cultural practices. Therefore, while the technology for the control and prevention of these diseases exists, the technological approaches are frequently less than successful because of the human behavior factors.

These factors are extremely important because the prevention and control of water related diseases requires a strong participatory element on the part of the population. With the exception of typhoid and cholera, there are no vaccines available to protect the population. Gastroenteritis, viral diarrheas, schistosomiasis, and other parasitic conditions can be contracted repeatedly and there is no immunity. However, these diseases can be prevented by avoiding contact with infected food, water, and other vectors.

The provision of clean water supplies and sanitation facilities makes it easier to minimize contacts but unless the population understands the linkages between sanitation and disease these measures may have only a slight impact on water related diseases. Therefore a health education component has been included in this project to inform the rural population about linkages between sanitation and disease and to encourage the population to assume a participatory role in the sanitation of their own environment. At present the Health Education Unit (HEU) of the MOH lacks the capacity to carry out such a program. Furthermore very little is known about the behavioral habits, attitudes, and cultural beliefs of the rural Swazi concerning hygiene practices, environmental sanitation, and health. While general principles of water and sanitation education can be integrated into training programs of health and other field workers, additional information is needed to make this education culturally acceptable to traditional rural people.

Another important area requiring investigation is the role of the traditional healer in water related diseases as well as the healer's potential role in sanitation programs. Traditional medicine remains very strong in Swaziland and could come in conflict with health education programs since healers frequently identify supernatural elements as the cause of disease. It is also very important to know how the healers treat water related diseases, especially infant diarrheas which are a major cause of mortality in rural Swaziland as traditional methods may contribute to dehydration.

A traditional health education approach through health facilities and mass media can serve to support a water related disease control effort but it must be accompanied by face to face contact with the rural population by people with the potential to be change agents in the community. This group would include health, agriculture, and community development field workers already present and known to the rural community as well as the traditional leaders and healers.

Multi-sectoral involvement in the control of water related diseases is crucial because the preventive measures are complex involving

environmental measures, house keeping and hygiene practices, and planning of local development projects to avoid increasing the incidence of water related diseases. Not only must all sectors understand their role in control but they must also coordinate their activities to provide a safe environment for rural people.

Some education related to control of water related disease is being carried out in rural Swaziland but it lacks coordination and does not provide the rural people with a comprehensive understanding of the relationships between a sanitary environment and their well being. In this project, the MOH Health Education Unit, will initially bear the responsibility for preparing and teaching a coordinated approach to the control of water related diseases for all extension workers in Swaziland. The curriculum prepared should then be integrated into all basic training programs for extension workers. This curriculum will be based on approaches that minimize conflicts with rural Swazi cultural practices and beliefs, and will include communication and non-formal education techniques to assist field workers in making more effective contacts with the population.

To accomplish this task the central HEU will explore innovative methods of personal communication while developing other approaches using mass media and established community resources to support and reinforce the message being carried to the rural homestead by extension workers. The water education program will be a national effort but special emphasis will be given to those communities involved in developing water systems and sanitary facilities, and to those areas where there is a high incidence of disease and lack of clean water and latrines. This emphasis will help to ensure that communities receiving water and disposal systems are motivated to participate in the care and maintenance of the systems, and will assist the people in areas not yet scheduled for systems to understand the relationships between water, sanitation, and health so that they can take reasonable precautions to avoid contact with infected water.

The technical approach selected for the health education component was chosen for three reasons. First this approach fits within the socio-cultural traditions of Swaziland, secondly it stimulates community participation, and thirdly it is within the capacity of the MOH to implement.

Swazis have a strong oral tradition which makes the spoken message, from a respected source, more powerful than written messages. To follow in this tradition, the project emphasizes training of community workers to improve their communication skills in personal contacts with the rural people. The health educators, training these workers, will enlist the assistance of local chiefs and other traditional leaders in supporting the community workers so that the people will accept their guidance.

Community workers, supported by local leaders, to carry out health education and technical assistance were chosen because: (1) culturally people will be more permanently influenced by a resident change agent who will be available over time to motivate them, assist them to build sanitary facilities and help them maintain and repair their latrines and water system; (2) at the most personal level within the homestead, mothers will be more easily persuaded by another woman who can come into

her home to demonstrate techniques such as oral rehydration, personal hygiene, water storage and general cleanliness.

The project calls for very few new government positions. Existing health and field workers will be retrained and their skills upgraded to make them more effective. At the homestead or community level there will be Health Assistants who act as resident change agents, helping communities construct and maintain latrines, teaching people how to protect and properly use their water supplies and to refer those who are ill to health services. Rural Health Visitors (RHVs) will be working closely with mothers to teach good personal hygiene, home cleanliness, child-care, and oral rehydration and care for children with diarrhea. RHVs serve as a very critical link between the homestead mother, who is the most important target for health education, and the health assistant and health system in general. Clinic nurses should be making accurate diagnoses of water-related diseases and instructing the people on how to avoid contacting the diseases. Community workers from other organizations should be sensitized to how they can contribute to good environmental health through promoting good personal hygiene, proper garbage and waste water disposal and pest control.

At the central level, the HEU will be developed using a skeletal staff; their primary responsibilities being in training and coordination. The project does not require great mobility because transporation costs are increasing dramatically. Instead the central staff will be looking for ways of improving the skills, support and supervision of existing field workers without building up a large new cadre of technicians with specialized functions. Because the main function of the HEU at the national level is in organization and training, a large staff is not necessary; nor is sophisticated equipment or technology. Instead AID will finance a small amount of simple equipment such as overhead projectors, silk screen aparatus and tape recorders to be used as training aides for health and community workers.

The HEU staff will be conducting annual seminars for a variety of health workers. All Health Assistants (except those working in special programs such as malaria or schistosomiasis control) will be given a two-week workshop at the Institute of Health Sciences (IHS). The skills to be taught should include: placement, construction and maintenance of low-cost VIP type latrines; community and individual motivation techniques using non-formal education skills; and introduction of innovative techniques through culturally acceptable channels such as indvunas, chiefs, traditional healers or government health workers. Other community workers such as the Rural Health Visitors (RHVs) and Domestic Science Demonstrators (DSDs) will be brought together at district headquarters for one-week seminars in the promotion of hygiene, environmental sanitation and to develop communication skills.

In addition to organizing formal training sessions, the HEU staff will be responsible for working with supervisory level personnel such as Matrons, Public Health Nurses, and Health Inspectors to provide them with specific suggestions about how they can assist the health workers, under their supervision, to more effectively integrate health education into their routine tasks.

Within the last two years of the project, four government posts will be created for District Health Educators (one for each District). Diploma level training will be provided for these District Educators (by WHO) and they will eventually provide supervision and support for the community health workers in health education activities. The District Educators should also be a resource to other extension workers and district administrators. It is important that these district-level posts be created in order to fully implement the MOH's decentralization plan and to provide the critical link between the field level activities and the HEU headquarters.

By the fourth year of this project the HEU will be required to submit a national health education plan to the MOH which will set forth the detailed strategy on how health education will be organized and implemented. To assist with this, the project provides for a small, but important, amount of research to be done concerning knowledge, attitudes and practices of the rural Swazi in water and sanitation related behavior. This information, which is currently not available, will provide the HEU with more specific information and ideas for approaches to the rural Swazi population in health education programs. This information will be used to train community workers in their personal contacts, to develop more effective media techniques that are culturally acceptable, or perhaps organize action programs which rely on incentive schemes.

The AID Health Education Advisor will provide leadership to the HEU after the WHO consultant leaves and before the Swazi Director has completed the necessary graduate training. He/she will also function as an advisor to the Swazi Director when he/she returns from training which will assure continuity to the program. The Social Scientist will organize the KAP studies and ensure that the results are incorporated into the health education schemes in the appropriate ways.

2. Schistosomiasis and Water Related Disease Survey

There are indications that schistosomiasis is a disease of public health importance in localized areas of Swaziland. The disease is certainly not evenly distributed around the country; the highveld is virtually free of schistosomiasis transmission, whereas, there may be portions of the lowveld where the parasite is hyperendemic. Because there is no surveillance system and because a nation-wide survey for schistosomiasis prevalence has never been done, the MOH still does not have adequate information to plan a nationwide control program. Limited surveys, conducted by the School Health Teams and the Bilharzia Unit, have given some indication of the distribution of urinary schistosomiasis but, because the surveys were poorly planned and the techniques used were inefficient, the data gathered is of limited value. No data are available on the distribution of intestinal schistosomiasis and little is known about the intensity of infection for either variety.

Although the survey is desired by the MOH primarily to collect information on schistosimiasis, other diseases will be investigated simultaneously. Intestinal parasites, primarily the helminthic and protozoan infections, can be detected from the fetal samples collected during the survey. The AID epidemiologist will train health assistants not only to recognize and count schistosome eggs, but also in the identification of parasites to be included in the survey. The choice of these additional diseases to be studied will depend on MOH resources, capabilities of health assistants and on the judgement of the epidemiologist.

This project will finance a carefully planned national survey, using existing manpower resources and facilities with only minor expansion of the laboratory space and additional equipment. The survey itself is important for the following reasons: (1) Given the limited financial resources of the MOH, a successful control program cannot be planned without basic information about the location of the endemic areas and transmission sites of the disease. (2) When the areas of high transmission

are located, priority can be given to those areas for installation of water systems and sanitation and health education programs. (3) The survey will provide the MOH with an idea of what external resources it can mobilize in a control program (e.g., the irrigated estates may be asked to do schistosomiasis screening and treatment for employees, the Ministry of Works may be needed to provide fencing or bridges and so on.) (4) The MOH can, at the time of the schistosomiasis survey, obtain valuable information on other parasitic and water-related diseases without much additional cost.

In order to minimize the cost and to maximize the accuracy of the survey the sample design for selection and examination of the sample requires careful consideration. It is fortunate that the 1976 population census enumeration maps are available. These maps will greatly facilitate the specification of the sample frame. Prevalence of urinary schistosomiasis varies considerably with age. It rises to a peak among teenage children then decreases in older individuals. This effect is much less marked for the intestinal species. It may be more practical to identify areas of high transmission by examining a representative sample of a specific age group which is most likely to have the highest infestation, i.e., the 10-14 year olds.

The sampling units should be the homestead to ensure that all of that age group, not just those attending school, are tested. Following the analysis of this age specific sample, more extensive samples can be taken from areas indicated to have high infestations.

Sampling of the population will be carried out by a team consisting of one Senior Health Assistant and three health assistants. Prior to the survey of each community the purpose of the survey and what it entails must be explained to the community and its cooperation enlisted. The experience of the Malarial Control Section in the field will be invaluable at this stage.

Each individual to be tested must provide a sample of feces and a midday urine specimen. Preservative will be added to the sample in the field and the sample carried back to the laboratory for analysis. The methods of analysis will have to be chosen by the Epidemiologist. They should be well-established, accurate, quantitative methods such as the Kato thick smear (feces), a simple urine filtration technique or use of the Pitchford/visser filter for urine or feces. Examination and egg counting will be done in the Manzini Laboratory by the other team of a Senior Health Assistant and three Health Assistants.

An initial analysis of the geographical distribution of the parasite could be carried out by the Unit; however, more detailed analysys would require a computer. Several universities and institutions already have computer programs designed to handle such data and would be interested in cooperating. (University of Michigan, Lowell University, Ross Institute).

Financing for specific control measures, (beyond the provision of excreta disposal units and health education and the water supply financed by other donors), was not built into this project because both AID

and the MOH agreed on the difficulty of anticipating the exact control measures that would be required. And it was felt that the resources needed, if any would be available locally through the private estates and GOS programs. Assistance in planning the control program would be available through the WHO-financed Epidemiologist who is expected to develop a comprehensive communicable disease control program for the country when he/she arrives next year.

The MOH is committed to launching an appropriate control program once the survey results have provided them with the necessary background information. The project will leave in place, the Health Assistants of the Bilharzia teams with skills in surveying for and diagnosis schistosomiasis, an expanded and well equipped laboratory and a sampling framework which will be useful for other epidemiological work.

3. Sanitation/Public Health Engineering

Public Health Engineering. The provision of rural water supplies in Swaziland is currently proceeding at a much faster rate than was experienced prior to 1977. Between July 1977 and July 1979 approximately 26,000 rural residents were supplied with piped water through public standpipes under the program of the Rural Water Supply (RWS) Branch of the Water and Sewerage Board (WSB). In addition, 10 systems were completed for rural clinics and schools. The RWS Branch projects that by sometime in 1980 they will be providing enough systems to serve an additional 25,000 people each year. Although other organizations are providing water supplies to the rural population (Ministry of Health (MOH), Ministry of Agriculture through the RDA program and private companies), the RWS Branch is taking the lead role in this area, and it is expected to play an even larger role in the future.

At the same time, general water resources development is taking place at an increasing rate in the intensive Rural Development Areas (RDAs) and on private estates. The development is centered around increasing irrigated agriculture through development of dams, reservoirs, canals, ponds and drains.

Safe, convenient water supplies are accepted as an essential component of any program to reduce water related diseases. The impact on specific diseases can be heightened if communities with high prevalence rates of those diseases are selected to receive water supply systems. There are, of course, other criteria which must be considered in selecting communities to receive water supplies, with potential health impact being only one of them. Too often, the engineers who are responsible for design and construction of systems and health specialists fail to achieve an effective dialogue, and specific health considerations are not always included as criteria in selection of communities to receive water. For example, unless the rural water supply agency is given information regarding areas with high prevalence of schistosomiasis or areas that must rely on heavily contaminated waters, the engineers have no basis on which to choose one community over another on the basis of potential health impact.

A public health engineering perspective is essential if the health problems associated with water related projects are to be addressed. This is the prespective of the environmental or sanitary engineer, who has had specific training and experience both in public health and in engineer-

ing practice. Currently there is no such person with that perspective in a position to oversee water related activities in Swaziland.

The Cabinet has recently approved legislation, which expand the role of the RWS Board to oversee all water related activities in the Kingdom. The Board, which now acts as a policy making body for the RWS Branch, will have broad review and advisory responsibilities, not only for the activities of the RWS Branch but for water resource activities of other Ministries. The Board includes representatives of the Water and Sewerage Board and representatives from the Ministries of Works, Health, Finance, Local Administration, Agriculture and Education. The RDAs are represented through the Ministry of Agriculture. The legislation also expands the capabilities of the RWS Branch by providing permanent posts for all positions and by placing it directly under the RWS Board and as a separate unit within the Ministry of Works.

The expanded technical assistance to the RWS Branch to be provided by CIDA (Canada) and capital funding provided by the Ministry of Overseas Development (ODM) of the UK, will mean that the Branch can proceed at a faster pace to provide rural water supplies once the legislation is passed. The various government ministries represented on the RWS Board have recognized the need for a sanitary engineer advisor to work with the RWS Branch in their activities and to advise the Board on the public health implications of other water related activities.

To fill the gap that exists in this area, this project will provide a public health engineer to the Ministry of Health who will be attached to the RWS Branch and act as advisor to the RWS Board. This individual will also provide an integral link between activities of AID suported rural sanitation, water and sanitation education and Bilharzia Unit survey activities.

The public health engineer's advisory functions will include: (1) the development of criteria for the design of water supply systems as well as selection criteria for use in determining target communities to receive water supplies and excreta disposal systems; and (2) review of the designs and plans for irrigation works, including dams, canals, reservoirs, and drains to determine the potential health implications, particularly related to schistosomiasis; and recommendation on feasible engineering alternatives to alleviate or minimize potential negative health impacts.

Therefore, this component of the project fills an important gap in the planning/design stage of water works construction in Swaziland and will ensure that purely technical solutions are tempered by potential impacts on the human environment. In the final analysis, however, it is likely that the advice of the public health engineer will, in turn, be tempered by the cost implications of recommended design alternatives with the final decision resting with the Rural Water Supply Board.

Sanitation Program. Improved health is normally considered one of the principal benefits of improved sanitation. Excreta contains a wide variety of human pathogens and the removal of those pathogens from the immediate environment, which is achieved by proper sanitation, can have

a dramatic impact on community health. However, prior or concurrent improvements in water supply combined with a vigorous and sustained campaign of community education in hygiene are ordinarily required before all the health benefits of a sanitation improvement program can be realized. Additionally, active community participation is essential to the success of any program to improve sanitation in rural communities.

Some of the more important diseases associated with improper disposal of excreta are listed below:

Bacterial Infections
Typhoid
Cholera
Bacillary Dysentery
Miscellaneous diarrheas
Gastroenteritis

Viral Infections
Infectious hepatitis
Poliomyelitis
Miscellaneous diarrheas

Protozoal Infections
Amoebic dysentery
Giardiasis

Helmenthic Infections
Roundworm (ascariasis)
Hookworm
Bilharzia (schistosomiasis)

The transmission of these diseases occurs via a number of routes. These routes can be through person-to-person contact, the contamination of water sources and crops with fecal material and contamination of soil. Tape worms may be obtained by eating improperly cooked meat of pigs or cattle which have eaten fecal matter, and infections may be spread by insects, especially mosquitoes, flies and cockroaches which have contacted fecal matter.

It should be noted that an essential feature of schistosomiasis control is to prevent excreta from contaminating surface waters. Not only are the schistosome eggs passed into the water, but the pollution of the water body can increase the growth of aquatic vegetation, providing more suitable habitats for the intermediate host snail for schistosomiasis.

Because many of these diseases are concentrated in young children, parental attitude and behavior are critical if children's stools are to be properly disposed of. It is among the age group of 3-12 years that children frequently do not use toilets regularly in rural areas, even when they are available. Therefore, all means for providing design for excreta disposal facilities for use by children, and vigorous encouragement by parents to use those facilities, must be fostered.

Some arguments have been presented that where rural populations are dispersed, the provision of latrines may result in less sanitary disposal of excreta than defecation in the bush away from the home. This may be true for very arid areas where the wastes quickly dry out and are

rendered rather harmless, and where latrines are poorly designed and initiated with no health education.

Although the rural communities in Swaziland are dispersed, climatic conditions are not such that fecal matter is rendered harmless in a short period.

A positive health impact is not likely to be realized until a comprehensive program is initiated to provide appropriately designed excreta disposal facilities along with health education.

Many of the fecal related diseases are reported to exist in the rural areas of Swaziland and the availability of sanitary excreta disposal facilities is limited. A review of the 1976 census data shows that about 16 percent of rural homesteads are served with some type of latrine. Based on this percentage, approximately 63,000 people in the rural areas had these facilities at the time of the census. Most of the facilities must have been installed without any government assistance since only about 500 latrines had been installed by the MOH through 1978. There is no data available, however, regarding the type of latrines, their condition or how they are used. It is likely that in the more outlying areas the percentage of the population with latrines is significantly lower than 16 percent.

Knowledge about attitudes and practices regarding excreta disposal and disease relationships, as perceived by rural dwellers, is lacking.

Health Assistants are reporting that there is presently a significant demand for pit latrines in many rural areas. They report that this demand is being generated by the health education activities of the Rural Health Visitors. This demand might be taken as a measure of acceptability of at least the idea of a facility for disposing of excreta. It may also be taken as an indication of the effect of health education on increasing demand for such facilities.

Conversations with a number of people working in the rural areas, as well as direct observation, indicates that there is a marked preference for corrugated iron roofs for pit latrines and wood or concrete block for construction of the superstructure as opposed to the traditional mud-wattle construction with thatched roofing. These observations could well be biased as preferences could vary significantly from community to community and even within communities.

Environmental sanitation activities are carried out by the MOH Environmental Health Division which began in earnest in 1974 with the initiation of a WHO assisted training program for Health Assistants. The candidates had to possess a junior level certificate and receive 6 months theoretical and 6 months practical training in different fields of environmental health activities. By June 1978, 44 qualified Health Assistants had been trained and were established in the 4 districts.

Among the duties of these Health Assistants are motivation of the community and provision of assistance in constructing latrines. They are also expected to initiate health education activities in the communities. Materials for constructing latrines, provided by UNICEF through 1977, included concrete, roofing materials and iron reinforcement for the

slab. Table IV.1 shows the number of latrines that have been installed nationwide since 1973.

Table IV.1

YEAR	STAFF (HEALTH ASSISTANTS)	NO. OF LATRINES
1973	4	9
1974	24	48
1975	34	82
1976	50	139
1977	46	160
1978	48	100
TOTAL 6 years		538

The goal of this program, to provide 1000 latrines per year, is obviously not being achieved and the program is having little impact on improving environmental health in rural communities.

Where latrines are installed, the materials described above are provided at a charge of E5 to the homestead (total cost = E25/unit). Each homestead is responsible for digging the pit, building the superstructure and helping to pour the slab. The Health Assistant stays on site to instruct at each phase of construction.

The stock of cement provided by UNICEF is down to 678 - 50 kg bags which must be used for the spring protection program as well as for construction of latrines. The number of Health Assistants is also now reduced to 42 distributed among the 4 districts as shown in Table IV.2.

The problems which have impeded the timely construction of latrines include the lack of transportation for both Health Assistants and materials to the rural settlements in each of the districts, the lack of storage facilities at the district level, overall supervision, and low morale of Health Assistants resulting from the above problems. In many areas, homestead members, encouraged by the RHVs, have dug pits in anticipation of receiving a slab and help with construction. Since most of this demand is not being met, the Health Assistants are losing rapport with communities.

Table IV.2

DISTRICT	HEALTH ASSISTANTS
Hhohho	13
Manzini	10
Shiselweni	6
Lobombo	13
District Health Inspectors	4 (all expatriates)

Under this project, the previous approach used by the MOA to provide pit latrines will be modified. As described more fully in the Project Description, the project will emphasize a self-help (and self-financing) approach to latrine construction. The AID-funded environmental sanitarian will develop a set of appropriate latrine designs and will set minimum

criteria; four senior health assistants, one in each district, will work closely with the sanitarian in the selection of designs. The senior health assistants will be trained in the siting and construction of the various options which will range in price from E11 to E17 in 1979 prices (E1=$1.19).

The demonstration units installed in each community will serve, along with health education efforts, to motivate other people to construct and finance their own pit latrines. The health assistants, in explaining the various options, will emphasize the trade-offs between pit life and cost so that homesteads may make a rational decision on the type of latrine desired, but, under no circumstances, will the minimum design criteria be violated. The cost range (E11-17) is within the affordability range of the rural homesteads (see Economic Analysis) for those latrines that use local materials for the roof and superstructure.

The sanitarian advisor will also assist in the development of materials ordering and delivery procedures to be managed at the district level by the senior health assistants. The system will be organized through the private market or by renting space on other CCS vehicles. The Rural Water Supply Division (RWSD) has expressed a willingness to haul latrine materials on their vehicles, probably at no charge. This service would be limited to areas where water supplies are being installed. Additionally, the Swaziland Central Cooperative Union (CCU) operates a fleet of trucks that has excess capacity during the winter and the Union is actively looking for additional business. Supplies could be hauled by the CCU vehicles during the off season and stored at either their four district centers or at the numerous farm sheds in the rural areas. The senior health assistants could arrange for the delivery of the latrine materials to the CCU district center or farm shed where they will either be picked up by the homesteads or arrangements for delivery will be made through the numerous private truck rentals. It is likely that in many instances, the CCU trucks will be able to deliver the materials directly to the site. In some cases, the private system may be used for the delivery of materials. Materials for both the demonstration scheme and the future program will be delivered using procedures established during the early stages of the project by the sanitarian advisor; maximum flexibility concerning the source of transport will be encouraged to help ensure timely deliveries.

While the previous discussion has laid the basis for a sanitation program in Swaziland along with a sketch of how the program will be implemented, the following section will elaborate on the reasons for choosing this particular approach followed by an illustrative summary of technical design options and 1979 cost figures for these options.

As previously mentioned, problems articulated by health assistants working in the MCH sanitation program include lack of transportation for materials, lack of storage facilities, and lack of supervision. One alternative considered to address the first two constraints was support to an expanded MCH program as currently exists. Such an approach would have some obvious similarities to the one proposed in this project, but would differ in some critically important areas. Vehicles could be provided to the MCH along with funds for materials to continue the subsidy to each homestead. At levels required to reach adequate numbers of the rural population, this approach was determined impracticable. To achieve a coverage rate of 75 percent, 45,000 units will be required over the next 10 years. Such an installation rate would create severe recurrent budget

problems for the MOH (see Financial Analysis) since the subsidy would be borne by the government in full after AID assistance terminated. Additionally, fuel and maintenance costs would be a burden as would be the administration of the delivery and storage system.

The approach proposed by the project maintains that there are low cost, technically appropriate, and health promotive pit latrines that can be financed and constructed by the rural poor of Swaziland when properly motivated and trained. Such motivation will be stimulated by the health education component of the project and the community demonstration program. The demonstration program will install pit latrines in selected homesteads in each community (people receiving demonstration units will participate in the construction) and will serve to train local health workers and community sanitation committees in construction techniques. Thus, the program becomes a community effort, not a government one. Transportation of materials will be provided through the private market, thereby avoiding the operation of a government vehicle fleet.

The type of latrine anticipated for the program is the ventilated improved pit (VIP) but other options may be used if found appropriate and affordable by the sanitarian advisor. A basic design for a VIP can be constructed for E11 and modifications to increase longevity by enlarging the pit (requiring a larger slab) bring the cost to around E17. These cost figures cover the cement for the pit slab and the asbestos pipe for ventilation. The materials for the superstructure and all labor is provided by the homestead. These basic designs are cheaper and healthier than the standard pit presently installed in Swaziland, and are considered affordable to the rural poor. Recent rural cash income data plus an analysis of projected health expenditure savings indicate that the E11-17 price range is not too high for rural people to afford; the cost falls well short of the IBRD estimates for the cut off point above which a subsidy would be required (see Economic Analysis). Furthermore, under the MOH's current program, the cost to the homestead would have risen to around E10 over the next few years in an attempt to reduce the amount of subsidy, bringing the subsidized price close to the total price proposed under this project. (Current cost of E25 includes iron roofing.) It should also be noted that many rural homesteads are purchasing two slabs at the E5/each price (when available); the extra slab is used as a washroom or shower floor.

Annex G describes the various technological and cost options for the pit latrine program. One variation of the ventilated pit has been developed by the UN sponsored Appropriate Technology Unit in Ntonjeni, Swaziland. The sanitarian will work closely with this group in developing the design options for use by rural communities. Costs for the various latrines will differ according to the size of the unit and selection of construction materials. More expensive models using cement block sides and iron roofs will, of course, be available. The purpose of the approach selected is to offer a basic design that can be financed and constructed by the poorer homesteads.

The supervision problem will be overcome by the addition of a senior health assistant for each district to serve as district sanitarian. (See Background and Annex D for details in current staffing and organization of health services.) The senior health assistant will train and supervise the local health assistants who, in turn, will supervise the

community sanitarian committees. The District Health Inspector will continue to supervise all health assistants but primary responsibility for all aspects (demonstration, training, supervision, logistics) of the sanitation program will be the specific, full-time responsibility of the senior health assistant. To ease the transportation problem, each of the four district senior health assistants will be provided a motorcycle and a tent for overnight stays during demonstrations at distant communities, if necessary.

Finally, it is expected that 2000 demonstration units will be installed over the life of the project according to the following schedule:

10/1/80	Arrival of environmental sanitarian
10/1/80 - 3/30/81	Training of senior health assistants, design criteria developed, various latrine designs developed
4/ 1/81 - 9/30/81	200 demonstration units (50 per district)
10/1/81 - 9/30/82	400 demonstration units (100 per district)
10/1/83 - 9/30/83	400 demonstration units (100 per district)
10/1/83 - 9/30/83	500 demonstration units (125 per district)
10/1/84 - 9/30/85	500 demonstration units (125 per district)

The demonstration rate achieved by the projects end will be 500 per year or 125 per district, implying an installation rate of 3 pit latrines per week. The demonstration homesteads will be selected on criteria developed by the sanitarian advisor in conjunction with the AID-provided sociologist to the MOH. It is expected that roughly 10 percent of the homesteads in each community will receive demonstration units. Siting and supervision for the construction of remaining units by the community will be provided by local health assistants and the community sanitation committee. The Senior Health Assistant will order materials and secure transport on the basis of community demand which will be transmitted via local health assistants on a monthly basis.

On the basis of the PP team's findings concerning the design of appropriate pit latrines, financing, transport, and program supervision, the foregoing plan was developed for the sanitation component; the approach planned is considered technically and administratively feasible.

B. Social Soundness Analysis

1. The Setting

Approximately 88 percent of Swaziland's 520,000 inhabitants live in rural areas. Most of them are concentrated on 56 percent of the total land area known as Swazi Nation Land, where a traditional land tenure system prevails. These people live in approximately 50,000 dispersed homesteads, with each settlement area surrounded by fields. Only about 13 percent of Swazi Nation Land is used for settlement and farming; the rest of the land is basically used for communal grazing.

The national sex ratio of females to males is 1.13:1 which reflects the absence of men who have migrated to work in South Africa. However, there is considerable internal migration, mainly to urban areas, which results in a sex ratio of 1.55:1 for rural areas as a whole. Thirty-one percent of the homesteads do not have any adult males normally resident.

Most Swazis incorporate both traditional and modern concepts into their view of the causes of illness, and use both health systems. Traditional beliefs instilled during their process of socialization are not easily dismissed, even though people recognize the value of modern medical care. The traditional belief is that sickness and suffering originate from two sources of supernatural powers: angry ancestoral spirits, and evil powers of people. Ancestors are believed to inflict punitive measures from time to time upon family members because of omissions and incorrect behavior. Also living persons can be the source of destructive powers, commonly referred to as witchcraft. Witchcraft can involve direct poisoning or the casting of evil spells. Most frequently the originator is someone well-known to the inflicted, such as a relative or neighbor. Traditional Swazi medicine does have its own concepts in which disease is related to a malfunctioning of certain organs in the body, although the relationship does not always coincide with modern theory.

However, modern health services are readily accepted and used, although shortage of staff, facilities and transport sometimes makes access difficult. The popularity of modern health services indicates that the traditional belief in the supernatural causes of illness has either lessened or at least been combined with the recognition of natural causes and the effectiveness of modern medical practices. Furthermore, there are certain conditions and diseases which traditional healers do not treat, and even traditional doctors use modern health services for treatment of these.

Little is known about the level of awareness, especially among rural women, on the relationship of certain practices to disease. It may be that some of them are well-informed but lack the alternative, or financial means prevent changes in practices. The knowledge, attitudes and practices study to be undertaken the first year of the project will be based on a sample of homesteads, stratified according to socio-economic characteristics. The information obtained on the level of awareness as well as the prevalence of certain unhealthy practices will guide the setting of priorities for the health education project component. Furthermore, it will help to distinguish characteristics of the rural poor so that messages can be tailored to meet their needs.

2. Spread Effects

Knowledge about practices which contribute to water and excreta related diseases, and measures that can be taken to lessen the possibility of contracting these diseases, will be widely disseminated through this project. Initially, the information will be communicated to rural homesteads through community workers on an interpersonal basis. The information will be supported by media such as posters and radio broadcasts; however, the emphasis will be on personal communication and demonstration in the community. It is anticipated that those benefiting from interpersonal communication under the project will diffuse information at local markets, frequented by women, and through visits with relatives and friends in other communities. Also, people reached only by the media are likely to spread information.

