Health education in the control of schistosomiasis

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1. Introduction

Schistosomiasis (or bilharziasis, as it is sometimes called) is a parasitic infection that affects 200 million people and poses a threat to 400 million more in at least 76 countries. In its various forms it frequently leads to serious physical, social and economic disability and, together with the other major parasitic diseases, can seriously weaken the productive capacity of the developing countries. Ironically, the disease is often a by-product of otherwise beneficial development initiatives, such as irrigation schemes.

Like many diseases, schistosomiasis is largely caused by human behaviour—in this case, principally water use practices and indiscriminate urination and defecation, but also failure to take advantage of available screening services or to comply with medical treatment. However, it is important to avoid blaming people and their behaviour exclusively, especially when appropriate control measures are not widely available. Fortunately, new technologies are being developed which are simple to use and inexpensive and which lend themselves to community participation in the control of schistosomiasis.

Control measures are generally concerned with diagnostic screening, treatment, snail control, water use and safe disposal of excreta. To be fully effective, however, integrated control programmes must also, through health education, emphasize the importance of behaviour that is conducive to health.

Health education is that aspect of health care directed towards promoting and reinforcing healthy behaviour through full participation of the individuals and communities concerned. It is a voluntary process that encourages people to make informed decisions to improve and maintain their health. The aim of health education in schistosomiasis is to help people understand that their own behaviour is a key factor in the transmission of the disease. It is more practical to explain the problem in terms of people's involvement with schistosomiasis than to attempt to describe the complex life cycle of the parasite that causes the disease.

However, details of the disease itself, the parasite, and methods of diagnosis and treatment have been included in an annex at the end of the book.

This manual describes the planning and evaluation of health education programmes that can be integrated into schistosomiasis control efforts. Individual sections focus on the ways in which health education can complement specific control technologies—improved water and sanitation facilities, screening and treatment programmes, and snail control measures. The illustrations used have been taken from a WHO health education poster, first published in *World health* in December 1984. The poster is designed for use both in schools and in the community. It shows the complete life cycle of the parasite, as well as principal methods of controlling the disease. While the scientific details may be difficult to explain to the general community, they may have more relevance in schools, where pupils may have the opportunity to study the parasites and their eggs.

The manual is intended primarily for health workers at all levels, but particularly primary health workers engaged in health education activities, and can be used for self-instruction or form the basis for a short training programme. For maximum effectiveness, the examples and pictures provided should be adapted to the local culture, to the prevalent type of schistosomiasis, and to local priorities for disease control.

2. General concepts of health education

The process and planning of health education

Health education involves people in all phases of solving their own problems: in finding out about the problems and in planning, implementing and evaluating programmes to solve them. The process works best when people are truly interested in the problem at hand. Frequently, however, when communities list their priority problems, specific diseases do not rank among them. Although this does not mean that community members will ignore specific disease control programmes, it does mean that health workers will have to strive harder to adapt these programmes to local interests.

For reasons such as the following, people do not generally recognize schistosomiasis as a priority problem:

- the disease has always been with them;
- they have more obvious problems, such as poor harvest;
- the disease causes little apparent mortality;
- they do not know the cause of the disease;
- they do not know that the disease can be prevented;
- they lack the time, money, materials and skills to take effective action;
- solutions to the problem may undermine the power of influential community leaders and therefore be resisted.

Understanding how people regard a problem such as schistosomiasis makes it easier to communicate with them about it and help them to see that solution of the problem may in fact coincide with their interests and priorities. Health education is

a two-way process in which health workers and communities learn from each other.

Health education diagnosis

The initial process of finding out about the community is known as health education diagnosis and begins with the identification of specific behaviour that puts people at risk, such as bathing in lakes, and of the reasons for such behaviour. It is a joint effort between the health worker and community members and should yield information about people's beliefs, values, behaviour, habits, and use of available health services and about the human and material resources that could be mobilized to encourage or reinforce health-promoting behaviour. Interviews, informal discussions, observation, and local records and documents are all valuable sources of such information.

Health education diagnosis serves four main purposes. First, by participating in the diagnosis with health workers, community members learn about themselves and their problems, which is an initial step towards action. Health workers play an important role in this, helping community members to interpret the problems in the context of their own culture. The table below gives an example of this process, which is known as health belief synthesis.

Traditional belief	Synthesis	Modern idea
People believe that urinary schistosomiasis is caused by urinating in the road.	The health worker agrees that urinating in the road is not good, and asks people what other places are not suitable for urinating. He or she guides people to see that the village pond or stream is not an acceptable place either.	Urinary schistosomiasis spreads when infected people urinate in water sources in which others later wade or bathe.

Once community members and health workers share a common understanding of a problem, they can proceed to document the

extent of that problem. This is the second purpose of diagnosis—establishing a baseline against which programme results can be evaluated. For example, the community and its health workers may find that 60% of adolescent boys swim in the local irrigation canals. If they design a programme to discourage swimming and substitute another form of recreation, they can later observe whether there has been a drop in the number of boys who swim in the canals and thus judge whether the programme has been successful.

The third purpose of diagnosis is to identify and assess the resources available to solve the problems. Primary health care is best served when local materials, technologies, funds and workers can be used in solving health problems. Diagnosis can help determine, for instance, whether a community can afford to participate in the construction of new wells and latrines or whether traditional healers might be available and willing to participate in screening and treatment efforts.

The fourth purpose of diagnosis is to provide a rationale for selecting appropriate health education strategies. There are many different health education strategies; they may provide information, teach skills, mobilize resources, develop leadership, or assist in decision-making. The choice of appropriate strategies will depend on the factors revealed by diagnosis to be contributing to the particular problem.

Health education planning

Information obtained through diagnosis as described above will provide the foundation for developing an educational plan. Health education must be a planned activity: it cannot happen by chance, by whim or by coincidence. The health worker must work together with other members of the programme team and the community to ensure that educational activities are carried out in a scientific and systematic manner.

A written plan for health education is most desirable, and ideally has ten components—a title, a description of the target population, a statement of the problem or need, a list of

programme and educational objectives, a description of the means for community involvement, an analysis of the factors that will promote or hinder programme success, a list of appropriate health education strategies, an outline of the resources available and needed for the programme, a timetable for action, and finally a scheme for evaluation. Each is described briefly below.

Programme title

A simple title like "Health education for the control of schistosomiasis" will probably suffice, but it may also be helpful to specify the major control effort (e.g. water and sanitation, or treatment). The title may also specify the area of coverage (e.g. national, regional), and should be followed by the name and address of sponsoring agencies (e.g. Ministry of Health).

Description of target population

Not everyone is at risk of being infected with a particular disease; because of lack of resources a programme may therefore concentrate only on certain high-risk groups. Adolescents may form the target group for health education on urinary schistosomiasis in one community, while agricultural workers may be the target for education on intestinal schistosomiasis in another area. It is also important to indicate the approximate number of people at risk. For example, half the adult men in a certain community may be engaged in agricultural work that exposes them to schistosomiasis; if there are 10 000 men in the community, the target population would be 5000.

Statement of need or problem

Stating the nature and extent of the problem serves as a baseline against which to measure programme outcome. There are two aspects to this. After epidemiological survey (as part of community diagnosis), programme planners should first be able to state what percentage of the target population is actually affected by schistosomiasis. From the above example of adult men in agricultural work as the target population, a survey may have shown that 75% (3750 people) are infected with the disease.

A second statement should concern the nature and extent of behaviour that influences disease transmission. For example, diagnosis may have shown that 80% of the target group bathe after work in the irrigation canals, 50% defecate in the bushes right next to the canals and 60% wade across the canals rather than use the bridges.

Objectives

Just as two types of baseline data are needed for developing the plan, two types of objectives are needed for the programme. The ultimate objective, or programme objective, should state the intended reduction in disease prevalence, for instance "Reduction in the prevalence of *Schistosoma mansoni* infection to below 10%". This objective is common to all components of the programme, including the health education section, the screening and medical team, and the water and sanitation engineers. The second objective is particular to the health education component and defines the changes in community behaviour that will occur if the programme succeeds, for example "The number of agricultural workers who bathe in the irrigation canals will decrease from 80% to 40% one year after the programme is implemented".

