ZOOBOTIC AND PARASITIC DISEASES

PROCEEDINGS OF THE THIRD INTERNATIONAL AND PAN-ARAB SEMINAR HELD IN AMMAN, JORDAN, 17–20 OCTOBER, 1989
The International Development Research Centre is a public corporation created by the Parliament of Canada in 1970 to support research designed to adapt science and technology to the needs of developing countries. The Centre's activity is concentrated in six sectors: agriculture, food and nutrition sciences; health sciences; information sciences; social sciences; earth and engineering sciences; and communications. IDRC is financed solely by the Parliament of Canada; its policies, however, are set by an international Board of Governors. The Centre's headquarters are in Ottawa, Canada. Regional offices are located in Africa, Asia, Latin America, and the Middle East.

Le Centre de recherches pour le développement international, société publique créée en 1970 par une loi du Parlement canadien, a pour mission d'appuyer des recherches visant à adapter la science et la technologie aux besoins des pays en développement; il concentre son activité dans six secteurs : agriculture, alimentation et nutrition; information; santé; sciences sociales; sciences de la terre et du génie et communications. Le CRDI est financé entièrement par le Parlement canadien, mais c'est un Conseil des gouverneurs international qui en détermine l'orientation et les politiques. Etabli à Ottawa (Canada), il a des bureaux régionaux en Afrique, en Asie, en Amérique latine et au Moyen-Orient.

El Centro Internacional de Investigaciones para el Desarrollo es una corporación pública creada en 1970 por el Parlamento de Canadá con el objetivo de apoyar la investigación destinada a adaptar la ciencia y la tecnología a las necesidades de los países en desarrollo. Su actividad se concentra en seis sectores: ciencias agrícolas, alimentos y nutrición; ciencias de la salud; ciencias de la información; ciencias sociales; ciencias de la tierra e ingeniería; y comunicaciones. El Centro es financiado exclusivamente por el Parlamento de Canadá; sin embargo, sus políticas son trazadas por un Consejo de Gobernadores de carácter internacional. La sede del Centro está en Ottawa, Canadá, y sus oficinas regionales en América Latina, Africa, Asia y el Medio Oriente.

This series includes meeting documents, internal reports, and preliminary technical documents that may later form the basis of a formal publication. A Manuscript Report is given a small distribution to a highly specialized audience.

La présente série est réservée aux documents issus de colloques, aux rapports internes et aux documents techniques susceptibles d'être publiés plus tard dans une série de publications plus soignées. D'un tirage restreint, le rapport manuscrit est destiné à un public très spécialisé.

Esta serie incluye ponencias de reuniones, informes internos y documentos técnicos que pueden posteriormente conformar la base de una publicación formal. El informe recibe distribución limitada entre una audiencia altamente especializada.
ZOONOTIC AND PARASITIC DISEASES

Proceedings of the Third International and Pan-Arab Seminar
held in Amman, Jordan, 17-20 October 1989

Edited by
Oumeish Youssef Oumeish and Panduka M. Wijeyaratne

Cosponsored by
International Development Research Centre,
Ottawa, Canada
and The Higher Council for Science and Technology,
Amman, Jordan

Material contained in this report is produced as submitted and has not been subjected to peer review or editing by IDRC Communications Division staff. Unless otherwise stated, copyright for material in this report is held by the author. Mention of proprietary names does not constitute endorsement of the product and is given only for information.
TABLE OF CONTENTS

1. ZOONOSES; GENERAL
   - Environmental and Community Research Issues on the Zoonoses.
     Pandu Wijeyaratne 1
   - Zoonotic and Parasitic Diseases in the Mediterranean Area.
     George Papdopoulos 8
   - New Information in Dermatology.
     Lawrence Charles Parish 19
   - The Changing Pattern of Disease Implications for Epidemiology and Individuals
     V. Tipton 26
   - Zoonotic Infections in Aids.
     D.C.W. Mabey 32

2. LEISHMANIASIS
   - Epidemiology of cutaneous Leishmaniasis in Jordan: The Current Situation.
     Oumeish Youssef Oumeish 35
   - The Presence, Distribution and Seasonal Abundance of Potential Vectors of Cutaneous and Visceral Leishmaniasis in Jordan.
     S. Kamhawi 40
   - Epidemiology of Cutaneous Leishmaniasis in The West Bank of Jordan.
     Hisham Arda 55
     Mamoon Jallad 59
- Existence of Leishmania Major in the South of Syria: Causative Agent of Damascus Boll.
  A. Khiami

- Cutaneous Leishmaniasis in Aleppo/Syria.
  A. Chehade, A. Mouakeh

- Leishmaniasis and Primary Health Care in Tunisia.
  R. Ben-Ismail, M.S. Ben Rachid

- Protective Immunity Against Leishmania Donovani in Balb/C Mice.
  Suad Z. Jawdat, Nada K. Al-Hussayni, Layla Kh. Rifaat

- Epidemiological Facts on Kala-Azar in Iraq.

