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 VECTOR BIOLOGY & CONTROL

**Vector Biology & Control Project**  
1611 North Kent Street, Suite 503  
Arlington, Virginia 22209  
(703) 527-6500

Telex: 248812 (MSCI UR)  
Cable: MSCI Washington, D.C.

PA-ALL 300

## SCHISTOSOMIASIS CONTROL IN SWAZILAND

January 27 - February 15, 1989

by

Paul Taylor, Ph.D.

AR-100-3

### Author

Paul Taylor, Ph.D., is director of the Blair Research Laboratory in Harare, Zimbabwe.

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1.

## INTRODUCTION

This report is not a control strategy for schistosomiasis in Swaziland nor does it presume to present a detailed work plan for implementing a control strategy. The intention has been to recommend how the resources available for schistosomiasis control in Swaziland could best be used to lay the foundation for developing a long term schistosomiasis control program. The author made these recommendations after reviewing the activities of the Ministry of Health's (MoH's) Bilharzia Control Unit (BCU), reading the BCU's draft strategy for controlling schistosomiasis, and speaking to MoH and USAID representatives, BCU staff, laboratory technicians, teachers, and officials from water and sanitation programs, irrigation schemes and other sectors related to schistosomiasis control.

2.

## SUMMARY OF SCHISTOSOMIASIS IN SWAZILAND

The disease schistosomiasis is caused by the reaction of the human body to the eggs produced by schistosome worms living in venous blood vessels. Schistosomes are transmitted to people through intermediate hosts, which are various species of freshwater snail. The snails are infected when eggs in human excreta contaminate a water body that is infested by host snails. This apparently simple cycle of man-water-snail-water-man has not proved easy to interrupt by action at any one part of the life cycle. The options for control at each stage of the life cycle can be simply summarized as follows:

### Measures to prevent eggs reaching water.

- a) Treating infected people to reduce the number of eggs passing into the environment.
- b) Providing adequate sanitation both at home and at work to reduce the risk of excreta reaching water bodies.
- c) Educating the community about how schistosomiasis is transmitted.

### Measures to limit the number of host snails.

- a) Application of chemical or biological molluscicides as part of a regular program.
- b) Habitat modification to try to reduce suitable breeding and survival sites for snails.
- c) Appropriate design of new water conservation projects to reduce snail habitats.

### Measures to prevent exposure of people to infection.

- a) Providing adequate domestic water to obviate the need to use natural water bodies.
- b) Providing health education.
- c) Providing bridges and facilities for laundry and bathing.

Schistosomiasis control focuses on one or more of the above interventions; however, it is clear that integrating a number of interventions will increase the likelihood of achieving sustainable schistosomiasis control.

Available data on the prevalence and intensity of schistosomiasis in Swaziland has been presented in the excellent report by Chaine (J.P.Chaine, 1984, Schistosomiasis prevalence and control in the Kingdom of Swaziland) from which the following data are taken.

The age prevalence of S. haematobium and S. mansoni follows the pattern seen elsewhere in Africa, with the peak prevalence and intensity in the teen-age group.

Transmission of schistosomiasis increases with higher average temperatures and availability of surface water. Both of these factors have a significant positive influence on the survival of vector snails. The vectors of schistosomiasis in Swaziland are believed to be Bulinus africanus for S. haematobium and Blomphalaria pfeifferi for S. mansoni.

Swaziland can be divided into four geographical regions, which run from north to south. From west to east are the highveld, middleveld, lowveld and Lubombo plateau.

Most S. haematobium is found in the northern lowveld (average 60 of percent schoolchildren positive). This prevalence decreases as one moves south through the central lowveld (average 24 percent of schoolchildren positive) to the southern lowveld (average one percent of schoolchildren positive). These changes in prevalence are primarily due to decreasing surface water availability from the well-watered northern lowveld to the very dry southern lowveld.

Since cold winter temperatures on the highveld do not allow the survival of vector snails, the schistosomiasis in this region (four percent) is believed to be imported. Vector snails are found in the well-watered middleveld, which is second in importance to the northern lowveld in prevalence of S. haematobium (37 percent).

S. mansoni is less common than S. haematobium but follows a similar pattern of distribution. The northern lowveld has the highest overall prevalence (30 percent of schoolchildren), followed by the southern (15 percent) and central lowveld (11 percent) and the middleveld (2.6 percent). The vector snail, Biomphalaria pfeifferi, does not occur on the highveld and appears only sporadically on the middleveld.

The limited data for Lubombo do not suggest a schistosomiasis problem in the area, but further examination may identify specific problem areas.

It is important to note that these are only general patterns. Schistosomiasis transmission is usually very focal and related to availability of surface water in conjunction with human settlement. Consequently, within any of these areas there may be localities of high transmission, as the great variability in the data reported by Chaine demonstrates. It also suggests that any water resource development projects for the middleveld or lowveld could greatly increase the risk of schistosomiasis in these regions.