The receptivity of the households will probably be influenced by the educational attainment of its members. Two-thirds of the rural

homesteads have at least one member with a secondary education, and fifty-nine percent of the rural population has some formal education. About 75 percent of the homesteads have absentee members, in employment, in school, or otherwise in urban areas, many of whom return home for a few days each month. These members, who are familiar with urban sanitation facilities, can play an influential role in developing better facilities in the homesteads.

Development of more appropriate motivational and communication skills for community workers under the project will facilitate more effective interpersonal communication. To date, most extension training focuses on technical data and theory, ignoring communication skills and motivational techniques. The community extension workers need visual aids and techniques for more effective group dynamics. The provision of these under the project is expected to positively impact on other projects and programs.

The strengthening of community cooperation under the sanitation project component has the potential for impacting on future activities as communities recognize their potential as a group in solving problems. And, the health education component, calling for greater cooperation and coordination among a variety of services, ought to influence other attempts at a coordinated approach to various rural problems.

The methodology and strategies for more effective training programs in outreach activities will evolve from the results of the study undertaken on knowledge, attitudes, and practices, concerning health and sanitation in the rural Swazi population. The study will also investigate sources of information for rural homesteads and determine which sources are more influential. In addition, data will be collected on values and perceptions of rural homesteaders. Such factors as colors, symbols, and other visual images will be investigated to determine positive or negative reactions. This data will provide a valuable source of information to be used in planning other projects and improving existing ones.

3. Social Consequences and Beneficiaries

The project will result in an improved state of health, especially among the rural population through the reduction of water- and excreta-related diseases. This will be affected by facilitating the construction of pit latrines, and the adoption of practices and measures to prevent diseases. Simple changes in household practices which are within the means and control of the poorer half of society, as well as others, will occur as a direct result of the health education component. Community-based activities, such as the fencing-off of contaminated water supplies with thorn bushes, will be stimulated by the project education component aimed at raising the level of awareness of individuals and groups, and encouraging them to act. Lessening the possibility of schistomosiasis will be brought about by an increase in people's awareness, especially those in the Middleveld and Lowveld, of the hazards of contact with water sources, and promotion of actions within their control such as collecting water at different times and discouraging children from playing in the water.

Lessening the possibility of contracting schistosomiasis will help prevent people from experiencing internal complications, secondary bacterial infections, severe fever, malaise and a shortened life-span.

Improved hygiene and sanitation will result in fewer cases of various diseases, such as gastroenteritis, a common cause of childhood mortality whereby severe vomiting and diarrhea lead to dehydration, and dysentery, characterized by diarrhea, fever and abdominal pain, which sometimes results in the death of children. Furthermore, reducing water- and excreta-related diseases will help to maintain nutritional levels since diseases reduce the body's capacity to absorb nutrients and hence contribute to lowering the nutritional status of the individuals affected.

By lessening the incidence of water- and excreta-related diseases, and thereby improving the health of the rural population, there will be an increase in the potential productive capacity of the beneficiaries. School attenders will miss fewer days at school and will have greater ability to concentrate on learning. Other members of the population will be better able to undertake their day-to-day responsibilities, in wage employment and in the homestead. It should also lessen the loss of potential, attributable to chronic incapacity, semi-invalidism and death. Furthermore, it will liberate time spent by women caring for sick children and taking them for treatment.

There will also be a cash savings by reducing the amount of money households spend on transport, medical consultations, and medicines. Currently, fees paid in the modern medical system are modest, but significant amounts are paid out to traditional healers. For the government there should be a saving in terms of treatment and services. Thus, while an effective preventive health program requires expenditures by the homestead and the government, it will reduce those needed on curative services, which absorb much of the time of health personnel and require large amounts of medication.

The project will assist the government in its aim to correct the current imbalance in the delivery of health services between urban and peri-urban areas and the rural regions. It will also help to support the government's emphasis on preventive health care and reach a broader-based group through simple, low-cost techniques.

The project will include techniques for consideration of existing cultural beliefs and norms. Through the use of group discussions in which participants are guided to identify alternatives within their means to solving some of their health problems, cultural factors will be taken into account by the participants. Also, involvement of various extension agents, officers and community leaders in seminars and short courses will provide a means whereby local conditions and culture will be considered.

The direct beneficiaries of the project will mainly be rural women and their families. Women will be the primary point of contact in the rural population since they are responsible for child care and education, most water-and food-related tasks, household maintenance, and the health of their family. Besides, up to one-third of the homesteads do not have an adult male present and about one-fifth of the homesteads are headed by women.

The health education component will be devised so it is aimed at the lower half of the socio-economic strata of rural society. While the main beneficiaries will be those households in relatively close

proximity to an extension agent, other channels will be used to reach people not served by agents. The latter channels will include the mass media and influential community leaders like chiefs and headmasters. An estimated 10,000 people will be reached through interpersonal communication of health and a further 15,000 will be reached through the mass media.

The pit latrine project component will impact primarily on households within the range of service by health assistants, rural health visitors, community development assistants and domestic science assistants and of piped water systems. Approximately 2000 poorer families will be the recipients of demonstration model pit latrines. A further 20,000 households (or 160,000 people) will benefit through the technical assistance given and organizational strategy devised under the project for pit latrines.

Other direct beneficiaries will be those receiving training: in-service; out of country; and in local communities. Under the health education component three participants will receive training in third countries in Africa. The proposed director of the HEU will be trained to the masters level, one staff member at the diploma level and another participant will receive training as graphic artist in a diploma course. All of these trainees will be women. Under the water and sanitation component, a Swazi science university graduate (probably a male) will be trained as a civil engineer.

Training through seminars and workshops will be given to rural health visitors, nurses, community development workers, domestic science demonstrators, health inspectors and health assistants. This training is expected to be received by approximately 430 participants, at least 85 percent of whom will be female. Locally, chiefs, schoolmasters, traditional healers and other influential people will be included in community demonstrations on water and excreta disposal systems, which will provide technical education on environmental sanitation and stimulate community leadership in this area. About 20 percent of these local leaders are expected to be women.

Under the schistosomiasis survey, the Bilharzia Unit teams will receive on-the-job training in diagnosis of bilharzia and other parasitic diseases.

Indirectly the project will also have a wide impact. The work of the Public Health Engineer technical assistant to the Rural Water Supply Board will impact on a larger number of households, mainly in the form of preventive health measures. Indirectly, through the strengthening of the Health Education Unit, the majority of the population should ultimately benefit from an increase in its delivery capacity.

In summary, approximately 20,000 rural households or 160,000 people will directly benefit from the health education and/or sanitation project component. And, approximately 700 government employees, community leaders and nongovernment workers (both males and females) will be the beneficiaries of the training given under the project components. (For detailed Social Analysis see Annex E.)

C. Environmental Considerations

An Initial Environmental Examination (IEE) was submitted subsequent to the transmittal of the PID in January, 1979. While the IEE contained information on the use of molluscicides in Swaziland as well as a description of the GOS bilharzia treatment program, the AID/W review committee expressed concern over these project areas and suggested that an environmental assessment be performed as an integral part of the PP. However, since the focus of the project has changed and the environmentally sensitive interventions that were envisioned at the time of PID preparation are no longer planned, a revised IEE is being submitted with this PP recommending a negative determination.

The original PID proposed many of the project interventions that are now planned; it is only the focus of the overall effort and the magnitude of certain components that have changed. The major thrusts of the project (health education, sanitation, public health engineering) are all designed to improve environmental health conditions and will have positive environmental impacts. The health education program will concentrate on the use, storage, and disposal of water as well as the proper use of pit latrines. From the design side, the AID-funded environmental sanitarian will assist the GOS to develop criteria for the design and siting of improved pit latrines to ensure that the program poses no environmental hazards (for details, see section IV and Annex G) and the public health engineering advisor to the Rural Water Supply Board will establish criteria for the review and modification of water works designed to incorporate health considerations. These actions are all supportive of an improved environment and further environmental analysis is considered unnecessary.

Regarding support to the Bilharzia Unit, AID assistance will be directed toward the completion of a national survey for schistosomiasis prevalence along with the requisite laboratory expansion, equipment purchases, and on-the-job training. This activity per se will create no environmental problems and the information generated will provide the opportunity to improve environmental conditions in high prevalence areas through the provision of health education, improved sanitary facilities, and safe water supplies. However, the identification of areas of high bilharzia prevalance carries implications associated with control measures and the treatment of infected individuals.

In the case of control measures, the program will include such actions as reporting on hyperendemic areas to the MOH and RWSD so that the community can receive a water supply system, sanitation assistance, and health education on a priority basis. If systems are already in place, or if problems are identified that cannot be entirely addressed by the above, alternative control measures may be required. Such alternatives may include fencing of water bodies, the construction of wooden or stone footridges over streams, or very localized mollusciciding. However, at this time, the MOH has no specific plans for such alternative control measures and prefers to develop a program only after the national survey has been completed and preventive measures are in place.

Finally, a major concern expressed by the AID/W review committee centered on the drugs used to treat schistosomiasis in Swaziland. A mass treatment campaign to be supported by AID is no longer envisaged under

the project; however, it is realized that the identification of high prevalence communities will affect the GOS/MOH treatment efforts. A WHO Medical Officer/Epidemologist is expected to arrive next year to assist the MOH develop a comprehensive communicable disease control program; he/she will definitely be involved in planning the control program for schistosomiasis when the survey is completed. This medical officer will clearly have the expertise to provide guidance in the chemotherapy program, when the details of such a program are decided upon. Those details, however, are outside the scope of the AID project.

In summary, the project components proposed are designed to improve the environmental health conditions in rural Swaziland, including the technical assistance and design criteria (for latrines) to ensure that any potential negative impact is minimized. Therefore, the project - by design - is promotive of an improved environment and USAID/S has concluded that no further analysis is required in addition to that found in the text of the PP. A revised IEE is included as Annex M and a negative determination is recommended.

D. Economic Analysis

1. Introduction

The goals of the project - to motivate people to improve their water use/contact and sanitation habits and then ultimately to reduce the incidence of water-related diseases - lead to benefits that cannot be measured in monetary units. Economic "analysis" is thus not very well-suited for projects of this kind. However, three things will be discussed in this section; (1) a summary of the types of benefits expected to be associated with this project; (2) a discussion of the cost effectiveness of the project; and (3) an analysis of the homesteader's ability and willingness to participate.

2. Benefits of the Project

Although data are very sketchy, it appears that the health status of Swaziland's population is poor in general and the incidence of water-related diseases is high. Data that do exist suggest that as much as 85 percent of the school-going population is currently carrying a parasite load that is at least partly water-related, and that perhaps 30 percent of the school-going population are infected with schistosomiasis. Approximately 22 percent of children born in Swaziland die before the age of five, many of them undoubtedly from water-related diseases. The potential for significant health improvements thus exists.

The current project analysis makes no pretense of measuring changes in health status. A recent IBRD document concluded: "the difficulties of benefit measurement for sanitation projects cannot be readily overcome. "Indeed in the case of water supply projects, it has been concluded that the theoretical and empirical problems involved in quantifying incremental health benefits are so great as to make serious attempts at benefit measurement inappropriate as part of project appraisals."

However, a review conducted by the World Bank of 28 empirical studies that examine relationships between the quantity and quality of water consumed, sanitary facilities, and the level of various water

and sanitation-related diseases, provides some evidence that more and better water and better sanitary facilities are associated with better health. These studies further suggest that the degree of improvement in health to be expected in any given population depends on the initial level of health, the economic status of the community, cultural habits, educational level, and the general physical environment including adequate means of waste disposal.

The current project seeks to heighten the health impact of rural water supply systems installed by the GOS by focusing on the last three contributory factors cited above: cultural habits, the educational level of community, with specific reference to health and water-related matters, and the provision of proper human waste disposal facilities. Thus, improved health status of the rural population should result from this project. While the benefits derived from this are not quantifiable they could be significant given the current health status of rural Swaziland.

A second intangible benefit derived from this project concerns a redistribution of income. The GOS revenue (primarily customs union receipts and income taxes in the formal sector) to support this project is heavily derived from richer urban areas. The direct beneficiaries of the project will be rural Swazis who in general have lower incomes than their urban compatriots.

A third type of benefit arises from the self-help, self-financing approach utilized. This project is intended to foster better community organization and motivation to undertake developmental activities. If successful, the effectiveness of other developmental efforts should be enhanced.

A fourth level of benefits derived from the project are reduction in expenditures for curative health services associated with improved health status. The following analysis is intended to be purely illustrative in nature, and is only meant to demonstrate the reasonableness of the approach of this project. It is not meant to be used as a guideline for project evaluation for the well-known reason that it is extremely difficult to attribute health status changes to any particular intervention. No shadow pricing of foreign exchange or other item is included because of the illustrative nature of the analysis.

The yearly GOS incremental real costs of the present project are at their highest (E78,500) in year one and decline to a steady state figure of E31,400 by year four in real 1979 terms. Improved water-related and sanitation habits of the rural population should lead to a reduction in the need for MOH curative services. Since many of the MOH curative services costs are fixed costs, they would be unchanged in the short run by fewer visits. However, at least one factor, curative services' consumables (such as drugs for treating water-related diseases), is a variable cost and could be reduced.

Again, for illustrative purposes, MOH budgetary savings as a result of the project are assumed to be one percent of the 1979 budget for curative services' consumables the first year, increasing by one percentage point per year until year 10, the assumed final year of project impact. These savings are reduced by the same percentage point per year of expected reduced government revenue from clinic visit fees. These

savings (benefits) are compared with incremental GOS costs of this project in Table IV.3. The internal rate of return generated by this net benefit stream is 16.5 percent. While this is merely illustrative, it does indicate that the project could easily lead to substantial monetary benefits to the GOS relative to its cost.

Table IV.3

ILLUSTRATIVE INCREMENTAL BUDGETARY COSTS AND SAVINGS OF PROJECT

	(1) Incremental Costs of Project	(2) GOS Savings	(3) Net Benefit (2-1)	(4) Discounted Net Benefits (@ 16.5%)
1981	78.5	10.2	-68.3	-58.6
1982	43.8	20.4	-23.4	-17.2
1983	43.2	30.6	-12.6	- 8.0
1984	31.4	40.8	9.4	5.1
1985	31.4	51.0	19.6	9.1
1986	31.4	61.2	29.8	11.9
1987	31.4	70.4	40.0	13.7
1988	31.4	81.6	50.2	14.8
1989	31.4	91.8	60.4	15.3
1990	31.4	102.0	70.6	15.3
				+ 1.4

3. Cost Effectiveness of Project Approach

Since the MOH will have a tight budget situation for the next several years, the project design has scrupulously attempted to achieve a cost effective approach to project implementation. This has been done in several specific ways. First, the project will increase the efficiency of the MOH rather than expand the number of people and facilities within the MOH. This has resulted in an extremely low, steady state incremental yearly recurrent cost of US$.08 per capita for a nationwide attack on water-related diseases. Efficiencies have been achieved primarily by relying on the currently underutilized health assistants and RHVs as the primary health education delivery unit and by utilizing the transport resources of the associated RWSD project. Second, combining health education and satination facilities' development with the provision of rural water is expected to create a synergistic effect wherein the impact of the coordination of the project components and the provision of rural water supplies is greater than in an approach which produces the same total outputs but in an uncoordinated manner.

Third and perhaps most important, the project utilizes self-help, self-financing by project beneficiaries to the maximum extent possible. This approach is cost effective in the sense that it substitutes relatively abundant resources with low opportunity costs, private labor and finance, for more limited resources with higher opportunity costs, trained health workers and governmental resources. Moreover, expenditures undertaken by direct beneficiaries will be made only by those individuals for whom the expenditures are expected to yield sufficient returns in

their private calculus. This not only helps ensure sufficient motivation to continue making use of a new innovation but also helps avoid making expenditures the output of which could go unutilized.

Finally, the project design for water-based diseases, particularly schostosomiasis, focuses on ways to minimize the eventual costs of control. Thus, the public health engineer will assist the GOS to design water sustems for agriculture which minimize public health dangers rather than either redesigning systems after completion, using high-cost and temporary snail control or treatment of those persons contacting schistosomiasis. Likewise the epidemiological survey is being undertaken to pinpoint the areas of heavy endemicity for schistosomiasis and other water-related diseases in order to minimize the areas where costly control measures need to be undertaken.

Given the above, it is felt that the current project does provide a cost effective approach.

4. Homesteader's ability and willingness to pay for Latrines

This section discusses the homesteader's ability and willingness to pay fully for pit latrines rather than having their construction subsidized as is currently the case. The IBRD has estimated that as long as the cost of a sanitation facility is no more than 5-10 percent of household income of the lower income consumer, no subsidization should be utilized. In one rural survey median Swazi homestead cash income was estimated to be E625, modal income was in the E240-400 group. Given the range of costs of E11-E17 for materials associated with latrine construction, even the lower income Swazi homestead does have the ability to pay for a latrine using the above criterion.

If the economic benefits of changed behavior exceed the costs, it is expected that the rural population will respond positively. The three major types of benefits are, of course, improved health and the psychic income related to feeling better, the increase in earning potential associated with better health-related production increases and a reduction in outlays for health care associated with fewer disease episodes. No estimates of the first two types of benefits for the homesteader can really be attempted although the first is undoubtedly very important given the current prevalence of water-related diseases associated with the rural Swazi. What follows is an analysis of the potential value of reduced health costs to the homesteader of changing his water-related sanitation habits.

Projecting rural clinic (both governmental and private) attendance from 1975 figures (the latest available) to 1979 assuming attendance rates to expand pari passu with population growth, outpatients will be charged E415,000 (30c per Government clinic visit; E1 per private clinic visit). With the rural population estimated at about 450,000 the average rural Swazi will be charged 92c for clinic outpatient care in 1979. Suppose improved water use/control and sanitation habits can reduce the number of clinic visits by 20 percent per year. This represents an 18c saving per resident per year. With an average homestead size of 7.9 people, the homestead saves E1.42 per year. Rural clinic visits average 1.74 per rural inhabitant. A 20 percent reduction in required visits saves 2.8 clinic trips per year for a homestead adult (assuming an adult must always accompany a sick child). Most clinic visits require at least a loss of one half-day's work. Shadow pricing rural Swazi labor at E1 per day

yields a reduction of income foregone by the homestead of E1.40 per year for the 2.8 half-day trips saved. (This reduction arises only when the adult is otherwise unable to work from illness.) Total savings per year for homestead from reduced clinic visits is thus E2.82 (say E2.80).

On the cost side, assume that the concrete slab and vent pipe will last 10 years and that the latrine will need to be resited (involving, say, four person day's work at E1 per day) after five years. Discounting the cost and benefit streams at 10 percent (which is a generous estimate of opportunity costs in rural areas given the 3½ percent interest paid on deposits) yields a present value of E15.07, which is the value a homestead might place on a latrine. Given the E4 labor cost, this would leave E11 for materials which is within the range (albeit the lower end) of materials costs for latrines.

The above analysis neglected the benefit of fewer visits to traditional healers (which could far outweigh outlays on modern clinic services) and requirements for hospital care, as well as any transportation costs associated even with clinic visits. If the assumptions made in the analysis are reasonable, it is concluded that rural people will have both the ability and sufficient incentive to pay for a latrine if, of course, they understand its importance.

5. Summary

This economic analysis has demonstrated that health benefits from the project could be significant, although no estimate of the magnitude of the benefits is attempted. In addition, the analysis has shown that the cost savings to the curative services program of the MOH could be quite substantial relative to the recurrent costs of the project. The project as designed is a cost effective approach to addressing the problem of water-related diseases utilizing to the maximum extent, self-help and self-finance mechanisms to help ensure nationwide coverage, and to have some direct costs borne by the actual beneficiary (homesteader). Additional analysis has indicated that the vast majority of homesteaders have the ability and should have the willingness to bear these direct costs without subsidization. The potential great health benefits, its cost-effectiveness and the ability and willingness of homesteaders to pay, indicate there is a sufficient economic rationale for undertaking this project.

V. Financial Analysis

A. Project Funding Summary

As currently designed, the total cost of this project is estimated at $4,626,000; of this USAID will finance $3,296,800, the GOS will provide $1,319,200, and the rural communities will contribute approximately $10,000 toward the cost of demonstration latrine construction. A summary of these contributions, identified by major item and year, is provided in Tables V.1 and V.2. More detailed cost estimates for each project component can be found in Annex L, while yearly expenditure and obligation levels are provided in Table V.3.

In the following section the ability of the GOS/MOH to meet the financial requirements under this project are examined.

Table V.1

Source and Use of Funds

($ 000)

Source	A.I.D		G.O.S		Local Communities		TOTAL
Use	FX	LC	FX	LC	FX	LC	
Health Education	909.2	161.1	4.5	787.5	-	-	1862.3
Sanitation/Public Health Engineering	1158.4	158.3	2.9	384.8	-	10.0	1714.4
Schistosomiasis Survey	471.0	58.3	-	111.3	-	-	640.6
Evaluation	80.8	-	-	-	-	-	80.8
Sub-Total FX & LC	2619.4	377.7	7.4	1283.6	-	10.0	4298.1
Sub Total FX + LC	2997.1		1291.0			10.0	4298.1
Contingency	299.7		28.2			-	327.9
TOTAL PROJECT	3296.8		1319.2			10.0	4626.0
(% of Total)	(71%)		(29%)				

Table V.2

AID Funding by Input and Project Component ($000)

Input	Health Education	Sanitation/ Public Health Engineering	Schistosomiasis Survey	TOTAL
Technical Assistance	820.7	1,062.8	429.1	2,312.6
Training	35.2	60.6	-	95.8
Construction	127.6	96.8	58.3	282.7
Vehicles	14.2	35.0	12.9	62.1
Commodities/ Equipment	24.6	61.5	29.0	115.1
Other Local Costs	48.0	-	-	48.0
Sub-Total (%)	1,070.3 (37)	1,316.7 (45)	529.3 (18)	2,916.3 (100)
Contingency (10%)				299.7
Add: Evaluation				80.8
TOTAL				$3,296.8

- Inflation factors for both tables are included in line item totals.
- See Annex IX for details including base cost estimates and yearly expenditures for both AID and GOS.

Table V.3

Obligations and Expenditures by Fiscal Year ($ 000)

Expenditures	FY 79	FY 80	FY 81	FY 82	FY 83	FY 84	FY 85	TOTAL
Technical Assistance	-	-	629.6	630.0	571.2	323.1	158.7	2,312.6
Training (U.S. & Third Country)	-	-	35.1	38.9	21.8	-	-	95.8
Commodities	-	-	58.3	13.8	15.1	13.3	14.6	115.1
Vehicles	-	62.1	-	-	-	-	-	62.1
Construction	-	282.7	-	-	-	-	-	282.7
Other Local Costs	-	-	30.7	17.3	-	-	-	48.0
Evaluation	-	-	-	-	29.4	-	51.4	80.8
Contingency	-	34.5	75.4	70.0	63.7	33.6	22.5	299.7
TOTAL EXPENDITURES	-	379.3	829.1	770.0	701.2	370.0	247.2	3,296.8
Obligations	640.0	800.0	587.0	700.0	569.8	-	-	3,296.8
Pipeline	640.0	1,060.7	818.6	748.6	617.2	247.2	-0-	-0-

B. The MOH Recurrent Budget

The total GOS recurrent budget has increased in recent years from E30.18 million in FY 1976/77 (1 April 1976 to 31 March 1977) to E68.1 million in FY 1979/80 (E1=US$1.19), an increase of 126 percent over the period (a compound annual rate of 31.2 percent). At the same time, the MOH recurrent budget increased by about 97 percent from E2.88 million to E5.67 million (25.4 annual increase), its share of the total GOS recurrent budget having fallen from 10.2 percent to 8.3 percent. In real terms per capita the MOH recurrent budget grew by 15 percent over the three year period.

A breakdown of the MOH recurrent budget by major activity center is as follows:

Table V.4

MOH Budget - by Activity Center

	1975/76		1979/80	
	E 000's	as % of Total MOH Budget	E 000's	as % of Total MOH Budget
Minister	38	1.3	39	.7
Ministry Administration	405	14.1	1,041	18.4
Medical Support Services	165	5.7	341	6.0
Preventive Medicines	352	12.2	941	16.6
Curative Medicines	1,920	66.7	3,308	58.3
TOTAL	2,880	100.0	5,670	100.0

The focus for implementation of the USAID-funded project components will be within the Preventative Medicines section of the MOH, which includes administrative units responsible for health education, the public health clinics, environmental sanitation, and the public health laboratories. As can be seen from the above table, MOH funds for these activities have been increased by 167 percent since FY 1975/76, with the Preventative Medicine portion of the MOH budget, expanding from 12.2 percent to 16.6 percent. Similarly, the number of established posts available for Preventative Medicines usage during this period increased by 48 percent (from 125 in 1975/76 to 185 in 1979/80) while the total number of established posts in the MOH increased by only 10.2 percent (from 881 to 972). These increases are reflective of the first MOH objectives contained in the draft Third Five-Year National Development Plan, the GOS' basic planning document for the period 1978/79 through 1982/83. That objective is:

> To increase the proportion of resources devoted to preventative services, to allow special emphasis on the protection of certain vulnerable groups - mothers and under five children - and to reduce the incidence of water-borne diseases, and diseases of insanitation.

To achieve this objective, the Development Plan calls for Preventative Medicines' share of the MOH recurrent budget to increase to 23.1 percent by FY 1982/83. Unfortunately, the budget figures contained in the draft Plan - which, although prepared in late 1977, has yet to be published - have already become outdated. It is now estimated that, as the result of a general tightening of economic conditions in Swaziland and a diversion of anticipated recurrent funds government-wide to finance the capital development of income- and job-creating projects, the MOH recurrent budget will increase in real terms more slowly than the projected rate of 10 percent over the next few years.

It is felt, however, that the significance of the Development Plan lies not in its detailed estimates, but rather in the intra-ministerial priorities which it identifies and the trends which can be seen developing. While the Plan projects the entire MOH budget increasing in real terms by about 61 percent over the development period, expenditures for the Preventative Medicine's unit were expected to increase by about 187 percent, or nearly three times the rate for overall health expenditures. It would thus appear that the focus of this project is in areas to which the GOS/MOH has assigned a high priority and to which an increasing proportion of MOH resources will be directed in the future.

Table V.5

Projections for MOH Recurrent Budget

In Third Five-Year Development Plan

(E 000's)

	FY 77/78	78/79	79/80	80/81	81/82	82/83	% increase during period
Total MOH recurrent budget	3766	4167	4780	5235	5637	6079	61
Preventative Medicines (Activity Code 32)	467	669	939	1090	1205	1342	187

It should be noted that the amounts actually budgeted the MOH for fiscal years 77/78, 78/79, and 79/80 exceeded the projections for these years by .2%, 5.3% and 18.6% respectively.

C. Project Impact on the MOH Recurrent Budget

The MOH recurrent budget allocation for the next several years will be based on a rather complicated formulation which does not allow an exact calculation of recurrent budget to be made available. The basic recurrent budget, defined as that portion of the budget not tied to a current capital project, will grow by three to four percent in real terms over the next several years. As a capital project is completed the recurrent costs associated with that project are added to the basic recurrent budget, resulting in a basic recurrent that will actually grow faster than the three to four percent rate. New capital projects proposed by the MOH will, at time of approval, also have their associated incremental recurrent costs approved. This will be available in addition to the basic recurrent budget.

The GOS incremental recurrent costs of the present project are E228,000 (E1=US$1.19) for the life of project in real 1979 terms (line 11 in Table V.6). At the end of project the yearly recurrent costs in real 1979 terms will be E31,400. In current terms the life of project recurrent costs are estimated to be E361,800 (line 12 Table V.6).

Table V.6 provides a projected recurrent budget for the MOH using the FY 79/80 approved recurrent budget and investment related recurrent budget requirements from the five year plan for the year 1980/82 and a reasonable estimate thereafter. Investment related recurrent costs are assumed to become part of the basic recurrent budget the year after first being incurred. The available incremental recurrent funds are then compared to the MOH requirements (including this project) outlined in the five year plan for 1980/82 and with reasonable estimates thereafter.

This analysis indicates that for the period 1981/85 total requirements will exceed total available funds by only E80 thousand, which effectively means that sufficient recurrent budget will be available over the life of project. In 1983 the maximum cumulative shortfall (E108 thousand) occurs but this period coincides with the time when the GOS should be able to expand recurrent budget availabilities much faster than at present. (It is at this time that several large revenue generating projects are scheduled to be in operation.)

The MOH has made an independent assessment of its recurrent budget requirements in FY 1982/83, the last year of the five year plan. Inclusive of the E44,000 per year incremental budget implementation of the project, the total requirements are estimated to be E7.0 million. The funds available would fall short of this amount by E130 thousand or by 2 percent of total requirements.

The above indicates that there is going to be a tight recurrent budget situation for the MOH during the next few years and there may have to be delays in implementation of certain planned MOH activities. However, the GOS seems to be elevating the health sector in importance. In the recent exercise to withhold certain capital budget items to finance shortfalls in some Tibiyo fund enterprises, the health budget received the smallest cut of any entity with a substantial capital budget. If this does portend an increasing priority for health, it is conceivable that no delays in plans will be required.

Even if the MOH must reassess its plan, several factors would indicate that the present project will receive adequate funding. First and most importantly, the project is already included in the GOS FY 1979/80 capital budget. While the project still must be approved by the GOS, it was at least given sufficient priority to be included.

Secondly, this project falls within the preventive medicines activity center. As has been shown above, this activity center is receiving priority attention as far as budget increases are concerned. Third, the present project addresses squarely the first objective of the MOH in its five year plan. Fourth, the design of the current project provides national coverage for health education, sanitation and the epidemiological survey. Thus there will be no growing incremental recurrent budget

Table V.6

MOH Recurrent Budget Estimates

	1979/80	1980/81	1981/82	1982/83	1983/83	1984/85	1984/85
1. MOH Basic Recurrent Budget (2.5%/P.A. real increase)	5,405	5,594	5,790	5,993	6,202	6,419	6,644
2. Investment Related Recurrent Expenditures	265	204	172	187	200	200	200
3. Cumulative Increase of Prior investment related recurrent Expenditures	-	273	496	691	909	1,148	1,395
4. Total Recurrent Budget (1 + 2 + 3)	5,670	6,071	6,458	6,871	7,311	7,767	8,239
5. Incremental Increase in Recurrent Budget	-	401	387	413	440	456	472
6. Incremental Requirements	-	455	402	442	450	450	450
7. Yearly Surplus (Shortfall) (5-6)	-	(54)	(15)	(29)	(10)	6	22
8. Cumulative Shortfall	-	54	69	98	108	102	80
9. Newly Estimated 1982/82 MOH Recurrent Requirements	-	-	-	7,000	-	-	-
10. Newly Estimated 1982/83 Shortfall (9-4)	-	-	-	129	-	-	-
11. Project Recurrent Costs in FY 79 Real Terms (including in above Analysis)	-	-	78	44	43	31	31
12. Project Recurrent Costs in Current Terms	-	-	96	65	71	58	64

requirements after the life of this project. Finally, the emphasis on preventative health in the current project should lead to a lessening of expensive curative services. If the present project proceeds as planned, there could be a reduced demand on total expenditures for curative medicine by the end of the project. (See Economic Analysis for illustrative figures.)