- Treatment of Leishmaniasis
  Mohamed Amen

- Histopathological and Immunological Changes in Experimental Leishmaniasis.
  Magda Youssef, Laila Abou Samia, Soheir E. Hamam

3. HYDATIDOSIS

- Hydatidosis in Jordan: A Review.
  E. Saliba

- Hydatid Disease: A Comparative Study in the Medical City Teaching Hospital After 10 Years.
  A.H. Khalili, T.I. Aljeboori, Remm Munir & M. Alsammak

4. BRUCELLOSIS

- Brucellosis in Animals: Control and Preventive Measures in Jordan.
  N. Abdul Aziz, F. Schenkel
5. **TOXOPLASMOSIS**

- Prevalence of Toxoplasma Antibodies in Iraqi Pregnant Women in Baghdad. 138
  
  A.D. Niazi, A.R. Omer, T.S. Al-Hadithe and A. Aswad

6. **RABIES**

- Health Systems Research and Rabies Control. 145
  
  K. de Balogh

- Rabies and Rabies Post-exposure Prophylaxis in Amman Governorate-Jordan. 152
  
  Fathy Saleh

7. **SCHISTOSMIASIS**

- Study on Heterologous Immunity in Schistosomiasis Using Heterophyid Antigens. 163
  
  Magda Youssef, Laila M. Boulos and Mervat El-Azzouni

- Resettlement, Schistosomiasis and Research: On Control Effects in Alexandria, Egypt. 171
  
  Hoda F. Farag

- Community Control of Schistosomiasis in Zimbabwe. 185
  

8. **RECOMMENDATIONS OF THE SEMINAR** 200

9. **PARTICIPANTS** 201
Introduction

Schistosomiasis is a major parasitic disease in Zimbabwe ranking second after malaria in its public health importance. Recent nationwide surveys for schistosomiasis showed that over 50 per cent of the population living in high endemic zones were infected by the urinary form of the disease (Schistosoma haematobium). On the other hand, prevalence of the intestinal form (S. mansoni) is usually under 20 per cent.

In the past, lack of a clear understanding of the major factors that influence the epidemiology of schistosomiasis prevented the development of control strategies that were appropriate to each endemic situation and could be implemented on a wide scale and on a sustainable basis. Recent comprehensive and longitudinal studies conducted by the Blair Research Laboratory have provided detailed information on focality and seasonality of schistosomiasis transmission, on human water contact patterns and on prevalence, intensity, morbidity and incidence of infection in the human population.
Based on the results obtained from the above studies, a community-based primary health care (PHC) approach to control morbidity and transmission in a rural community of over 30,000 people is outlined and discussed. The community-based PHC approach to schistosomiasis control is the strategy adopted in Zimbabwe. The PHC approach allows for the active participation of the population. This is essential for long term and sustainable control programs. The community can be actively involved in control activities such as assisting local health authorities in the distribution of antischistosomal drugs and health education posters, snail control through habitat modification and use of plant molluscicides, and sharing costs of the sanitation and water supply programs. Such community-based participatory and cost-sharing activities lower costs of the control program to the health services and funds may be saved for tackling other health problems. In addition, local leaders can develop a community level surveillance system to monitor the progress of interventions and to determine an appropriate mechanism for sustaining the achievements.

Project Area and Control Design

Madziwa communal area comprising 53 villages (total area is about 21,000 hectares), with a total population of 30,913, was selected for the demonstration control project. The communal area lies in the north-east high veld of Zimbabwe, a region of high rainfall and temperature in summer, numerous perennial streams, and high densities of human population, conditions which favour a high transmission of schistosomiasis. At the beginning of the control project combined prevalence of both forms of diseases as in excess of 60% in the majority of villages. A significant proportion of children and young adults (7 - 20 years) harboured heavy infections (i.e. > 50 S. haematobium eggs per 10 ml of urine or > 100 S. mansoni eggs per gram of faeces).