### 3. CONTROL STRATEGY AND WORK PLAN

A draft control strategy has been prepared by the Bilharzia Control Unit (BCU) of the Ministry of Health (Schistosomiasis Control Strategy for Swaziland, August 1988, Min. Health).

This document provides an excellent overview of schistosomiasis and the factors affecting its transmission and control, both globally and in Swaziland. It also outlines the control strategy for Swaziland, which is briefly summarized below.

The strategy recognizes that the control program must adopt an integrated approach using existing resources within the primary health care system and targeting populations at risk of schistosomiasis.

Interventions would be adopted to suit the particular epidemiological conditions of schistosomiasis in the different regions and would include all of the control measures mentioned in section 3 above.

The strategy document shows a clear understanding of the appropriate actions to be adopted to control schistosomiasis in Swaziland and bases the control action on the seven assumptions quoted below:

- "
- 1) Schoolchildren constitute the population at greatest risk (of schistosomiasis).
  - 2) Urinary schistosomiasis is the only form of the disease of importance (in the middleveld. More data on intensity of infection is needed to decide where intestinal schistosomiasis is a significant problem.)
  - 3) Cases can be identified employing simple techniques (the reagent strip test for S. haematobium), which can be applied by clinic nurses, school health teams and teachers.
  - 4) Treatment can be managed by clinic nurses, school health teams and teachers.
  - 5) Schools and clinics provide environments conducive to health education.
  - 6) Communities where schistosomiasis is a major problem can be motivated to initiate actions to control the disease.
  - 7) Water supply and sanitation programs can be responsive to the needs of communities where risks to health (from schistosomiasis) are high and communities are highly motivated and actively involved. "

These assumptions are appropriate guides for establishing a schistosomiasis control program in Swaziland. They are also used as a basis for the activities suggested in this report.

Detailed targets were set in the strategy document that were probably unrealistic in view of the resources available for the program. The strategy document would have been an appropriate place to outline other MoH policy positions, including 1) which antischistosomal drugs would be used at different levels of the health service and for which schistosome species; 2) which drug would be used in the control program; and 3) the expected or legal responsibility of water resource developers for health consequences. These are discussed below (7(a)).

The work plan developed from the strategy has six objectives quoted below:

- "1. To draft and implement a strategy for the control of schistosomiasis in Swaziland.
2. To increase diagnostic coverage and treatment of urinary schistosomiasis among schoolchildren in middleveld and lowveld schools.

3. To carry out operations research on treatment as a control strategy.
4. To establish and implement a data storage and data processing system to handle data on schistosomiasis and other intestinal parasites.
5. Training to:
  - o strengthen and expand laboratory support for surveillance, treatment and control of schistosomiasis and other parasitic diseases;
  - o strengthen interpretation of results and follow up measures;
  - o review and strengthen control strategies.
6. To provide technical support for planning, design, and implementation of water resources development projects. "

The strategy document and the work plan are excellent documents that set the scene for the implementation of a sustainable schistosomiasis control program in Swaziland, but they are weak in three areas. First, the targets are ambitious given the proposed time frame. Second, the work plan does not envisage the collection of the baseline epidemiological data essential for establishing control activities and allocating resources to priority areas. Finally, the available and projected resources should be identified in the work plan so that the activities of the plan can be realistically adjusted to those resources.

It is against this background that the schistosomiasis control program in Swaziland is reviewed.

#### 4. BILHARZIA CONTROL UNIT

The BCU is responsible for planning and coordinating schistosomiasis control in Swaziland.

The BCU suffers from a lack of clear objectives, goals and targets for its activities. The work program developed for the BCU should remedy this problem by setting objectives, goals and targets for each activity.

#### 4.1 Operation

The Bilharzia Control Unit (BCU) and the Malaria Control Unit fall under a senior medical officer (epidemiologist) to whom they report. This post has been vacant for many years, resulting in some confusion about the chain of command, as well as a lack of epidemiological support. Epidemiological skills are essential for the determination of a disease problem and its control, so it is important that the MoH try to fill this post as soon as possible. This would also solve the BCU's reporting problems. The BCU is fairly independent in its daily operation, which is to be expected in a specialized unit responsible for Bilharzia control at a national level. BCU activities include the following:

- o Development of a National Schistosomiasis Control Strategy and Plan of Action. This is well in hand, as this review indicates, and can be commended.
- o Regular examination of schoolchildren for schistosomiasis in endemic areas. This provides data on the prevalence of S. haematobium and S. mansoni infections in schools, which is useful for setting program priorities. However, the techniques employed are not adequately quantitative and cannot be used to assess intensity of infection. The severity of schistosomal disease is related to the intensity of infection; therefore, it is important to measure intensity of infection for two reasons: 1) to identify areas or age groups with highest intensity of infection for priority action and 2) to assess the impact of control on infection status. At the present time, there is no clear sampling framework to maximize the usefulness of the data obtained from the limited number of schools that the team is able to survey each year. This problem is related to the point on goals and objectives mentioned above and is also addressed under 6.2.
- o Clinic services to patients who present to the unit for schistosomiasis treatment. The BCU provides treatment free of charge to those who believe that they are suffering from schistosomiasis. Patients are asked to return after one month for a check. This activity has limited, if any, value to the BCU. It might have some value if it were undertaken as a research exercise for collecting specific data. Since there is no nursing staff at the BCU, the clinic is operating without any medical cover. The BCU staff's limited time is depleted by routine work that could be carried out by

existing health services. Continuation of this service is not recommended.

- o Supplying antischistosomal drugs to clinics and other health institutions. These institutions must collect their drugs from Manzini and submit reports on treatments provided for schistosomiasis. The purpose of receiving direct reports is to make them more comprehensive than those normally submitted through the health information system. In practice, however, many clinics do not submit any information or submit the same data that is submitted to the MoH. Monthly drug delivery to health institutions is a well-established procedure of Central Medical Stores. Separating antischistosomal drugs from this system is more likely to hinder their availability and therefore reduce the success of the control program. It would be operationally more effective if the BCU only stocked drugs for those specific control activities implemented in addition to the routine curative services of the MoH.
- o Maintaining liaison with the many other sectors that have a direct or indirect influence on the schistosomiasis problem in Swaziland. These include the Rural Water Supply Board, Health Education Center, the Ministries of Education and Agriculture, the University of Swaziland and private water development schemes. These links are very important for the mobilization of additional resources to develop an effective, integrated and decentralized control strategy. Working with other sectors is discussed further under 7(e) below. Currently, the strongest links appear to be with the Rural Water Supply Board.

#### 4.2 Budget

The BCU budget is limited. It is combined for administrative purposes with the malaria control program budget. This financial year the vote for the BCU is approximately E40,000 (approx. US\$18,000), with an additional E35-40,000 for transport.

Some of the items purchased, particularly drugs, are not bought to best advantage. For example, praziquantel is purchased from traditional local suppliers at approximately US\$2 per tablet, but it is available internationally at US\$0.25 per tablet.

The extent of any control program established with the existing resources will be limited. Allocation of additional financial resources to the BCU could greatly improve the

operational effectiveness of the national schistosomiasis control program, principally by allowing it to reach a greater proportion of the affected population. Other resources are available to support schistosomiasis control and could be used advantageously. They include resources for water supplies (Rural Water Supply Board) and sanitation (Ministry of Health), health education materials (Health Education Center), drugs (clinics), personnel (Ministries of Education and Health) and control in agricultural projects (irrigation scheme owners). However, access to these resources depends upon the development of links with the appropriate organizations.

#### 4.3 Staff

The head and deputy of the BCU are health inspectors. One senior health assistant and two health assistants have certificates of training. The remaining five health assistants have had no formal training.

Only the head of the unit, who attended a four month certificate course at the Danish Bilharzia Laboratory, has received any training in schistosomiasis control. This is a major weakness in the prospects for a sustainable schistosomiasis control program. Providing additional training for all cadres of staff in the unit should be given high priority. In particular, the deputy should receive training in schistosomiasis control, and both the head and deputy should receive training in epidemiology. Without further training of support staff, the loss of the head could cause a severe interruption in any ongoing control program.

The deputy could be sent to the Danish Bilharzia Laboratory for training. A short course of three to four months training in epidemiology, which would not disrupt BCU activities too greatly, would probably be adequate for the head and deputy of BCU, assuming that an epidemiologist would be appointed to the senior medical officer position.

Junior staff should receive in-service training in schistosomiasis control to bring them up-to-date with new developments.

Exposure to schistosomiasis programs being conducted in neighboring countries of the region would provide useful experience. Therefore, it is suggested that the head of the BCU be sent on a study tour to Botswana, Zimbabwe and Kenya.

#### 4.4 Equipment

The BCU's equipment is acceptable, except in three areas.

First, the BCU needs certain small, specialized items to enable the unit to convert to quantitative diagnostic techniques. Members of the unit learned these techniques during the training course taught by Dr. Everett Schiller. The procedures for these tests and the equipment recommended by the World Health Organization (WHO) are described in a WHO paper, "Urine Filtration Technique for S. Haematobium Infection" (PDP/83.4), which has been supplied to the BCU.

Second, due to the difficulty experienced in maintaining microscopes, there is a shortage of operational microscopes. This problem cannot be resolved easily because it may be equally difficult to maintain new equipment. It is important to standardize new microscopes with those used in the rest of the Ministry's laboratory services for ease of servicing. The BCU should work with the chief medical laboratory technician to standardize microscopes.