Community involvement

If health education is to be effective it must encourage community participation as a regular and continuous part of the whole planning process. The specific means for ensuring this involvement must be made clear. It may, for instance, take the form of a health and development committee. If the agricultural workers have a union or a cooperative society, this organization should be involved in planning. Women's groups and youth associations can also be appropriately involved. Such groups should be made full partners in planning and receive appropriate orientation to enable them to communicate and work effectively with health and related staff. It is important to identify these groups during diagnosis.

Analysis of factors that influence success

Diagnosis may reveal certain beliefs, resource shortages, or attitudes among health workers that could influence programme success either positively or negatively. Listing these factors will make it easier to select appropriate health education strategies. The fact that, in some communities, people with schistosomiasis are treated as social outcasts is an example of a negative influence that may discourage others from participating in screening programmes. On the other hand, a rural development scheme by the government or a voluntary agency which makes money available to communities for small-scale water and sanitation improvements would be likely to have a positive influence.

Health education strategies, methods and materials

Health education strategies should address the factors contributing to behaviour that influences health. Where knowledge about a particular health problem is lacking, information can be supplied through mass media, community meetings, traditional communication channels like story-tellers and town criers, or counselling provided by individual health workers. When community skills are inadequate to solve a health problem, a training strategy is appropriate. If a community lacks the resources for action to improve health, community development strategies can mobilize internal funds, materials and manpower, or community action can recruit external resources. Family counselling or formation of clubs and support groups can provide the social encouragement to adopt and maintain new types of behaviour. Examples of the application of these strategies to specific aspects of schistosomiasis control are provided in later sections of the book.

In discussing health education methods, it is important to mention the materials that may be used, such as posters, pamphlets, flip charts, flannelgraphs, films, handbills, audio and video tapes, magazines, newspaper articles and radio features. The usual term "educational aids" for these materials gives an indication of their role in health education, where they aid or assist health educators in doing their job. However, educational aids never substitute for the trained personnel who plan and

deliver health education services, and many health education strategies, for example community action, organizational development, personal counselling and support group activities, may rarely require their use.

If used properly, health education materials can be beneficial in a number of ways. They clarify communication by helping people to visualize better the ideas being proposed and discussed, and some may also allow the health educator to reach wider audiences. They may also provide reinforcement and reminders of what has been taught.

A health worker must choose or develop health educational materials with care, bearing their limitations in mind. The following guidelines may be helpful:

- Begin in a simple manner using locally available materials. Draw posters or cut out and paste pictures from magazines. Become proficient in traditional communication techniques like telling stories and proverbs. Use town criers and local leaders to spread health messages.

- Express messages in culturally appropriate terms. Build on local beliefs; do not criticize or belittle them. Avoid scientific or technical words; find simple ways to express ideas using the local language. Draw pictures or choose photographs that resemble local situations and people.

- Test materials before using them widely, whether they are home-made or officially supplied. Ensure that pictures are understandable and do not cause offence. Ask questions to determine whether people have understood the intended messages. Make appropriate modifications to improve materials.

- Use materials in ways that encourage participation. Involve people in discussion about what they observe and think about posters. Ask thought-provoking questions after telling stories and showing films. Encourage community members to develop their own dramas to depict local health problems and possible solutions.

Resources

Programmes need resources—funds, personnel and materials—to implement planned activities. A health education programme must specify its resource needs, indicating which are available at present and which have yet to be acquired. Resource needs can be grouped under six broad categories for budgeting purposes, and these should be justified by the chosen strategies:

- Personnel—professional and support staff.
- Training—workshops, orientation and short courses.
- Transportation and travel—vehicles, mileage, fuel, maintenance and travel allowances.
- Equipment—typewriters, projectors and copiers, etc.
- Educational materials—development, testing, production and distribution.
- Supplies—stationery and communications, etc.

Action timetable

Listing strategies and resources does not convey exactly how the programme will be implemented on a month-by-month basis, and it is therefore necessary to draw up a timetable showing the actions that will be taken, when they will be accomplished and who is responsible for them. This should be arranged in chronological order as far as possible.

The activities shown on a timetable should include important community meetings, workshops, planning and distribution of educational materials, construction of latrines or wells, and introduction of school health sessions. The planning group (health workers and community members) should designate the specific persons responsible for carrying out each activity—health educators, community members, public health inspectors, schoolteachers, etc.

Evaluation

From the outset, the programme plan must state the means by which it will be evaluated. Broadly speaking, the same methods as used for diagnosis—interviews, observation and review of records—should be used for comparing the situation before the start of the programme with that after its completion.

The first stage of evaluation is to assess implementation of the programme, that is, to monitor whether the activities planned in the timetable took place as and when intended. A programme may fail to produce changes in health and behaviour simply because it is not implemented in an adequate, proper and timely manner.

Evaluation next considers the types of behaviour targeted in the objectives by asking the following questions:

- Have people stopped wading in streams and ponds?
- Are they using newly constructed latrines?
- Is participation in screening programmes increasing?

To judge the success of change it is also important to ask:

- Is there substantially less unhealthy behaviour than was found during baseline diagnosis?
- Is the change as good as or better than that obtained by similar programmes in the area?
- Is the change sufficient to reduce disease transmission to a minimum or to eliminate it entirely?

Answers to these questions provide the basis for improvements in future programmes. Evaluation is thus an important learning process for both health workers and community members.

Thirdly, evaluation relates to the reduction in morbidity and mortality from schistosomiasis. Here it is not only the health education activities that are being evaluated, but also the total

sum of programme components (the work of medical and laboratory staff, sanitarians, engineers, etc.). Evaluation of changes in both behaviour and disease patterns must be appropriately timed, allowing an adequate interval for the programme to take effect. It may be a year or more before the true level of behaviour change can be ascertained, and reductions in disease prevalence will become apparent only after behaviour changes have been consolidated.

Alone, preventive measures against schistosomiasis produce a slower rate of change in disease prevalence than when combined with treatment. New infections are avoided and the parasites slowly die off in those people who are already infected. Evaluation results can be misleading or disappointing if they are not properly timed or if they do not carefully consider the nature and effects of the different control strategies.

3. Health education in schistosomiasis control

Guidelines for organizing health education

Health education is a systematic and planned activity based on a scientific understanding of human behaviour as it relates to health. Ideally, a schistosomiasis control programme should either include a health educator from the outset or should bring one in on a short-term basis to help the health workers develop their health education plan. The health workers should understand that health education can be expected to succeed only if they all fulfil their particular responsibilities.

This chapter of the manual should help health workers to develop a clear idea of how health education fits into the overall effort to control schistosomiasis. It should be noted, however, that it is impossible here to provide *all* the directions for organizing a health education programme or to answer *all* the questions that may arise during the planning process.

The three main sections of this chapter focus specifically on three major technologies for schistosomiasis control and the role that health education plays in each. Each section can form the basis for training and planning sessions in the field, and is subdivided into four parts.

The first part of each section is a framework for diagnosis and action, in which are listed types of risk behaviour, suggested reasons for such behaviour, and possible approaches to health education. The points listed, and their relevance to the local situation, should be discussed during planning and training. Further points should be added where appropriate. It is important to plan carefully the means of gathering information on the nature and extent of each risk behaviour—or, in other words, of carrying out the health diagnosis. Each suggested health education strategy should also be critically examined to determine its relevance and feasibility in the particular circumstances.