The human population is made up of the MaShona ethnic group of peasant farmers who intensively rear cattle as a form of wealth and for use in customary activities. Before the sanitation and water supply programs were begun the majority of the people used natural water (streams) for all water-related activities, piped/borehole water sources being few or unavailable. Most people used the cover of bushes and crops for excretion because toilet facilities were inadequate.

The Madziwa project (initially for three years: 1985 - 1988) investigated the effectiveness of integrated control measures against schistosomiasis at the community level. The design involved control of schistosome infections through selective treatment targeted at school children, those being among the most heavily infected groups in the community. It was considered that
progress made through selective chemotherapy would be consolidated by improved sanitation, provision of safe water supplies and health education.

Targets were set at one latrine per household, one protected water point for every 25 to 30 families, and intensive health education through annual school-based drama competitions, talks, films, posters and local committees. A single blanket application of the commercial molluscicide Bayluscide was applied into the main streams at the beginning of the program in order to support the impact of the initial chemotherapy.

To evaluate the impact of the improved sanitation, protected water supplies and health education campaigns, 16 villages in Bushu rural community were subject to selective targeted treatment of the school children only. In these villages there were no active programs to improve sanitation, water supplies, or health education, or to control snail hosts. Bushu is located about 20 kilometres from Madziwa area, and presumably the mixing of human populations of the two communities through inter-migration is not a problem. However, topographical, cultural and socioeconomic conditions, and prevalence rates of schistosomiasis in the two areas, are essentially the same.

Control Measures

Chemotherapy

Treatment was targeted primarily at school children aged 7 to 15 years of age, but older pupils and some teachers (up to the age of 21 years) were also included. Peak intensities of schistosome infections are known to occur in these age groups. Targeted treatment was facilitated by the fact that in the project localities, as in most rural areas of Zimbabwe, about 90% of the children attend school. Class teachers were available to assist with records and in controlling the pupils. In the Madziwa and Bushu project areas school children comprised about 50 per cent of the total populations.

Children were examined for haematuria using reagent strips and those positive were given oral dosages of praziquantel at the recommended regimen of 40 mg/kg body mass. The sensitivity and specificity of reagent strips to haematuria were found acceptable following evaluation by parasitological examination of urine and stool specimens from 20% of children participating in the study. The technique saves a considerable amount of time when compared with conventional methods and is a convenient, rapid and effective tool for screening infected children. Treatments were done during January - February 1986, September - October 1986, and September - October 1987.
Results of our initial analysis of the impact of treatment on *S. haematobium* infections showed a marked reduction in the targeted age class, particularly for heavy infections (Fig 1). However, treatment targeted at school children may not have a substantial impact on transmission and some reinfections observed could be attributed to infected members of other age groups who did not receive treatment (Fig. 1). Whether in the long term treatment targeted at school children has some benefit to other age groups remains to be seen in the ongoing monitoring program. Similarly, comparison of incidence rates data from the Madziwa and Bushu project localities should elucidate the role, if any, of improved sanitation, safe water supplies, health education and snail control in slowing the force-of-infection of endemic schistosomiasis.

Sanitation  
The ventilated improved pit (VIP) latrine locally known as the Blair latrine (Fig. 2) is the sanitation technology of choice in Zimbabwe. It was developed in the early 1970s and its acceptability and effectiveness is probably measured by the fact that over 120,000 VIP latrines have been constructed throughout the country in the last 10 years. The VIP is an improvement over the pit latrine and when it is properly constructed it is odourless and free of flies. The latrine works without water and is thus appropriate for most rural communities where water is a problem.

To encourage latrine construction in the Madziwa project area, the research team, through the local health assistants and committees, provided 5 bags of cement, a stainless steel mesh for the fly-screen, and reinforcing wire to each family willing to construct a VIP latrine. These subsidies per family add up to about US $28 per latrine. The family provides labour for digging the pit, sand and gravel, bricks and labour for the construction of the latrine. Locally recruited persons were trained to build the VIP latrines, thereby introducing building skills into the community. Approximately US $27 were required to contract a locally trained individual to build a single compartment latrine. There were additional costs for materials and labour if a family required a two-compartment latrine. This type of latrine is convenient and proved to be very popular in the project area.