Finally, the unit needs data processing equipment in order to direct, monitor and evaluate a national schistosomiasis control program. The BCU's equipment is not functional because it is outmoded and incompatible with the MOH's computer system.

One PC computer with a printer of the same model as the MoH's would be adequate for the unit's needs.

## 5. CURRENT CONTROL ACTIVITIES

### 5.1 Treatment programs

There have been treatment programs for schoolchildren in the northern lowveld and the middleveld for the last four years. Schoolchildren were examined for haematuria by school health teams using reagent strips. All children positive for haematuria were treated with praziquantel or metrifonate. Since the program concentrated on S. haematobium, stools were not examined. The treatment program only covered a few schools because health teams were restricted by a shortage of transport. The program stopped in early 1987 due to the lack of reagent strips. School health teams continue to have great difficulty reaching schools for their normal duties because of a shortage of transport.

BCU staff members have been examining schoolchildren's stool and urine specimens with conventional parasitological techniques and treating schistosomiasis-positive cases with praziquantel.

## 5.2 Water supply and sanitation

Schistosomiasis control is only one of the benefits of improved water and sanitation. Swaziland's rural water and sanitation program therefore has its own commitments and priorities, which may not necessarily be those of the Bilharzia Control Unit. Nevertheless, there has been considerable collaboration with the BCU, which is to be commended and encouraged.

In recent years the MoH's sanitation program has been linked with the rural water program of the Ministry of Natural Resources. These programs depend upon a considerable degree of community support for the construction and maintenance of facilities and their resulting success is impressive. Water supplies are usually provided through boreholes, handpumps or standpipes from protected springs.

The Rural Water Supply Board has been willing to cooperate with BCU in the past when it was thought that a particular community would benefit considerably from a protected water supply. Thus, it is to be hoped that as the BCU becomes more active in a national schistosomiasis control program, it will continue to take advantage of this relationship.

The importance of improved sanitation facilities and water supplies in areas affected by schistosomiasis in order to avoid a perpetual dependence on chemotherapy cannot be too strongly emphasized.

As noted above, no laundry facilities are provided at water points. Clearly, a considerable amount of schistosomiasis transmission takes place when people wash their clothes in natural water bodies. The provision of laundry facilities at strategic community water points should be an important point of negotiation with the Rural Water Supply Board, the Health Inspectorate and the community.

## 5.3 Irrigation schemes

Despite the increased risk of schistosomiasis associated with irrigation development, apparently no schistosomiasis control measures are being adopted on irrigation schemes in Swaziland. However, the authorities in irrigation schemes visited expressed considerable interest in a schistosomiasis control program and would probably be willing to make resources available for its control in areas under their responsibility. Both schemes visited also indicated that they would be willing to organize surveys in their own schools to assess the extent of the problem and would look to the BCU for guidance. Since each

irrigation scheme operates independently, these resources can be tapped most effectively through regular informal contacts.

#### 5.4 Mollusciciding

Mollusciciding activities are very limited. Molluscicide is being applied to contact sites in some recreational sites.

The University of Swaziland is conducting research on the molluscicidal plant Phytolacca dodecandra. Since commercial molluscicides are very expensive and therefore are unlikely to be used widely in a national control program, any attempt to develop a natural snail control agent that communities can use should be supported.

### 6. DATA COLLECTION AND HANDLING

#### 6.1 Ministry of Health

The MoH has a computerized health information system. All health institutions summarize data on patients diagnosed with different conditions and submit monthly summaries to the Ministry. Unfortunately, the MoH has no statistician at the moment. The Ministry also has no epidemiologist, which restricts the ability of the Ministry and units such as the BCU to make full use of available data. Data on schistosomiasis cases treated are being collected nationally. Although they are not being analyzed centrally, these data could be selected out for use by the BCU.

The tally sheets only refer to bilharzia and do not differentiate between urinary (S. haematobium) and intestinal (S. mansoni) infections. Since the grounds for treatment are clear and depend upon identification of the parasite species, there is no reason why the tally sheets could not differentiate between S. mansoni and S. haematobium. This would provide the control program with a regular supply of information about the areas where each species of schistosome is of clinical importance.

No laboratory services are available at clinics and therefore S. haematobium is the only species that can be identified at this level from the clinical presentation of haematuria. Laboratory services at rural health centers and hospitals do relatively few stool examinations and use a technique that has a poor sensitivity for S. mansoni. It is therefore likely that the incidence of this infection is underreported.

## 6.2 Bilharzia Control Unit

The BCU has four sources of data: 1) results of clinic treatment for schistosomiasis; 2) school health team examination and treatment results; 3) BCU school survey results and 4) the BCU clinic.