The expansion as planned of two other MOH activities, the Health Assistants' and Rural Health Visitors' programs, are essential to the success of the current project. For many of the reasons listed above, these two activities are also expected to receive priority funding. The fact that the Health Assistants program has been allocated 30 percent of the FY 79/80 investment related recurrent budget augers well for its continuation and expansion. The Rural Health Visitor program currently receives no budgeted recurrent funds - salaries for the RHVs are paid extra-budgetarily. The MOH, however, has the planned 800 RHVs' salaries fully funded from recurrent budget sources by 1982/83, which is an indication of the priority accorded this program by the MOH.

The above analysis indicates that, given the projected rate of increase of the MOH budget, the MOH will have to delay or reduce in scope some of the project activities outlined in its third five year development plan. A reassessment of these plans will perhaps be necessary. It is felt, however, that the current project and those essential associated activities are of sufficiently high priority within the MOH and within the GOS as a whole, that adequate recurrent budget funds will be available.

VI. Implementation Plan

A. Implementation Schedule

The following schedule presents the actions to be implemented during the course of the project along with the responsible entity:

DATE	ACTION	RESPONSIBILITY
Aug-Sep 79	Pro-Ag signed	USAID/GOS
Dec. 79	TA House sites selected and plans for HEU building and laboratory designed	GOS
Oct. 79	RFP issued for TA contractor	AID/W
Jan. 80	Tender Documents for construction prepared	GOS/USAID
Feb-Mar 80	TA contractor selected	AID/W
Mar. 80	Construction contract awarded	GOS/USAID
Apr. 80	Construction begins	
Apr. 80	Post established for Sanitary Engineer, candidates selected and application submitted to U.S. university	GOS/USAID
Apr. 80	Equipment/supplies for Bilharzia Laboratory ordered	USAID
Sep. 80	Engineer participant leaves for U.S.	USAID/GOS
Sep. 90	Posts for HEU staff established, health education master's degree candidate and graphic arts student leave for Ibadan	GOS/USAID

DATE	ACTION	RESPONSIBILITY
Sep. 80	PES conducted	USAID
Sep. 80	TA houses, HEU building and laboratory constructed	Contractor
Oct. 80	All U.S. TA team members arrive (except statistician)	Contractor
Oct. 80	Environmental Sanitarian Advisor begins review of latrine designs and training of the four senior health inspectors	Contractor
Oct. 80	Health Education Advisor reviews current HE activities, prepares purchase list of equipment for the HEU, and designs workshops	Contractor
Oct. 80	Social Scientist designs KAP methodology and develops demonstration latrine homestead selection criteria	Contractor
Oct. 80	Epidemiologist begins to train Bilharzia teams	Contractor
Nov. 80	HEU equipment ordered	USAID/S
Dec. 80	Field workers trained for KAP studies	Contractor
Jan. 81	Statistician arrives to design sampling framework for schistosomiasis survey	Contractor
Jan. 81	KAP studies started	Contractor
Jan-Feb 81	In-service training for 42 health assistants	Contractor/GOS
Mar. 81	Statistician leaves, schistosomiasis survey begins	Contractor/GOS
Mar-Apr 81	Rural Health Visitor seminars	Contractor/GOS
Apr. 81	Sanitation program begins - first demonstration latrines are constructed	Contractor/GOS
May 81	DSDs in-service seminar	Contractor/GOS
May 81	Graphic artist returns from Ibadan training	GOS
Sep. 81	Health education diploma candidate leaves for Ibadan training	GOS/USAID
Sep. 81	PES	USAID
Set. 81	First 200 demonstration latrines constructed	GOS/Contractor
Jan-Feb.82	Annual seminars for health workers	GOS/Contractor
Mar. 82	KAP studies completed. Interpretation of data and preparation of recommendations started	Contractor
Sep. 82	400 additional demonstration latrines built	GOS/Contractor
Sep. 82	Major mid-term external evaluation	USAID
Oct. 82	Swazi HEU Director returns to assume position and HE diploma graduate returns	GOS
Oct. 82	HEU fully staffed with AID HE Advisor acting as counterpart to director	GOS/Contractor
Oct. 82	Social Scientis submits KAP findings/ recommendations and departs	Contractor

DATE	ACTION	RESPONSIBILITY
Jan. 83	National Health Education Plan finished and submitted to MOH for [redacted]	Contractor/GOS
Jan-Feb 83	Annual seminars for health workers	GOS/Contractor
Mar. 83	National Health Education plan beginning implementation	GOS
May 83	Swazi Engineer returns from studies to train with the Public Health Engineer Advisor	GOS/Contractor
Sep. 83	Additional 400 demonstration latrines built	GOS/Contractor
Sep. 83	PES	USAID/Contractor
Sep. 83	Schistosomiasis survey completed - statistician arrives to help process data and interpret results	Contractor
Oct. 83	Schistosomiasis survey results submitted to GOS - Epidemiologist and statistician depart	Contractor
Oct. 83	Environmental Sanitarian Advisor departs with sanitation program in progress	Contractor
Nov. 83	Sanitary Engineer making recommendations for priority placement of water systems based on schistosomiasis survey	Contractor
Sep. 84	500 additional latrines constructed	GOS
Sep. 84	PES	USAID
Oct. 84	Health Education Advisor leaves	Contractor
Aug. 85	Final major evaluation	USAID/Contractor
Sep. 85	500 additional latrines constructed	GOS
Oct. 85	Sanitary Engineer leaves, Swazi Engineer assumes position	Contractor/GOS

B. Implementation Responsibilities

1. GOS

The GOS will be required to establish official government posts for the Public Health Engineer and nine posts for health education (a Director, 2 Nurse-Educators, a HEU typist, a Driver and 4 District Health Educators). The Engineer's post must appear in the 1980 Establishments Register to enable the candidate to be sent for U.S. training in September of 1980. Similarly, five of the HEU posts must be officially established within the first two years of the project while the posts for the District-level educators must be created by 1983. The graphic artist is the only HEU post already in existence.

The MOH will be responsible for selecting four of their most capable Health Assistants to be promoted as Senior Health Assistants and to function as district sanitarians in charge of the latrine construction program. The four Senior Health Assistants must be available to work with the AID-funded Sanitarian in October 1980.

In summary, the list of required posts is as follows:

Positions	Ministry	Year of Post Establ.
Public Health Engineer	MOH	1980
Director/HEU	MOH/HEU	1981
Nurse-Educator	MOH/HEU	1981
Nurse-Educator (WHO-funded trainee)	MOH/HEU	1980
Typist	MOH/HEU	1980
Driver	MOH/HEU	1980
(4) Distrcit Health Educators	MOH	1983

In addition to the new posts, four Health Assistants must be promoted to Senior Health Assistants by Oct. 1980.

For the schistosomiasis survey, six Health Assistants now working with the malaria program will have to be seconded to the Bilharzia Unit, at least for the duration of the survey. These Health Assistants must also be prepared to begin in October of 1980.

The MOH will provide classroom facilities at the Institute of Health Sciences for the annual in-service workshops for those health workers to be trained in Mbabane (to be financed by the GOS beginning in 1932). The HEU staff will be responsible for planning and making the necessary arrangements for such seminars, as well as for conducting them.

The GOS will also be responsible for the usual contractor support such as furnishings for the TA houses.

The Ministry of Works (MOW) of the GOS will be responsible for project construction activities. The MOW will prepare final plans and specifications, tender documents, and will select and supervise contractors. Plans, contracts, and construction will be inspected and approved by AID engineers; these approvals will be formalized in Project Implementation Letters submitted to the GOS.

2. AID

USAID/Swaziland will be responsible for project monitoring and the USAID/S project manager will serve as the primary contact point for the contract team's Chief of Party and will be responsible for obtaining decisions on contract and project matters. USAID/S will prepare necessary PIO's, Project Implementation Letters (PIL's), and will be responsible for the preparation of Project Evaluation Summaries (PES) and the supervision of the two external evaluations.

AID will disburse funds for local costs on a reimbursable basis following procedures to be defined in the Grant Agreement; funds for construction will be disbursed on a Fixed Amount Reimbursement (FAR) with FAR levels and procedures for advances to be established with assistance from REDSO/EA engineers and set forth in PILs.

Non-local commodities and equipment will be procured by AID through a U.S. agent. A waiver will be requested for project vehicles a covenant to be included in the loan agreement will ensure the provision of these facilities

and construction materials to allow for Code 935 procurement; cement and pipe for the latrine demonstration program will be procured locally.

3. Contractor

AID/W, in coordination with USAID/S, will contract with a United States institution to provide the technical assistance proposed for the project. The institution will be responsible for the timely provision of the required technical assistance personnel as well as all administrative arrangements related to recruitment, transporation, shipment of household effects, etc.

The technical assistance team, under the leadership of the Chief of Party, will be responsible for implementing project activities as described in the Project Paper (detailed Job Descriptions are included as Annex K). In addition to in-country and on-the-job training responsibilities, the technical assistance team will also assist the GOS in the selection and evaluation of participant trainees. In the case of the participant in civil engineering, the contractor will be responsible for arranging training in a U.S. institution.

The technical assistance team will be required to submit annual work plans to be approved by the MOH and USAID. Requisite reports will consist of monthly status reports during the first year of technical assistance followed by quarterly reports during the following years and a final, end of project report.

VII. Evaluation Plan

A. Annual Evaluations

AID Project Evaluation Summaries (PESs) will be prepared annually to examine progress toward achieving project objectives and the performance of the involved parties in meeting project commitments and requirements. These evaluations will be conducted by USAID/S in accordance with standard AID procedures.

B. External Evaluations

Two external, in-depth evaluations are scheduled, one in FY 83 (October 1982) and one at the end of the project in FY 85 (August 1985). The first external evaluation will be conducted by a REDSO/EA evaluation officer and two outside consultants over a 3-4 week period. Timeliness of the provision of inputs will be evaluated at this stage along with an assessment of output achievement. The evaluation team will compare targets actually achieved to those projected in the project paper and evaluate the achievement rate in light of project purpose attainment. If necessary, the evaluation team will recommend modifications regarding project inputs that may be required to accomplish the purpose and immediate goal of the project. In addition to the above, the team will evaluate the KAP study results for validity and use in developing a health education strategy and program content. On the basis of this assessment, the team will make specific recommendations regarding the measurement of goal level indicators (using the KAP information as a baseline) including such factors as the type of study required, number and qualifications of study

team members, the selection of specific communities and data bases from the KAP, and timing of the study. USAID/S considers this project a good opportunity to go beyond purpose level evaluation and attempt to ascertain the degree of goal achievement. However, the questions listed above must be resolved by the mid-project evaluation team before definite plans can be made, especially regarding timing since the goal evaluation may be more appropriate after the termination of the project. For that reasons, a decision on the goal evaluation will be deferred until the FY 83 mid-project evaluation. For this reason, no funds have been included for the goal measurement; funding will be provided through PD&S.

The end of project evaluation will determine the effectiveness of the total project, including the validity of the project's input-output purpose linkages with major emphasis on the impact of outputs on end of project status indicators. This final evaluation will assess the degree to which GOS institutional capacity has been developed to implement on-going programs in health education, sanitation, and public health engineering. The evaluation will also determine the degree to which the schistosomiasis survey was used to prioritize the communties receiving GOS services and the action taken on the recommendations of the public health engineer concerning the modification of water works designs.

VIII. Conditions and Covenants

The Project Agreement will contain, in substance, the following conditions and covenants:

A. Prior to the disbursement, or to the issuance by AID of documentation pursuant to which disbursement will be made, for the purpose of financing construction of staff housing, the HEU office, and the Bilharzia laboratory, the the Grantee will furnish to AID, (a) final plans and specifications for construction in form and substance satisfactory to AID, (b) where appropriate, contracts with firms acceptable to AID, and (c) evidence that adequate sites have been identified and provided for the construction of staff housing. This condition precedent may be satisfied separately for the staff houses, HEU office, and Bilharzia Laboratory.

B. The Grantee will covenant that candidates for participant training will be selected on a timely basis.

C. The Grantee will covenant to establish the local positions required for the project as described in Section VII.B.1, Implementation Plan.

D. The Grantee will covenant that housing constructed under the project will be reserved for use by AID-financed technicians and, upon completion of the Project, for use by AID-financed technical assistance personnel assigned to other projects in Swaziland.

ANNEX A

SWAZILAND **GOVERNMENT**

The Prime Minister's Office,
Economic Planning and Statistics,
P.O. Box 602,
MBABANE.

July. 30. 1979

The Director,
U.S.A.I.D.,
P.O. Box 750,
MBABANE.

Dear Sir,

RURAL WATER-BORNE DISEASE PROJECT

This Department has participated in joint discussions with the Ministry of Health and your office concerning the proposed water-borne disease project. Since these discussions we have received a request from the Ministry of Health to approve this project.

As the proposed project complements the work of the British and Canadian aid programme with respect to rural water supplies, and rounds out the solid contribution these two donors are making to public health in rural areas, this Department fully supports this request because of its complementary features and vital assistance to public health - a high priority in our national development.

In supporting this project we are prepared to commit the local resources necessary to implement the project - estimated at E225,000 over the five-year life of the project, additional to the existing Ministry of Health budget and a staff complement of ten.

We appreciate the consistent support provided by your staff and other members of the United States Agency for International Development for the time spent on our behalf formulating this difficult but important project.

Yours faithfully,

T.M.J. DWANE
PERMANENT SECRETARY

cc: P.S. Ministry of Health
P.S. Ministry of Finance
Director - Personnel Management
P.S. ministry of Works

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TAGS:

SUBJECT: RURAL WATER BORNE DISEASE CONTROL PID 645-0237

1. SUBJECT PID APPROVED. RESPONSE CABLE DELAYED PENDING RECEIPT AND REVIEW OF IEE. IN INITIAL 4 JAN 79 REVIEW COMMITTEE MEETING, WHILE NOTING OBVIOUS EFFORT INVOLVED IN PID DESIGN, COMMITTEE RECOMMENDED ADDRESSING FOLLOWING CONCERNS AND ISSUES DURING PP DESIGN:

A. COMMITTEE EXPRESSED MAXIMUM CONCERN OVER USE OF THE CARCINOGENIC DRUG ETRENOL, HIGHLIGHTING ITS NOTORIETY IN U.S. SPECIAL ATTENTION MUST BE PAID TO KINDS OF DRUGS AND PESTICIDES PLANNED FOR USE IN PROJECT AND TO QUALIFICATIONS OF PERSON WHO ADMINISTERS THEM.

B. CONCERN WAS REGISTERED ABOUT COMMITTEE STRUCTURE RESPONSIBLE FOR PROJECT IMPLEMENTATION. RESERVATION WAS EXPRESSED OVER ABILITY AND AUTHORITY OF NATIONAL COMMITTEE TO ADEQUATELY ADMINISTER AND CONTROL A PROJECT INVOLVING SO MANY ENTITIES. COMMITTEE ENDORSED PID RECOMMENDATION THAT RESOLUTION OF THIS MANAGEMENT ISSUE BE CARRIED OUT AT TIME OF PP DESIGN. COMMITTEE FURTHER REQUESTS THAT MISSION PROVIDE ASSURANCE THAT RESOLUTION OF THIS ISSUE BY DESIGN TEAM PROBABLE.

C. PP TEAM SHOULD ASSURE THAT PARTICIPANT TRAINING PROGRAM IS RELEVANT TO SKILLS NEEDED TO CARRY OUT BILHARZIA CONTROL PROGRAM.

D. A MEDICALLY QUALIFIED EPIDEMIOLOGIST OR TROPICAL DISEASE/VECTOR CONTROL SPECIALIST SHOULD BE INCLUDED ON DESIGN TEAM.

2. ADDITIONAL ISSUES TO BE RESOLVED IN PP INCLUDE:

A. PROJECT APPARENTLY UNDER-BUDGETED IN NEARLY ALL CATEGORIES. LINE ITEMS SHOULD BE CLOSELY EXAMINED FOR SUFFICIENCY DURING PP DESIGN.

B. MUCH MORE ELABORATION OF HEALTH EDUCATION BOTH FORMAL AND INFORMAL COMPONENT NECESSARY.

C. MORE CLARIFICATION OF LOGISTICS FOR MOVING TEAMS FROM AREA TO AREA NEEDED.

ACTION
USAID

INFO
AID
IDCPE/DM
IPO
DARAC
PC
DSRON
M&P
PD
ADMIN
PC

AID
ALD
HRDO
PDCO
RSEC
RPDO X
MSNG

BEST AVAILABLE DOCUMENT

D. CLEARER AND MORE EXPLICIT DISCUSSION OF DIRECT BENEFICIARIES SHOULD BE INCLUDED.

E. UNCERTAINTY AS TO PROJECT PURPOSE: IS IT BILMARZIA CONTROL OR CLEAN WATER CAMPAIGN? A RELATED QUESTION IS, QUOTE IS THE DISEASE SEVERE ENOUGH TO WARRANT AN EFFORT OF SUCH MAGNITUDE UNQUOTE? THIS CALLS INTO QUESTION ALSO THE BASELINE DATA UPON WHICH SUCH AN ASSESSMENT IS MADE. CAREFUL ATTENTION SHOULD BE GIVEN THIS ISSUE DURING PP DESIGN. TO EXTENT POSSIBLE PROJECT BENEFITS SHOULD BE QUANTIFIED.

F. PP SHOULD ASSURE THAT THERE IS NOT HEAVY RELIANCE ON LOCAL EXPATRIATES FOR PROJECT IMPLEMENTATION GIVEN THEIR TRANSIENT TENDENCIES.

3. IEE FOR SUBJECT PROJECT REVIEWED 3 FEB 79 AND HIGHLY COMMENDED. COMMITTEE SUGGESTED, HOWEVER, INSTEAD OF RECOMMENDING NEGATIVE DETERMINATION, IEE SHOULD CALL FOR ENVIRONMENTAL ASSESSMENT TO BE DONE AS INTEGRAL PART OF PP DESIGN BUT NOT AS INDEPENDENT STUDY UNLESS WARRANTED AT THE TIME. ADDITIONAL MEMBERS FOR DESIGN TEAM SHOULD INCLUDE ECOLOGIST AND TOXICOLOGIST TO EXAMINE ALL IMPLICATIONS PERTAINING TO RISK FOR HUMAN POPULATIONS. THE FOLLOWING QUESTIONS SHOULD BE ADDRESSED:

A. WHAT EXACTLY IS THE CURRENT ROLE OF THE BILMARZIA LABORATORY MENTIONED IN THE IEE? WHAT WILL ITS ROLE BE,

IF DIFFERENT OR EXPANDED, UNDER THIS PROPOSED PROJECT?

B. CAN WE REALLY EXPECT TO QUOTE ELIMINATE UNQUOTE THE SNAIL INTERMEDIATE HOSTS AS SUGGESTED IN THE IEE?

C. THE IEE INDICATES THAT THE PP TEAM WILL FOCUS ON POSSIBLE BIOLOGICAL CONTROL TECHNIQUES TO BE INCLUDED IN THE PROPOSED PROJECT. HOW WILL SUCH AN INTEGRATED PEST MANAGEMENT APPROACH ADDRESS THE OVERALL POTENTIAL IMPACTS ON NON-TARGET FAUNA AND FLORA? HOW WOULD SUCH A PROGRAM EFFECT THE FOOD WEB STABILITY IN THE AQUATIC COMMUNITY OVER A RATHER LONG TIME PERIOD?

D. WILL THE CONTROL PROGRAM TO BE IMPLEMENTED UNDER THIS PROJECT HAVE ANY SIGNIFICANT IMPACT ON THE INCIDENCE OR EPIDEMIOLOGY OF OTHER VECTOR BORNE DISEASES, HUMAN AND/OR ANIMAL, IN SWAZILAND? VANCE

ANNEX C

DRAFT PROJECT AUTHORIZATION (PAF)
PART II

A draft PAF II will be prepared during the week of July 30 by REDSO/EA legal staff and cabled to AID/W for inclusion in the project paper.

HEALTH SERVICES IN SWAZILAND

A. Health Care Delivery System

Health services in Swaziland are delivered through GOS facilities, missions and voluntary organizations, industries, private practitioners, and traditional healers. The GOS recognizes, and in varying degrees, supports all non-governmental health services but with the exception of mission groups, there is little coordination with Ministry of Health (MOH) programs.

GOS health services today are based on old colonial model which emphasized curative services and tended to be administratively quite centralized. The key individuals operating the MOH from the headquarters in Mbabane are: The Minister (a physician), the Permanent Secretary, the Director of Medical Services, a Health Planner (expatriate), a Health Planner Trainee (Swazi) Administrative Liaison Officer (expatriate), a Chief Nursing Officer, and a Chief Health Inspector. The government health facilities in the country include 5 hospitals, 3 speciality hospitals (TB, leprosy, and mental disorders) and 32 government clinics which are administrative satellites of the hospitals. In addition, there are 7 urban-based public health MOH centres, a central laboratory and TB centre.

Mission facilities provide a large percentage of both curative and preventive services in Swaziland through 34 clinics and 2 major hospitals. The missions supplement MOH services and are partially supported by GOS subsidies.

Industries are the third largest providers of organized health services in Swaziland. Five major industries provide physicians and medical services for approximately 69,000 people, while several other companies make some medical provisions for their employees.

There are approximately 15 physicians in private practice in Swaziland. Thirteen of these physicians are located in the major urban areas of Mbabane and Manzini so that this sector has minimal influence in rural health services.

Traditional practitioners are numerous but there are no records of the actual numbers practising in Swaziland. Surveys indicate that the majority of rural Swazis do consult traditional practitioners making them an important link in rural health services requiring further investigation.

The MOH and mission health facilities now existing are fairly well distributed throughout the rural areas, however, they lack adequate staffing and are limited in services and equipment. Hospitals are located in each of the four districts of Swaziland but sixty percent of all hospital beds are located in the urban and periurban areas of Mbabane and Manzini creating an inequitable distribution in the rural areas.

The MOH has a clinic construction program underway to increase health coverage. By 1983, 75% of the population will live within five miles of a health facility. New clinics will be constructed with 4 bed maternity wards and oral rehydration units. These facilities will also be added to existing clinics. The addition of these facilities will relieve pressure on district hospitals and extend better maternal and pediatric care to the more remote rural population.

1. Health Manpower

Registered nurse midwives (RNMs) and their auxiliaries carry the responsibility for the majority of health services delivered. At present there is only one nurse training school in Swaziland located in Raleigh-Fitkin Hospital, a mission institution. The output of RNs from this school is insufficient to meet both the needs of the MOH and the missions. Through USAID and other donor assistance an Institute of Health Sciences (IHS) is being constructed. The IHS will provide the GOS with an RN/M school expected to produce an annual output of 20 RN/Ms. The first class is expected to graduate in 1983.

The 1978 Establishment Register lists a total of 240 posts for RN's, of which 173 are in hospitals, 34 in public health units and 33 in the rural clinics. All RN's in Swaziland are double-qualified in general nursing and midwifery, (3 years of post-secondary school plus one year of midwifery, obtained outside of Swaziland). A former group of "Enrolled Nurses" have been given on-the-job training to upgrade them to the skill level of registered nurses (given they pass the qualifying exam).

There are a small group of government nurses who have been sent away for post graduate training in specialized subjects such as public health, health education, psychiatric nursing and so on. The majority of nurses functioning in specialty categories though are not formally trained in that field. A total of 13 nurses in the country do have post-graduate public health training and some of them are working at the Mbabane Public Health Unit.

Other health manpower categories include nursing assistants, health inspectors, health assistants, orderlies, laboratory personnel, nutrition officers, dental technicians and a group of more specialized, hospital-based technicians and assistants (e.g. radiographers, orthopedic technicians, etc.). The majority of rural clinics are staffed by one nurse, a nurse assistant and an orderly. Public health nurses visit clinics on a rotating basis from the Public Health Sub-Centres located in major towns.

Another health manpower group requiring special mention is the Rural Heal Visitor (RHV) program. With UNICEF funding assistance, the MOH is currently in the process of training individuals selected by rural communities to act as health motivators and educators. People with little or no education are given eight weeks of training near their own locale and then sent back to cover 40 homesteads each. By 1983 the MOH hopes to have trained 800 RHVs: currently some 250 have been fielded. They are supposed to be supervised by clinic nurses. The RHVs receive a small R20/month incentive pay from the GOS.

2. MOH Plans

The government health care delivery system is currently undergoing a process of evolution based on a realization that the current model is not appropriate. The Ministry is beginning to develop a plan called "decentralization and integration" aimed at lessening the dichotomy between curative and preventive services and gradually decentralizing the administrative structure. Attached to this paper is a copy of the proposed organization chart for the MOH and a policy paper outlining the integration scheme.

Manpower training plans for the MOH revolve around the IHS currently under construction. The MOH plans to eventually train almost all categories of health workers (except physicians) at this institute. For the time being, only the nurse training program is scheduled to begin in October 1979. The nurses' training will be geared to emphasize primary health care including a six-month component which will strengthen the diagnostic and treatment skills.

B. Manpower Categories

The following section is a brief summary of the kinds of health manpower who deal with water-related health problems and an assessment of how they perform their jobs.

1. Front Line Health Workers - Rural Health Clinics

a. Clinic Nurses: Unlike many countries, clinic nurses in Swaziland are given considerable responsibility in the area of diagnosis and treatment of common diseases. Theoretically they remain under the supervision of physicians, however, in reality (given the shortage of physicians), that supervision is indirect. During the five and a half day work-week, clinic nurses stay in the clinics, seeing patients and referring those they cannot diagnose or treat to hospitals or physicians. The nurse also has the administrative responsibility for the clinic as leader of the health team. Although all RNs are qualified as mid-wives, only those who have delivery room facilities attached to their clinics handle obstetrical cases. Domiciliary deliveries are rarely done.

Although most people recognize the theoretical ability and desirability of clinic nurses diagnosing and treating most illnesses, there is little doubt that the nurses are not adequately trained for this function. They often treat symptoms with no real knowledge of what the problem really is or how to either treat or prevent it. For instance, diarrhea and vomiting, seems to be a rather common "diagnosis" in young children. Nurses respond by giving a standard antibiotic/kaopectate mixture. There is rarely time for a more detailed investigation of what is causing the diarrhea or to give advice on rehydration techniques. Although health education is included in the job description for nurses, little of this can be done given the heavy patient loads.

Community work is also a part of the job description but again, because of time constraints, virtually none is carried on. The nurse spends a great deal of time filling out the required reporting forms which exceed 50 in number.

b. Nurse Assistants: Nurse assistants seem to function primarily as help-mates to the clinic nurses. They register patients, weigh children and pregnant women, take vital signs, do dressings, guide patients around, and in general free the nurse to concentrate on patient consultations. These women have undergone an 18-month training course (after 7 years of basic education) and are expected to do much of the patient education. The MOH has posts for a total of 61 nurse assistants, however, only eleven of them are in rural clinics.

c. Orderlies: Orderlies in the rural clinics are untrained, can be either male or female and are responsible for keeping the premises clean. Depending on their sex, they either function as security guards for the clinic or as cooks for the nurses. Orderlies are also supposed to help in other routine clinic operations under the direction of the nurse.

d. Health Assistants: There are 86 posts for health assistants although many of these remain vacant because of the lack of qualified condidates. A WHO sanitatian trained a total of 28 students several years ago, however, when he left, the training was discontinued. Students were required to have 9 years of basic education and they were were trained for one year (6 months didactic, 6-practical). Their responsibilities include communicable disease control, housing sanitation, food hygiene, water supply protection, health education, sanitary surveys, sewage disposal and pest control.

There appears to be little doubt that health assistants are not functioning effectively in the area of community environmental sanitation or health education. The reasons are varied; many have no place to live or are living in inadequate quarters, none of them have transportation and there are no support services. Consequently, when they are assigned anywhere near a town or city, the health assistants tend to become absorbed in conducting abattoir inspections or inspection of restaurants. The few that are assigned out in rural clinics help maintain records, fill out forms and build latrines or compost pits for the clinic itself. Because there are so few Health Inspectors, who in theory should supervise them, the Assistants function without guidance and with virtually no support.

e. Rural Health Visitors: The RHV program has been designed to provide Swaziland with a community based primary health care worker capable of giving health education, administering first aid, and referring the community to health facilities. Since the RHV not only works at the homestead level but also is a member of the community she has the potential to be a key motivator in the water education program.

At present there is very little information on the effectiveness of the RHV or whether her training is adequate since the RHV receives little or no supervision when she returns to her area after training. A major evaluation of the RHV training is scheduled for 1980. This evaluation should be able to measure the effectiveness of the RHV and provide guidance for additional training to enable her to serve as a community motivator in the water education program.

2. Supporting Manpower Categories

a. Physicians: There are eleven government physicians stationed at district hospitals in Swaziland. One physician in each district is designated as the District Medical Officer (DMO) in charge of all health services in the district and has the responsibility for supervising clinic personnel.

The DMOs are scheduled to visit all rural clinics on a bi-weekly basis however, since their specialized skills are required for emergency medical care and surgical procedures they become involved with in-patient services at the district hospital and lack the time to provide adequate support to rural clinics.

The government physicians, for the most part, are relatively inexperienced with no specialized training in public health or administration. In addition, they are responsible for many routine tasks which could be carried by mid level health administrators thereby reserving their special skills for patient care. The DMOs are also not prepared to provide nursing supervision at the clinic level and this task should be assumed by a district level public health nursing supervisor in the decentralization plan for district services.

Since the number of MOH physicians is not expected to increase significantly for at least the next decade, decentralization planning should focus on releasing the physician from non medical responsibilities so that he or she can concentrate on health care. There is also a need for one or two Swazi physicians to have post graduate training in public health to provide expertise for preventive and environmental health services.

b. Public Health Nurses (PHNs) PH nursing is narrowly defined and limited to MCH/FP services in Swaziland. This approach is rational since women and young children are the largest population groups most seriously affected by the common causes of morbidity and mortality in Swaziland. Also the largest

percentage of preventive services are delivered to mothers and children. However, this focus tends to restrict the PHN to a clinic setting and limits the development of more comprehensive community health services which more fully utilize PHN skills.

At present only 13 of the 34 RN/Ms occupying PHN positions have had st graduate PH training. All of the PHNs are assigned to PH units mainly in urban areas. While the PHNs do have responsibilities for supervising rural clinics in the area, problems of transport and a heavy caseload at the PH Unit limits their supervisory role. PH nurses are expected to do health education but this activity is mainly limited to clinic lectures.