Members of the research team, with support from the provincial health authorities, regularly visited the project area and gave advice to the locally trained builders as well as monitoring the quality of latrines built. The target of 3000 latrines of the Madziwa area was not met. However, this was somewhat compensated for by the fact that, of 2152 latrines that were completed by November 1988, nearly half were of the double compartment type. Furthermore, the monthly cumulative numbers of latrines and pits dug since the project was started (Fig. 3) suggest that satisfactory progress was made. Of significance is the fact that the majority of the latrines met the standard specifications,
indicating that the training program for the builders was effective. It still remains to maintain the momentum if the goal of one latrine per family is to be achieved.

In a project of this complexity extending over an area of about 21,000 hectares there are variations in local conditions and in the requirements for promoting the sanitation program. In addition, personal enthusiasm of local leaders, local customs, and the degree of cooperation from the peasant families had a significant influence on the rate of construction and thus on the total number of latrines that were built in each ward. The Blair latrines were accepted by the communities, particularly the double compartment version for males and females. Strict separation in usage of ablution facilities by sex accords well with the cultural norms of the MaShona.

**Water Supply**

The National Action Committee for the International Drinking Water Supply and Sanitation Decade in Zimbabwe has approved low cost technologies for the supply of water to scattered village communities. For the water supply component of the Madziwa schistosomiasis control project three approaches were adopted: 1) the use of a hand operated drilling rig to increase the number of wells; 2) installation of simple pumps (Blair and bucket pumps) on shallow wells; and 3) construction of washing slabs at water points.

As with the sanitation program, efforts were made to involve the community in all aspects of the water program. Inputs of the local people included provision of their labour for drilling or digging wells, provision of bricks and river sand for the wells and washing slabs, and preparation of rings for well lining. The villagers played a central role in the identification of sites for drilling new wells or upgrading existing wells. The research team, with the help of other government agencies such as the District Development Fund (DDF), assisted in the formation and training of water committee members to install, maintain and repair water pumps.

Before the beginning of the water program, there were 40 boreholes fitted with hand operated bush pumps in Madziwa. The Bush pump is more robust than the Blair pump and is suitable for heavy-duty settings, such as those required at schools and business centres. The target was to install 150 hand pumps (approximately three pumps per village). This target was by and large met if we take into account the Bush pumps, 104 shallow wells that were fitted with Blair hand pumps, and several protected wells that were fitted with bucket pumps.
Some factors militated against optimum usage of the available water points. In some cases water points were not easily accessible because of distance (localities near the villages were often rocky) or because some individuals claimed sole rights to wells that had been protected but were located on their land. In others, wells dried up during the dry season because they were not deep enough. However, the most important factor for the water program concerned operations and maintenance of the water works. A clear national policy on who is responsible for maintenance and repair of installed pumps is required, because observations in the project area showed that communities do not recognize installed pumps as belonging to the community and therefore as being their responsibility.

**Health Education**

In spite of the high prevalence of schistosomiasis in the project area, a survey of knowledge, attitude and practices (KAP) conducted before the beginning of the control program revealed that knowledge about the disease, its public health importance, transmission and control were not well understood. Few people associated schistosome infections with absence of latrines and unprotected water supplies. Although the people probably observed snail hosts in the natural streams they visited, in most cases they were unaware that snails played an essential role in the transmission process.

People usually acquired infection during a variety of water contact activities such as bathing, swimming, washing clothes and utensils and crossing bodies of water. However, as the effects of schistosomiasis infection are not as dramatic as those of malaria, the people were generally not aware of the infection. Under such circumstances, it was necessary to launch a vigorous health education campaign to alert the people of the dangers of infection and also of the need to control the disease.

The implementation of the health education program proved to be fairly complex. It was found convenient that health education be primarily undertaken by health officials in the district, with some technical support from the research team. Three main approaches were selected to provide health education to the communities:

1) posters, films and talks
2) drama competitions
3) local committees.

Posters and films on schistosomiasis, hygiene and safe water were available and were distributed throughout the project area with emphasis on schools and women's groups. Posters and films on the construction of Blair latrines and upgrading of wells were popular because they were clear, portrayed indigenous actors and
were relevant to the perceived health needs of the people. As well, in rural communities, films (even educational ones) provide rare entertainment and therefore are well attended. After the films, health assistants and nurses talked to the people present on various aspects of hygiene and other health matters to support and strengthen community participation in the various control activities.