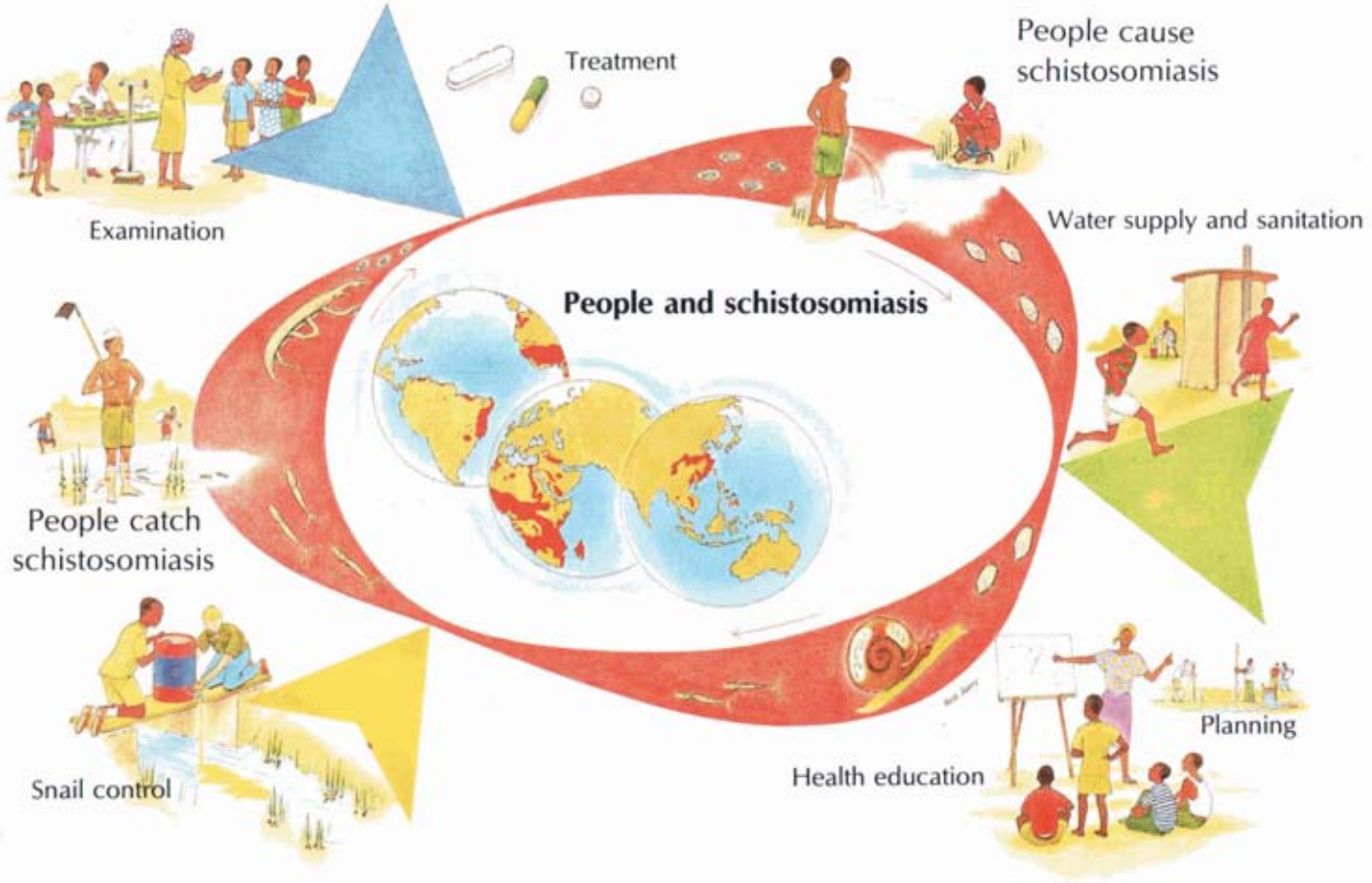
The second item in each section is a case study, which describes a hypothetical situation and shows how and why certain health education strategies were chosen. These case studies should be read and discussed critically. Health workers should also describe their own real-life experiences in case-study form, so that the group can learn from them.

Sample posters are provided as a third item, and may be used for health education in small group settings. Each poster is accompanied by a set of discussion questions, to emphasize that posters alone cannot teach, but are only aids in the educational process. During a training or planning session the group leader should review the posters and questions with the health workers as if they were members of the community, to help them understand how posters can form the basis of educational discussion and interaction. Discussion should then focus on how posters might be improved and adapted, for instance so that people, houses, clothing, etc. resemble the local scene.

All the posters illustrated are taken from that shown on the facing page—"People and schistosomiasis"—which was originally published in *World health* in December 1984.

The fourth item in each section is an educational story. Story-telling is a traditional and valuable method of communication that is particularly useful in small groups where the literacy level is low. If stories are told in a realistic manner, they can help people to understand a problem, especially if discussion is encouraged at the end of the story. To demonstrate how an educational story session should proceed, one health worker should tell the story to the others and then lead the discussion. Afterwards, each health worker should write his or her own story to illustrate an important aspect of schistosomiasis control. The stories should sound realistic and be appropriate to the local culture. All members of the group should be given a chance to tell their stories and to receive comments and suggestions from the others.

To complete the training or orientation process, the health workers can work together, or in groups of three or four, and develop a health education plan for a specific intervention (water and sanitation, snail control, screening and treatment) based on


Treatment
People cause schistosomiasis
Examination
Water supply and sanitation
People and schistosomiasis
People catch schistosomiasis
Snail control
Health education
Planning

the situation in the community where they work. The ten components of a health education plan mentioned earlier should serve as a guide in this activity. Plans can then be presented to the whole group for discussion.

Water supply and sanitation

Diagnosis and action

Risk behaviour. The following types of behaviour are likely to put people at risk of becoming infected with schistosomiasis:

- Water-related
  — wading
  — swimming
  — washing
  — bathing.

- Excreta disposal
  — urinating and/or defecating in or near streams or ponds used for the activities listed above.

Explanations for particular behaviour patterns will vary between communities, and it should never be assumed that there are obvious reasons for specific types of behaviour. Discussions with the community concerned are important to obtain an accurate picture of the situation and to establish possible reasons for risk behaviour. For each type of risk behaviour, discussion should yield answers to the following questions:

- When?
- Where?
- Why?
- How long?

Risk behaviour	Reasons for behaviour	
Water-related:	Job-related: —fishing —irrigation	Local knowledge and beliefs may not connect risk behaviour with disease
	Recreation: —swimming Lack of alternative facilities for bathing/washing	Level of economic development may mean scarcity of funds for improvement of water and sanitation facilities
Excreta disposal:	No land available to construct latrines	Health staff set bad examples in water use and sanitation
	Discouraging experiences in the past with poorly maintained facilities like latrines	

Education. Understanding the reasons for risk behaviour is essential in deciding on the educational approaches to be taken to the problem of schistosomiasis. Locally available resources must be borne in mind when a community decides on actions to be taken immediately and those to be taken over an extended period to reduce or eliminate risk behaviour. Improvements to water supplies and/or sanitation alone are not sufficient. Many other ideas may be developed within the community; the following is a list of some of the possible approaches, but it is by no means exhaustive:

- Development and/or strengthening of local organizations that can mobilize community action and manage funds and other resources to improve water supply and sanitation facilities.

- Identification of local people, such as masons, carpenters and plumbers, who could be trained in the construction and maintenance of water supply and sanitation facilities.

- Working with local institutions, such as schools, clinics and religious organizations, to develop demonstration projects and hold educational meetings.

- Development and dissemination of culturally appropriate information about schistosomiasis, using local leaders, traditional healers, town criers, etc.

- Organization of community groups to identify needed financial and material resources and request them from external sources—government agencies and voluntary organizations.

- Development of schemes for marketing locally made and appropriate items, such as well rings and latrine slabs.

Case study

In a peri-urban area which is separated from the main city by a slow-moving river, and to which the municipal water supply and sewage systems do not extend, schistosomiasis is quite common. A few of the older-established families in the area own small portions of land and have their own wells and latrines. The bulk of the population, however, is crowded together on property belonging to a few businessmen from the city, and for these residents there is little space available for siting wells and latrines. Even if there were more space, the residents would be unwilling to invest in constructing facilities on land that did not belong to them. Consequently, the river has become both the main source of water in the area and ultimately the major disposal site for all kinds of waste.