- 1) Clinics. Few data have been forthcoming from the clinics on the amount of schistosomiasis treated, so the available data have not been analyzed by the BCU and are of little value. However, the data are available from the tally sheets sent to the MoH, as mentioned above, and can be analyzed to provide the geographical distribution of clinical schistosomiasis and information on any seasonal patterns in incidence of clinical schistosomiasis.
- 2) School health teams. The teams have provided little treatment during the last year, as mentioned previously. However, the data contained in their reports are valuable and could be used for more than the summaries presented in the unit's annual report. Suggestions have been made to the BCU on how these data could be summarized upon receipt to provide information on numbers of children in each intensity class of haematuria by school, age and sex. Such summaries are essential for the annual evaluation of the control strategy.
- 3) School surveys. The BCU had conducted regular surveys for schistosomiasis in some 12 schools first treated in about 1983 and also in a few randomly selected schools. Much of the earlier data is stored on a computer tape system that is outdated and incompatible with the MoH data system. These data have not been analyzed to assess impact of the treatment program and are limited by the non-quantitative nature of the parasitological techniques used.

It is proposed that in future, BCU school surveys should be carried out to serve the specific functions discussed below.

In schistosomiasis control areas where school health teams are treating children on the basis of reagent strip haematuria, school surveys should be used a) for annual evaluations of the sensitivity and specificity of the reagent strip; b) to evaluate the efficacy of the treatment program according to changes in prevalence and intensity of schistosome infection; and c) as part of an in-depth investigation when schistosomiasis fails to respond satisfactorily to the treatment program.

A sampling frame that focuses on areas of suspected high endemicity and samples only a specific age group to collect data on prevalence and intensity should be developed for school surveys outside the sampling frame. These data would be used to define areas for future expansion of the intervention program as resources become available.

Suggestions have been made to the BCU about the most useful ways to analyze these data.

## 7. PROPOSED ACTIVITIES FOR THE WORK PLAN

It is important that 1) the activities be related to the available resources in order to be realistic and sustainable, and 2) a horizontal approach be adopted to take advantage of resources available in other sectors and to make the program more robust.

As envisaged in the strategy developed by the BCU, the control program would be an integrated one. This is a desirable objective. The approaches considered in the strategy document, including clinic treatment of schistosomiasis-infected patients, examination and treatment of schoolchildren, focal snail control, community-wide health education and improved water and sanitation, should all be a part of the work plan. The following activities are suggested:

### PHASE ONE

#### A) Finalize planning of work and organization and policy-setting.

A work plan should be developed with clear objectives, timetables and targets for the activities outlined below. This includes identifying equipment requirements for the BCU and for the school health teams. Priorities must be set in relation to resources in order to determine the target number of schools to be included in the treatment program. Because the severity of schistosomiasis is related to the intensity of infection, it is of higher priority to treat those individuals with heaviest infection and to focus the control program on those areas where the prevalence of heavy infections is highest. Although there is no hard and fast rule, the WHO has considered over 50 S. haematobium eggs per 10 ml. of urine or over 100 S. mansoni eggs per g. of stool to be heavy infections.

Policy issues must be clear. For example, the plan should state which drugs will be recommended at each level of the health service for each species of schistosome; which dosage of drug will be used in clinics and schools; what reagent strip reading will be the cut-off point for treatment in the school treatment program and the clinics; what level (intensity and prevalence) of schistosomiasis in schools will determine its inclusion in the program; and the legal or ethical requirements for schistosomiasis control in water resource development projects. Since many of the decisions will have financial repercussions affecting the feasibility of the program, these issues should be considered at the outset.

An example of an important question is whether metrifonate (only effective against S. haematobium) or praziquantel (effective against S. haematobium and S. mansoni) will be used in the school treatment program. Due to present cost considerations, praziquantel should only be used in those areas where S. mansoni is present at a high intensity. This decision must be based on good epidemiological information. Evaluation of the effect of the treatment on S. mansoni must be undertaken regularly to enable a prompt change to metrifonate where S. mansoni is no longer at high intensity. Should praziquantel be purchased at a more reasonable price in the future, it should be the drug of choice for the school treatment program.

B) Training of BCU staff and other cadres involved in the control program.

As discussed above (4.3), BCU staff need training in epidemiology and schistosomiasis.

In collaboration with the chief medical laboratory technologist, the BCU should develop standardized diagnostic techniques for identifying parasites in urine and stool for adoption within the health service. Subsequently, laboratory and clinic staff around the country will need training in approved diagnostic techniques. Some staff members have already been trained in a variety of diagnostic techniques during the course taught by Dr. Everett Schiller and could act as resource persons for training of others.

School teachers and nurses should be trained to run the school examination and treatment program.

C) BCU school surveys for baseline data and evaluation of control.

Baseline data on the prevalence and intensity of S. haematobium and S. mansoni are needed initially for the lowveld

and the irrigation schemes, which are felt to be the priority areas for schistosomiasis intervention. When these data are available it will be feasible to determine which specific schools will be included in the treatment and what resources are needed. Following the establishment of a treatment program in the lowveld, the next priority area for the collection of baseline epidemiological data would be the middleveld, according to the general prevalence data collected by Chaine.