Drama is an important part of local culture and we incorporated it in the health education program as an effective means of communication. For organizational reasons the annual drama program was focused on schools. It was hoped that drama would be a more effective means of reaching the adult population, which is less easily accessible. The themes of the plays sought to facilitate understanding of the disease and its control.

To encourage broad identification with the project, private sector companies were encouraged to give donations for the prizes (e.g., stationery, food, cash, etc.). District officials from the ministries of health, education and local government were invited to judge the plays and also present opening and closing speeches. Drama competitions were popular with people of different ages who came to watch the performances. Members of the research team and health officials took the occasion to discuss with the people various aspects of the control project.

For a community-based control program, the involvement of the target communities in disseminating health education is essential. Efforts were therefore made to maintain an information exchange system between local health officials, members of the village and ward development committees, and local political and civic leaders. These groups and individuals played an important role in mobilizing the people to take part in various aspects of the control project, particularly the sanitation and water supply components.

In spite of the efforts described above, health education proved to be a difficult aspect of the control program. Local health staff did not spend enough time in addressing the people because of other pressing duties. In addition, organizational and transport problems limited the number of school visits that could be made by the health education officers. Such a situation probably explains the results of the KAP surveys of 1985 and 1988 (pre- and post-intervention, respectively) which indicated that health education had a very limited impact on knowledge of schistosomiasis by female heads of household.

In addition, knowledge of specific aspects of the life cycle of the disease by children was poor. This could be attributed to the fact that health education attempted to get children to grasp too technical details of the disease. Health education should aim at developing the ability of children to apply the information
acquired to disease prevention. Interestingly, the majority of them were aware that natural streams were a source of infection. Such knowledge should be used to reinforce health education messages.

Snail Control
In support of the other control activities, Bayluscide, a synthetic molluscicide was applied to all permanent water bodies in July 1986. A total of 123.6 kg of 70% wettable powder of the molluscicide was used, packets of 50 g being mixed in 8 litres of water and used as a cover spray. Spraying was carried out 10 metres upstream and 5 metres downstream from the contact site, spraying from one bank to the other.8

Commercial molluscicides are too expensive for routine use and in the control project Bayluscide was used once at the beginning of the control program. Only human water contact sites were treated. In the long term sustained snail control would realistically be through the use of a low cost and locally obtainable molluscicide. Great promise has been shown by berries of the African soapberry, *Phytolacca dodecandra*, which are highly toxic to snail hosts.9

Evaluation
The effectiveness of the community-based schistosomiasis control project is being assessed by annual age-prevalence surveys in the human population and monitoring infection rates in snail hosts. Selective chemotherapy of school children based on reagent strip detection of haematuria proved to be an effective and cost-effective means of detecting and treating *S. haematobium* infections. Nevertheless, the rate of reinfections appeared to be rather high although infection intensities were generally low. Infection rates may be misleading in evaluating the effectiveness of interventions since intensity and length of exposure to infection are the major determinants of the development of morbidity.

The impact of the sanitation, water supplies and health education programs will be evaluated by comparing reinfection incidence rates in people of villages in the Madziwa project area with those in the witness villages in the Bushu area. In principle, improved hygiene and health education should limit the risk of reinfection. This would reduce the need for frequent chemotherapy with consequent savings in the costs of drug procurement and delivery. Nevertheless, the contribution of improved sanitation, safe water supplies and health education in controlling schistosomiasis is difficult to evaluate. Piped water may only influence a small proportion of human water contact activities which are normally carried out at natural bodies of water.10 The construction of washing facilities at water points is an attraction away from natural water. However, streams may continue to be used for swimming and bathing.
Overall, snail infection rates declined somewhat during the course of the project implementation. However, there was marked spatial heterogeneity in snail infection rates among different sites. Under such circumstances, it is difficult to attribute the decline in snail infection rates partly or wholly to the latrine building program. In any case, some water contact activities may result in the contamination of natural water with schistosome eggs. On the other hand improved sanitation would have a psychological effect, reinforcing health education messages and thereby encouraging behaviour patterns that result in less contamination.

There is concern that overall evaluation of the impact of the interventions will be difficult due to differences in location of villages in relation to natural bodies of water. Furthermore, account should be taken of variations in the number of latrines, water points and coverage of health education among the different villages. Also, the results of the epidemiological monitoring may be confused by movements of people among the villages. This calls for intensified monitoring in the second phase of the project so that adequate comparison can be made of the impact of the interventions among the various villages.

References