The banks of the river are marshy places to which children and women go to fetch water for their families. While there, the children often wade into the river to catch frogs and fish. The river is a good habitat for snails, and it is thus not surprising that urinary schistosomiasis is prevalent among the children and women who frequent the river.

People believe that blood in the urine is simply a sign of maturation in young children, especially boys, and not a cause for worry. Few parents take their children to the clinic to complain of this problem, although a recent study by some medical students from the nearby university found that 40% of the school-age children are infected with schistosomiasis.

In these circumstances, health education intervention would probably begin with the establishment of a local community development council that could plan for further appropriate action. This is necessary because most of the residents in the area are tenants, have only recently moved into the area, and lack strong local leadership and organization. The community is also poor and for the most part has no direct control over

the land on which it is settled. The development council should therefore undertake action on behalf of the community and make representations both to the municipal authorities and to the landowners. If it is possible to bring together representatives of the city, the landowners and the residents, they may be able to resolve certain basic issues like potential funds and sites for water and sanitation facilities. If the city and the landowners agree to provide some amenities, the community council can mobilize residents to contribute their share in terms of time, labour or other available resources.

The community will probably need assistance from the ministries of health and works to provide training for local people in construction and maintenance of the new facilities. In this way useful skills will be transferred to the community, which will not only prevent the breakdown of the new facilities but also provide local expertise for future development projects. The community council will also need to consider means of raising funds to support maintenance as well as a programme to educate residents about proper care and use of the new facilities.

Health education strategies

Community education might usefully begin in the schools since a large proportion of the people at risk are schoolchildren. (Teachers may initially need in-service education to provide them with appropriate knowledge and methods to plan their lessons on schistosomiasis.) Educational sessions could also be planned with the parent-teacher association to increase awareness of the dangers of the disease and of means of preventing it. The school should mobilize local resources and those of the appropriate ministries to guarantee the siting of good water and sanitary facilities on the school grounds; teaching of hygiene can then be reinforced with practical experiences.

Teachers, community council members and other locally trained staff must find as many opportunities as possible—for instance, at markets, work-sites and religious meeting places—to talk with community members about schistosomiasis and its symptoms. Communication should employ traditional methods such as story-telling wherever possible since they may be more familiar and understandable to local people, and should build on local beliefs. For example, if parents believe that blood in urine is a sign of maturation in young boys, the health worker or teacher can agree in part by saying "Yes, young boys commonly have this disease", but then go on to encourage parents to list the various

activities of young boys. When swimming and fishing are mentioned, the educator can introduce the idea that it is during contact with river or pond water that children can acquire the disease.

As these health education strategies are being implemented, it is important for the health worker to guide the community council, the schoolteachers and others in observation and evaluation of the effectiveness of their actions. For instance, if they are successful in gaining improved water and sanitation facilities, they should then check whether these are actually being used. They should also find out whether people are still coming into contact with the river water.

It may be found that a group of women still go to the river to fetch water to wash clothes. Perhaps these women enjoy working as a group and the new water system does not provide them a convenient gathering place. This shows that the women's views should have been sought earlier, but it is still not too late to involve them in finding a solution to the problem.

Evaluation may also show that some children still go to the river to play and fish, complaining that they have no other place to play. The community council would then have to consider plans for recreational facilities for the children.

This example shows how various health education strategies could be applied to improve water and sanitation, beginning with the development of a community organization which is encouraged to take responsibility for obtaining outside resources and skills, mobilizing local resources and helping the community learn how to maintain health once improvements are made. The council also learns the importance of involving all sections of the community—women, youth, etc.—to guarantee successful action against local disease problems.

Posters

Poster A: People cause schistosomiasis

People—not snails—are responsible for the transmission of schistosomiasis.

The worms that cause urinary schistosomiasis live in the blood vessels around the bladder. The female worm produces eggs, which are found in the urine—generally mixed with blood in the case of children. The worms that cause intestinal schistosomiasis live in the blood vessels around the intestines, and eggs from the female worms are found in the faeces. About half the eggs produced remain in the body where they cause damage to the liver (in intestinal schistosomiasis) or to the bladder or kidneys (in urinary schistosomiasis).

If the eggs that leave the body reach fresh water, each hatches to release a tiny, fast-moving parasite—a miracidium—which swims about in the water. In order to continue growing, the miracidium must find and enter the body of a snail. Inside the snail the single parasite multiplies into thousands of fork-tailed parasites—cercariae—which escape into the water 4–7 weeks later.

Recognition

With all visual aids it is important to determine what people actually see. Their answers to the following questions will form the basis for detailed discussion:

- Do viewers see the two boys in the poster?
- Do they see what each boy is doing?
- Do they recognize the environment, that is, the stream?

Discussion

- Why are the boys urinating and defecating in and near the steam?
- Is there any other place they could do this?
- Is this behaviour generally acceptable?
- Are there any community taboos about where people should or should not urinate and defecate?
- Can defecating and urinating in the stream cause any problems?
- What can be done (by individuals or by the community) to change this situation?
- What specific diseases can result from this behaviour?

Poster B: People catch schistosomiasis

People catch schistosomiasis by going into the water.

Children love to swim and play in water—but they must be taught to urinate and defecate far away from the water, preferably in latrines. Water is one of the most important parts of people's lives—it helps crops to grow and keeps them green. People must work in the water when they are tending their crops, but they can stop the spread of schistosomiasis by getting treatment and by not urinating or defecating in water.

The fork-tailed parasites, or cercariae, penetrate the skin of people who go into the water—this is the way the disease starts. Most of the time people do not know that they have been infected, and this makes the problem worse.

Recognition

- Do people see the men in the poster? What is each man doing?
- Do people realize that the men are standing in water?
- Can they see the small snails attached to the plants in the water?
- What do they think the swimming creatures are?

Discussion

- What disease can these men catch by standing in the water?
- Why is the man at the back of the picture scratching his leg?
- Are small snails common in the nearby ponds and streams?
- Are these small snails good for anything?
- Do people know of any disease that can be carried by snails?
- How can snails be removed from the streams and ponds?

Poster C: Water supply and sanitation

Improved water supply and sanitation facilities are the simplest solution to the problem of schistosomiasis.

If people build latrines and use them, they do not contaminate local streams and ponds. It is important for children to learn to use latrines and not to urinate or defecate in the water. If every child used latrines, the water would be safe and everyone would be able to swim with no danger of getting schistosomiasis.

Good village water supplies with pumps and pipes encourage people to stay away from streams and ponds that are contaminated.

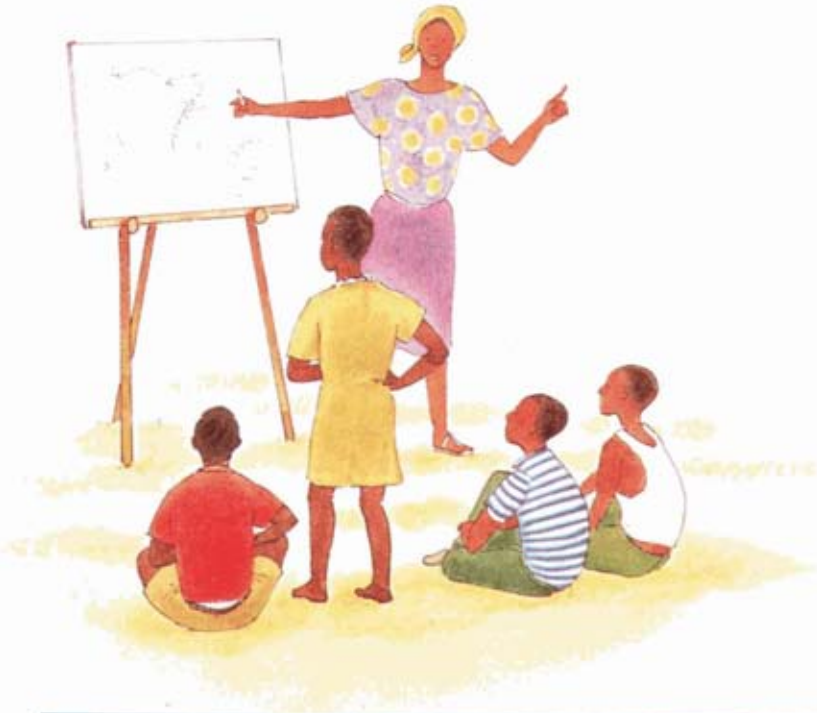
Recognition

- Do the viewers see three people in the picture?
- What do they think these people are doing?
- Why is the boy running?
- What is the building in the centre of the picture?