The role of the PHN in the decentralization plan needs to be explored. Currently many of the activities carried out by PHNs could be absorbed by nursing assistants and RN/Ms with additional training in family planning techniques. This would free the nurses with PHN training to assume district supervisory responsibilities and provide more support to clinic nurses and other health auxiliaries in carrying out comprehensive health services at the community level.

c. Health Inspectors: As of 1978 there were six trained health inspectors assigned to main towns around Swaziland. Because of the severe shortage of personnel in this category, Health Inspectors act primarily in an administrative capacity at the District level. Most engage in meat and food inspection within the town or city but very few, if any, have any activities in the rural areas. They are responsible for supervising Health Assistants however, this is difficult unless the Assistants work with the Inspector from a Public Health Unit. Inspectors do have vehicles but maintenance problems are common.

d. Laboratory Personnel: The 1978 Establishments Register shows the following positions: 3 microscopists, 4 lab technicians, and 14 lab assistants. All of these positions are in government hospital laboratories and in the central laboratory in Manzini. Sitabela Rural Health Centre, however, does have a lab and presumably there will be a position created in the 1979 Register for a lab assistant, if not a technician. Lab assistants are primary school graduates who are given on-the-job training. The majority of these lab assistants are stationed at the central laboratory in Manzini.

C. The Role of the MOH in the Control of Water Related Diseases.

The MOH has direct responsibility for the control of water related diseases through: curative and preventive treatment programs; environmental control measures (malaria spraying and mollusciding); health and sanitation education; and construction of excreta disposal facilities. Indirectly, the MOH is involved in the rural water supply in an advisory capacity.

Within these direct responsibilities the MOH has been most successful in providing curative treatment for water related diseases and in establishing a more adequate malaria control program. However, personnel resources from the Bilharzia Unit have been used to reactivate the malaria program. This has resulted in a decline in the schistosomiasis surveillance program in certain areas of the country.

Both the health education and excreta disposal facility programs are inadequate for the needs of the population. Under the MOH latrine construction program, Health Assistants motivate rural people to build latrines and provide technical advice on the siting and construction of the latrines with subsidized materials. There are an estimated 50,000 homesteads in Swaziland however, to date the HA's have only been able to assist in constructing about 100 latrines per year. The program has been obstructed because the HA's lack transport to get the construction materials to the homesteads.

The Health Education Unit (HEU) of the MOH was established with the assistance of a WHO advisor who is still in charge of the unit. While the MOH recognizes the value of health education, it has not yet established the HEU as an official section of the MOH and it lacks permanent staffing and material support. As it is presently functioning the HEU will not be able to provide adequate support to the water and sanitation effort proposed in this project. Since health education is an essential component of any environmental sanitation project, the HEU must be strengthened within the proposed project to provide support for the other components.

The Rural Water Related Disease Project has been designed to strengthen and expand the capacity of the MOH to carry out the programs for the control of water related diseases that now fall within the direct responsibility of the MOH. The interventions planned, for the most part, will be carried out with existing MOH personnel since the MOH does not expect to have any appreciable increase in personnel for the next few years. The project has also been designed to minimize dependence on vehicles and supplies which would incur heavy support costs since only minimal increments can be expected in the MOH recurrent budget for at least the first three years of this project.

The areas of intervention selected for RWRD Project are: health education; water and excreta disposal programs, and surveillance of schistosomiasis and other selected parasites.

Through the RWRD Project, the MOH has made a committment to develop the HEU as an official section of the ministry. By the end of the project, a Swazi director and two professional health educators (one funded by WHO for training) will have been trained for the HEU in addition to a graphic artist. USAID will provide two technicians to assist in the development of the HEU, a Senior Health Educator, and a Social Scientist (Anthropologist). The HE will assist with the development of the HEU while the anthropologist will carry out the KAP survey and assist with the design of media and training materials.

A knowledge, attitudes, and practices (KAP) study will be carried out to obtain information on the rural Swazi's perceptions of health and disease as they relate to water and sanitation. This information will serve as a reference for the development of mass media materials and education modules for water and sanitation by the HEU.

The HEU, in addition to the preparation and production of media materials for health education, will play a major role in training Swazi health workers. This training will include inservice programs for those health and other extension personnel already employed and health education and communication training for students in the basic training programs at the IHS.

The training function of the HEU is a critical factor in Swaziland's health services since it is unlikely that trained health educators will be available beyond the district level for at least the next decade. Therefore, health education will be an important responsibility of personnel working in the community and at the rural clinic level.

Under the water and excreta disposal component of the project, USAID will provide technical assistance through a Public Health Engineer, who will work with the Rural Water Board, and an Environmental Sanitarian, who will work with the excreta disposal component.

The excreta component has been designed to concentrate on mobilizing rural communities to participate in water and sanitation programs so the maintenance of water systems and sanitation of the environment becomes a community rather than government responsibility. Under this component the HA's will build a number of latrines in rural homesteads to demonstrate the various types of latrines. During the demonstration the rural community will receive training in latrine construction so that the residents can build their own latrines at a reasonable cost and will not have to wait for the HA to visit each homestead. Health education programs will also be included in the demonstrations to teach the people the proper use and care of latrines, and the relationship of sanitation to good health.

The schistosomiasis component of the project is designed to increase the surveillance capacity of the Bilharzia Unit and to provide information on the location and prevalence of schisto in Swaziland. Two teams of HA's will be organized with the technical assistance of an epidemiologist. The epidemiologist will, in collaboration with a short term statistician, design a sampling survey for Swaziland for schistosomiasis and other selected parasitic diseases.

The epidemiologist will train the HA teams to collect and analyse urine and stool specimens in the sampling areas for schisto and the other parasites. In addition, this technician will assist with expansion of the Bilharzia Unit in Manzini to increase the diagnostic and administrative capacity of the unit.

The Bilharzia component will provide the MOH with expanded facilities for the diagnosis of schistosomiasis, six trained HA's for surveillance programs, and a report on the location and prevalence of schistosomiasis and other parasitic diseases in Swaziland. This report will serve as a reference to the MOH in planning more effective control programs and in allocating resources. In addition the PH Engineer working with the Rural Water Board will provide the MOH and other ministries with technical advice on construction in rural areas to avoid breeding areas for Schisto snails.

The RWRD Project is within the capacity of the MOH to implement, however, the development of a long range program for the control of water related diseases is impeded by the centralized administration of the MOH. The current system does not provide the supervision and support required for the front line or primary health care workers who will play a major role in the development of control programs. In addition most of the clinic nurses who serve as supervisors for the primary health care workers, have not been trained in public health or diagnostic procedures so that they are neither fully prepared for delivery of services nor supervision of community health workers.

The MOH is currently in the process of developing a plan for decentralization to the district level and integration of curative and preventive services to the primary care level. This plan remains a concept and probably will not be fully implemented by the end of the RWRD Project. However, activities in the project which relate to longer term planning will need to consider the decentralized administration plan.

The Swaziland Health Manpower Development Project, also being financed by AID, is expected to play a major role in improving the quality of rural services. The new RN curriculum being designed under this project focuses on more appropriate training for Swazi nurses. The IHS program will emphasize a public health approach in the delivery of services. Nurses will be prepared as nurse practitioners, with diagnostic skills, and as public health nurses plus other specialities. Therefore by the end of the next decade, the MOH should have a cadre of nurse practitioners and public health nurses placed in rural areas and available to supervise and more fully support community health workers.

USAID Water-Related Disease Project

Social Soundness Analysis

I. Socio-Cultural Feasibility

A. Demographic Features

Approximately 88 percent of the nation's 520,000 inhabitants live in rural areas. Most of them are concentrated on 56 percent of the total land area known as Swazi Nation Land (SNL), where a traditional land tenure system prevails. These people live in approximately 50,000 dispersed homesteads, with each settlement area surrounded by fields. Only about 13 percent of SNL is used for settlement and farming; the rest of the land is basically used for communal grazing. The remainder of the country's 17,364 sq. kilometers is under freehold titles, primarily held by European residents and foreigners. The freehold title land is devoted to commercial forests, mines, farms, estates and ranches. The two land systems are interdispersed as shown on Map 1.

Swazi Nation Land is spread across the country's four major ecological zones which run in a north-south pattern (Map 2). The Highveld, with an altitude of 1100-1400 meters, has a temperate climate and heavy rainfall in the summer. The Middleveld and Lubombo both have sub-tropical climate, but the altitude of the former ranges from 350-1100 meters while the latter's altitude varies from between 550 to 650 meters. Table 1 shows the distribution of SNL and the percentage of estimated population on this land according to ecological zone. On SNL the highest population density is found in the Middleveld, with roughly 56 persons per square kilometer, and the lowest density, 28 persons per square km, occurs in the Lowveld.1/

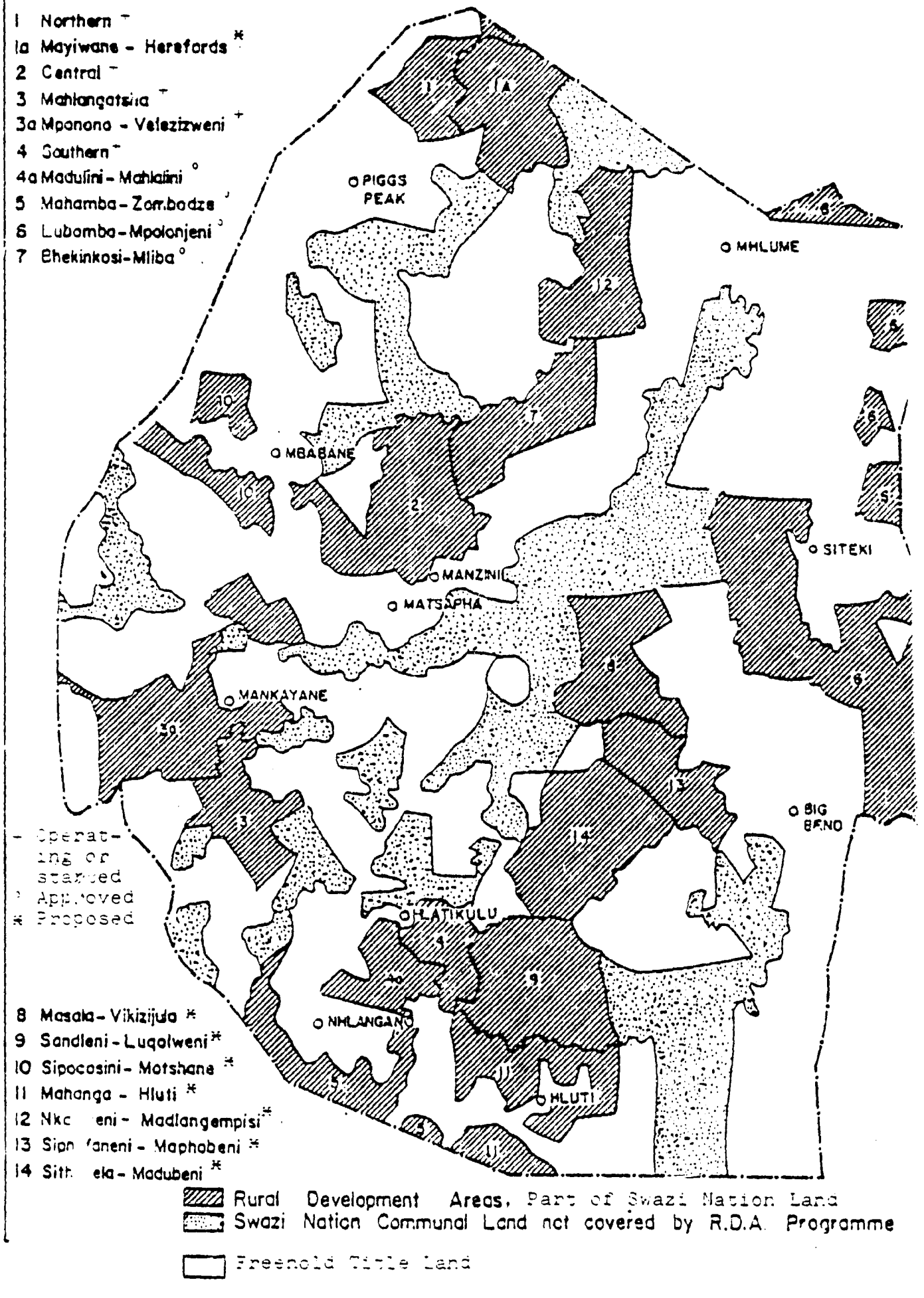
TABLE 1 - DISTRIBUTION OF SWAZI NATION LAND AND ITS POPULATION

	% of Swazi Nation Land	% of Estimated Pop on Swazi Nation Land
Highveld	21	22
Middleveld	34	48
Lowveld	39	24
Lubombo	6	6

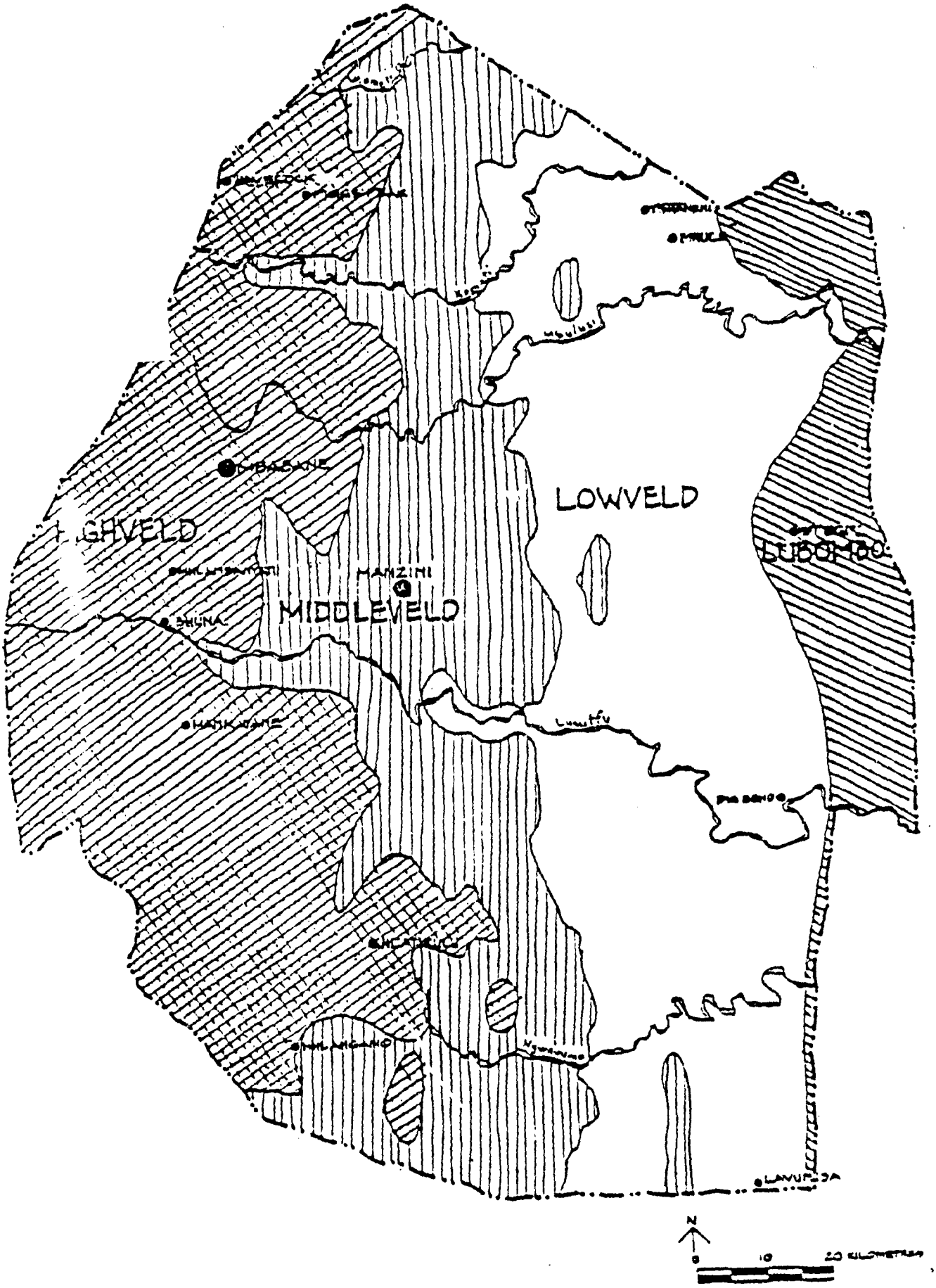
Source: Derived from Table A-1 "Features of Swaziland's Regions," USAID Swaziland Shelter Sector Assessment, July 1978, p. A-2

1/ The population density figures are derived from a total of 356,000 persons as given in USAID, Swaziland Shelter Sector Assessment, July 1978, p. A2.

Map 1 SWAZI NATION LAND



Map 2 MAJOR ECOLOGICAL REGIONS OF SWAZILAND



The national sex ratio, i.e. females to males, is 1.13:1, which reflects the absence of men who have migrated to work in South Africa. However, there is considerable internal migration, mainly to urban areas, which results in a sex ratio of 1.55:1 for rural aras as a whole. A study by Prof. F. de Vletter in the Northern Rural Development Area found the female/male ratio to be 1.7:1, while comparison areas had a ratio of 2.4:1. Thirty-one percent of the homesteads do not have any adult males normally resident.2/

A survey of 430 rural households throughout the country undertaken by Professor de Vletter shows that most households are headed by males, either resident or absent. The respondents' own perception of the term and members' acknowledgement of who is head was recorded, rather than following a uniform definition. Nevertheless, 21 percent of the homesteads were found to be headed by females, most of whose husbands had died or were living elsewhere with another wife. 3/

The crude birth rate is estimated to be 52 per 1000 population and the crude death rate at 19 per 1000, giving a natural increase of 3.3 percent annually. The infant mortality rate is given as 156 per 1000 live births, while the fertility rate (defined as the number of children born per woman reaching the age of 50 years) is 6.87.4/ A study undertaken by Dr. Harriet Sibisi in six rural communities reveals that out of 31 women who had been pregnant, there was an average of five pregnancies per woman. Ten percent of the pregnancies resulted in miscarriage and a further ten percent in stillbirths. Approximately 33 percent of those born died before the age of ten; the data indicate that these deaths were the result of illness. 5/

The age distribution of the population shows a high proportion of dependents. Forty-eight percent of the rural population is under 15 years and four percent are over 64 years old. Forty-eight percent are between 15-64 years old.

2/ Fion deVletter "The Rural Homestead as an Economic Unit: A Case Study of the Northern Rural Development Area," Department of Economics, University of Botswana and Swaziland, 1977. Hereafter it is referred to as the deVletter NRDA survey.

3/ Fion deVletter "Subsistence Farmer, Cash Cropper or Consumer?: A Socio-Economic Profile of a Sample of Swazi Rural Homesteads," Report prepared for the FAO/Program for Better Family Living, Ministry of Agriculture and Cooperatives, Mbabane, June 1979. Hereafter referred to as the de Vletter national rural survey or sample.

4/ Svend Christensen and Isabella Hlope, "Health Information System in the Kingdom of Swaziland," Report on a Mission from 17 October to 16 November 1978, p.1.

5/ Grateful acknowledgement is extended to Dr.Harriet Sibisi, for access to her field data, collected for D. Bell et al "Swaziland Rural Water Supplies: A Baseline Study" I.D.R.C., August 1979.

Of those in the 5-14 age group, 64 percent are in school, while 72 percent of the 6-12 years olds attend. The sex ratio is slightly in favor of girls at the primary school level in the age range of 5-14, but it becomes less favorable in the secondary school, dropping from parity in Form 1 to 31 percent in Form 6. In regard to the African resident population over 15 years, 24 percent of the females and 25 percent of the males have at least five years of primary school education. In the age range of 15-24, however, 32 percent of the females compared to 23 percent of the males have at least five years of education.6/

B. Health: Beliefs and Systems

Most Swazi's incorporate both traditional and modern concepts into their view of the causes of illness, and use both health systems. Traditional beliefs instilled during their process of socialization are not easily dismissed, even though people recognize the value of the modern medical world. The traditional belief is that sickness and suffering originate from two sources of supernatural powers: angry ancestoral spirits, and evil powers of people. Ancestors are believed to inflict punitive measures from time to time upon family members because of omissions and incorrect behavior. Also, living persons can be the source of destructive powers, which is commonly referred to in English as witchcraft. Witchcraft can involve direct poisoning or the casting of evil spells. Most frequently the originator is someone well-known to the inflicted, such as a relative or neighbor. Nevertheless, Swazi medicine has its own concepts in which disease is related to a malfunctioning of certain organs in the body, although the relationship does not always coincide with modern theory.7/

There are basically four types of traditional healers:

a) inyanga: throws bones to determine cause of sickness and is a pharmaceutical specialist

b) sangoma: diagnoses through a trance in which contact is made with supernatural powers; some make medicines, although many refer patients to other healers to obtain medicine

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6/ UNICEF "Country Profile, Swaziland 1978" p. 1,6.

7/ The description herein of traditional healers and medicine is based on L.P. Makhubu "Towards the Integration of Traditional and Modern Medicine," a paper prepared for the Workshop on Rural Environment and Development Planning in Swaziland, L.P. Makhubu The Traditional Healer Mbabane: University of Botswana and Swaziland, 1978; and an interview with the author July 5, 1979.

c) umfembi: similar to sangoma but is possessed with non-ancestral as well as often ancestral spirits

d) lugedla: acquires skills, whereas others are believed to be "possessed".

The males and females who become traditional doctors, except for lugedla, undergo a process whereby spirits, most often those of ancestors, manifest their presence. In former times when a person was taken possession of by the spirits, she/he disappeared to an unknown place, as if in hibernation. The spirits subjected the person to vigorous training and normally enabled her/him to identify plant and animal matter. Following his/her reappearance, the person was required to perform unusual tasks to test if the possession was genuine. In recent times the hibernation period has disappeared. The initial stage, the occurrence of an incurable sickness in the subject, remains, and is followed by family consultation with an inyanga to determine the cause of sickness. If the subject is considered to be possessed, she/he is taken to another healer for training. The trainers are usually well-known traditional healers and a few of these have established training centers, with residence quarters for pupils. In comparison, if one wishes to accuire skills associated with the making of medicines, she/he becomes an apprentice to a traditional practitioner and ultimately becomes lugedla.

The traditional Swazi concept of illness, diagnosis and treatment are deeply embedded in a wider belief system. The traditional system utilizes treatment which focuses not only on symptoms but also on psychological and social factors. The traditional healer is consulted in times of sickness, upon appearance of an evil omen, to bring good luck or good fortune, for preventative health measures, and upon occurrence of misfortune and suffering, such as accidents and family quarrels. The healer's task is to reveal the nature of the problem by a process of questions and response until the cause is established.

A large component of the treatment aims at satisfying the belief in the mysterious and superhuman which influences recovery by improving the psychological state of the patient. Traditional treatment includes:

a) making small cuts on the body surface and directly rubbing medicine (usually burned herbs) into the cuts; to prevent sickness, e.g. anti-snake-bite, and cure e.g. urinary failure, sprains

b) administering enemas: to clear children's stomaches and improve their appetite, to improve digestive disorders and impotence in adults

c) drinking an extract of medical herbs and then inducing vomiting: to eliminate coughs, excess bile and general bad luck

d) inhaling a hot herbal preparation followed by a bath in the same preparation: to cure skin aliments, bruises, colds and misfortunes.

e) inhaling fumes, including those of animal materials, and drinking the residue added to water: to increase infants' resistence to disease and evil spirits, and to ward off evil spirits manifest in the nightmares of adults

f) taking orally an extract of herbs combined with (a) above and then fastening a support to keep a limb in position: to heal sprains and fractures.

Presently tests are being run by Dr. Makhubu, Head of the Chemistry Department and Dean of the Faculty of Science at the University of Swaziland, on commonly used herbs to detect the presence of elements known to have positive physiological effects. She advocates that tests be run on medicines generally known to be effective to monitor proportions used and effectiveness in treating specific ailments, and gardens be established to preserve and propogate effective herbs.

Dr. Makhubu, as well as others, advocate integrating modern and traditional medicine by establishing a climate of cooperation and understanding between the two systems. She points out that most Swazis use both systems. For example, maternal and child health care in the modern health system is widely accepted and used, where available. At the same time, there is a strong belief in the traditional system which aims at raising healthy children as well as bringing up well-adjusted and balanced members of society. The inhaling of fumes (treatment e above) by infants is to protect against evil spirits and to ensure that the child becomes a stable, useful member of society. Mothers, even the most educated and enlightened, care not risk ruining their child's future by ignoring this traditional belief.

Modern health services are readily accepted and used, although shortage of staff, facilities and transport makes access difficult. The popularity of modern health services indicates that the traditional belief in the supernatural causes of illness has either lessened or at least been combined with the recognition of natural causes and the effectiveness of modern medical practices. Futhermore, there are certain conditions and diseases which traditional healers do not treat, and even traditional doctors use modern health services for treatment of these.

Dr. Makhube reports that about 80% of the population consult traditional healers, but not necessarily in isolation from using modern medical services. Two rural surveys have attempted to learn about the source of health care when one is ill, but have not assessed the extent to which the traditional system is used for other purposes, such as preventive measures. It should be pointed out that survey research is not the best

method to use since people may be reluctant to admit to consulting traditional healers. Research in the Southern Rural Development Area which included interviews with 78 women of different households found that 23 percent of the respondants go to "prophets" or "witchdoctors" when someone in the family is ill. (This includes those going to more than one source for treatment.) Almost all (96%) report that they or a member of their family have gone to a doctor, nurse, hospital or clinic for medical assistance.[8] In a survey of women in the Northern Rural Development Area respondents were asked "Who do you contact for advice and treatment when you are ill?" Seventy-seven percent of the 56 women said they go to the clinic, hospital, doctor or nurse, 9 percent reported seeing a traditional doctor or using African herbs, 11 percent mentioned other people such as husbands and neighbors, and four percent said nobody. It does not appear that more than one response was asked for, hence the data probably do not cover all channels used. Only 14 percent of those interviewed had never been to a clinic (the nearest facility) and of these one-third claimed they would attend if ill. The data thus indicate a "hard-core" group of six percent who are against using the modern health care system. Most women specified that they wanted to have more clinics built in their area and that lack of transport hindered access to the existing ones.[9] The acceptance of the modern system is also shown in the deVletter national rural survey: 29 percent of the interviewees listed improved health services and facilities as the most pressing problem.

C. Practices Resulting in Water and Excreta Related Diseases

According to the 1976 census, 78 percent of the rural inhabitants (including those in company towns, which accounts for 5 percent of the rural population) rely on sources other than piped water. However, in the deVletter national rural sample, the percentage of homesteads without access to piped water was a high 92 percent. The vast majority of rural inhabitants rely on rivers, streams, and to a lesser extent, springs, dams, wells, and boreholes for their water. Less than 10 percent of the rural homesteads have at least one iron-roofed house with a gutter to facilitate catchment of rain water in raintanks, drums or other containers. The source of water is not always constant, but often varies for a given household due to the purpose for which the water is needed and seasonal changes in the source. For example, during the rainy season a nearby river is foresaken for a more distant spring because the river is considered too unclean; and, shallow wells dug in dry riverbeds can serve as the main source of drinking water but due to

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8 FAO Program for Better Family Living, Southern Rural Development Area Study, Ministry of Agriculture and Cooperatives, Mbabane, 1979. Hereafter referred to as FAO/PBFL SRDA survey.

9 Inga-Lill Indrehn, Dinah Rabemila and Maria Smitt, Draft Report on The Living Conditions of Women in the Northern Rural Development Area of Swaziland 1977, Ministry of Local Administration and the Office of Technical Cooperation. NRDA Survey.

the slow rate at which the supply is replenished, a nearby river is used for other purposes.

Improvement in the supply of water is considered a high priority among rural dwellers, especially women. In the deVletter NRDA study virtually all respondents expressed the desire for improved water systems, emphasizing the need for piped clean water. Fifty-five percent of those interviewed in the deVletter national rural sample listed water supply as the most important problem.

Rural women view the following as advantages to having piped water:

a) diminish the time it takes to fetch water

b) reduce the dependency on children to fetch water

c) facilitate the construction of better houses or repair existing ones

d) improve health

e) increase the possibility of having taps inside the homes

f) enable them to have vegetable gardens year-around, from which output would be consumed and sold. 10/

Women, girls, and sometimes boys, fetch water. Men are only involved if donkey carts or ox-sledges are used, which tends to be for commercialization of water. The nature of the terrain as well as distance determines the amount of time it takes to obtain water. Some households report having to spend three hours per trip, although most are more fortunate. The number of trips per day does not appear to be related to the size of the household but more to the amount of time it takes to fetch water and the amount of water fetched each trip. Households relying mainly on youngsters unable to carry 20 liter containers tend to send these children more often to transport lighter loads. The amount of water fetched daily appears to be related to the total amount of time it takes rather than the size of the household. There may be a positive correlation on the availability of females to carry 20 liter containers of water to the amount of water obtained daily. The relationships mentioned above, however, have not been firmly established but are indicated in the Sibisi and Matthews studies.

Water is needed by homesteads for drinking, cooking, bathing, washing clothes, pots and pans and brewing beer. Washing of clothes and bathing often occur at the water source, particularly when it takes a lot of time otherwise to fetch the

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10/ Sibisi op. cit. and Margaret Matthews, "A General Survey of the Water Problems of the Mafutseni and St. Michael Communities," paper submitted to the Department of Geography, University College of Swaziland, April 1979.

water for doing these functions at the homestead. Water is also used in construction, repair and maintenance of walls and floors of traditional houses and for making bricks for construction of "modern" houses and buildings. Furthermore, most homes own animals which need watering. Cattle in particular will enter rivers or streams to drink and bathe, thus further polluting the source of water; very few watering troughs are found. Open water sources such as ponds and streams are also used by children for recreation.

Communities with piped water have their own peculiar problems with practices detrimental to good health. The most common difficulty is with children playing with taps, resulting in large puddles around the standpipes and sometimes broken taps. Large puddles also often form when users forget to properly turn off the taps. Moreover, some laundry areas get in a messy state due to poor drainage and lack of general cleanliness.

Water is fetched in containers of various sizes and types. Significant from a health point of view is whether or not the inside of the container can be cleaned. A common type of receptacle is one with only a small opening, e.g., tins or plastic containers in which edible oils come, that cannot be thoroughly washed on the inside. Metal and plastic buckets are also often used. The plastic bucket, however, absorbs smells and is difficult to get clean. The containers vary from 4.5 litre to 20 litre capacity. In the FAO/PBFL SRDA survey 74 percent of the women reported using buckets to carry the water. In contrast, other studies found that containers with small openings at the top were the most common.[11] These findings show that further investigation is needed on a broadly based sample. The recommended practice by the Community Development Officer of the Rural Water Supply Branch is use of open-topped metal containers to fetch water and clay pots, with a damp cloth placed over the top, for storage.

The FAO/PBFL SRDA study inquired into the means used to store water. It appears that almost all respondents keep the water in the same container in which it was fetched, whereas in Dr. Sibisi's study most women stored water in a metal container, different from which the water was carried. When the SRDA interviewees were asked if they did anything to the stored water before drinking it, one-fourth of the women said yes: most of them boiled it, while the others covered the top of the storage container. While the boiling of drinking water does not appear to be practiced by many households, the feasibility of this needs to be further investigated as should the storage of water. It is not unusual to have an open topped container of water sitting on a dirt floor of a room while it is being swept.

Practices related to disposal of human excreta increase the likelihood for diseases. In most homesteads members use the bush, fields or nearby forests to relieve themselves. Pit latrines are found in less than one-fourth of the rural homesteads. The desire for latrines, however, is extremely high.