It is particularly important that these surveys are conducted in order to collect epidemiological information and not for the purpose of treatment. This focus would allow the BCU to sample a smaller number of children from each school and therefore cover a larger number of institutions than it presently can manage.

Routine surveys by the BCU in the areas under schistosomiasis control are essential for monitoring the success of control activities in terms of parasitological parameters.

D) **Implementation of school treatment program in the northern lowveld and irrigation schemes.**

Schoolchildren should be the focus for the chemotherapy intervention in the schistosomiasis control program and diagnosis should be by the reagent strip technique. The northern lowveld and irrigation schemes remain the first priority for the implementation of the school treatment program, which would be carried out by a multidisciplinary team from the region. The school health teams have demonstrated that school surveys for schistosomiasis control would be too much work for them to undertake in addition to their other duties. This treatment program would probably best be carried out by the teachers with the help of a nurse from the nearest clinic. The collaboration of the school health team, teachers and clinic staff would be essential in order to integrate this treatment program into existing activities.

Examination and treatment would be carried out annually and the data submitted to BCU. Analysis of the data by the BCU would provide the foundation for regular review of the program and the possible reallocation of priorities.

E) **Liaison with the Rural Water Supply Board, Health Education Center, Ministry of Education and others.**

Contact with the Rural Water Supply Board should continue, with added emphasis on the importance of laundry facilities. The identification of priority areas for water and sanitation intervention to improve schistosomiasis control is an important

function of the BCU. Within the MoH, the health assistants and health inspectors are responsible for the sanitation programs and therefore the BCU must maintain close liaison with these cadres in all regions.

Health education plays a pivotal role in motivating communities to solve their health problems. Health information on schistosomiasis in schools is limited. Contacts with the Ministry of Education and the Health Education Center of the MoH should be renewed in order to review the present educational material available and propose a plan of action to redress any deficiencies.

Liaison with other organizations, including private or mission health institutions and irrigation companies, is also essential to identify additional resources that could be allocated for schistosomiasis control. These contacts are likely to be most successful when they are carried out through informal consultation due to the scattered distribution of the organizations. Wide distribution of the final MoH schistosomiasis control strategy and work plan documents would help sensitize these organizations to MoH policy on schistosomiasis.

- F) Participating in research, particularly on the possible role of Phytolacca in community-based mollusciciding programs.

To fulfill its function in advising on schistosomiasis control at a national level, the BCU needs to conduct operational research into better methods of diagnosis, treatment and control. This operational research need not be a priority of the unit at the present time; however, the unit needs to maintain contact with those agencies able to conduct such research in order to ensure that the research is relevant to the needs of the control program. One area of research at the University of Swaziland is on plant molluscicides. The BCU should work with the university to identify how the research could be oriented to the needs of the control program.

## PHASE TWO

Phase two would require review of the control program after two to three years with a view to expanding it where necessary and carrying out additional control measures in localities where the school treatment program is not achieving adequate success.

- G) Review of success of phase one control activities to identify problem areas for specific intervention. Further investigation of water contact and snail infections would be

conducted in these areas in order to recommend additional control measures.

Schools or areas where the reduction in prevalence and intensity had not reached the target would be identified for further investigation. Specific identification of affected communities and the factors responsible for schistosomiasis transmission would lead to further intervention measures. These may include a priority water and sanitation program in liaison with the Rural Water Supply Board. Focal mollusciciding and treatment of adults may also be considered necessary.

Data from school treatment examinations could also help identify areas where modifying the control program and reallocating resources might be necessary.

H) Given additional resources, expansion of the school treatment program to areas considered of high priority from the ongoing school surveys.

The present intervention strategy is based upon the identification of problem areas from a few sample schools. Additional surveys in other schools would help refine the epidemiological picture to enable more specific targeting of treatment programs for future expansion of the program. The results of the first phase of the control program would need to be reviewed in order to justify the approach used and to present a case for the allocation of the additional resources necessary for a full national control program to be implemented.

## 8. PROPOSED ACTIVITIES OF THE BCU

The BCU is responsible for the national control of schistosomiasis and therefore could be carrying out a great many activities. The BCU should be collecting data for its role in guiding and coordinating the schistosomiasis control program and should not be directly involved in treatment programs. Therefore, in order to maximize the unit's ability to carry out its primary functions of developing, organizing, implementing and evaluating a schistosomiasis control program, the BCU should cease assuming responsibility for distribution of antischistosomal drugs to health institutions and running a routine clinic service for schistosomiasis patients.

It is important that the BCU develop detailed objectives for each of its activities. As a first stage in the development of the work plan, the BCU should identify available resources so that the activities can be related to these resources.