Discussion

- Is it acceptable for men and women, boys and girls to use the same latrine?
- Have viewers seen a latrine like the one in the picture before?
- What do they think about latrines?
- Do they notice the vent pipe? Do they know its purpose?
- What is happening in the background of the picture?
- What kind of water supply facilities are common in the viewers' community?
- Are the viewers satisfied with the existing facilities?
- What improvements would they like to make?
- What connection do people see between this poster and Poster A?
- What can be done in the community to achieve improvements like those seen in Poster C?

Poster D: Health education



People are not usually aware that they can cause schistosomiasis, nor do they realize how they get it. Once they know these things, they also need to know what they can do to stop the disease. They can best understand this if it is explained in their own language by people who know how to deal with the disease.

Recognition

- Do the viewers see five people in the picture?
- What do they think the people are doing?

Note: This is a "transition" poster; it shows the people what they are doing right now—learning, being educated.

Educational story

Toni and his friends liked to play in the river. On their way home from school they stopped to swim and catch fish. Toni's mother scolded Toni for this because he was usually late reaching home. She was also worried that the boys might drown or be bitten by snakes, but this never worried Toni.

Ben was in Toni's class in school. After school Ben usually went straight home to help his parents and do his homework. Toni and his friends teased Ben, saying he was afraid of the river.

One day Toni was late coming to school. When he arrived he told his teacher and classmates the reason. He had been passing blood in his urine. His mother had become concerned and taken him to the health centre. The doctor had given Toni some medicine and advised him never to go into the river again. Toni was angry about this advice.

The teacher asked the class, "Have any of you had blood in your urine?" All of Toni's friends raised their hands. The teacher asked Ben why he had not raised his hand. Ben answered, "Because I never play in the river". Toni wanted to argue with Ben, but the teacher asked Ben to explain further. Ben reminded his classmates about the lesson they had had some months earlier about diseases that can be caught from bad water. One of the diseases was schistosomiasis. People catch this disease when they wade or swim in rivers or ponds and then pass the disease back into the water when they urinate and defecate into it or near it.

The teacher led the class in more discussion about schistosomiasis. At the end she agreed in part with Toni. "I know you boys like to play after school, and that is good, but you must be careful about where you play." She asked the children for their own ideas about places where it would be safe for them to play.

A special meeting of the parent-teacher association was called to consider the ideas about preventing schistosomiasis. The children were asked to explain the problem to their parents. They presented a short play based on the experiences of Toni and Ben. At the end, Toni's mother spoke. She said, "I always told Toni that the river was not safe, but I never realized that there were diseases in the river water. I suggest we all help by giving some money and working together to make a proper playground for our children". Everyone agreed with the suggestion and began making plans for the new playground.

Discussion

- Why did Toni and his friends have blood in their urine while Ben did not?

- Did Toni's mother have good reason to be afraid of the river?
- Toni had ignored the lesson on schistosomiasis—why?
- What could the children and parents do to prevent schistosomiasis?

Examination and treatment

Diagnosis and action

Risk behaviour. The following types of behaviour put people who are infected with schistosomiasis at risk:

- Failing to seek treatment at a clinic or a health centre despite having the symptoms of schistosomiasis.
- Practising self-medication with either modern or traditional drugs.
- Refusing to provide stool or urine samples for examination.
- Adulterating urine samples submitted for examination.

In the course of public health interventions for schistosomiasis control, health workers are required to go to villages to examine the people and treat all those who are infected. However, it is not unusual for people to believe that they are healthy even when they have the disease. Moreover, they may not understand why doctors and health workers must come to their villages rather than waiting in the clinics or health centres for people to request treatment.

There are two main reasons for people failing to support or participate in examination and treatment programmes for schistosomiasis:

- Schistosomiasis is not perceived as a serious problem.
- People do not always recognize the symptoms of the disease.

Other reasons, such as the following, will depend upon local circumstances:

- Instructions about how to provide stool or urine samples may have been inadequate.
- Local beliefs or superstitions may make people fearful of providing stool or urine samples.

- Health facilities may not be easily accessible or may have inadequate supplies of drugs.

- People may not believe that modern medicines work, especially if those who been treated become reinfected.

- If people receive no follow-up treatment or information about the results of previous examinations, they may be reluctant to be examined a second time.

Nevertheless, most people prefer to receive treatment. Even if reinfection does occur, cooperation by infected people, and acceptance of treatment, will benefit the entire community. Once all infected people are treated and are no longer excreting eggs in their urine or faeces, the risk of infecting others is minimized.

Education. The following is a list of possible approaches to education about the value of screening for and treating schistosomiasis.

- Training primary health workers to assist in screening, and ensuring the accessibility/availability of treatment and follow-up.

- Counselling infected individuals about the nature of their disease, with particular emphasis on preventing reinfection.

- Using locally appropriate communication channels to create awareness of the purpose and availability of screening.

- Cooperating with the community to plan convenient times and places for screening.

- Working through social organizations (youth groups, women's clubs, etc.) to mobilize their participation in screening programmes and to provide information about preventing reinfection.

- Using schools for screening and health instruction programmes.

- Helping the community to establish a revolving fund to purchase and maintain regular and adequate supplies of drugs.

- Using a microscope as a visual aid to demonstrate the presence of the disease, and personal testimonies to underline the benefits of treatment.

The community should be kept fully informed of how examinations and treatment will be carried out. All details should be discussed with community leaders.

Case study on planning

Agricultural development is important because it helps provide more food. Irrigation projects, small reservoirs and lakes—which contribute to agricultural development—must therefore be carefully planned. Schistosomiasis should be controlled and the people educated about the disease, right from the start—before the problem of schistosomiasis gets too big to handle.

Five years ago the national electricity authority commissioned a new dam and hydroelectric plant to provide power for over one-third of the country's population. The new lake created by the dam provided many opportunities for the local people to increase their income. At the same time, however, the local health facilities reported an increasing number of patients with schistosomiasis. Two different ways in which the problem might have been handled are described below. The implications of the two approaches for health education and disease control should be discussed.

Version 1

A university research group was sent to the area by the Ministry of Health to establish a true picture of the prevalence of schistosomiasis and conduct trials of two new drugs. The research group went from village to village asking people of all ages to provide urine and stool samples. Under the guidance of their teachers, schoolchildren complied with the request,

but a number of adults in the villages hid when the research team came. After collecting the samples, the team went back to the city to examine them.

When the samples were analysed, the researchers selected some of the people who were infected with schistosomiasis for inclusion in the drug trials. Although they informed these people in November, the first drugs were not available until the following February, and some participants were not phased into the trials until May. By that time many said they were no longer interested and refused to take the drugs.

Eventually the researchers reported their findings to the Ministry, who decided to launch a formal mass screening and treatment programme.

The first screening team to arrive in the area encountered a very hostile reception. Even the schoolteachers did not cooperate. One teacher confided their reasons to the team. "The last time you people came you did not tell us much about why you were doing these tests. You did not even talk to the village elders. You know these old people believe that witches can use people's stools to cause them harm, and so they were afraid to give stool samples to strangers. They were very angry with us for allowing their children to give stool samples."

"Not only that, we were never given any information about the results. No one knows who had the disease and who did not. A few people were called to receive drugs; the rest did not know whether they needed drugs or not, but they were jealous. Even those who were selected to receive drugs were disappointed because of the long delays. Now no one trusts people who come here and say they want to test us and treat us."