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11 Ibid

Some families have dug pits but are awaiting provision of cement slabs,[12] while others would like to have a pit latrine but do not know how to build them.[13] It is unclear, however, the extent to which rural people are aware that improper disposal of of human excreta causes human diseases. Interviews conducted by the writer in Lubomba District on reasons for having a pit latrine revealed a variety of answers by rural women:

(a) nowadays there is very little bush left near the houses in which to go;
(b) the children make the area near the house dirty;
(c) our cattle will be rejected for slaughtering if they have tapeworm; and
(d) it is better during the rainy season to have a shelter.

Nevertheless, a Rural Health Visitor in Lubomba District who has been most effective in influencing adoption of pit latrines uses the following argument: "A visitor comes who has stomach problems and asks to use your latrine. If you do not have one, he will have to use the field or bush. Flies will carry his germs from the excreta and your family will become ill."

Some households dig one pit, cover it with two slabs and build a partition between the two so as to have separate facilities for males and females. Others have only one pit latrine but build an adjoining bathing room, which has a slanted slab and a hole whereby water drains into a shallow pit outside. It appears that technical assistance is needed to better design the drainage for such bathing areas since these pits can be breeding grounds for insects.

Common practices in the disposal of refuse also increases the disease factor in rural areas. Only about one-fourth of the rural homesteads throw their rubbish in an open pit,[14] and relatively few burn the refuse.[15] The majority of homesteads tend to put their refuse at the cattle kraal, near the house or in the bush. This suggests that disposal of waste materials is not perceived to be related to diseases.

Almost all Swazis are aware that drinking unclean water causes diseases. Cleanliness of water, though, is usually judged by color, smell, and taste. They also recognize that cows pollute water and that during the rainy season debris, including feces, get washed into streams and rivers making them unsafe sources for drinking water. As one woman explained to Dr. Sibisi: "The present water is not good for our health...we wash all things (including diapers) in the river and draw the same water." One community studied by Dr. Sibisi revealed a very high level of awareness of water-borne diseases. When discussing the proposed

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12/ PP Team interviews. Sometimes pit latrines are considered a status symbol. Although Health Assistants and Health Inspectors encourage people to use local materials, some families prefer to make the superstructure out of improved bricks. This especially occurs when at least one house on the compound is also of "modern" construction materials.

13/ WID NRDA Survey.

piped water scheme for the area, the women pointed out measures which ought to be taken to ensure that pools of water and stacks of refuse did not accumulate around the standpipes.

The incidence of diseases among rural inhabitants is difficult to assess. Records at health facilities tell only about those attending for treatment, while School Health Team records provide information only on school attenders in the first and second grades. In the NRDA WID study, the women were asked "What diseases do people around here usually suffer from?" The replies given were mainly descriptions of symptoms experienced. Those mentioned to be most frequent were: stomach trouble, usually diarrhea; common colds and flues; and headaches. When asked about their own illnesses the past year, the women reported suffering from stomach problems, colds, backaches, headaches and chest troubles. The frequent carrying of heavy loads on the head can cause continuous headaches, while aching backs can be caused from lifting loads and hard physical work. Stomach problems can be caused by water-related diseases. When all women with children were asked about the latters' illnesses, the most common problems were stomach troubles, colds and flues.

As previously indicated, more needs to be known about the level of awareness, especially among rural women, on the relationship of certain practices to disease. It may be that some of them are well-informed but lack of alternatives or financial means prevent changes in practices. The Knowledge, attitudes and practices study to be undertaken the first year of the project will be based on a sample of homesteads, stratified according to socio-economic characteristics. The information obtained on the level of awareness as well as the prevalence of certain unhealthy practices will guide the setting of priorities for the health education project component. Furthermore, it will help to distinguish characteristics of the rural poor so that messages can be tailored to meet their needs.

D. Organization, Leadership and Community Participation

Swaziland has a dual government structure. The one is based on a cabinet, ministries and districts. The other is unique to Swaziland. Authority of Swazi Nation Land (SNL) is vested in the Swazi National Council (SNC) whose membership constitutes all Swazi adult males. The council is custodian of Swazi law and custom. Through its Central Rural Development Board and tinkhundla (singular inkhundla) the council seeks to ensure that development programs are fully in accord with the interests and aspirations of the Swazi people, and their laws and customs. The Central Rural Development Board, established by the Swazi National Council in 1954, consists of members appointed by the King. Final approval of any project which will in any way affect rural development rests with the Board. The CRDB appoints Rural Development Officers (currently 7) who are involved in the preparation, presentation and implementation of development schemes.[16]

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16 Information herein on the traditional government structure is based mainly on Dlamini and B.M. Sibandzi "Interministerial Coordination on Vertical and Horizontal Levels," a paper prepared for the Workshop on Rural Environment and Development Planning in Swaziland, Ezulwini Valley, Swaziland, May 1-[illegible], 1978.

Throughout SNL there are 24 tinkhundla or meeting centers which are used as points of congregation. Here SNC officials, chiefs, and some government officers, especially district commissioners, call meetings with local inhabitants to make announcements, exchange ideas, and debate issues and proposals. All tinkhundla come directly under the SNC.

Each inkhundla contains about 5-6 chiefdoms, with SNL containing a total of about 200 chiefdoms. The chief, whose position is either inherited or sanctioned by the King and King's mother, appoints councilors to guide him. He also refers local affairs to the libanda, which constitutes male heads of households in the area, some of whom are consulted more frequently than others and form in effect a working committee.

People are supposed to perform services upon request for their chief, such as contributing labor to his fields. This tradition was considered a sacred obligation to show allegiance and offer services in return for protection and land. Apparently now in some areas only a few people show up when requested to perform farm labor: men are away in wage employment, children are in school and women are reluctant to leave their work at their homesteads.[17] Nevertheless, chiefs are key persons in encouraging development activities in their areas and their sanction is necessary for implementation.

Traditionally, community participation centered not only on donation of labor to the chief and sometimes the King, but also on assisting neighbors. Within the local community, a person could call for assistance, such as for weeding fields, and the participants were rewarded by a beer party. This form of cooperation still exists to some extent.

Self-help projects are based on community participation. These activities tend to be under the guidance of community development assistants. Currently there are 10 community development assistants in the country and two districts are served by community development officers, who fall under the Community Development Unit in the Ministry of Agriculture and Cooperatives. The community development program seeks to raise the standard of living, including health, of the rural population. Activities undertaken on a self-help basis have mainly been in the form of construction of farmers' sheds (centers for storage of agricultural inputs and for meetings), schools, clinics, etc., and approximately 25 are completed annually. More recently the program has stressed an educational component. All activities are carried out with approval of the local chief.

In addition to chiefs as important leaders in the community, often headmasters and sometimes traditional healers are also key local leaders. For example, Dr. Sibisi found that in communities where a piped water system covered more than one chiefdom, the headmasters were particularly instrumental in mobilizing the local people to dig trenches. And, in one community a standpipe was being placed in the homestead of a traditional healer who would be responsible for its care and maintenance.

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17 Carole Allen Dimensions of Swazi Households in Rural and Urban Areas. PhD dissertation University of Massachusetts, 1979.

E. Communications

Very little is known about the rural population's major sources of information, expecially in regard to health-related matters. No data on such exist based on socio-economic status of households and on the extent to which the indigenous media contains a social message to criticize behavior, change attitudes and move people to action. A few surveys have attempted to assess the extent to which homesteads have contact with extension agents. The deVletter national rural sample showed that only about 25 percent of the homesteads have contact with an agricultural extension worker, and those contacted tended to be the most progressive farmers. The FAO/PBFL SRDA study, when completed, will provide one of the only sources about contact with various types of extension agents. The preliminary data show that only about 20 percent of the homesteads have had some contact and in the female sample only 10 percent report having contact with a rural health visitor. In contrast, in the WID NRDA survey, 43 percent of the women claim to meet at least once a month with an extension agent, although the survey did not specify the type of agent. The latter survey result is probably due to the close proximity of the respondents to an agent. Given the agents' problem of mobility combined with the dispersed homestead pattern, extension staff are hindered from serving a large number of households.

One way in which some people increase their level of awareness and knowledge is through listening to the radio. A survey was undertaken in the Highveld and Middleveld, areas with good reception of the Swazi Broadcasting Company, covering one-fourth of Swaziland and one-third of its population. Out of a sample of 500 homesteads, 65 percent of the rural homesteads had a radio in use, i.e., used the previous month. Of the rural population over 10 years old, about 37 percent reported to listen to the radio during the average week and of these 84 percent listened to the Swazi Broadcasting Company.[18]

Due to the dearth of data on sources of information about health-related matters, the project includes a study to identify the main sources used, which will be based on a sample stratified according to socio-economic variables. The study will attempt to assess the major sources of information for both initial information as well as those influencing adoption. This is important since studies on diffusion of innovation show that impersonal sources, e.g., the mass media, are usually the initial source of information but that adoption tends to be influenced by inter-personal communication, e.g., extension agents, relatives and neighbors. Furthermore, the study will identify the main sources in the indigenous media, e.g., song and poetry, and seek to assess the feasibility of using these to change attitudes and motivate action.

Since group learning and commitment have been shown to influence adoption in other developing countries, the project will probably use this strategy at the community level. Because Swazi culture emphasizes open forums, group discussions and decisions, it is believed that this strategy will be effective

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18 SCS "Survey of Radio Listenership, 1977" Central Statistical Office Mbabane, March 1978.

in influencing adoption of new practices. But, given the shortage of extension personnel, impersonal sources, e.g., posters and songs, may be the most efficient source for creating awareness.

Currently the adult learning institute (Sebenta) and the MCH Health Education Unit produce health posters, mainly on themes related to family planning, nutrition, and immunization. These posters have graphic art designs and usually a short message written in siSwati, the national language. Lacking, however, has been the systematic testing of rural people's perception of both the content and message, particularly among the uneducated and those without an urban or town experience. Therefore, in the initial stage of the project a few techniques, e.g., photographs with the peripheral material blacked-out so that the main subject remains, and graphic designs of the same subjects, will be tested to assess the extent to which the content is understood. Also, the receivers perception of the pictorial message may be tested as well as their perception of the meaning of certain colors used. At the same time attitudinal information can be collected. The respondents will mainly be women since they have the primary responsibility for educating children, caring for family health, and carrying out water-related household tasks. The selection of respondents will be based on a sample stratified on socio-economic characteristics. The study results will guide the health education component by identifying effective teaching aid techniques for devising a strategy to reach those in the bottom half of the socio-economic strata of rural society.

F. Profile of Rural Households

The physical appearance of Swazi homesteads today bears little resemblance to descriptions written in the 1930 - 1950's about a semi-circular cluster of houses facing a cattle byre. The round traditional house, referred to as a beehive, had a conical shaped thatched roof. Currently these are seen but most often combined with other styles. The beehive houses now are usually used for cooking since they allow the smoke to escape or are inhabited by the elderly who prefer this style house. About 39 percent of the homesteads have houses made only of wattle poles, filled with mud, grasses, or stones and then plastered, or of clay bricks. Most common (44 percent) are compounds with the latter types combined with permenant brick houses.[19] The permanent houses tend to have corrugated iron roofs and cement floors. The building of permanent houses indicates that the belief that homesteads had to be moved every two generations because of ancestral spirits has greatly receded.

Homesteads range from a minimum of two buildings, one for sleeping and the other primarily for cooking, built side-by-side without a cattle byre, to very large compounds of up to

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19 UNICEF op. cit.

15 structures. As membership increases, buildings are constructed, usually in rows, for sleeping, cooking and storage. The settlement area tends to be surrounded by the fields of the household, although in densely populated areas noncontiguous parcles are common.

The old ethnological model characterized Swazi rural households as having (a) large membership, (b) male household heads, (c) agnatic relationship, and (d) multiple material links. However, this pattern has changed. Households average between 7 - 10 members (depending upon the definition used) and about 21 percent are headed by women.[20] A case study in a Middleveld community found that at least 30 percent of the homesteads do not contain agnatic kin, i.e., kin linked to the homestead through the male line, or complex relationships, e.g., kin of the wife or members without kinship affiliation. Furthermore, only 11 percent of them contain multiple marital links, i.e., a male and female living together in a household and functioning in the role of husband and wife. Seventy-five percent have only one marital link and 14 percent contain none. Only slightly over half of the hometeads are composed of members of three to four generations.[21] Thus, household composition and leadership are undergoing a change as land becomes scarcer, households rely more on the cash economy to meet their basic needs, and job opportunities provide a channel to establish economic independence, as discussed below.

Most (76 percent) of the rural homesteads have absentee members. Of these, about two-thirds have three or less members absent, including 29 percent with only one person away. The most common reason for absenteeism is wage employment, while others are in school, with spouses or with parents. Most of the absentees (77 percent) are in Swaziland, with the majority of them in urban areas, whereas in 1960 40 percent of the rural absentees wer working in South Africa. This difference is due both to increased labor absorption in the Swazi economy and greater difficulty in obtaining work in South Africa. In addition to absentee members, forty percent of the households have resident members earning wages in close proximity to the homestead. Both the absentees and residents in wage employment diminish the adult labor force for agriculture and other homestead related tasks.[22]

Swazi Nation Land belongs to the King, who vests in chiefs the power to allocate rights for building and cultivating to male household heads. Usufructuary rights can be inherited by sons and rights are usually secure as long as the person fulfills his obligation in the form of occasional service and gifts to the chief, and is generally law-abiding. One community study found that 34 percent of the households had inherited their land, 3 percent had obtained it by swearing allegiance to the chief, and a further 23 percent, primarily consisting of female headed households, obtained useage rights from husband (where there were no sons to take over), parents or husband's brother. Women

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20 deVletter 1979, op. cit.

cannot inherit Swazi Nation Land.[23]

Grazing is done on communal land. About two-thirds of the homesteads own cattle, although there are significant regional differences. One-third keep goats and one-fourth raise pigs. Virtually all homesteads keep poultry. The average homestead comprises 2.75 ha of which 80 percent is devoted to crops grown once a year. Virtually all households grow maize and pumpkins, often intercropped. And, at least one-third of the homes produce sweetpotatoes, groundnuts and beans. While cotton and tobacco are the country's main smallholder crops, less than 15 percent of the homesteads grow these. Homesteads selling maize frequently also have to purchase these items at other times of the year, indicating the need to satisfy an immediate cash requirement. About two-thirds of the homesteads do not appear to meet their consumption needs, but purchase basic items like maize, milk and vegetables.[24]

There is a dearth of information on nutritional status . Swazis. In 1974, it was calculated that 66 percent of the ral population did not have a satisfactory level of nutrition.[25] does not appear, however, that there is a very high rate of severe malnutrition but probably a significant percent suffer from protein energy malnutrition or mild cases of malnutrition.

The WID NRDA study found that women perform about two-thirds of the agricultural work in addition to being the major contributors to most other household tasks.

Table 2

DIVISION OF LABOUR ACCORDING TO CONTRIBUTION BY MALES AND FEMALES

	Females	Males
Cooking	1.00	0.00
Fetching firewood	0.96	0.04
Fetching water	0.98	0.02
Washing clothes	1.00	0.00
Looking after children	1.00	0.00
Looking after cattle	0.09	0.91
Thatching the roof	0.19	0.81
Smearing the floor	0.98	0.02
Making handicrafts	0.93	0.07
Ploughing	0.59	0.41

23/ Allen op. cit.

24 deWletter 1979, op. cit.

25 Andreon op. cit.

Table 2 cont.

DIVISION OF LABOUR

	Females	Males
Sowing	0.76	0.24
Weeding	0.85	0.15
Harvesting	0.83	0.17
Transporting to market	0.60	0.40
Selling at market	1.00	0.00

Source: Ingo-Lill Andrehn, Dinah Rabemita and Dinah Smitt, "Draft Report on the Living Conditions of Women in the Northern Rural Development Area of Swaziland, 1977" Ministry of Local Administration and UN Office of Technical Assistance, p. 40.

Occasional income-generating activities are undertaken by most rural women. Selling of handicraft items, e.g., grassmats and knitwear is the most common, followed by selling of beer. Relatively few sell prepared food, fowls, fruits, vegetables, or traditional medicine. Data are not available on the amount earned.

The most important source of homestead income is from wages and/or remittances. Sale of farm produce is the second most important source. The mean annual gross cash income per resident member is E131.50 while the modal group is E30-50. Over half of the homesteads purchase basic foods on a monthly basis. Furthermore, they tend to spend E93 annually on education. Household assets indicate that money is spent on capital investments and labor-saving technologies. At least half of the homesteads have ploughs, wheel-barrows, radios, hand maize grinders, charcoal pressing irons or primus stoves (small kerosene cookers).[25/]

II. Spread Effects

Knowledge about practices which contribute to water and excreta related diseases, and measures that can be taken to lessen the possibility of contracting these diseases, will be widely disseminated through this project. Initially, the information will be communicated to rural homesteads through community workers on an interpersonal basis. The information will be supported by media such as posters and radio broadcasts; however, the emphasis will be on personal communication and demonstration in the community. It is anticipated that those benefiting from interpersonal communication under the project will diffuse information at local markets, frequented by women, and through visits with relatives and friends in other communities. Also, people reached only by the media are likely to spread information.

The receptivity of the households will probably be influenced by the educational attainment of its members. Two-thirds of the rural homesteads have at least one member with a secondary education, and fifty-nine percent of the rural population has some formal education. About 75 percent of the homesteads have absentee members, in employment, in school, or otherwise in urban areas, many of whom return home for a few days each month. These members, who are familiar with urban sanitation facilities, can play an influential role in developing better facilities in the homestead.

Development of more appropriate motivational and communication skills for community workers under the project will facilitate more effective interpersonal communication. To date, most extension training focuses on technical data and theory, ignoring communication skills and motivational techniques. The community extension workers need visual aids and techniques for more effective group dynamics. The provision of these under the project is expected to positively impact on other projects and programs.

The strengthening of community cooperation under the sanitation project component has the potential for impacting on future activities as communities recognize their potential as a group in solving problems. And, the health education component, calling for greater cooperation and coordination among a variety of services, ought to influence other attempts at a coordinated approach to various rural problems.

The methodology and strategies for more effective training programs in outreach activities will evolve from the results of the study undertaken on knowledge, attitudes, and practices, concerning health and sanitation in the rural Swazi population. The study will also investigate sources of information for rural homesteads and determine which sources are more influential. In addition, data will be collected on values and perceptions of rural homesteaders. Such factors as colors, symbols, and other visual images will be investigated to determine positive or negative reactions. This data will provide a valuable source of information to be used in planning other projects and improving existing ones.

III. Social Consequences and Beneficiaries

A. Social Consequences

The project will result in an improved state of health, especially among the rural population through the reduction of water- and excreta-related diseases. This will be affected by facilitating the construction of pit latrines, and the adoption of practices and measures to prevent diseases. Simple changes in household practices which are within the means and control of the poorer half of society, as well as others, will occur as a direct result of the health education component. Community-based activities, such as the fencing-off of contaminated water supplies with thorn bushes, will be stimulated by the project education component aimed at raising the level of awareness of

individuals and groups, and encouraging them to act. Lessening the possibility of schistosomiasis will be brought about by an increase in people's awareness, especially those in the Middleveld and Lowveld, of the hazards of contact with water sources, and promotion of actions within their control such as collecting water at different times and discouraging children from playing in the water.

Lessening the possibility of contracting schistosomiasis will help prevent people from experiencing internal complications, secondary bacterial infections, severe fever, malaise and a shortened life-span. Improved hygiene and sanitation will result in fewer cases of various diseases, such as gastroenteritis, a common cause of childhood mortality whereby severe vomiting and diarrhea lead to dehydration, and dysentery, characterized by diarrhea, fever and abdominal pain, which sometimes result in the death of children. Furthermore, reducing water- and excreta-related diseases will help to maintain nutritional levels since diseases reduce the body's capacity to absorb nutrients and hence contribute to lowering the nutritional status of the individuals affected.

By lessening the incidence of water- and excreta-related diseases, and thereby improving the health of the rural population, there will be an increase in the potential productive capacity of the beneficiaries. School attenders will miss fewer days at school and will have greater ability to concentrate on learning. Other members of the population will be better able to undertake their day-to-day responsibilities, in wage employment and in the homestead. It should also lessen the loss of potential, attributable to chronic incapacity, semi-invalidism and death. Furthermore, it will liberate time spent by women caring for sick children and taking them for treatment.

There will also be a cash savings by reducing the amount of money households spend on transport, medical consultations, and medicines. Currently, fees paid in the modern medical system are modest, but significant amounts are paid out to traditional healers. For the government there should be a saving in terms of treatment and services. Thus, while an effective preventive health program requires expenditures by the homestead and the government, it will reduce those needed on curative services, which absorb much of the time of health personnel and require large amounts of medication.

The project will assist the government in its aim to correct the current imbalance in the delivery of health services between urban and peri-urban areas and the rural regions. It will also help to support the government's emphasis on preventive health care and reach a broader-based group through simple, low-cost techniques.

The project will include techniques for consideration of existing cultural beliefs and norms. Through the use of group discussions in which participants are guided to identify alternatives within their means to solving some of their health problems, cultural factors will be taken into account by the participants. Also, involvement of various extension agents, officers and

community leaders in seminars and short courses will provide a means whereby local conditions and culture will be considered.

B. Beneficiaries

The direct beneficiaries of the project will mainly be rural women and their families. Women will be the primary point of contact in the rural population since they are responsible for child care and education, most water- and food-related tasks, household maintenance, and the health of their family. Besides, up to one-third of the homesteads do not have an adult male present and about one-fifth of the homesteads are headed by women.

The health education component will be devised so it is aimed at the lower half of the socio-economic strata of rural society. While the main beneficiaries will be those households in relatively close proximity to an extension agent, other channels will be used to reach people not served by agents. The latter channels will include the mass media and influential community leaders like chiefs and headmasters. An estimated 10,000 people will be reached through interpersonal communication on health and a further 15,000 will be reached through the mass media.

The pit latrine project component will impact primarily on households within the range of service by health assistants, rural health visitors, community development assistants and domestic science assistants and of piped water systems. Approximately 2000 poorer families will be the recipients of demonstration model pit latrines. A further 20,000 households (or 160,000 people) will benefit through the technical assistance given and organizational strategy devised under the project for pit latrines.

Other direct beneficiaries will be those receiving training: in service; out of country; and in local communities. Under the health education component three participants will receive training in third countries in Africa. The proposed director of the HEU will be trained to the masters level, one staff member at the diploma level and another participate will receive training as graphic artist in a diploma course. All of these trainees will be women. Under the water and sanitation component, a Swazi science university graduate (probably a male) will be trained as a civil engineer.

Training through seminars and workshops will be given to rural health visitors, nurses, community development workers, domestic science demonstrators, health inspectors and health assistants. This training is expected to be received by approximately 430 participants, at least 85 percent of whom will be female. Locally, chiefs, schoolmasters, traditional healers and other influential people will be included in community demonstrations on water and excreta disposal systems, which will provide technical education on environmental sanitation and stimulate community leadership in this area. About 20 percent of these local leaders are expected to be women.

Under the bilharzia control component, the Bilharzia Unit's teams of six members will recieve on the job training in diagnosis of bilharzia and other parasitic diseases, and control measures for these.

Indirectly the project will also have a wide impact. Households, primarily in the Middleveld and Lowveld where schistosomiasis is most prevalent, will benefit through the strengthening of the capacity and effectiveness of the Bilharzia Control Unit. The work of the Public Health Engineer technical assistant to the Rural Water Supply Board will impact on a larger number of households, mainly in the form of preventive health meausres. And, indirectly, through the strengthening of the Health Education Unit, the majority of the population should ultimately benefit from an increase in its delivery capacity.

In summary, approximately 20,000 rural households or 160,000 people will directly benefit from the health education and/or sanitation project component. And, approximately 700 government employees, community leaders and nongovernment workers (both males and females) will be the beneficiaries of the training given under the project components.

SCHISTOSOMIASIS SURVEY - TECHNICAL DESCRIPTION

Schistosomiasis is a disease caused by parasitic worms called schistosomes which live in the blood vessels of the human host. It has a complicated life cycle involving man and certain species of aquatic snail in which the larval stages develop.

There are two species of human schistosomiasis in Swaziland: Schistosoma haematobium (urinary schistosomiasis) and S. mansoni (intestinal schistosomiasis). The life cycle of both parasites is essentially similar. Paired male and female worms live in the fine blood vessels around the bladder (S. haematobium or intestine S. mansoni) and lay eggs which are passed into that organ and are voided in the urine or feces. The eggs or urinary schistosomiasis must be passed directly into water or they will die; those of the intestinal species can survive in moist feces for some time until washed into water. On contact with water the eggs hatch and release the first stage larva or miracidium which swims about searching for its specific snail host. The miracidium penetrates the soft spots of the snail and undergoes a process of development and multiplication within the snail. Thousands of fork-tailed cercariae result from each miracidium and, when development is complete, these emerge from the snail over a period of several weeks. This is the stage capable of infecting man. They penetrate rapidly (three to five minutes) through healthy skin by secreting digestive enzymes. Entry is not restricted to damaged skin nor ingested water as is frequently believed.

The schistosomes, as they are now called, shed their tails and enter the blood or lymph vessels. They migrate via the heart and lungs to the liver. Here they grow to adult males and females, mate and migrate to the veins of the bladder or intestine where the females lay their eggs and the cycle once more.

The snail intermediate host for S. haemotobium in Swaziland is Bulinus (Physopsis) globosus although B. (Ph) africans has been implicated in transmission of the parasite in the south. S. mansoni is transmitted by Biomphallaria pfeifferi. Two snail species closely related to the host for S. haematobium have been found in Swaziland but neither is capable of transmitting the parasite.

B. (Ph) globosus occurs extensively throughout the low and middle veld in a wide range of slow moving and stagnant water bodies.

B. pfeifferi is widespread in the lowveld and is becoming more common in the middleveld with the increase in permanent artificial water bodies. Both snails have been found in the highveld but transmission of schistosomiasis is limited to the low and middle veld by the temperature requirements for the development of the parasite within the snail.

S. haematobium transmission occurs extensively in the well watered middleveld and to a slightly lesser extent in the lowveld.

S. mansoni first appeared with the construction of the irrigated estates in the north east lowveld but has since spread throughout the low and middleveld following the rapid expansion of irrigation and dam building.

Transmission of schistosomiasis occurs mainly in the summer months with peak transmission for S. haematobium and S. mansoni occuring in November to March and October to January respectively. For both species transmission is low in spring and autumn and almost nil in winter. Maximum cercarial emergence and therefore the time of highest risk for water contact, occurs between 10 am and 2 pm for S. haematobium and 8am and 2 pm for S. mansoni.

Previous consultants, Jobin and Jones, Bruce and Unrau, recommended that the MOH undertake a major program aimed at reducing the prevalence of water-related diseases and in particular schistosomiasis.

They recommended an approach consisting of our complementary actions:

1. Improved diagnosis and treatment of infected persons.
2. Killing of snails by chemical mollusciciding along streams and canals and by installing mechanisms to flutuate water levels in dams.
3. Providing safe water supplies to rural homesteads.
4. Improvement in sanitation in rural areas.
5. Health education of the rural population.

Major emphasis was placed on the first two of the recommendations.

The MOH, AID and the PP design team have discussed the detailed recommendations made by Jones, Jobin, Bruce and Unrau and set out in the PID. Certain constraints which make the full implementation of this project impracticable were identified.

1. Lack of personnel suitable for training to the standards required.
2. Lack of established posts for the proposed staff.
3. Lack of GOS funds to meet the recurrent costs of the project particularly in view of the greatly increased costs of fuel and molluscicides.

It was felt that MOH would be unable to provide counterparts to the expatriate personnel or to support the recurrent budget of the project as proposed in the PID, at this completion.

In view of these constraints it was decided to reduce the scope of the project.

It is no longer aimed at a rapid reduction in the prevalence of schistosomiasis but at a longer term view which will provide a greater range of benefits in the reduction of other water-related diseases and improvement of the general public health of the rural population of Swaziland.

The most effective long term approach to the reduction of water-related diseases among the rural population of Swaziland is the provision of adequate clean water supplies. The GOS already has a program for the provision of piped water underway, funded by ODM and CIDA. The PP design team therefore propose to collaborate with this project in the provision of a health backup system. This will consist of three components. The provision of a sanitation component to the water supply project, the provision of a health education component and, as the GOS has particularly identified schistosomiasis as an important health risk, a component aimed at assessing the prevalence of this parasite. This section specifically deals with that last component.

The majority of water-related diseases are a result of insufficient water supplies for adequate hygiene and contaminated drinking water. Schistosomiasis differs from these in that it can be contracted through contact with infected water.

The provision of adequate clean water supplies will have a beneficial effect on the prevalence of schistosomiasis in reducing contact with contaminated water during water collection and the use of contaminated water for washing and laundry activities. However, additional control measure specifically aimed at the control of schistosomiasis are required to have a major effect on the parasite.

CURRENT SITUATION

Following the successful control of malaria in the early 1950s the Department of Health, as it then was, turned its attention to the control of schistosomiasis. In the late 1960s the development of more effective molluscicides and schistosomicidal drugs enabled the Bilharzia Unit to achieve limited control in selected areas. By the mid-seventies, snail control measures using focal mollusciciding with Baylascide were carried out in 49 areas. Host snails were eliminated from many of the areas and greatly reduced in others; however, successful control was confined to streams and had little long term effect in larger water bodies. Successful snail control on its own cannot be used as a measure of the success of a schistosomiasis control program. The water bodies treated may not be the only ones involved in the transmission of the parasite and the reduction in snail numbers may be insufficient to ensure a reduction in transmission. The only viable measure of the success of the control program is to show a reduction in the incidence of schistosomiasis in the human population. No such measure was carried out in conjunction with the above program.

In addition the Unit visited schools to test the pupils for schistosomiasis. This could have been of immense value in establishing the distribution and prevalence of schistosomiasis in Swaziland. Unfortunately the survey was not carried out on a sound epidemiological basis. Schools were visited at the request of the headmaster. The children were tested for bilharzia and those found positive were treated. Initially urine and fecal samples were collected and the children were tested for urinary and intestinal bilharzia. However, the drug used for treatment, Bilharcil (Metrifonate), and testing for intestinal bilharzia was discontinued as treatment could not be provided. The techniques, used for diagnosing the disease were inefficient and, as no egg count was included, gave no indication of the severity of the disease in the infected individuals.

The program to date has been poorly implemented and will have had little or no effect on the prevalence of schistosomiasis in Swaziland. The mollusciciding program temporarily reduced snail populations in the areas treated but is unlikely to have had a major effect on transmission. The drugs used in the treatment of schistosomiasis do not provide protection against reinfection by the parasite. Consequently treatment of school children had little long term benefit, particularly in view of the small number of schools treated (60 schools tested between 1976 and 1978).

The rise in prevalence of malaria in 1975/76 resulted in a suspension of surveillance and control measures when staff, transport and equipment were transferred to malarial control duties.