Proposed activities of the BCU result from the foregoing discussion and can be summarized as follows:

1) Overall function of the unit.

Planning, management, implementation, supervision and evaluation of the national schistosomiasis control program.

2) Collection of baseline data.

- a) In-service training of BCU personnel and MoH laboratory technologists in quantitative parasitological diagnostic techniques. Training of clinic staff in use of reagent strip diagnosis for S. haematobium.
- b) Surveys of a selected age group of children in schools for baseline epidemiological information about the prevalence and intensity of S. haematobium and S. mansoni.
- c) Collection and analysis of data from the MoH information system on distribution and incidence of clinical schistosomiasis.
- d) Data management and analysis to show prevalence of infection and prevalence of heavy infection by sex and by school or health institution.

3) Implementation of control.

- a) Training of teachers and health personnel involved in the school treatment program.
- b) Defining areas and schools for intervention.
- c) Supervising the school treatment program.
- d) Carrying out in-depth investigation of selected schools in treatment areas where additional control measures are thought to be necessary due to unsatisfactory control by treatment.
- e) Providing recommendations on the necessity for snail control and improved water and sanitation supplies.
- f) Promoting health education activities in schools and communities.

- g) Maintaining close liaison with the Rural Water Supply Board, Health Education Center and operators of irrigation schemes, recreational sites and other high risk sites.
- 4) Evaluation of the control program.
- a) Analysis of the reagent strip and treatment data submitted to show changing prevalence and intensity of infection.
  - b) Selected surveys in treated schools to evaluate the sensitivity and specificity of the reagent strip and to assess the impact of treatment.
  - c) Snail surveys for assessment of infection status, identification of transmission sites and evaluation of control.
- 5) Conducting research to improve techniques and approaches used in control.

For example, research on the plant molluscicide Phytolacca dodecandra in liaison with the University of Swaziland.

9. SUMMARY OF RECOMMENDATIONS

The following are the major recommendations made to assist in the development of a schistosomiasis control program in the Kingdom of Swaziland. Each recommendation is followed by a reference to the relevant section of the report.

Training

- 9.1 The deputy head of the Bilharzia Control Unit (BCU) should receive training in schistosomiasis control at the Danish Bilharzia Laboratory. (ref. 4.3)
- 9.2 The head and deputy head of the BCU should take a three to four month course in epidemiology. (Ref. 4.3)
- 9.3 Junior staff of the BCU need in-service training in the theory and practice of schistosomiasis control to bring them up-to-date with new developments. (Ref. 4.3).

- 9.4 The head of the BCU should have the opportunity to see regional schistosomiasis control activities through a study tour to Botswana, Zimbabwe and Kenya. (Ref. 4.3)
- 9.5 Laboratory and clinic staff throughout Swaziland should be trained in new, standardized diagnostic techniques. BCU staff members who recently took a course in diagnostic parasitology could serve as a resource for training others. (Ref. 7(b))

### Resources

- 9.6 Additional resources should be allocated to the BCU for equipping the unit and implementing the control program (Ref. 4.2, 4.4)
- 9.7 The BCU should be provided with data processing equipment and microscopes. The computer equipment must be compatible with that used in the MoH. The BCU should receive microscopes that are compatible with those used in the laboratory services and can be maintained in Swaziland. (Ref. 4.4)
- 9.8 Central Medical Stores should assume full responsibility for supplying antischistosomal drugs to health institutions for routine curative services. (Ref. 4.1)
- 9.9 The MoH should try to fill the post of senior medical officer (epidemiologist) for the Bilharzia and Malaria Control Units as soon as possible to provide epidemiological support and to solve the BCU's reporting problems. (Ref. 4.1)

### Control Program Activities

- 9.10 The northern lowveld and irrigation schemes are the areas of first priority for the implementation of a schistosomiasis control program due to the high prevalence of schistosomiasis. The BCU should conduct school surveys to collect baseline data on the prevalence and intensity of S. haematobium and S. mansoni in these areas. (Ref. 2, 7(c), (d))
- 9.11 The schistosomiasis control program should be planned in accordance with available and projected resources in order to be realistic and sustainable. (Ref. 7)

- 9.12 As originally envisaged, the schistosomiasis control program should adopt an integrated approach and take advantage of resources available in other sectors. (Ref. 7)
- 9.13 The work plan should state clearly the MoH's policy positions on schistosomiasis and its control. (Ref. 3, 7(a))
- 9.14 Schoolchildren should be the target group for the program's chemotherapy intervention. This treatment should be provided by a multidisciplinary team at the regional level consisting of a school health team, teachers and clinic nurses. (Ref. 3, 7(d))
- 9.15 The schistosomiasis control program's work plan should include a timetable for reviewing the program to evaluate the approach used and justify the allocation of additional resources for continuation or expansion. (Ref. 7(h))
- 9.16 As an essential part of a schistosomiasis control program, laundry facilities should be provided at selected community water points. The BCU should work with the Rural Water Supply Board and the Health Inspectorate to adopt this policy. (Ref. 5.2)