Version 2

As part of a comprehensive effort to control schistosomiasis, the Ministry of Health sent a screening and treatment team to the area. The team consisted of epidemiologists, health educators, parasitologists, laboratory technicians and public health nurses, who travelled from village to village.

At the first village the team met with the village leaders. They introduced themselves as staff of the Ministry and explained that they had come to learn about the community and see whether local services could be improved. They asked whether the leaders were free for discussion, and the head of the village suggested it would be better to return in the evening when more people would be available to participate. The team members asked permission to walk around the village in the meantime, to observe conditions and talk to individuals. The village head agreed to this.

Individual interviews and informal group discussions focused on two broad areas: the benefits the people had derived from the lake and the

problems that had become more common since the lake was created. The most frequent answer to questions on the first topic was that the lake provided the opportunity to increase family income through fishing. The women were happy to have a regular source of water for domestic use and children liked the lake for recreation.

However, people complained that the lake had isolated them from friends and relatives living on the opposite shore. When asked what other changes they had noticed, some people said that there were now more mosquitos. A few said that the disease which causes people to pass blood in their urine was more common these days, and others said that more people were complaining of stomach pain too.

At the village meeting that evening the health team discussed their day's findings and asked for additional comments. Those present confirmed the earlier observations, especially the increasing numbers of people with blood in their urine.*

The health workers asked whether there was a local name for the disease. One traditional healer spoke up and said that blood in urine is of two types. One is serious, and is called human gonorrhoea. The other affects mostly young boys and goes away after some time; this is not serious and is called dog's gonorrhoea. Most people believe it comes from walking where dogs have urinated and, since young boys keep dogs for hunting, they are most likely to get the disease.

Concerning stomach pain, the healer said that there were so many types that he could not say much about it. Another man then spoke up. He said that he and his brother had worked at a large irrigation project a few years previously to earn some extra money during the dry season. He remembered that a number of workers had developed a disease that caused stomach pains, weakness and even bloating of the belly. The disease was feared, and the man said he had left the area hoping he would never catch it. Other people remember hearing of such a disease, but said it had not been common in their area before.

Through discussion, the health workers were able to help the villagers understand the link between the new lake and the increase in disease. They also explained that they could screen and treat people for the disease, and were willing to begin as soon as the community wanted. They asked the village leaders to suggest when, where and how the programme should be set up. The villagers asked many questions about the screening procedures and the drugs, and when they were satisfied that the programme would cause them no harm, drew up a plan with the health workers to begin action.

* See "Blood in the urine" in *The community health worker*, Geneva, World Health Organization, 1987.

Before the meeting closed, the health workers commented that treatment alone would not solve the problem if people continued to urinate and defecate near the lake and to wade, swim and fish in the lake. They encouraged the villagers to think about this so that possible solutions to the problem could be discussed at the next meeting.

Posters

Note: Posters A and B are used to make sure that the audience recognizes the disease to be treated and to convince them that early treatment will avoid severe disease. Use of poster A and/or B should depend on the type of schistosomiasis prevalent in an area.

Poster A: Consequences of untreated urinary schistosomiasis

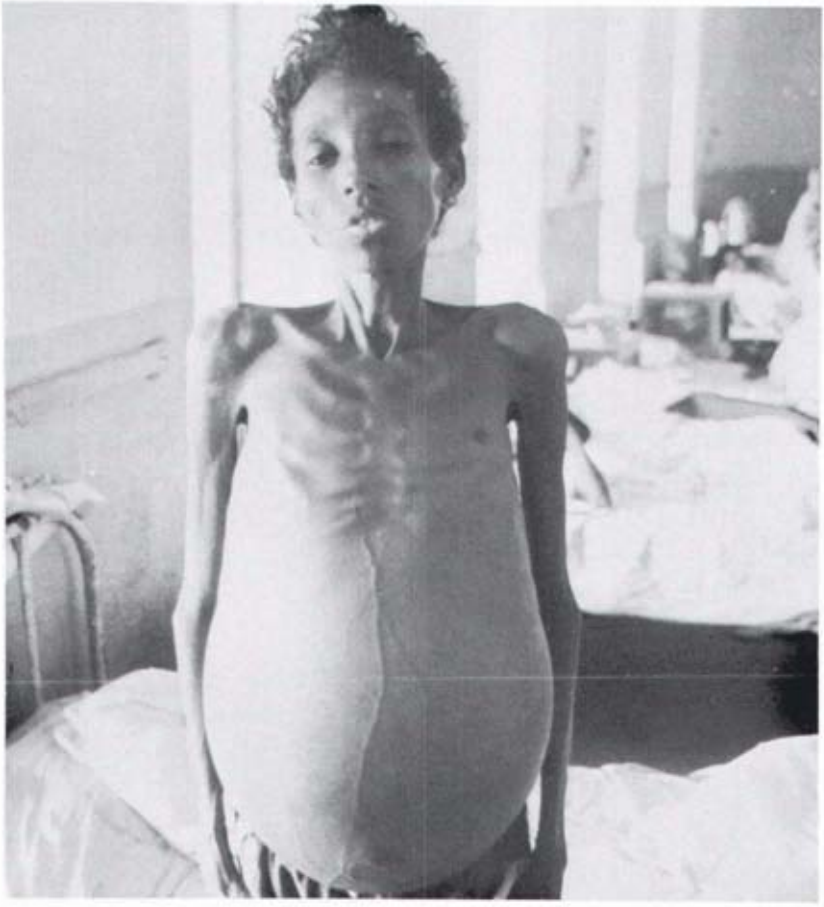
Recognition

- What do the viewers see?
- Can they see the boy urinating?
- Can they see that the urine is red?

Discussion

- Why is the boy's urine red?
- What is the local name for the disease?
- Is the disease common—who has it, where and when?
- Is the disease serious? Why (or why not)?
- Can the disease be treated?
- What types of treatment do the viewers know?
- How effective are these treatments?

Poster B: Consequences of untreated intestinal schistosomiasis



Recognition

- Do people see the man standing?
- Do they recognize that he is sick?
- Do they realize that the man is in hospital?

Discussion

- Why is this man in hospital?
- What is the local name for his disease?
- Is the disease common — who has it, where and when?
- Is the disease serious? Why (or why not)?
- Do all people with this disease have such obvious symptoms?
- Can the disease be treated?
- What types of treatment are known? Which are effective?
- Is there anything that would prevent people from seeking treatment?

Poster C: Examination

Examination for schistosomiasis is a simple matter: a small sample of urine or faeces is looked at under a microscope. If there are eggs in the sample, treatment should be started. All children in schools should be checked once a year. If there is urinary schistosomiasis in the area, schoolteachers can check their classes to see how many children have blood in their urine. Children with bloody urine may have schistosomiasis and will need treatment.

Recognition

- Can viewers distinguish who the people in the picture are?
- Do they see what the children are carrying?
- Can they identify the items on and in front of the table?

Discussion

- What are these children bringing to the man?
- What will the man do with the samples of urine and faeces?
- What might he find in the urine or faeces?
- What common diseases can be found in urine and faeces?
- If the man finds that the children have schistosomiasis, what will he do?
- Do all people who have schistosomiasis actually look or feel sick? Why (or why not)?
- What is the benefit of testing people who do not look or feel sick?
- Where can people go for such testing?

Poster D: Treatment

New drugs, which are both safe and effective, kill the worms that cause schistosomiasis. Once the worms have been killed, they can no longer produce the eggs that damage various parts of the body, make people ill, and spread the disease.

Recognition

- Do people see the three types of drugs on the right of the poster?
- Can they see what the woman has in her hand?
- Do they know why the children are lined up in front of the woman?

Discussion

- Why is the woman giving medicine to the children?
- Will every child who has been tested get the medicine? Why (or why not)?
- Will the medicine cure the disease once and for all?
- Can the disease come back? Why (or why not)?