Several major weaknesses have been identified in the existing Bilharzia Unit. Neither the Health Inspector, the Senior Health Assistant (Bilharzia) nor any of the staff of the Unit have received formal training in the diagnosis and control of schistosomiasis. The staff, equipment and transport are shared with the Malaria Control Unit. When the prevalence of malaria increases these are transferred to malarial duties and the schistosomiasis program is neglected. Methods used for diagnosis of bilharzia are inaccurate and are inefficiently carried out. Similarly snail control is confined to mollusciciding with no consideration given to alternative more appropriate techniques. The mollusciciding is poorly implemented with little attention paid to ensuring that suitable concentrations of molluscicide in the water body are achieved. Accommodation for the Bilharzia Unit is restricted to two small rooms and a molluscicide store. In one room diagnosis, clerical work and some treatment of infected persons takes place. In the other, fecal specimens are prepared for examination and molluscicide

store. In one room diagnosis, clerical work and some treatment of infected persons takes place. In the other, fecal specimens are prepared for examination and molluscicide is weighed out. The organizational structure of the Malaria-Bilharzia Section is shown in Figure 1. The Bilharzia Unit comprises of one Senior Health Assistant as the rest of the section have been transferred to malaria control duties.

The MOH plans to return six Health Assistants (four established posts, two non-established) to the Unit later this year. The MOH also plans to employ an epidemiologist, funded by WHO/UNDP to head the Malaria-Bilharzia Unit and Public Health Laboratories. AID proposes that the staff structure of the Unit be strengthened further by the addition of a second Senior Health Assistant, a clerk and a Unit leader.

RATIONALE

Schistosomiasis is not evenly distributed throughout Swaziland. Some areas, in particularly the highveld, have little or no transmission whereas in others the parasite is hyperendemic. In areas where schistosomiasis transmission is low or non-existant, prevalence rates and pathological effects among the population will be relatively insignificant and to introduce control measures into such areas would be an unnecessary wast of the limited preventative medicine budget of the MOH.

In areas where the disease is hyperendemic it is important that control measures be introduced. It has been established that high prevalence rates of schistosomiasis are associated with high intensities of infection and, in turn, with gross pathological effects. This is particularly true of intestinal bilharzia.

Recent surveys by the School Health Teams and the Bilharzia Unit have given some indication of the distribution of urinary schistosomiasis but, as the surveys were poorly planned and the techniques used were inefficient, the information gathered is only of limited value. Little is known about the intestinal schistosomiasis situation. No data is available on the intensity of infection of either parasite in individuals.

The PP design team identified this as the major problem in the planning and implementation of the national control program requested by the GOS. It was considered of primary necessity to undertake a nation-wide schistosomiasis survey to:

1. establish the extent and degree of the schistosomiasis problem in Swaziland in order that the public health importance may be assessed.
2. identify areas where schistosomiasis is hyperendemic in order that control measures could be concentrated on those areas.
3. to identify areas in greatest need of water supplies.

The most accurate approach to determine the number of persons infected and intensity of infection in a population is to test all members of the population. This simple approach is time consuming and costly. An alternative is to test a representative sample of a defined population. The number found infected divided by the number in the sample is the proportion positive in the sample i.e. the prevalence rate. If the population has been sampled on a random basis i.e. if each person has an equal chance of the total and a statistical measure of the degree of precision of this figure.

In order to minimise the cost and to maximize the accuracy of the survey the sample design for selection and examination of the sample requires careful consideration. It is fortunate that the 1976 population census enumeration maps are available. These maps will greatly facilitate the specification of the sample frame (the "list" from which the sample is drawn). Prevalence of urinary schistosomiasis varies considerably with age. It rises to a peak among teenage children then decreases in older individuals. This effect is much less marked for the intestinal species. It may be more practical to identify areas of high transmission by examining a representative sample of a specific age group which is most likely to have the highest infestation i.e. the 10 - 14 year olds.

The sampling unit should be the homstead to ensure that all of that age group, not just those attending school, are tested. Following the analysis of this age specific sample, more extensive samples can be taken from areas indicated to have high infestations.

The representativeness of any sample must be tested against the age, sex and geographical distribution of population in the 1976 population census.

Background details should be recorded for each individual sampled. These should include name, age, sex, homestead identification, location, water supply etc.

Sampling of the population will be carried out by a team consisting of one Senior Health Assistant and three health assistants. Prior to the survey of each community the purpose of the survey and what it entails must be explained to the community and its cooperation enlisted. The experience of the Malarial Control Section in the field will be invaluable at this stage.

Each individual to be tested must provide a sample of faeces and a midday urine specimen. Preservative will be added to the sample in the field and the sample carried back to the laboratory for analysis. The methods of analysis will have to be chosen by the epidemiologist. They should be well-established, accurate, quantitative methods such as the Kato thick smear (feces), a simple urine filtration technique or use of the Pitchford/Visser filter for urine or feces. Examination and egg counting will be done in the Mazzini Laboratory by the other team of a Senior Health Assistant and three Health Assistants.

An initial analysis of the geographical distribution of the parasite could be carried out by the Unit; however, more detailed analysis would require a computer. Several universities and institutions already have computer programs designed to handle such data and would be interested in cooperating. (University of Michigan, Lowell University, Ross Institute).

The sample frame designed for the schistosomiasis survey would be suitable for studying the distribution of other diseases. If a team from the MCH including a nurse trained in diagnostic methods, accompanied the schistosomiasis team they could use the frame to survey these diseases.

An initial six month pilot study would be carried out to test the techniques and record forms and to train the staff in their use. This would be followed by a two year nation wide investigation to identify the hyperendemic areas. These areas would be further investigated to establish the prevalence distribution in the community, water contact pattern and transmission sites.

Post survey control methods will be the responsibility of the MOH. Hyperendemic areas revealed by the study should be further investigated. In each area a more detailed survey of the human population should be carried out involving all age groups. The schistosomiasis teams would then need to examine local water bodies to identify transmission sites. Areas of high water contact i.e. bathing areas, water collection points and irrigation canals, should be tested for the presence of the bilharzia host snails and the snails should then be tested for bilharzia infection. From the results of these surveys control measures should be devised and recommendations made to the MOH by the Unit.

The control measures would, to a great extent, link in with the activities of the RWS Branch and the other components of this program.

Hyperendemic areas would be recommended to the RWS Board as high priority areas for the installation of water supplies. Once water supplies were installed and the complementary activities of health education and sanitation were underway then the introduction of self-help measures i.e. the construction of simple footbridges, fencing of contaminated water supplies with thorn fences etc. could be implemented. These are most readily introduced at this stage because:

1. A organizational structure, the Community Water Committee will be formed and able to coordinate the activities.
2. Health Education will have made the population aware of the necessity for such practices.
3. The provision of water will have limited the need for contact with contaminated water so that such areas can be fenced off without undue inconvenience to the population.

Where hyperendemic areas are associated with irrigation schemes the MOH in collaboration with the Bilharzia Unit and the Sanitary Engineer should liaise with the owners to develop control measures. These should include recommending engineering improvements in irrigation and drainage practice to discourage the snail intermediate host. The upgrading of water supplies and sanitary facilities for employees, fencing and bridging of transmission sites and focal molluscicidding. Responsibility for the implementation of these would rest with the owners but would be supervised and monitored by the Bilharzia Unit.

The RDA areas priority should be given to the provision of clean water, sanitary facilities and health education. The Sanitary Engineer in collaboration with the Bilharzia Unit should recommend improvements in canal design and maintenance and the bridging of fencing of contaminated water supplies. Recent improvements in RDA irrigation practices, the fencing of dams and the use of pipes for the distribution of irrigation water are already reducing the risk of schistosomiasis transmission.

In high prevalence urban areas, the Town Council would be advised of the existence of transmission sites and control measures would be recommended.

The control of schistosomiasis in Swaziland depends to a great extent on education of the population, not only the rural population but also of people at all levels of authority, to the problems of schistosomiasis and to the necessity of working together to reduce the spread of the parasite.

CONTROL MEASURES FOR SCHISTOSOMIASIS

A rapid reduction in the incidence and prevalence of schistosomiasis can be achieved by the chemical destruction of snails and the chemotherapeutic killing

of adult worms in man. These methods require only an official control organization under the control of a single public service agency. Although this approach has been shown to be extremely effective in may cases, it involves a high recurrent expenditure.

Molluscicides provide only short term control of the snail host and, to be effective require repeated application, in some cases as often as once every six weeks. The two currently available commercial molluscicides are expensive (Frescon 16.5% e.c. = E450/100 litres; Baylascide 70% w.p. = E495/25 kg). The rising costs of oil are likely to further increase the price of both compounds. In addition, the above molluscicides lack selectivity, and although harmless to man, stock and crops are highly toxic to fish at molluscicidal concentrations although environmental damage can be minimised by careful application focussed at specific transmission sites.

The use of vegetable molluscicides i.e., plants toxic to snails when added to water, is sometimes recommended as a cheap control measure. Several potentially molluscicidal plants are native to Swaziland but would require extensive research to ensure that they caused no damage to stock, crops, man and other non target organisms before they could be introduced.

Although some forms of biological control show promise no method suitable for widespread use has been developed. The adequate testing of locally available predator species is a complex and expensive process outside the scope of the present program. The introduction of exotic species to control snails is highly dangerous without a full understanding of its potential effect on the environment.

Chemotherapy on its own is inefficient except in stable, isolated populations. Although it results in a rapid reduction in prevalence, the drugs provide no protection against re-infection. They must therefore be used in conjunction with other control measures. Previously mass treatment campaigns were hindered by the toxic nature of the drugs employed, by unpleasant side effects or by the necessity for repeated treatment. Recent developments have reduced these problems and safe cheap schistosomicidal drugs are now being developed by Bayer and Ciba in conjunction with WHO and USAID respectively.

In addition to the problems mentioned above all these control measures are specific for schistosomiasis and have no other beneficial effects. The PP design team considered that the GOS should aim initially at controlling the further increase of schistosomiasis then at the gradual reduction of the parasite, concentrating first on areas of high endemnicity.

As the spread of schistosomiasis is related to that of water projects (irrigation schemes, stock watering dams etc), it is important that these are designed to minimize the disease potential and that expert advice can be provided on modifications which will reduce the risks from existing structures. AID propose to provide a Sanitary Engineer for a five year period to carry out these tasks and to train a local counterpart. This measure is discussed elsewhere.

In the long range the most beneficial permanent method for schistosomiasis control is the provision of adequate safe water. Combined with improved sanitation and public health education, it has the additional benefits of reducing other water and fecal related diseases. Other non-chemical methods of control are aimed at reduction of human contract with contaminated water or in rendering water bodies unsuitable for the intermediate snail host. The former involve, fencing of dams and streams and canals to prevent contamination with excreta both human and cattle and to reduce contact with infected water supplies. This approach is already being implemented in part by the Land Use Planning Section (MOA) but for reasons other that schistosomiasis control. Dams installed by this

Department are surrounded by barbed wire fences and provided with an infiltration gallery linked to a standpipe and cattle trough below the dam. These measures are aimed at preventing erosion of the dam walls by cattle but will provide additional benefits in reduction in disease transmission in both humans and stock.

Reduction in suitable snail habitats is brought by improved drainage, increasing water flow in rivers or canals, weed clearance to permit greater water flow rates or by careful water management. In many cases good engineering and agricultural practices and schistosomiasis control go hand in hand. Introduction of environmental control measures may lead to improved agricultural production.

The advantages of ecological and environmental control measures are that:

1. The effect is persistant without continual reapplication.
2. Recurrent costs are often lower than for other methods.
3. Health benefits may extend to other infectious diseases.
4. The approach lends itself to local or small scale use.
5. It may result in increased agricultural production.

The disadvantages are:

1. The cooperation of the local population, other Government bodies or private companies is required.
2. The initial cost of installation may be high in some cases.

One form of environmental control was suggested by Jobin and Jones, the fluctuating of water levels in dams by the use of siphon spillways. This method, although successful elsewhere is unlikely to be effective in Swaziland because of the annual rainfall patterns. The main rainfalls do not occur until 2 months after the start of the transmission season. Also the drop in water level would leave behind small pools of water ideally suited to the breeding of Anophales gambiae, the mosquito vector for malaria in Swaziland.

FURNISHINGS AND EQUIPMENT FOR BILHARZIA UNIT

a) Laboratory

1 stainless steel sink unit, double with draining boards
1 stainless steel sink unit, single
Plumbing for above.
18½ metres of laminated benching 75cm wide and 90cm high
4 underbench drawer units
3 underbench cupboard units
5 wall cupboard units
6 laboratory stools
Lighting - 4 double fluorescent lights
Power - 8 x 13 amp power points
Wiring for above.

b) Office

4 desks
6 chairs
2 filing cabinets
2 bookcases

CONSTRUCTION

Laboratory and office building 12 metres x 4 metres comprising a laboratory 8 metres x 4 metres and an office 4 metres square.

Equipment list

4	microscope compound with objective lenses x 4, x 10, x 40 and x 100 (oil)	E3,200
2	stereoscopic microscopes x 20 to x 100 zoom magnification	1,600
1	bench centrifuge, variable speed, with timer and capacity for 24 x 15 ml. centrifuge tubes	400
1	analytical balance, 4 place	500
1	refrigerator 9 cu.ft.	300
2	electric heaters	50
	laboratory glassware	1,000
	chemicals, containers etc, for survey	6,000

Sanitation Program - Technical and Cost Details

Technology for Extreta Disposal In Rural Areas

In rural areas where water is not piped directly into the home, the options for sanitary disposal of excreta are limited to non-water carried disposal techniques. The options are further limited if human excreta is not used for fertilizer. The sanitary options therefore involve some type of pit with an appropriate cover and opening, and superstructure.

Pit latrines are the most common sanitation facility used in developing countries. In its simplest form, a pit latrine has three components:

1) the pit;
2) a squatting plate (or seat and riser); and
3) the superstructure.

A typical arrangement is shown in Figure 1. The pit is simply a hole in the ground into which excreta fall. When the pit is filled to within one meter of the surface, the superstructure and squatting plate are removed and the pit filled up with soil. A new pit is then dug nearby.

The simple unimproved pit latrine shown in Figure 1 has two major disadvantages: it usually smells, and flies and mosquitoes readily breed in it, particularly when it is filled to within one meter of the surface. These undesirable attributes have led to the rejection of the pit latrine in favor of other, far more expensive forms of sanitation. The undesirable attributes are almost completely absent in ventilated imporved pit latrines and Reed odourless earth closets. It is therefore recommended that unimproved pit latrines of the type shown in Figure 1 should no longer be built.

Ventilated Improved Pit Latrines. Recent work has provided designs for pit latrines that are odourless and have minimal fly and mosquito nuisance. Ventilated improved pit (VIP) latrines are a hygienic, low-cost and indeed sophisticated form of sanitation, which has only minimal requirements for user care. The pit is slightly offset to make room for an external vent pipe. The vent pipe should be at least 150 mm in diameter (preferably 200 mm); it should be painted black and located on the sunny side of the latrine superstructure. The air inside the vent pipe will thus heat up and so create a vigorous updraft with a corresponding downdraft through the squatting plate. Thus any odor emanating from the pit contents are exhausted via the vent pipe, leaving the superstructure odor free. The VIP basic design is shown in Figure 2.

[illegible] pit ventilation may also [illegible] and mosquito breeding. [illegible] flies and mosquitoes from [illegible] Nevertheless, some eggs will be [illegible] adults will emerge. If the vent pipe is [illegible] let light into the pit and if the superstructure is sufficiently dark, the adults will try to escape [illegible] the vent pipe. However, the vent pipe is covered by a gauze screen so that the flies are prevented from escaping and they eventually fall back, to die in the pit.

Both vent pipe and the gauze screen must be made from corrosion resistant materials (e.g. asbestos cement, fibreglass, PVC). Little detailed work has been done on the design of the vent pipe; at present it is recommended that the pipe diameter should be 150-200 mm and that it should extend 300 mm above the roof; this should be increased to 600 mm if the pipe cannot be located on the sunny side of the superstructure.

Reed Odorless Earth Closets. An alternative design for a VIP latrine is the Reed Odorless Earth Closet (ROEC), shown in Figure 3. In this latrine the pit is completely offset and excreta are introduced into the pit via a chute. A vent pipe is provided, as in the VIP latrine, to minimize fly and odor nuisance. A disadvantage of the ROEC, however, is that the chute is easily fouled with excreta and thus provides a site for fly breeding; the chute has therefore to be cleaned regularly with a long handled brush. In spite of this small disadvantage ROECs are sometimes preferred to VIP latrines for the following reasons:

1) the pit is larger and thus has a longer life than other shallow pits;

2) as the pit is completely displaced, the users (particularly children) have no fear of falling into the pit;

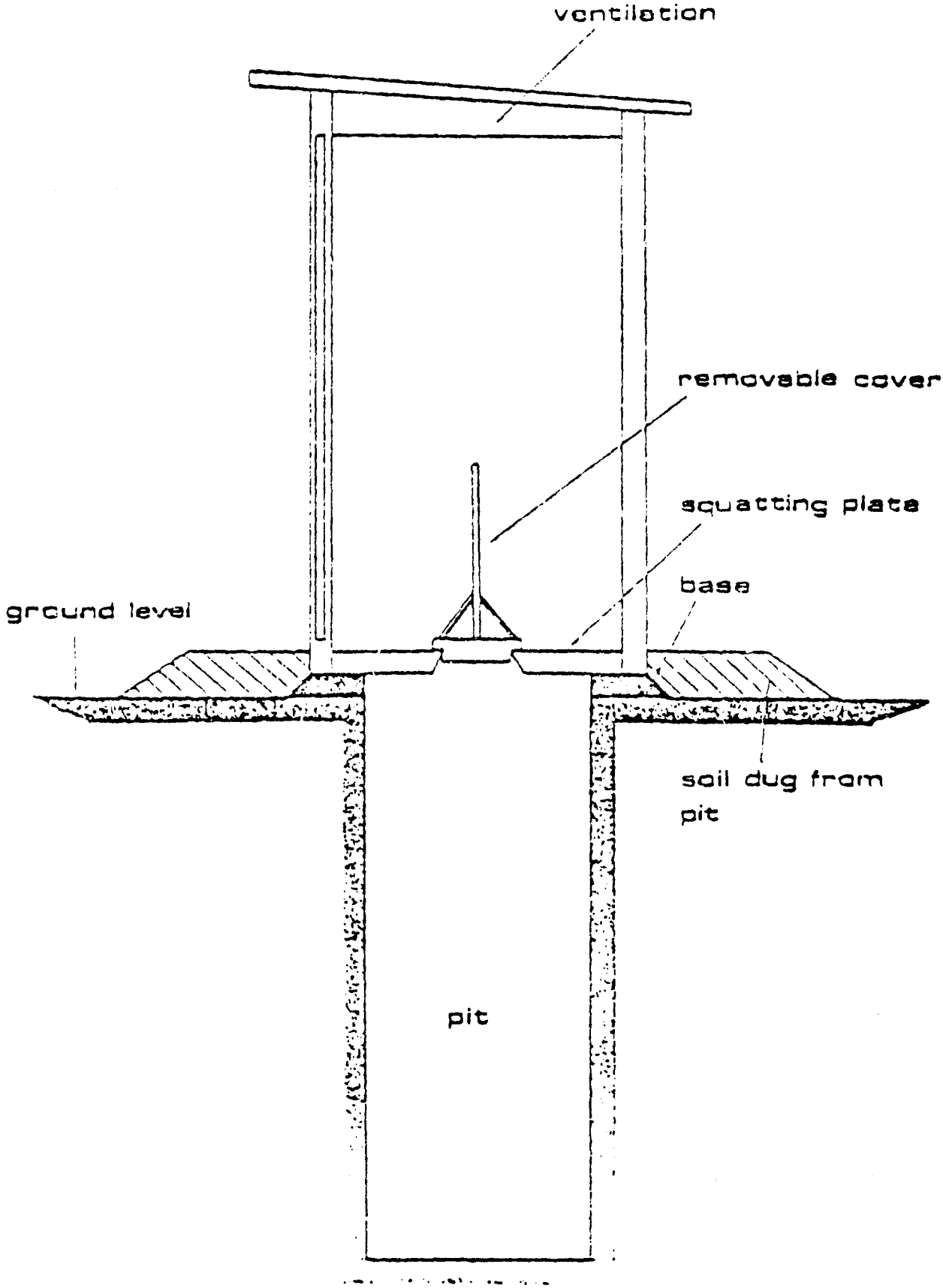
3) it is not possible to see the excreta in the pit; and

4) the pit can easily be emptied, so that the toilet can be a permanent facility.

ROECs have proved extremely satisfactory in southern Africa, where some units have been in continuous use for over 20 years. Recent experiments in Tanzania have also demonstrated their technical and social acceptability.

The decision concerning which of the two improved designs to use must be based on local conditions, cost constraints and the level of maintenance that can be expected. Additional modifications of the two designs are certainly possible, but the basic design concept should be maintained. Generally

CONVENTIONAL UNIMPROVED PIT LATRINE



VIP LATRINE

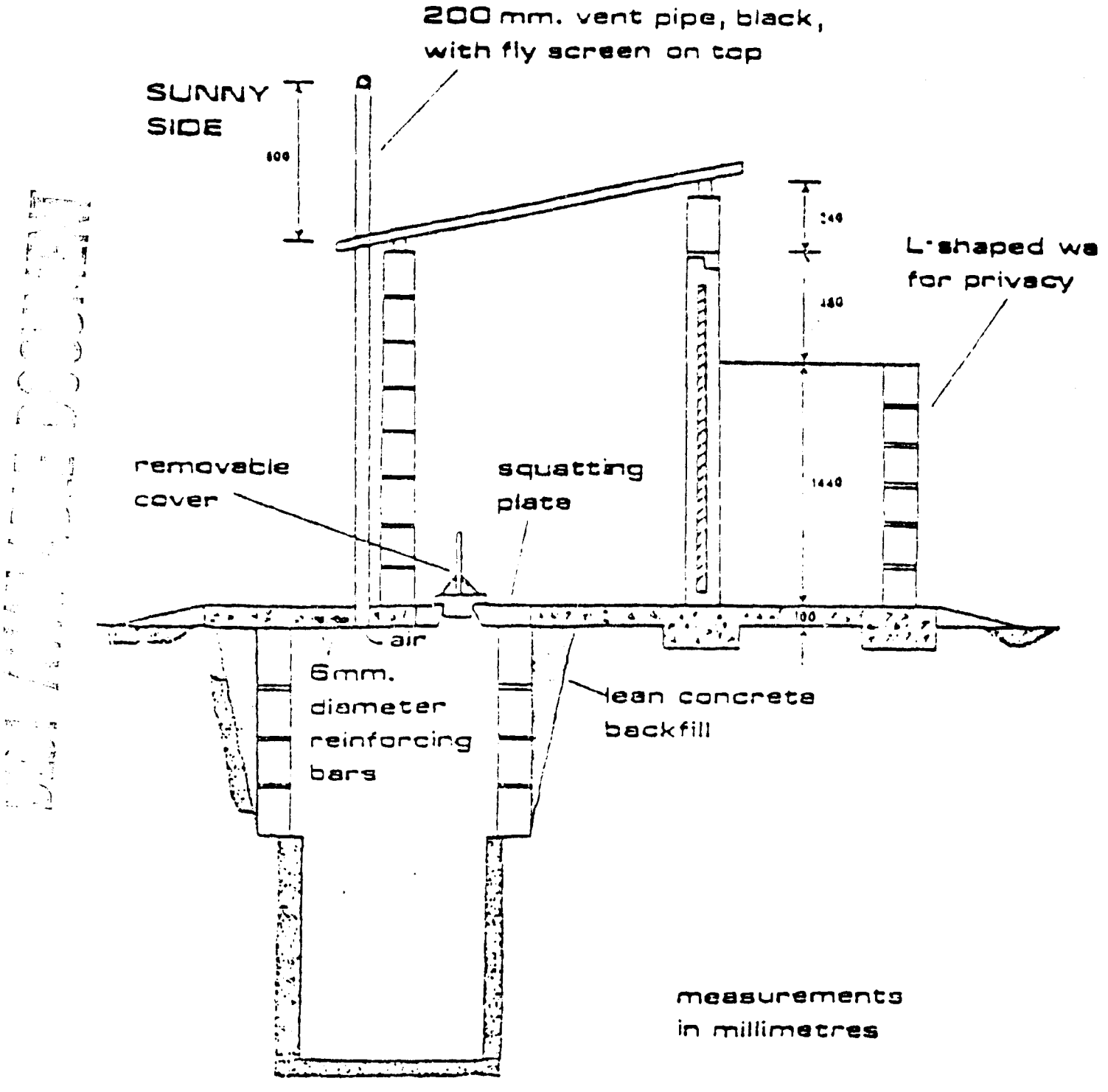


FIGURE 2

Source: Appropriate Sanitation Alternatives: A Field Manual; Thomas Kalbermatten, Telecommunications Department, The World Bank, October 1[illegible].

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NO. 65

the VIP latrine will be somewhat less expensive than the ROEC.

Other designs. If a water distribution point is located in the family living area or quite nearby, an alternative design, a pour-flush toilet with a water seal toilet bowl, can be used. (Figure 4). The PF toilet is subject to the same constraints as the VIP and ROEC latrines and has the additional requirement of 3-6 liters per capita per day of water for flushing. The pit can be completely offset or under the superstructure as in the conventional pit latrine. This design is probably less suitable due to the requirements for water.

Pit Design. Pit latrines should be designed for a minimum life of five years and preferably for as long as 10 or 15 years. For the purpose of design, the required capacity of dry pits should be taken as 0.06 m^3 per person per year. For wet pits, where the pits extends below the water table, 0.04 m^3 per person per year should be used. In areas where anal cleansing materials which are not readily decomposed are used (grass, leaves, maize cobs, mudballs), these figures should be increased by 50 percent.

Pits should be made as large as is feasible. The volume (V) can be caculated for pits less than 4 meters deep using the equation -

$$V = 1.33\ C \times P \times N$$

where C = pit design capacity, m^3/person per year
P = number of people using the latrine (usually the household size)

N = pit design lifetime, years.

The factor 1.33 is introduced as the pit is filled in with earth or emptied when it is three-quarters full. For pits deeper than 4 meters, $V = C \times P \times N + 1$ to allow for filling the upper one meter with earth. For VIP latrines the pit is usually about 1 m^2 and the depth can be calculated using the above formula. Depths are usually in the range of 3-8 meters. The upper part of the pit should be lined especially in light soils to prevent the pit from caving in.

Location. The pit should be sited downstream from any water source used for domestic purposes. It should be located at least 6 meters from living quarters and as far as possible from shallow wells or surface streams. Pit latrines contaminate the soil and groundwater, especially shallow wells located nearby (within 10 m or so). If the soil is fissured, the pollution is more extensive and is particularly serious if it affects borehole supplies for large populations.

Squatting Plate Design. First of all it is essential to determine whether the local preference is to sit or squat during defecation. It should never be assumed that squatting is the preferred position. There are medical arguments that the squatting position is more healthy, but nonetheless it is best to provide the facilities a community wants; in many cases if provided with the "wrong" facility, the users may alter it to the one they prefer or, in some cases, they may not use the facility at all.

Squatting Plates for VIP Latrines. The four most important design considerations are:

1) The opening should be about 400 mm long, to prevent soiling of the squatting plate, and at most 200 mm wide, to prevent children falling into the pit. A "keyhole" shape is suitable.

2) Foot-rests should be provided as an integral part of the squatting plate and properly located so that excreta fall into the pit and not on the squatting plate itself.

3) The free distance from the back wall of the superstructure to the opening in the squatting plate should be in the range 100-200 mm; if it is less there is insufficient space, and if it is more then there is the danger that the rear part of the squatting plate will be soiled. Generally, the preferred distance is 150 mm.

4) The squatting plate should have no sharp edges to make its cleaning difficult and unpleasant.

A variety of materials can be used to make the squatting plate: reinforced concrete, ferrocement and sulfur cement are usually the cheapest. Cost and aesthestics are the important criteria, apart from strength and rigidity. A variety of finishes can be applied to concrete or ferrocement squatting plates (for example, alkali resistant gloss paint and polished marble chippings) or the concrete itself can be coloured. Aesthetic considerations are often extremely important to the users and should never be ignored by engineers and planners; indeed they should make a special effort to determine community preferences before the final design stage.

Figure 4 shows a good design for a reinforced concrete squatting plate. A ferrocement version of this is possible and advantageous as it need only be 19-25 mm thick (rather than 75 mm as shown in Figure 5), with consequent savings in materials and weight (but equal strength). The mix specification for ferrocement is: 1 part cement, 2 parts medium to coarse sand and 0.4 parts water; reinforcement is provided by 3 layers of 12 mm chicken wire across the slab. An

alternative ferrocement design with an integral metal "flap-trap" has been successfully developed in Tanzania. The metal flap-trap is prefabricated from 1 mm thick mild steel sheet and then galvanized.

Squatting plates should be cast in an oiled timber mold, for ease of construction. If the scale of manufacture is large, a steel mold may be preferable.

With ROECs it is necessary to provide a steeply (60°C) sloping chute to direct the excreta into the adjacent off-set pit. The chute diameter should be 200 mm. It is also essential to provide an inclined depression in front of the chute to permit urine to drain away (see Figure 4). It is possible, but rather difficult, to cast the chute in ferrocement as an integral part of the squatting plate; in practice it is easier to use metal or PVC pipe cut to shape.