#### Bilharzia Control Unit Activities

- 9.17 The work program developed for the BCU should include clear objectives, goals and targets for each activity. (Ref. 4, 4.1, 6.2, 8)
- 9.18 The BCU should discontinue the clinic service for schistosomiasis patients. (Ref. 4.1)
- 9.19 The BCU should adopt fully quantitative parasitological techniques for examination of urine and stool specimens. (Ref. 4.1)
- 9.20 The BCU should collaborate with the chief medical laboratory technologist to establish within the health service standardized diagnostic techniques for parasites in stool and urine specimens. (Ref. 6.1, 7(b))
- 9.21 BCU surveys for schistosomiasis should be conducted in order to collect epidemiological data for management of the program rather than for treatment purposes. (Ref. 6.2(3), 7(c), 8)
- 9.22 The BCU should maintain an up-to-date analysis of data on schistosomiasis from school prevalence surveys, school treatment programs and clinics. (Ref. 6)

- 9.23 The BCU should maintain its liaison with the Rural Water Supply Board and strengthen links with the Health Education Center, the University of Swaziland, the Ministry of Education and irrigation authorities through circulation of documents on the schistosomiasis control program, regular meetings and informal contacts. (Ref. 4.1, 5.2, 5.3, 7(e))
- 9.24 The BCU should meet with the Ministry of Education and Health Education Center to review available educational materials about schistosomiasis and propose a plan of action to remedy any deficiencies. (Ref. 7(e))
- 9.25 The BCU should work with the university and other agencies to encourage operational research relevant to the needs of the control program. (Ref. 7(f))
- 9.26 If the above recommendations are adopted, a consultant should visit the BCU within 12 to 18 months in order to review the program's progress, identify constraints and provide further guidance on data processing.

## ANNEX 1

### ASSIGNMENT

1. Attend briefing at USAID/Mbabane and Ministry of Health.
2. Coordinate activities with Dr. Everett L. Schiller.
3. Review Ministry of Health schistosomiasis control activities, data collection and management at the operational level.
4. Advise USAID and MOH in writing of recommendations for improving and strengthening schistosomiasis control strategies and surveillance.
5. Review data handling and follow up in laboratories.
6. Debrief USAID and file final report with VBC.

## ANNEX 2

### ITINERARY

#### Jan

- 27 Depart Harare.
- 28 Arrive Swaziland.
- 30 Review documents.
- 31 Bilharzia Control Unit, MoH, USAID

#### Feb

- 1 Public Health Labs., RFM Hospital
- 2 Piggs Peak Hospital, Emkhuzweni Rural Health Center, Emkhuzweni primary school
- 3 School health team Mbabane, School health team Manzini
- 6 Central Medical Stores, Rural Water Supply Board
- 7 Vusweni water and sanitation project
- 8 Bilharzia Control Unit, Malaria Control Unit
- 9 Mhlume Irrigation Scheme
- 10 Bilharzia Control Unit
- 13 Ubombo Ranches irrigation scheme and clinic
- 14 Ministry of Health, Rural Water Supply Board
- 15 USAID

### ANNEX 3

#### PEOPLE CONSULTED

Mrs. Sibongile Mthupha, Head, BCU and staff  
Mr. Mduduze Hlope, Chief Health Planner  
Miss Mary Pat Selvaggio  
Dr. Rudolph Matsiya, Chief Medical Laboratory Tech.  
Mr. Jim Whited, Laboratory Tech., RFM Hospital  
Mr. Sukati, Lab. Tech., Piggs Peak Hospital  
Mr. Mhloyi, Lab. Asst., Piggs Peak Hospital  
Mr. Sifton Dlodlu, Lab asst., Emkhuzweni Health Center  
Dr. J. Hickie, Emkhuzweni Health Center  
Sr. Sebenzile Ginindza, School health Nurse, Hhohho Region  
Sr. Abelia Dhlamini, School Health Nurse, Manzini Region  
Mrs. Tuli Sibiya, Central Medical Stores  
Dr. Bill Hoadley, Rural Water Supply Board  
Mr. Kobus Legrange, Malaria Control Unit  
Dr. Ian Gilbertson, MoH, Mhlume Irrigation Scheme  
Mr. Dave Summersgill, Chief Engineer, Mhlume Irrigation Scheme  
Mr. John Dhlamini, Lab Tech., Mhlume Irrigation Scheme  
Dr. John Efstratiou, Chief Medical Officer, Ubombo Ranches  
Mr. Clifford Mamba, Chief Health Inspector, Ubombo Ranches  
Dr. Q.Q. Dhlamini, Ministry of Health

I am grateful to the above for the kind reception afforded to me and for the information they contributed to make this report possible.