Educational story

Two brief outlines of stories about schistosomiasis screening and treatment are given below. The health worker should fill in the details, making up his or her own story to reflect the conditions in the local community, and should write discussion questions to follow the story.

Story A

A man has schistosomiasis. He fears the disease because of the social stigma attached to it. He does not want to come for screening because he is embarrassed. His co-worker also has the disease but is not afraid. He goes for screening and treatment and recovers.

Story B

Two boys have schistosomiasis. The boys' parents send them for treatment. The health worker teaches them about how the disease is transmitted, and then he gives them treatment. One boy becomes reinfected while the other avoids the disease even though his friends tease him for not playing in the pond.

Snail control

With the introduction of new and safer drugs for the treatment of schistosomiasis, and, in many places, improvements in water supply and sanitation facilities, snail control is perhaps employed less often as a means of combating the disease. However, it remains an important and effective measure.

Where weeding of ponds and streams is not considered sufficient to eliminate the snail population, the use of chemicals—molluscicides—may be considered. The decision to do this, and the activity itself, must be the responsibility of technically qualified people; direct involvement of the community is not always appropriate.

Diagnosis and action

Risk behaviour. Where schistosomiasis is prevalent, and streams and ponds are contaminated, the following types of behaviour put people at risk of becoming infected:

- wading
- swimming
- washing
- bathing.

There may be many reasons for people persisting with risk behaviour, including the following:

- Contact with water is regarded as an essential part of domestic duties, agricultural work, or recreational activities.
- There is a lack of knowledge about the part played by snails in the transmission of schistosomiasis.
- The snails are regarded as a food or, at worst, as a nuisance, rather than as having a direct connection with schistosomiasis.

Further problems may arise in the form of local attitudes or beliefs that limit the use of molluscicides; these include the following:

- If local ponds or streams have significance in religious rituals, the addition of chemicals to the water may cause serious offence.

- If local snail habitats are in private ownership, it may be difficult to get permission to treat the water.

- Local people may have already had bad experiences with other chemicals, such as pesticides, and may be reluctant to permit the use of more.

- There may be difficulties with the availability of the necessary supplies, or with the ability of local people to master the skills needed for them to contribute to snail control activities.

Education. The following are suggested approaches to education on the value of snail control in the fight against schistosomiasis:

- Holding community meetings, school health sessions, meetings with women's clubs and youth groups, etc. to increase awareness of the role of snails in transmitting the disease.

- Training local health workers to assist snail control personnel in their work and to help create public awareness of the problem.

- Involving local people in modifying snail habitats and in identifying and making use of local plant substances with anti-snail properties.

Case study

In Tapa Village there was a bend in the local stream where the water flowed very slowly, and parents felt that their children could play there safely. In fact, this place had been a traditional recreation site for Tapa children for several generations.

A new health worker who was posted to the village noticed that urinary schistosomiasis was quite common among the children of Tapa. He observed the children carefully, and when he followed them to the stream he found that their play area was heavily infested with snails. The health worker asked the children about schistosomiasis, and they said that the blood in urine was not serious. It was a sign of puberty and their parents had assured them that they would grow out of it. The health worker asked the children whether they had ever noticed the small snails attached to the weeds, grasses and rocks along the stream bank. The children said they had and that they often collected the snails and used the shells for play money.

During a later discussion, village parents confirmed what the children had said. When the health worker asked them what they thought about blood loss as a result of an accident or injury, they said it was very bad, because the blood cannot easily be replaced. It makes a person weak and very susceptible to evil influences. The health worker agreed that loss of blood in any amount is not good. He then asked the parents whether they realized that children who have schistosomiasis also lose blood. One of the elders spoke up: "We always considered schistosomiasis to be a temporary and minor problem, but now that you mention the loss of blood, I can see that it may in fact have serious effects on our children. What can we do about this problem?" Other people quickly supported his concern.

The health worker asked the people whether they knew of any particular place that children frequented more than adults, and the people easily thought of the stream. The health worker explained that, since it was mainly the children who suffered from schistosomiasis and since they also played in the stream, there might be something in the stream that caused the problem. He asked whether it would be possible for the children to find another place to play.

The villagers were sad because the stream had been a favourite playing area for so long and it was one of the few places where children could play without their parents worrying. They asked whether anything could be done to make the stream safe again.

The health worker then explained the role of snails in the disease process. He mentioned the different ways of removing the snails, including weeding the stream banks regularly, channelling the stream so that it would flow faster, and using a chemical—or molluscicide—to kill the snails.

The villagers debated these alternatives. They did not want to channel the stream because it might become dangerous if it flowed more swiftly. They expressed worry that the chemical used to kill the snails might also harm their children, although the health worker said that it would be safe if was used properly. Finally the villagers said they would first try weeding. The

children themselves could be organized to do it and might even view it as a game. One adult would volunteer to supervise the weeding each week. If this approach failed to work, the villagers said they would reconsider the alternative of molluscicides.

Discussion

This case study shows what might be possible on a small scale. The following points should be critically discussed:

- What the health worker did to help create awareness and foster decision-making among the villagers.

- How snail control efforts could be organized and managed in a larger area or district, with many villages participating.

Posters

Poster A: People catch schistosomiasis

Recognition

- Do people see the men in the poster? What is each man doing?
- Do they realize that the men are standing in water?
- Can they see the small snails attached to the plants in the water?
- What do they think the swimming creatures are?

Discussion

- What disease can these men catch by standing in water?
- Why is the man at the back scratching his leg?
- Are small snails common in the nearby streams and ponds?
- Are these small snails good for anything?
- Do people know of any diseases that can be carried by snails?
- How can snails be removed from streams and ponds?

Poster B: Snail control

Chemicals are available to kill snails. In general they are very expensive and require skilled people to use them in the water. Snails are able to bury themselves and escape the chemicals, so that the chemicals may have to be applied several times.

A much simpler way to help control snails is to remove vegetation. People can remove plants from places where children swim or where women come—with their children—to wash clothes or dishes. Without the plants snails cannot thrive.

Recognition

- Do viewers see two people in the picture, and a container with liquid coming out?
- Do they recognize that the liquid is being poured into a stream or canal?
- Do they see the small snails attached to the plants in the water?

Discussion

- What are these people pouring into the water?
- Why are they doing it?
- Is the liquid safe for human beings?
- Would viewers be willing to have chemicals used to kill snails in the streams and canals in their community?
- Who would be responsible for applying the chemicals regularly?
- Do the viewers know of any other means by which snails could be removed from streams and ponds?

Educational story

A story on snail control could be made for telling at an area or district meeting of village leaders. The story could be based on examples of what two different villages did about the snail problem. Village A could be patterned after the village in the case study on page 47. Village B could have decided to do nothing. The outcome of the story could describe the impact of these decisions on the health of the village children (or others who are usually in contact with water).

Discussion of the story could centre around debating which village did the right thing. Posters would be used to illustrate the story while it is being told. Listeners should be enouraged to raise their own questions and concerns about snail control.

Final remarks

Health education is the first essential primary health care service because it enables the community to accept and make use of the other services in ways that are culturally relevant. Health education should play the same role in schistosomiasis control. Health education helps bridge the gap and find common ground between local community priorities and the concerns of health workers as well as between traditional beliefs and practices and modern scientific knowledge and methods. Health education forges a partnership between the community and the health agency.

Health education materials produced by WHO focus on four basic health educational skills: behavioural and educational diagnosis, programme planning, educational strategy selection and development of simple educational aids. With professional health educators as trainers, this book can become a resource for training local health teams in the health education aspects of schistosomiasis control.

Annex

Schistosomiasis

Schistosomiasis is one of the most widespread of all human parasitic diseases, ranking second only to malaria in terms of its socioeconomic and public health importance in tropical and subtropical areas. It is also the most prevalent of the waterborne diseases and one of the greatest risks to health in rural areas of developing countries.