Superstructure Design. The function of the toilet superstructure is to provide privacy and protect the user and the toilet from the weather. In addition its location, orientation, shape, size and color may be very important to the householder and his use and maintenance of the facility. These aesthetic details should be designed in conjunction with the users. The technical design requirements of the superstructure are relatively straigtforward and may be stated as follows

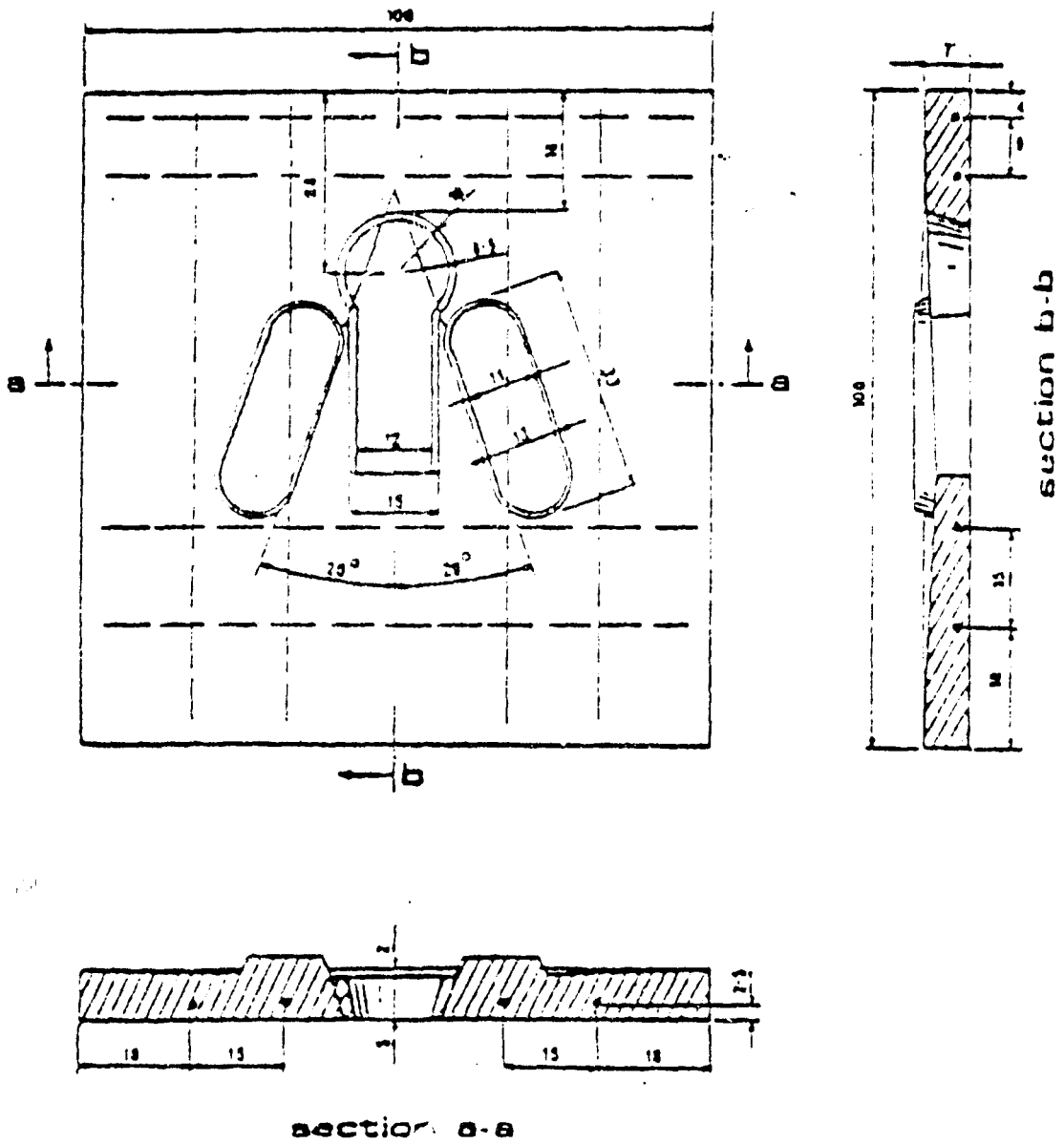
1) Size: the plan area should be at least 0.8 m^2 to provide sufficient space and generally not more than 1.5 m^2. The roof height should be a minimum of 1.8 m.

2) Ventilation: there should be several openings at the top of the walls to dissipate odors and, in the case of VIP latrines and ROECs, to provide the through draft required for functioning of the vent pipe. These openings should be about 75-100 mm x 150-200 mm in size; often it is convenient to leave an open space between the top of the door and the roof.

3) The door: this should open outwards in order to minimize the internal floor area. In some societies, however, an outward opening door may be culturally unacceptable. In either case it must be possible to fasten the door from the inside, and it may also be necessary to provide an external lock to prevent use by unauthorized persons. At its base the door should be flush with the floor in order to provide complete privacy.

4) Lighting. natural light should be available and sufficient. However, the toilet should be sufficiently

CONCRETE SQUATTING PLATE



measurements in mm

Source: From Wagner and Landial

shaded to discourage flies: this is particularly important in the case of VIP latrines and ROECs.

5) The walls and roof: these must be weatherproof, provide adequate privacy, able to exclude vermin and be architecturally compatible in external appearance with the main house.

A wide variety of materials may be used to construct the superstructure, for example: brick or concrete blocks, with tile or corrugated iron or asbestos cement roof; mud and wattle with reed thatch roof; ferrocement, sheet metal or timber with corrugated iron or asbestos cement roof. Two such designs are illustrated in Figures 5 and 6. The choice depends on cost, material availability and community preferences. The important point is that they meet the criteria in (5) above. If the superstructure is for a VIP latrine or ROEC, it is not a permanent structure but one which must be dismantled and re-erected over or adjacent to the new pit. It should therefore be designed with this in mind, although this becomes of less economic importance as the design life of the pit increases.

Specific design features for latrines and the types of superstructures cannot be specified at this time. The concept of the Ventilated Improved Latrine, however, should be maintained, as it represents a significant step forward in basic latrine design. Specific details of design must be worked out in the first stages of the actual project implementation and should be subject to evaluation and modification if necessary as the project progresses. More conventiaonal types of designs may be appropriate for schools and clinics where water is provided on the premises. These designs would more than likely be for flushing-type toilets with septic tanks and tile or french drain.

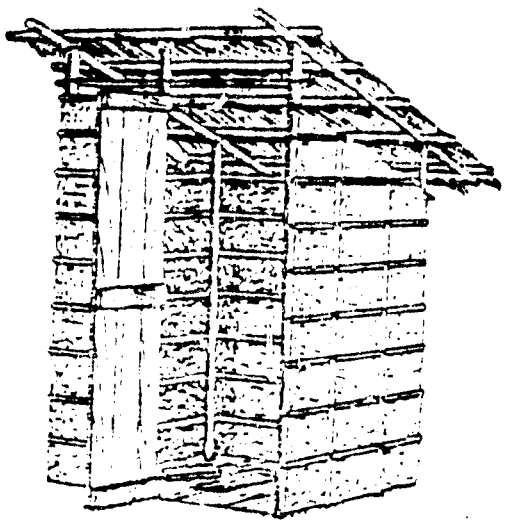
A summary of basic design criteria for Ventilated Improved Pit Latrines is shown as Table G-I.

TABLE G-I

BASIC DESIGN CRITERIA FOR IMPROVED PIT LATRINES

PIT	CRITERIA
Minimum design life	- 5 years
Recommended design life	- 10-15 years
Basis for capacity	- 0.06 m^3/person/year (dry)
	- 0.04 m^3/person/year (wet)
Minimum cross section	- 1 m^2
Location from well or water course	- 15 m
	- downstream from water withdrawal point, if possible

ALTERNATIVE TOILET SUPERSTRUCTURE
DESIGNS (CONTINUED)

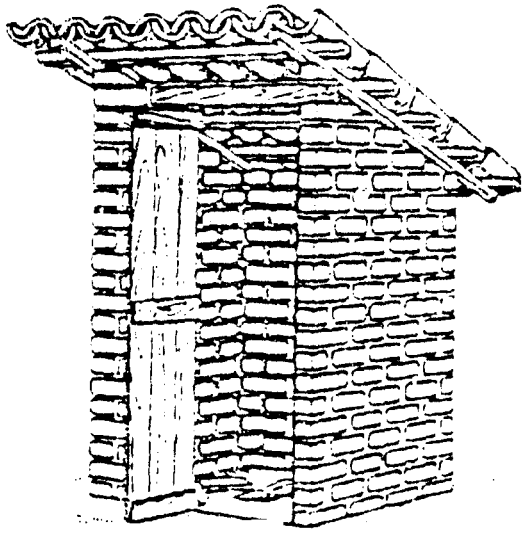


3 Mud and Wattle Walls and Palm Thatch Roof

Source: (From Wagner and Lanoix)

FIGURE 5

ALTERNATIVE TOILET SUPERSTRUCTURE
DESIGNS (CONTINUED)



D. Brick Walls and Tile Roof: an Alternative
to Concrete Block Walls and Corrugated Iron
or Asbestos Cement Roof)

Source: (From Wagner and Lanoix)

SLAB

1)	Concrete mix	- 1 part cement, 2 parts small gravel, 4 parts river sand
	Reinforcing	- 6 mm reinforcing iron
	Thickness	- 75 mm
2)	Ferrocement mix	- 1 part cement, 2 parts medium to coarse sand, 4 parts water
	Reinforcing	- 2 layers of 12 mm chicken wire layed across slab
	Thickness	- 18 - 25 mm
3)	Squat plate hole (adults)	- 400 mm long x 200 mm wide
	Hole for children (this should be given consideration if children have a fear of falling in the pit).	- 300 mm x 150 mm (these dimensions should be field verified as to appropriateness)
4)	Size of plate	- must cover offset pit for VIP and extend to cover floor of superstructure
5)	Other	- iron handles for removing to relocate

VENT PIPE

Size	- 150-200 mm diameter, extend above roof 300 mm
Material	- Black PVC pipe or asbestos cement pipe painted black
Location	- back of structure, on sunny side

SUPERSTRUCTURE

Material	- mud-wattle, wood, concrete block or brick
Size	- .8-1.8m^2 surface area 1.8 m minimum height.
Roof	- thatch, corrugated iron, other
Ventilation	- several openings 75-100 mm x 150-200 mm
Door	- if provided, should open outwards

* These criteria should be considered as a general guide, as local conditions may dictate modifications that may be necessary. However, the minimum values given should not be violated.

ILLUSTRATIVE MATERIALS REQUIREMENTS FOR VIP LATRINE - OPTION A

AID SUPPLIED

VIP COMPONENT	MATERIAL	COST (July 1979 local)
Concrete Slab* (1.2m x 2.0m x .075m) and concrete floor	2 x 50kg bags cement @ E2.86/bag	E 5.62
Concrete Block (15mm x 23mm x 46mm) for pit support 30 blocks (made on site)	1.2 x 50kg bags cement	E 3.33
Reinforcing iron	6mm @ 20m @ E0.53/1m	E 1.93
Vent pipe	200mm x 2.7m PVC (black) @ E7.40/m	E20.00
Hole cover		E 2.00
Screen	0.06m²/per each vent pipe @ E1.74/m²	E 0.10
Bailing wire	2m @ E0.10/m	E 0.20
Iron handles for moving slab	2 @ E1.00	E 2.00
TOTAL COST OF MATERIAL		E35.22

OPTION B**

Concrete slab	E 5.62
Concrete block	E 3.33
Reinforcing iron	E 1.93
Asbestos Vent pipe	E 6.00
Screen	E 0.10
Bailing Wire	E 0.20
TOTAL	E17.18

OPTION C***

Slab (1.2m x 1.2m x .05m, incl. reinforcing iron)	E 5.00
Asbestos Vent Pipe	E 6.00
TOTAL	E11.00

*Assumes that sand and gravel are obtained on site
** Same quantities as Option A.
*** Design developed by Swaziland Appropriate Technology Unit.

OPTIONAL MATERIALS

OTHER MATERIALS SUPPLIED BY HOMESTEAD*

		PRICE
Corrugated iron roofing	$2m^2$ @ E3.14/m^2	E6.82
Concrete block for seat base** (15 x 23 x 46 mm)	8 blocks @ E0.10/block	E0.80
Concrete block for house	88 blocks @ E0.10/block	E8.80
Plastic seat		E4.95

* All these materials are optional as local materials can be used and the financial costs avoided.

** Assumes concrete blocks are made on site.

TRAINING PROGRAM

1. HEALTH EDUCATION

Academic: The Health Education Unit (HEU) of the Ministry of Health is currently staffed by an expatriate Director, two seconded Public Health Nurses and an untrained graphic artist (receiving guidance from a Peace Corps artist). One of the Public Health Nurses has a health education diploma from Ibadan, Nigeria. As a part of this project, this nurse will be sent to Ibadan to complete a Masters Degree in Health Education which will give her the administrative and technical background necessary to assume leadership of the new HEU. The other public health nurse will be sent for a health education diploma in Ibadan sponsored by WHO in late 1979. To replace the first nurse educator, who will become the HEU Director, a second nurse will be selected and sent under this project for her health education diploma in Ibadan. The two nurse educators will then have the necessary skills in training and communication to conduct in-service training and provide supervision for health and community workers. AID will also fund a short course in an African institution for the graphic artist so that she can assume responsibility for preparing the required teaching aids and materials.

In-Service: Early in calendar year 1981 the 42 Health Assistants will be given a two-week workshop at the IHS in Mbabane to prepare them to carry out the sanitation program. The Health Assistants will be taught about the placement, construction and maintenance of the low cost VIP latrines, non-formal education skills and community organization techniques. The actual construction of the demonstration latrines under the supervision of the Senior Health Assistants will provide the necessary practice to carry on the program. These re-trained Health Assistants and the new Health Assistants from the IHS, when that program is resumed in 1980, will all be given one-week seminars annually to discuss field problems and train in new methodologies.

The 230 RHVs will be gathered together in groups of 40 at district headquarters for one-week seminars in 1981 and annually thereafter at MOH expense. They will receive additional training in how to teach improved hygiene and community sanitation and in special techniques such as oral rehydration therapy.

Similarly, DSDs, and possibly other community workers, will be given short annual seminars to improve the communication and motivation skills.

2. ENVIRONMENTAL ENGINEERING AND SANITATION

As a counterpart, and eventual replacement for, the AID Public Health Engineer, the project will train a Swazi candidate up to the Bachelors level in civil engineering. Ideally, a graduate engineer should be sent for public health post-graduate study; however, because and engineer for this project would be virtually impossible to recruit, a maths or science graduate (or near graduate) from the local University will be sent for a BS in civil engineering over a three year period. This engineer will then receive on-the-job training from the AID advisor in the specific skills necessary to judge the public health impacts of various designs of water systems and to recommend modification. The engineer will understudy the AID Public Health Engineer for a two-year period, from October 1983 to October 1985, before assuming the permanent position on the RWSB.

3. BILHARZIA

No academic or formal in-service training is provided because the skills required for the schistosomiasis survey are best acquired through on-the-job training rather than through academic training. The Environmental Epidemiologist will train the Health Assistant in the collection, preservation and examination techniques necessary to conduct the survey, both for schistosomiasis and for the other intestinal parasites or water-related diseases (see Annex F). The six-months between when the epidemiologist arrives and when the survey begins, will provide sufficient time for this training.

4. RATIONALE FOR TRAINING PLAN

This project provides for fewer (7) person-years of academic training than most AID projects in Southern Africa because the major groups involved in implementing all three components of the project are grass-roots level health workers. The skills these workers require in communications and community motivation, and in some basic technical skills, are highly culture-specific and are best taught within the country. The project will institutionalize annual in-service training sessions for several categories of community health workers and thereby ensure that the workers, their supervisors and the central-level personnel have an opportunity to educate one another. The five candidates receiving academic training are those needing specialized technical skills which cannot be provided for in-country (engineering and graphic arts) and those needing additional administrative and organizational skills (the HEU Director and 2 Nurse-Educators). The Nigerian training institution was chosen because the training the Educators receive there will be more relevant to their eventual jobs and because the MOH has sent students to Ibadan before with good results.

Building Construction Engineering Analysis

I. Construction Requirements

Construction of five houses for long-term U.S. technicians, offices for the Health Education Unit of the MOH, an office and workroom for a bilharzia laboratory, and four offices for District Sanitation teams is planned to support project activities. Housing is for the two Health Educators, the Sanitary Engineer and the Environmental Sanitarian in Mbabane and for the Biologist/Malacologist in Manzini. The Health Education Unit will be built near the new Health Services Institute in Mbabane. The office and workroom for the bilharzia laboratory will be an extension to the existing Health Center in Manzini. One existing room in the Center will be utilized for an office/records room. Offices for Sanitation teams will be located at Piggs Peak, Siteki, Manzini and Hlatikulu.

The B3A1 house plan (recently developed by the Ministry of Works and USAID for another MOH project) will be utilized for the T.A. housing. It has three bedrooms and provides 153 m^2 of living area.

Space requirements for the Health Education Unit, Bilharzia laboratory and Sanitation Offices have been determined by the project design team and are based on MOW standards (See attached preliminary sketches).

All buildings will utilize materials, designs and specifications that are standard for construction in Swaziland and are familiar to local contractors. In general, floors are reinforced concrete slabs, walls are concrete block masonry (plastered and painted), window and door frames are metal or wood, doors are wood, rafters or roof trusses are wood, and roofing is corrugated metal sheets. Except for sand, gravel and some wood, these materials have their source and origin in the Republic of South Africa. To facilitate timely supply of materials during construction and eventual maintenance of buildings, a waiver to allow procurement from Geographic Code 935 countries will be requested.

II. Construction Plan

Final plans and Bills of Quantities for the B3A1 house are available from the MOW and have been reviewed and approved by USAID engineers. Final plans and Bills of Quantities for the Health Education Unit, the bilharzia laboratory and the Sanitation Offices will be developed by the architect and quantity surveying offices of the MOW. Approval by USAID engineers will be required before the tendering process begins. The MOW will follow its normal procedures for tendering, review and award of construction contracts.

The planned schedule of construction action is based on recent USAID and MOW expenditures.

ACTION	TIME REQUIRED	DATE
Pro-Ag Signed	0	Sept. 79
Site Selection for Houses	3	Sept - Dec. 79
Preparation of Plans for Health Education Unit and Bilharzia Laboratory	3	Sept - Dec. 79
Preparation of Tender Documents	1	Jan. 80
Tendering and Contract Award	2	Feb. - March 80
Construction	6	April- Sept. 80

USAID will utilize Fixed Amount Reimbursement (FAR) procedures to pay for the building construction. When sites, final plans and specifications have been reviewed and approved by AID engineers, a FAR cost for the buildings will be negotiated. A 50 percent advance against the FAR cost will be allowed when a contract for construction has been awarded. Under the FAR procedures, AID review and approval of the contract will not be required. However, AID will monitor construction and make a final inspection prior to final reimbursement.

III. Cost Estimates

Cost estimates for construction have been determined by the quantity surveying office of the MOW based on recent contract awards for similar construction. Inflation is currently estimated at 1 1/4 percent per month.

B3A1 House

June 1979 estimate is $44,000 each.

Health Education Unit

Area of new structure is 135 m^2. At $180/$m^2$, cost estimate 7/79 is $24,300. Site works at 15% = $3,700.

Bilharzia Laboratory

Area of 48 m^2. At $180/$m^2$, July 1979 cost is $9,000.

Summary

Building	Unit Cost	No.	Total Cost
House	$44,000	5	$220,000
Health Education Unit	28,000	1	28,000
Bilharzia Laboratory	9,000	1	9,000
Sub-Total			$257,000
Inflation 10%			25,700
TOTAL			$282,700

IV. 611(a) Determination

USAID has been financing building construction in Swaziland for a number of years. The construction plan outlined in this analysis reflects these years of experience. A good working relationship has developed between USAID and the Ministry of Works. Their supervision and monitoring capabilities have improved to the point where few problems are encountered and construction is finished satisfactorily and on time. Cost estimates are based on recent contract awards and are consistent with other USAID project construction. Therefore, the requirements in FAA Section 611(a) for sufficient planning and resonably firm cost estimates are considered to be met by this analysis.

ANNEX J

PROJECT DESIGN SUMMARY
LOGICAL FRAMEWORK

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Sector Goal:			
To reduce the incidence of water related diseases.	Reduction in hospital and clinic cases of water related diseases.	Hospital and clinic records.	
Project Goal:			
To improve water use/ contact and sanitation practices of Swaziland's rural population.	-5,000 improved pit latrines constructed annually by 1985 -40% of the rural population using improved practices by 1985 -75% of homesteads served by improved pit latrines by 1990 -75% of the rural population using improved practices by 1990	-KAP studies -MOH records	Purpose of Goal Assumptions -There are no cultural factors beyond the scope of the project that will inhibit use of improved practices. -Rural water supply program will continue at at least the current rate of implementation. -GOS will continue Rural Health Visitor and Health Assistant Program.
Purpose:	EOPS		
To expand the capacity of the GOS to deliver effective preventive health services to combat diseases related to water and poor sanitation.	-Relevant health and water education messages reaching 60% of the rural population on a continuing basis	-Project evaluations -MOH records	

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
	EOPS		
	-80% of community level sanitation field workers involved in motivation, supervision, and training of rural people to construct and properly utilize improved pit latrines.	Project Evaluations MOH Records	
	-Health criteria being incorporated into design of water supply systems, dams, reservoirs, irrigation schemes, and other major water works.	MLA Records RWSD Records	
	-Data from schistosomiasis survey being used to set priorities for the delivery of health education and sanitation programs.		Output to Purpose Assumptions -KAP study results will be useful in determining appropriate health education content. -GOS will establish required posts.
Outputs:			
Health Education	Health Education		
KAP study completed and analyzed	-KAP study completed, analyzed, and results incorporated into content of health education program by 1983.	-MOH and project records -PES	-Trainees will return to work in positions for which trained.

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Health Education			
National health education plan developed Content of health and water education program developed on basis of KAP Participants trained HA's, RHV's and DSD's trained In-country training program developed Content of health and water education program developed on basis of KAP Facilities constructed and equipped Participants trained	-National plan, developed and implementation begun by 1983 -312 community workers trained and working -Central HEU office constructed by Oct., 1980 -1 nurse trained to M.Sc. in health education and the job -1 nurse trained to diploma in health education and the job -1 graphic artist trained to diploma level and on the job	Project Records MOH Record Site Inspection	Health Education and Sanitation activities are a high priority of the MOH. Qualified candidates are available for training.

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Sanitation and Public Health Engineering	Sanitation and Public Health Engineering		
-Selection criteria established for latrine demonstration -Optional designs and minimum design criteria developed for improved pit latrines -Improved pit latrines constructed on demonstration basis -Health assistants trained -Community sanitation committees trained -Criteria developed to incorporate health consideration into design of water works -Engineer trained	-Selection criteria developed by March, 1981 -Designs and criteria for pit latrines developed by March, 1981 -2,000 demonstration latrines constructed -42 health assistants trained -200 community sanitation committees elected and trained -1 Swazi engineer trained and on the job in public health aspects of engineering design for water works	Project Records MOH Records Site Inspection	Communities are receptive to the idea of local sanitation committees Private transport system can be used, to efficienty deliver project materials. Qualified candidates available for engineering training.
Schistosomiasis Survey	Schistosomiasis Survey		
-Nationwide schistosomiasis survey completed -Facilities constructed and equipped -On-the-job training	-Survey completed by Oct., 1983 -1 laboratory renovated -6 health assistants at the bilharzia job trained in survey techniques	Project Records Bilharzia Unit Records	GOS will use results to plan future control program.

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Inputs:			
Technical assistance	-17.66 years of TA ($2,312,600)		
Academic training	-7 years of academic training ($95,800)		
Construction	-5 staff houses 1 laboratory ($282,700)		
Commodities	-5 vehicles 5 overnight trailers cement and pipe lab equipment health ed. equipment ($177,200)		
In-country training	-10 in-country seminars during 1981 ($22,300)		
Evaluations	-1 Mid-project evaluation in 1982 ($29,400) 1 end-of-project evaluation in 1985 ($51,400)		

JOB DESCRIPTION

ENVIRONMENTAL SANITARIAN

TIME FRAME: 3 years

QUALIFICATIONS: MPH in Environmental Management or related field. Specific experience with environmental sanitation programs, particularly relating to excreta disposal systems. Must have awareness of new technologies for low-cost sanitation systems.

DUTIES:

- Investigate various pit latrine programs in Swaziland and draw up appropriate, low-cost design options for use in a demonstration program;

- develop minimum standards for the siting and construction of pit latrines;

- supervise the construction and demonstration of improved pit latrines or appropriate excreta disposal systems in rural communities;

- provide in-service training of field teams and instruction to local community members;

- coordinate activities of sanitation program with RWS program and with the health education program;

- oversee community participation activities and coordinate this with the community development officer;

- evaluate the designs and use of facilities;

- provide training for Swazi counterpart;

- set up materials ordering procedures and train district saniatrians in the use of these procedures.

JOB DESCRIPTION

SANITARY/ENVIRONMENTAL ENGINEER

TIME FRAME: 5 YEARS

QUALIFICATIONS: B.S. in Civil Engineering and M.S. in Sanitary/Environmental Engineering with previous field experience in developing countries. Experience in the prevention and control of water related diseases through engineering design of water supply/sanitation systems and through other engineering and environmental interventions.

DUTIES:

- Assist the Rural Water Supply Branch with appropriate designs of rural water systems;

- As advisor to the RWS Board:

  * establish criteria for selecting communities to receive water supply systems with particular attention given to potential health impacts;

  * develop criteria to evaluate other engineering designs from a public health engineering perspective particularly relating to water resource development, including dams, reservoirs, irrigation canals and drains;

  * review such designs and advise the Rural Water Supply Board on the potential health impacts, and design modifications to reduce or alleviate the impacts;

- Advise the Bilharzia Unit of the Ministry of Health on the potential for engineering and/or environmental interventions for controlling schistosomiasis.

JOB DESCRIPTION

HEALTH EDUCATION ADVISOR

TIME FRAME: 4 years

QUALIFICATIONS: A Master's degree in Health Education or Adult, Community, or Continuing Education.

This technician will be stationed at the MOH Health Education Unit (HEU) in Mbabane and will serve as Chief of Party for the project and Director of the Unit for two years while the Swazi Director is obtaining a Master's degree in Health Education. For the last two years the technician will serve as a counterpart to the Swazi Director.

The technician should have a minimum of ten years of experience in the field of health or non-formal education with at least two years of experience in a developing country preferably in Sub-Saharan Africa. This experience must include development and administration of a health education or a non-formal or adult education program with a health component designed for rural areas.

DUTIES:

- Serve as Chief of Party for the AID Project Team;
- direct and supervise the staff of the HEU in the absence of the Swazi Director;
- assist with the continuation and expansion of the national health education program;
- develop a water and sanitation education program based on the Knowledge, Attitude and Practice (KAP) studies of the Swazi rural population (to be conducted under this project);
- establish and maintain collaborative relationships with all units of the GOS involved in health education in rural areas;
- develop and supervise, in collaboration with the project Social Scientist, workshops and seminars to teach community workers the principles of water and sanitation education and interpersonal and group communication skills;
- assist with the development of a national long-term plan for health education which identifies the major health problems of Swaziland, and develops a strategy for supporting eradication and control measures through health education. (To complement the national plan for decentralization of health services the national health education plan will also be designed as an administratively decentralized program with district supervision.)

JOB DESCRIPTION

SOCIAL SCIENTIST

TIME FRAME: 2 years

QUALIFICATIONS: PhD (or candidate in process of completing dissertation for PhD) in Social or Medical Anthropology. Technican must have field work experience in Africa in conducting studies in rural populations. Experience in the development and implementation of surveys is essential.

This technician will be stationed at the Central HEU in Mbabane but will be required to travel extensively in Swaziland and to remain in rural areas for periods of time to supervise field studies.

DUTIES:

- Design, implement, and interpret a basline study of knowledge, attitudes, and practices (KAP) concerned with water and sanitation among the rural Swazis;

- investigate values and perceptions of the rural population to determine factors (such as colors, symbols, and other visual images) that will develop positive images for health education materials;

- assist with design of health education materials based on Swazi values and perceptions;

- identify all potential human resources for the delivery of water education to the rural population;

- design modules (in collaboration with the Health Educator) for water and sanitation education based on the KAP studies, for in-service training of health and other community workers and for integration into formal basic education programs (nurses, health inspectors, health assistants, RHVs, home economists, etc., plus primary and secondary school curricula).

- assist the HEU with development of appropriate media aids to support water education.

JOB DESCRIPTION

EPIDEMIOLOGIST

TIME FRAME: 3 years

QUALIFICATIONS: PhD in Epidemiology or MD with MSPH or MSc in Epidemiology with substantial field experience in schistosomiasis and other water-realted disease control programs. Must be able to teach para-professionals how to conduct a survey including techniques of collection, transport and examination of specimens. The candidate will be living in Manzini but will be required to travel extensively in rural Swaziland.

DUTIES:

- Work in collaboration with the short-term Statistician in designing a sampling protocol for schistosomiasis and other selected intestinal parasites for a national survey of Swaziland;
- implement the national survey for schistosomiasis and other intestinal parasites based on the sampling framework;
- provide on-the-job training to Health Assistants in methods for collection, preservation, and transport of urine and stool specimens from the field to the lab;
- provide the MOH with final survey results including data on the location and prevalence of urinary and intestinal schistosomiasis;
- assist the MOH in developing a national plan for the allocation of resources to control schistosomiasis and for future surveillance.

JOB DESCRIPTION

STATISTICAN

TIME FRAME: two 2-month consultancies

QUALIFICATIONS: Master's degree in Statistics preferably with experience in epidemiological survey work.

DUTIES:

- design a sampling protocol for the schistosomiasis survey in consultation with the Epidemiologist;

- design a suitable data collection and analysis system;

- assist the Epidemiologist with the final analysis of the survey data in the third year of the project.

ANNEX L

EXPENDITURES BY FISCAL YEAR - A.I.D. ($000)

COMPONENT: A.I.D. HEALTH EDUCATION	FY 79 COST	INFLATION RATE	FY 80	FY 81	FY 82	FY 83	FY 84	FY 85	TOTAL
1. Technical Assistance									
a. Educator/Admin. (4 yrs)	100/yr.	8%		116.6	126.0	136.0	146.9		525.5
b. Sociologist (2 yrs)	100/yr.	8%		116.6	126.0				242.6
c. Short Term Consultancies	10/mo.	8%		23.3			29.3		52.6
2. Training									
a. MS Training 2yrs - Africa	6.2/yr.	15%		8.2	9.4				17.6
b. 1 year Diploma (H. Ed.)	6.2/yr.	15%			9.4				9.4
c. 1 year Diploma (Graphic Arts)	6.2/yr.	15%		8.2					8.2
3. Vehicles									
a. Station Wagon	7.5/ea.	10%	8.2						8.2
b. Sedan	5.5/ea.	10%	6.0						6.0
4. Construction									
a. Houses for TA (2)	44/ea.	10%	96.8						96.8
b. Health Educ. Office	28	10%	30.8						30.8
5. Health Ed. Materials/Equipment	20.3	10%		24.6					24.6
Other Local Costs:									
6. KAP Study									
a. Materials	3/yr	10%		3.6	4.0				7.6
b. Enumerator Expenses	4/yr.	10%		4.8	5.3				10.1
c. Computer Time	40/ph.	10%			8.0				8.0
7. In-Country Training									
a. Health Assis. Workshop (84 work weeks)	17/wk.	5%		1.6					1.6
b. RHV seminars (240 work weeks)	17/wk.	5%		4.5					4.5
c. Travel for a & b	4/trip	15%		1.7					1.7
d. Production Costs	11.9	10%		14.5					14.5
SUB-TOTAL			141.8	328.2	288.1	136.0	176.2		1070.3
CONTINGENCY 10%									107.0
TOTAL									1177.3

EXPENDITURES BY FISCAL YEAR - A.I.D. ($000)

COMPONENT: A.I.D. SANITATION/PUBLIC HEALTH ENGINEERING	FY 79 COST	INFLATION RATE	FY 80	FY 81	FY 82	FY 83	FY 84	FY 85	TOTAL
1. Technical Assistance									
a. Public Health Engineer (5yrs)	100/yr.	8%		116.6	126.0	136.0	146.9	158.7	684.2
b. Environmental Sanitation (3yrs)	100/yr.	8%		116.6	126.0	136.0			378.6
2. Academic Training									
a. Puclic Health Engineer (U.S. - 3 yrs.)	16/yr.	8%		18.7	20.1	21.8			60.6
3. Materials for Latrine Demonstration (400/yr.)	21/Unit	10%		10.2	11.2	12.2	13.3	14.6	61.5
4. Vehicles									
a. (1) 1/4 Ton Pick-up Truck	5.4/ea.	10%	5.9						5.9
b. (1) Sedan (PH Engineer)	5.5/ea.	10%	6.0						6.0
c. (4) Motorcycles	950/ea.	10%	4.2						4.2
d. (4) 4 berth overnight trailers	4.3/ea.	10%	18.9						18.9
5. Construction									
a. TA Houses (2)	44/ea.	10%	96.8						96.8
SUB-TOTAL			131.8	262.1	283.3	306.0	160.2	173.3	1316.7
6. Concingency 10%									131.7
TOTAL									$1448.4

EXPENDITURES BY FISCAL YEAR - A.I.D. ($000)

COMPONENT: SCHISTOSOMIASIS SURVEY	FY 79 COST	INFLATION RATE	FY 80	FY 81	FY 82	FY 83	FY 84	FY 85	TOTAL
1. Technical Assistance									
a. Epidemiologist (3 yrs)	100/yr.	8%		116.6	126.0	136.0			378.6
b. Statistician (4 mos.)	10/yr.	8%		23.3		27.2			50.5
2. Construction - 1 TA House	44	10%	48.4						48.4
Lab Renovations	9	10%	9.9						9.9
3. Vehicles									
a. (1) Station Wagon	7.5/ea.	10%	8.2						8.2
b. (1) 4 berth overnight trailer	4.3/ea.	10%	4.7						4.7
4. Lab Equipment									
a. Equipment	17	10%		21.1					21.1
b. Supplies	2/p.a.	10%		2.4	2.6	2.9			7.9
SUB-TOTAL			71.2	103.4	128.6	166.1			529.3
5. Contingency 10%									52.9
TOTAL									582.2

EXPENDITURES BY FISCAL YEAR - A.I.D. ($000)

COMPONENT: EXTERNAL EVALUATIONS	FY 79 COST	INFLATION RATE	FY 80	FY 81	FY 82	FY 83	FY 84	FY 85	TOTAL
1. Mid-Project (2p.m.)	10/mo.	8%				29.4			29.4
2. End-of-Project (2p.m.)	10/mo.	8%						51.4	51.4
SUB-TOTAL						29.4		51.4	80.8
CONTINGENCY 10%									8.1
TOTAL									88.9

EXPENDITURES BY FISCAL YEAR - GHS (E 000), FOR FY80-85, E 1 = US$1.19)

COMPONENT: HEALTH EDUCATION	FY 79 Cost	Infl. Rate	FY 80	FY 81	FY 82	FY 83	FY 84	FY 85	TOTAL
A. Current									
2 Public Health Nurse Educators (GR 16)	4140	5%		9.1	9.6	10.1	10.5	11.1	50.4
1 visual AID assistant (GR 8)	1620	5%		1.8	1.9	2.0	2.1	2.2	10.0
Health assistants (50% TMG)	1620	5%		16.1	26.3	37.4	49.6	52.1	181.5
RHVs (50% TMG)	240	5%		39.7	48.6	58.4	68.9	80.4	296.0
Sub-Total				66.7	86.4	107.9	131.1	145.8	537.9
B. Incremental									
(a) Round trip air fare (Nigeria)	1000	10%		1.8	2.0	-	-	-	3.8
(b) Public Health Nurse Educator (GR 17)	4680	5%		5.2	5.4	5.7	6.0	6.3	28.6
(c) Jr. Clerical Officer (GR 5)	1140	5%		1.3	1.3	1.4	1.5	1.5	7.0
(d) Driver (GR 6)	1272	5%		1.4	1.5	1.5	1.6	1.7	7.7
(e) Fuel maintenance, replacement (2 vehicles @ 8 Km/L, 24,000 Km Yr/v	E1.15/l	15%		9.1	10.5	12.1	13.9	16.0	61.6
(f) Education Materials				1.0	2.0	1.0	1.0	.5	5.5
(g) Furnishings for TA Houses	6100	10%		13.4	-	-	-	-	13.4
Sub-Total				33.2	22.7	21.7	24.0	26.0	127.6
Sub-Total A + B				99.9	109.1	129.6	155.1	171.8	665.5
Contingency @ 10% B (e,f,g)									8.1
TOTAL									E673.6
									($801.6)

EXPENDITURES BY FISCAL YEAR - COS (E 000 For FY80-85, E 1 = US$1.19)

COMPONENT: SANITATION/ ENGINEERING	FY 79 Cost	Infl. Rate	FY 80	FY 81	FY 82	FY 83	FY 84	FY 85	TOTAL
A. Current									
Health Senior Assistants (4) Replace PCU's	2316	5%		10.2	10.7	11.3	11.8	12.4	56.4
12 P.Y. equivalent of Health Assistants Time	1620	5%		21.4	22.5	23.6	24.8	26.0	118.3
Sub-Total				31.6	33.2	34.9	36.6	38.4	174.7
B. Incremental									
(a) Round trip air fare to U.S. PH Engr. Counterpart	1700	15%		1.0		1.4			2.4
(b) Salary of PH Engr. Counterpart	5220/py	5%		5.8	6.0	6.3	6.7	7.0	31.8
(c) H.A.'s per diem 60 days/py x 12	E2/day	5%		1.6	1.7	1.8	1.9	2.0	9.0
(d) Consummables	400	10%		.5	.5	.6	.6	.7	2.9
(e) Furnishings for TA houses	6100	10%		13.4					13.4
(f) Fuel/maintenance/replacement of autos 25,000 km/yr	E1.15/l 8 km/l	15%		9.5	10.9	12.6	14.5	16.6	64.1
(g) 4 of motorcycles 20,000 km/yr	E1.15 @ 30 km/l			4.1	4.7	5.4	6.2	7.1	27.5
Sub-Total				35.9	23.8	28.1	29.9	33.4	161.2
Sub-Total A + B				67.5	57.0	63.0	66.5	71.8	325.8
Contingency @ 10% B (e,d,f,g)									10.8
TOTAL									E336.6
									($400.6)

EXPENDITURES BY FISCAL YEAR - COS (E 000 For FY 80/85, E 1 = US$1.19

COMPONENTS: SCHISTOSOMIASIS SURVEY	FY 79 COST	INFL. RATE	FY 80	FY 81	FY 82	FY 83	FY 84	FY 85	TOTAL
A. Current									
Sr. Health Asst. GR 11 (1)	2316	5%		2.6	2.7	2.8	-	-	8.1
Health Asst. GR 8 (6)	1620	5%		10.7	11.3	11.8	-	-	33.8
electricity and maintenance of Laboratory	840	10%		1.0	1.1	1.2	-	-	3.3
SUB-TOTAL				14.3	15.1	15.8			45.2
B. Incremental Contributions									
(a) Lab Supplies	2940 p.a.	10%		3.6	3.9	4.3	-	-	11.8
(b) Consumables	840 p.a.	10%		1.0	1.1	1.2	-	-	2.2
(c) Durables	1680 p.m.	10%		1.9	1.9	2.0	-	-	5.8
(d) Additional personnel 4 x 72 days/yr. ea.	2/day	5%		.6	.7	.7	-	-	2.0
(e) Overnight expenses	2.50/night	5%		.7	.7	.7	-	-	2.1
(f) Fuel and maintenance (25,000 Km/yr)	1.15/litre 8/Km/l	10% 10%		4.8	5.5	6.3	-	-	16.6
(g) Furnishings for TA House	6100	10%		6.7	-	-	-	-	6.7
SUB-TOTAL				19.3	13.8	15.2			48.3
SUB-TOTAL A + B				33.6	28.9	31.0			93.5
Contingency @ 10% of B									4.8
TOTAL									E 98.3
									($117.0)

EQUIPMENT LIST

A. HEALTH EDUCATION UNIT

ITEM	QUANTITY	UNIT PRICE $	TOTAL $
1. Overhead projector 250 x 250mm 220 v 50/60 HZ	1	106	106
2. Projection stand, portable	1	54	54
3. Projector 35mm slide and film/ strip 220 v 50/60 HZ	2	119	238
4. Cassette tape copier	1	200	200
5. Bell & Howell 16mm sound film projectors 220 v 50/60 HZ	2	666	1,333
6. Tape portable open to reel recorder (Uher or ferrography)	2	800	1,600
7. Tape magnetic recording for open-reel recorder	50	2.38	119
8. Tape recorders portable cassette type AC/DC power with speakers	15	117	1,755
9. Public address system set mobile 6-12v with parts	1	161	161
10. Public address system (fixed installation) with parts	1	274	274
11. Goose neck microphone with stand	1	75	75
12. Slicer for magnetic recording tape	1	18	18
13. Megaphone (loud-hailer type) transistorized	5	69	345
14. Darkroom kit, basic equipment and chemicals (set)	1	124	124
15. Dryer print photographic flat bed 220v	1	42	42
16. Enlarger for 35mm film w/50mm lens 220v	1	103	103
17. Epidiascope (opaque) 250 x 250mm 100 W 220v 50/60HZ	1	200	200

ITEM	QUANTITY	UNIT PRICE $	TOTAL $
19. Camera simple fixed-focus type :h case	4	16	76
20. anning machine	1	100	100
21. Guillotine (paper cutter) H 14	1	30	30
22. Filing Cabinets	4	150	600
23. Silk screening equipment (frame, silk, drying, rack, squeezies, pigments)	1	200	200
24. Reference books	-	-	238
25. Educational films	-	-	2,380
26. Teaching models	-	-	208
27. Other equipment and supplies	-	-	8,925
			$20,337

B. BILHARZIA LABORATORY

29. Desks	4	200	800
30. Chairs	6	50	300
31. Filing cabinets	2	150	300
32. Bookcases	2	50	100
33. Compound microscopes (with objective lens x 4, x 10, x 40 and 100 /oil/)	4	952	3,808
34. Stereoscope microscopes (x 20 to x 100 zoom magnifier)	2	952	1,904
35. Bench centrifuge (variable speed and timer and capacity for 24 x 15ml tubes)	1	476	476
36. Analytical balance (4 place)	1	952	952
37. Refrigerator (9 cu.ft.)	1	357	357
38. Electric heaters	2	30	60
39. Laboratory glassware	-	-	1,190

WAIVERS

A. Waivers Required

1. Procurement source and origin waiver to permit the procurement of project vehicles estimated at $68,300 from countries included in AID Geographic Code 935 (Special Free World). The following vehicles will be procured under the project:

a. Sedans (2) for the public health engineer and social scientist;

b. Station wagons (2) for the health education unit and the schistosomiasis survey team;

c. Pick-up truck (1) for the environmental sanitarian;

d. Motorcycles (4) for the senior health assistants serving as district sanitarians;

e. Overnight trailers (5) for the senior health assistants (4) and the schistosomiasis survey team (1).

. Procurement source and origin waiver to permit the procurement of construction materials estimated at $155,000 from countries included in AID Geographic Code 935 (Special Free World).

B. Justification for Waiver Requests

1. Vehicles

The need for this waiver is based on mechanical/maintenance capabilities, spare parts availability, and the safety hazards associated with left-hand drive vehicles in Swaziland. Currently, the GOS is standardizing its vehicle fleet to ensure optimal maintenance capacity and to economize on its spare parts inventory. It would be uneconomical and impractical to require the procurement of U.S. vehicles for which the GOS would have to maintain additional inventories of parts. The dangers involved in operating left-hand drive vehicles in a right-hand drive country are obvious.

The motorcycles to be purchased for the district sanitarians should be small, dirt bikes which are unavailable in the U.S.

The small, overnight trailers for the district sanitarians and schistosomiasis survey team would be expensive to transport from the U.S. and should be of a type easily serviceable locally.

2. Construction Materials

Construction materials must be compatible with local standards and local dealers are equipped only to service and repair equipment

made in the Republic of South Africa or the U.K. Additionally, the small quantities required of each specific type of material make ordering from the U.S. impractical and the long lead time would delay the construction of facilities and, consequently, overall project implementation.

STATUTORY CHECKLIST

5C(2) - PROJECT CHECKLIST

Listed below are statutory criteria applicable generally to projects with FAA funds and project criteria applicable to individual fund sources: Development Assistance (with a subcategory for criteria applicable only to loans); and Economic Support Fund.

CROSS REFERENCES: IS COUNTRY CHECKLIST UP TO DATE? HAS STANDARD ITEM CHECKLIST BEEN REVIEWED FOR THIS PROJECT?

A. GENERAL CRITERIA FOR PROJECT

1.	FY 79 App. Act Unnumbered; FAA Sec. 653(b); Sec. 634A. (a) Describe how Committees on Appropriation of Senate and House have been or will be notified concerning the project; (b) is assistance within (Operational Year Budget) country or international organization allocation reported to Congress (or not more than $1 million over that figure)?	1.a. FY 79 Congressional Presentation
2.	FAA Sec. 611(a) (1). Prior to obligation in excess of $100,000, will there by (a) engineering, financial, and other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the U.S. of the assistance?	2.a. YES
3.	FAA Sec. 611(a)(2). If further legislative action is required within recipient country, what is basis for reasonable expectation that such action will be completed in time to permit orderly accomplishment of purpose of the assistance?	3.a. None Required
4.	FAA Sec. 611(b); FY 79 App. Act Sec. 101. If for water or water-related land resource construction, has project met the standards and criteria as per the Principles and Standards for Planning Water and Related Land Resources dated October 25, 1973?	4.b N/A
5.	FAA Sec. 611(e). If project is capital assistance (e.g., construction), and all U.S. assistance for it will exceed $1 million, has Mission Director certified and Regional Assistant Administrator taken into consideration the country's capability effectively to maintain and utilize the project?	5.e Not a capital assistance project exceeding $ One Million

6.	FAA Sec. 209. Is project susceptible of execution as part of regional or multilateral project? If so why is project not so executed? Information and conclusion whether assistance will encourange regional development programs.	6.a. NO
7.	FAA Sec. 601(a). Information and conclusions whether project will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; (c) encourage development and use of cooperatives, credit units, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions.	7.a. a) N/A b) Project relies on self-help for construction of latrines c) N/A d) N/A e) N/A f) N/A
8.	FAA Sec. 601(b). Information and conclusion on how project will encourage U.S. private trade and investment abroad and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private interprise).	8.b. Private U.S. participation in the form of technical assistance
9.	FAA Sec. 612(b); Sec. 637(h). Describe steps taken to assure that, to the extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the U.S. are utilized to meet the cost of contractual and other services.	9.b. Host country contribution to project equals 30%
10.	FAA Sec. 612(d). Does the U.S. own excess foreign currency of the country and, if so, what arrangements have been made for its release?	10.d. NO
11.	FAA Sec. 601(e). Will the project utilize competitive selection procedures for the awarding of contracts, except where applicable procurement rules allow otherwise?	11.e. YES

12. FY 79 App. Act Sect. 608. If assistance is for the production of any commodity for export, is the commodity likely to be in surplus on world markets at the time the resulting productive capacity becomes operative, and is such assistance likely to cause substantial injury to U.S. producers of the same, similar or competing commodity?

12. N/A

3. FUNDING CRITERIA FOR PROJECT

1. Development Assistance Project Criteria

a. FAA Sec. 102(b); 111; 113; 281a. Extent to which activity will (a) effectively involve the poor in development, by extending access to economy at local level, increasing labor-intensive production and the use of appropriate technology, spreading investment out from cities to small towns and rural areas, and insuring wide participation of the poor in the benefits of development on a sustained basis, using the appropriate U.S. institutions; (b) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward better life, and otherwise encourage democratic private and local governmental institutions; (c) support the self-help efforts of developing countries; (d) promote the participation of women in the national economies of developing countries and the improvement of women's status; and (e) utilize and encourage regional cooperation by developing countries?

1. a

(a) Project will focus on the poor as initial participants for the sanitation program. The latrines constructed will be an appropriate technology model, using local labor and encouraging the development and use of local markets for the commodities.

(b) Rural poor will be given the technical and organizational assistance necessary to carry out a self-financed latrine construction program.

(c) Basis of project is self-help

(d) Majority of beneficiaries - both at community and technical level- will be women.

(e) N/A

b. FAA Sec. 103, 103A, 104, 105, 106, 107. Is assistance being made available: (include only applicable paragraph which corresponds to source of funds used. If more than one fund source is used for project, include relevant paragraph for each fund source.)

b.

(1) (103) for agriculture, rural development or nutrition; if so, extent to which activity is specifically designed to increase productivity and income of rural poor; (103A) if for agricultural research, is full account taken of needs of small farmers;	N/A
(2) (104) for population planning under sec. 104(b) or health under sec. 104(c); if so, extent to which activity emphasizes low-cost, integrated delivery systems for health, nutrition and family planning for the poorest people, with particular attention to the needs of mothers and young children, using paramedical and auxiliary medical personnel, clinics and health posts, commercial distribution systems and other modes of community research;	Project focus is on working with the rural poor to demonstrate how the health status, especially of young children, can be improved through use of sanitary facilities and a change in water and sanitation related behavior. Project relies on primary health care workers and health auxiliary personnel for implementation of all aspects of the project.
(3) (105) for education, public administration, or human resources development; if so, extent to which activity strengthens non-formal education, makes formal education more relevant, especially for rural families and urban poor, or strengthens management capability of institutions enabling the poor to participate in development;	N/A
(4) (106) for technical assistance, energy research, reconstruction, and selected development problems; if so, extent activity is:	N/A
(i) technical cooperation and development, especially with U.S. private and voluntary, or regional and international development, organizations;	N/A
(ii) to help alleviate energy problems;	N/A
(iii) research into, and evaluation of, economic development processes and techniques;	N/A

(iv) reconstruction after natural or manmade disaster;	N/A
(v) for special development problem, and to enable proper utilization of earlier U.S. infrastructure, etc., assistance;	N/A
(vi) for programs of urban development, especially small labor-intensive enterprises, marketing systems, and financial or other institutions to help urban poor participate in economic and social development.	N/A
c. (107) Is approriate effort placed on use of appropriate technology?	YES
d. FAA Sec. 110(a). Will the recipient country provide at least 25% of the costs of the program, project, or activity with respect to which the assistance is to be furnished (or has the latter cost-sharing requirement been waived for a "relatively least-developed" country)?	Host country will provide 30% of costs for this project.
e. FAA Sec. 110(b). Will grant capital assistance be disbursed for project over more than 3 years? If so, has justification satisfactory to Congress been made, and efforts for other financing, or is the recipient country "relatively least developed"?	NO
f. FAA Sec. 281(b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage institutional development; and supports civil education and training in skills required for effective participation in governmental and political processes essential to self-government.	The project responds to a demand for clean water and latrines already expressed the rural people evidenced by several studies conducte (see Social Soundness Analy

g. FAA Sec. 122(b). Does the activity gove reasonable primise of contributing to the development of economic resources, or to the increase of productive capacities and self-sustained economic growth? N/A

2. Development Assistance Project Criteria (Loans Only)

a. FAA Sec. 122(b). Information and conclusion on capacity of the country to repay the loan, including reasonableness of repayment prospects. N/A

b. FAA Sec. 620(b). If assistance is for any productive enterprise which will compete in the U.S. with U.S. enterprise, is there and agreement by the recipeint country to prevent export to the U.S. of more than 20% of the enterprise's annual production during the life of the loan? N/A

3. Project Criteria Solely for Economic Support Fund

a. FAA Sec. 531(a). Will this assistance support promote economic or political stability? To the extent possible, does it reflect the policy directions of section 102? N/A

b. FAA Sec. 533. Will assistance under this chapter be used for military, or paramilitary activities? N/A

1. Country Checklist previously submitted in FY 79 with Primary Curriculum Unit Project (645-0009).

2. Standard Item Checklist has been reviewed and found to satisfy legislative criteria.

THE RESPONSIBILITIES OF THE RURAL WATER SUPPLY BRANCH, OF THE WATER AND SEWERAGE BOARD

A Rural Water Supply Branch has been established under the administrative control of the Water and Sewerage Board. The following is a summary of the Branch's history and a detailing of its responsibilities within the framework of Rural Water Supply Development in Swaziland. This report is meant to introduce the Branch to all Government agencies.

HISTORY

On 1st April 1974 the Water and Sewerage Board was established. This is the main agency responsible for the provision of water supplies in Swaziland, and is a self-accounting commercial organization. Under its regulations it must seek an adequate financial return from any operation it undertakes. Thus, its obligation to earn a return reinforces its natural tendency to be primarily orientated towards the provision of conventional water supplies to relatively well-off groups in major urban centres.

However, there are many other groups who require water supplies, even if they are not able to pay the full economic costs of services provided. These groups include squatter developments in the semi-urban areas, rural communities, schools, clinics etc.

Some water supplies are already provided for these groups, but efforts so far have been on a fairly small scale, largely due to the lack of any organization whose specific responsibility is to supply water to low income areas, and which also has sufficient equipment and technical expertise to carry out a significant construction program.

The following organizations are presently involved in one way or another in Rural Water Supplies :

a) Environment Health Unit
b) Community Development Unit
c) Groundwater Development Unit
d) Water and Sewerage Board, on an agency basis.

In order to concentrate and co-ordinate efforts in Rural Water Supply Development, the Rural Development Committee, on 13th March 1975, agreed to the establishment of a Low Income Water Supplies Unit (now called the Rural Water Supply Branch) under the administrative control of the Water and Sewerage Board.

BRANCH RESPONSIBILITIES

It is the responsibility of the Rural Water Supply Branch to construct water supplies to Low Income Groups in the following areas :

a) Low Income in the major urban areas, particularly the squatter developments.
b) Rural Communities
c) Government institutions in Rural Areas, e.g. schools and clinics.

The Branch has also been given the responsibility for maintenance of Rural Water Supply Schemes.

ORGANIZATION

The Rural Water Supply Branch is responsible to the Director of the Water and Sewerage Board. The Water and Sewerage Board has seen fit to establish a policy-making body for the Branch and and has called it the Rural Water Supply Board. This Board is made up of existing Water and Sewerage Board members, plus Permanent Secretaries from the Ministries of Agriculture and Education (refer to the attached Organization Chart).

The Rural Water Supply Branch, as a member of the Water and Sewerage Board can make use of facilities and expertise that are within the Water Board. Besides the Construction and Maintenance responsibilities, a major part of its duties will be to liaise with other Agencies, to ensure that its activities are within the framework of national objectives.

It is intended that the initiation of projects to be undertaken by the Branch will come from the level of the district teams, who will consider proposals from communities and agencies.

Branch offices are established in the four Districts, and located in the communities of Mbabane, Manzini, Nhlangano and Siteki.

FINANCING

The first phase, a three year period, is to be financed by a loan through the Overseas Development Ministry of the United Kingdom. The total estimated cost of the proposed 120 projects in this period is 1.3 Million Emalangeni.

The funds for maintenance work are being provided by the Ministry of Finance & Economic Planning.

TECHNICAL ASSISTANCE

Technical Assistance for establishing the Rural Water Supply Branch is being provided by the World University Services of Canada through the Canadian International Development Agency. The Rural Water Supply Engineer as Branch head, and a Clerk of Works for each district are being provided.

1977/78 PROGRAM

It is planned that the Branch will undertake twenty major construction projects through 1977/78. The attached list of water supply schemes has been approved by the Rural Water Supply Board. The commencement of work is waiting arrival of necessary equipment and materials purchased in the U.K.

INVOLVEMENT OF THE LOCAL POPULATION

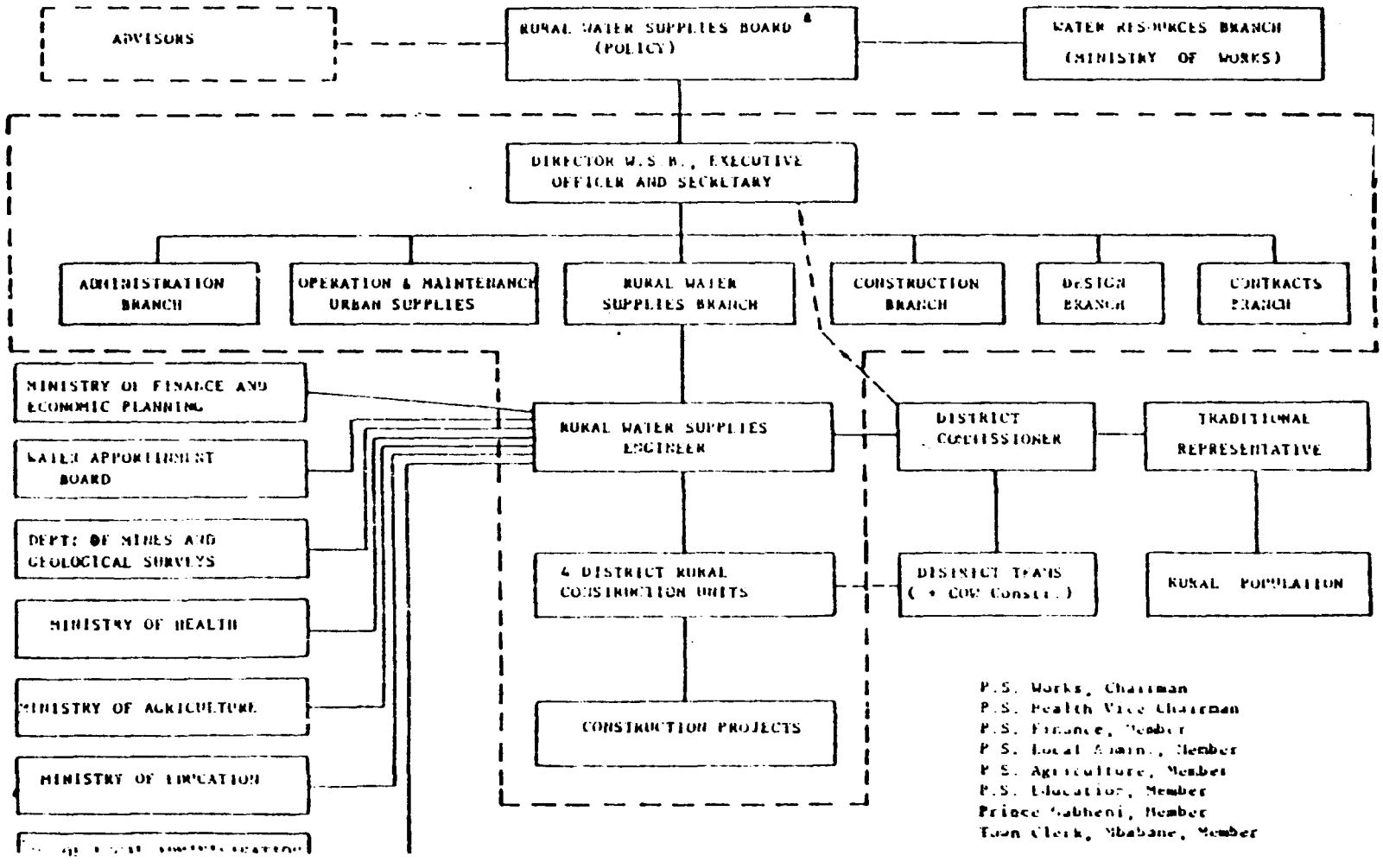
It is accepted that any community project must have local involvement in order to succeed. It is, therefore, expected that the local communities will provide unskilled labour on these water supply projects as their own contribution. Then, after the completion of a project, it is expected that the communities will be responsible for it's operation. This may include the provision and payment of an operator and the supply of fuel. As mentioned above, the responsibility for maintenance will be with the Rural Water Supply Branch.

FUTURE DEVELOPMENT

It is expected that future water development projects will continue to be initiated at the community level and processed through the District Teams.

J. van Beuzekom
(SECRETARY)
Rural Water Supply Board.

RURAL WATER SUPPLIES ORGANISATION CHART



Other Donor Programs
(affecting water related disease control)

Sponsor	Title and Type	Funding ($)
WHO	Health Sanitarian - training Health Inspectors and Health Assistants at IHS	80,000 p.a.
WHO	Malaria control program supplies, consultants	30,000 p.a.
UNFPA WHO	Health Education Consultant to the HEU	20,000 p.a.
UNICEF/WHO/ UNEP	Bilharzia Control Pilot Project 1/	1,162,380
PEACE CORPS	4 Volunteers to work in UNICEF/ UNEP Bilharzia pilot project	N/A
ODM	Capital funds for Rural Water Supply Division	1,580,000
CIDA	Technical and training assistance to the Rural Water Supply Div.	2,500,000
USAID	Institute for Health Science 2/ Nurse training program	4,300,000

1/ The objective of this pilot project, located in southern Swaziland, is to test the effectiveness of controlling schistosomiasis and other water-related diseases by providing potable water, sanitation facilities (for washing, bathing, and excreta disposal), and health education to an area which includes 1050 homesteads, 6 schools and one clinic (about 15,000 people). Where feasible, the project will provide up to 4 taps per homestead, shower and laundry basins and low-cost swimming pools within school compounds.

2/ The Institute of Health Sciences (IHS) will ultimately serve as the government training institution for many categories of health workers. In October of 1979 the IHS will begin classes for the first group of nurses. After three years of general nursing curriculum which includes practical work in the rural clinics, the nurses will specialize either as MCH/FP practitioners or as diagnostic nurses. Nurses graduating from the IHS should be well equipped to do preventive health care, make accurate diagnosis and treatment of common illnesses and generally be well adopted to rural health care work rather than being hospital oriented.

WHO is expected to provide tutors for the Health Inspectors and Health Assistant training programs at the IHS by the end of 1979.

BEST AVAILABLE DOCUMENT

ANNEX 1

GOVERNMENT AND MISSION HOSPITALS: DISCHARGES AND DEATH 1976 AND 1977

Disease Group (Water-related Diseases)	Discharges								Deaths							
	1976		1977						1976		1977					
	No.	%	No.	%	Under 1 No.	1-14 No.	15-44 No.	45+ No.	No.	%	No.	%	Under 1 No.	1-14 No.	15-44 No.	45+ No.
1. Cholera	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2. Typhoid Fever)	62	0.3	098	0.4	2	48	40	8)	5	0.5	4	04		1	3	
3. Paratyphoid) Fever)	3	0.0		-	-	-	-	-)	1	0.1						
4. Bacillary Dysentery and Amoebiasis	165	0.8	106	0.4	15	25	52	14	6	0.6	4	0.4	1	-	2	1
5. Enteritis and other diarrheal diseases	7014	8.3	1832	7.6	1057	409	286	80	209	20.0	96	9.3	58	20	11	7
6. Infectious hepatitis	76	0.3	86	.35	-	34	35	16	10	1.0	6	0.56	-	-	2	4
7. Typhus and other rickettsioses	-	-	7	0.03	-	-	7	-	-	-						
8. Malaria	65	0.3	132	.54	9	57	63	3	-	-	21	2.01	1	5	10	5
9. a)Bilharzia-Vesical	134	0.6	95	.39	-	31	51	13	-	-	4	0.4	-	-	3	1
b)Bilharzia-Intestinal	0.0	-	27	0.11	-	2	24	1	-	-						
c)other Schistosomiasis	8	0.0	3	0.013	-	-	3	-	-	-						
10. Other Helminthiases of which Tapeworm & other cestode	32	0.1	31	0.13	-	18	10	3	1	0.1						
Infections	29	0.1							1	0.1						
11. All other infective and parasitic diseases	45	.20	45	0.18	11	15	17	2	1	0.1	1	0.1	-	-	-	1