Schistosomiasis is now endemic in 76 tropical developing countries, and over 200 million people living in rural and agricultural areas are estimated to be infected. Some 400 million more people are at risk of becoming infected as long as they live in conditions of poverty and ignorance, with few, if any, sanitary facilities.

As a mainly rural, occupational disease, schistosomiasis principally affects people engaged in agriculture or fishing, but in many areas a large proportion of children are infected by the age of 14. Increased population movements help to spread the disease, and schistosomiasis is now occurring increasingly in periurban areas.

Although most people in the endemic areas have light infections with no symptoms, the effects of schistosomiasis on a country's health and economy are serious. In northeastern Brazil, in Egypt and in Sudan, the rural inhabitants claim that their ability to work is severely reduced as a result of the weakness and lethargy caused by the disease.

Major forms of schistosomiasis

Three species of the trematode parasite are responsible for the major forms of human schistosomiasis. Intestinal schistosomiasis caused by *Schistosoma mansoni* occurs in 53 countries in Africa, the eastern Mediterranean, the Caribbean area and South America. Oriental or Asiatic intestinal schistosomiasis, caused by

S. japonicum, is endemic in eight Asian countries. (Another form of intestinal schistosomiasis caused by *S. intercalatum* has been reported from seven central African countries.) Urinary schistosomiasis, caused by *S. haematobium*, is endemic in 55 countries in Africa and the eastern Mediterranean.

Life cycle of the parasite

On reaching water, the eggs excreted by an infected person hatch to release a tiny parasite (a miracidium), which swims actively through the water by means of the fine hairs (cilia) covering its body. The miracidium will survive for about 8–12 hours, during which time it must penetrate the soft body of a freshwater snail in order to develop further.

Once inside the snail, the miracidium divides many times until thousands of new forms (cercariae) break out of the snail into the water. This phase of development takes 4–7 weeks or longer, depending on the species of parasite. Outside the snail, the fork-tailed cercariae can live for up to 48 hours. Within that time they must penetrate the skin of a human being in order to continue their growth cycle.

As the cercaria penetrates the skin, it loses it tail. Within 48 hours it penetrates the skin completely to reach the blood vessels. This process sometimes causes itching, but most people never notice it.

Within weeks, the young parasite matures into an adult male or female worm. Eggs are produced only by mated female worms, and male and female adult worms remain joined together for life—less than five years on average, though as much as 40 years in some cases. The more slender female is held permanently in a groove in the front of the male's body. Once eggs are produced, the cycle starts again.

In intestinal schistosomiasis, the worms attach themselves to the walls of the blood vessels that line the intestines; in urinary schistosomiasis, they live in the blood vessels of the bladder. Only about half of the eggs leave the body in the faeces (intestinal schistosomiasis) or in the urine (urinary schistosomiasis); the rest

remain embedded in the body where they cause damage to important organs.

Diagnosis

Modern techniques for detecting schistosome eggs under the microscope are simple and inexpensive. A simple syringe filtration technique (using filter paper, or polycarbonate or nylon filters) is now recommended for diagnosis of urinary schistosomiasis, which makes it possible to estimate the severity of infection by performing urinary egg counts on up to 200 children in an hour and a half.

Researchers using this technique in Ghana, Kenya, Liberia, Niger, United Republic of Tanzania and Zambia reported that children with more than 50 *S. haematobium* eggs per 10 ml of urine nearly always have blood in their urine (haematuria). This sign, evidence of bladder disease caused by urinary schistosomiasis, can be used by primary health care workers to identify children needing treatment.

Diagnosis of intestinal schistosomiasis by counting the eggs in faecal specimens has also been simplified. A small amount of faeces, pressed through a fine nylon or steel screen to remove large debris, and placed under a piece of cellophane soaked in glycerol, or between glass slides, can be quickly examined by trained microscopists.

The cost of each of these tests is now US$ 0.01 or less.

Treatment

Three safe, effective drugs that can all be taken by mouth are now available to treat schistosomiasis. Praziquantel, oxamniquine and metrifonate are all included in the WHO Model List of Essential Drugs. Their development has revolutionized treatment of this disease.

Praziquantel, which is effective against all forms of schistosomiasis, became available as a result of unprecedented

collaboration between WHO and the drug manufacturer. The drug was thoroughly tested in laboratories collaborating with the International Agency for Research on Cancer and shown to be safe. Over 2 million people have been treated with praziquantel so far.

Oxamniquine is used exclusively to treat intestinal schistosomiasis in Africa and South America, while *metrifonate*, which was originally developed as an insecticide, has now proved to be safe and effective for the treatment of urinary schistosomiasis.

The fears of many doctors, that reinfection would quickly eliminate any benefit from treatment, have proved groundless. In fact, rapid identification and prompt treatment of infected people immediately reduce environmental contamination with parasite eggs. In most areas, a reduction in the overall number of cases is maintained for one and a half years without further intervention. During this period other measures can be taken, and patients who remain infected can be treated a second time.

In Brazil, over 7 million doses of oxamniquine have been administered for intestinal schistosomiasis since 1975, and prevalence of the infection has dropped significantly in the north-east of the country. More importantly, independent evaluation by Brazilian specialists in tropical medicine has confirmed a reduction in the rate of liver and spleen enlargement, which is a common symptom in children with heavy infections.

Water, food and schistosomiasis

Some 71% of the earth's surface is covered with water, of which only 1.9% is fresh water; less than a quarter of that occurs in the form of groundwater, lakes or swamps. The world's expanding population is increasingly concentrated in places where surface and groundwater are available.

Agricultural development must accelerate to keep pace with the expanding food requirements of the world's population of over 5000 million. Two-thirds of the world's potentially cultivable land is located in the developing regions of Africa, Asia and the Americas.

The increasing numbers of water resource projects, essential for industrial and agricultural expansion in developing countries, are a matter of great concern to schistosomiasis experts. Water impoundments of all sizes, including "man-made" lakes and irrigation systems, provide excellent habitats for freshwater snails—the intermediate hosts of schistosomiasis—and encourage close and frequent contacts between people and infected water.

Disease-free development

Schistosomiasis and other waterborne diseases, whether introduced or spread by water development projects, can delay the completion of projects if construction workers, or the local population, become infected. However, it is now possible to control schistosomiasis effectively from the moment such a project is planned. Diagnosis and treatment of the population in the project area, of all employees of the development project and their families, and of potential migrant populations, reduce the risk of schistosomiasis becoming a major public health problem.

Health education and water supplies

It is difficult for people to understand that their own habits can cause disease in themselves and in their families and neighbours. With WHO's new strategy of controlling the amount of disease in the community rather than trying to eliminate it entirely, the part played by people in spreading the disease has become all-important. The strategy depends heavily on health education activities in school and in the community to bring about a change in behavioural patterns.

To control schistosomiasis, it is also essential to reduce people's contacts with infected water, and to provide a potable water supply as a public health amenity if necessary. The allocation of resources for water supplies in endemic areas has traditionally been ruled by developmental considerations, rather than by health priorities. This situation must change, and indeed has changed in certain countries, where water supply programmes are now being administered by ministries of health.

Snail control

As a sole control measure, the use of molluscicides has many disadvantages: it requires a long-term commitment (a fact that is not always appreciated), and the chemicals are costly, require special apparatus and trained personnel, and may have adverse effects on other animal (and plant) life. In combination with drug treatment, however, the use of molluscicides can be effective in reducing the risk of infection.

Schistosomiasis-linked bladder cancer

A specific type of bladder cancer occurs in countries where urinary schistosomiasis is endemic, and a clear link between the two has become apparent.

Patients in whom bladder cancer is linked with urinary schistosomiasis are usually about 40 years old and predominantly farmworkers; five times as many men are affected as women. By contrast, cases of bladder cancer without schistosomiasis generally occur in industrialized countries, and patients are usually industrial workers aged about 65; about twice as many men are affected as women.

In some areas of Africa where *S. haematobium* is endemic, the incidence of bladder cancer linked with schistosomiasis is 32 times higher than the incidence of simple bladder cancer in the United States of America.