

MONITORING HELMINTH CONTROL PROGRAMMES

Guidelines for monitoring the impact of control programmes aimed at reducing morbidity caused by soil-transmitted helminths and schistosomes, with particular reference to school-age children



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1. BACKGROUND

1.1 *Introduction*

Community-based intervention programmes aimed at reducing morbidity caused by soil-transmitted helminths and by schistosomes have become an important priority in areas where disease associated with these infections is endemic. The most severe consequences of worm infections are seen in young children who can die from acute roundworm obstruction of the gut and in adults who are disabled or die from chronic effects due to schistosomiasis. High-risk groups for schistosomiasis are school-age children and special occupation groups. High-risk groups for soil-transmitted helminth infections are pre-schoolchildren, school-age children and women of child-bearing age. However, recent evidence confirms that it is through effective community-based treatment targeted towards school-age children that significant reduction in the burden of disease due to schistosomiasis and soil-transmitted helminth infections can be achieved.

School-based control programmes show tremendous promise for reducing morbidity and have been initiated in several countries to date. Operational research has advanced our knowledge of the type of intervention to be administered (e.g. combinations of anthelmintics, micronutrients, health education), the frequency of application (e.g. annual, bi-annual), the logistic and financial support required and the collaborations and partnerships which lead to the successful implementation and sustainability of the control programme. With such large-scale control programmes being undertaken, it is important to document their impact in terms of standard indicators so that we can inform current practice and guide future applications and research. In addition, it is informative to document milestones and lessons learned including the identification of problems and approaches to their solution.

The World Health Organization (WHO) therefore sees monitoring as an integral component of the control programmes themselves. This aspect of the control programme is essential in ensuring that the programmes are run effectively and efficiently by health and school authorities and that maximal benefit is attained by infected individuals, their families and their communities.

1.2 Aims of the manual

This manual has been designed as a companion to the *Guidelines for the evaluation of soil-transmitted helminthiasis and schistosomiasis at community level* (WHO/CTD/SIP/98.1). It is intended to assist health planners at national, regional or district levels in monitoring the impact of control programmes aimed at reducing morbidity caused by soil-transmitted helminths and by schistosomes. With several large-scale control programmes currently underway in child populations in endemic areas, this manual focuses particular attention on control programmes targeting school-age children; however, it can also be adapted for use in other populations.

The aims of the manual are:

- ✓ to encourage health planners to incorporate monitoring activities as an integral component within control programmes
- ✓ to offer a systematic approach for monitoring and evaluating the impact of programmes aimed at controlling schistosomiasis and soil-transmitted helminthiasis
- ✓ to ensure early and appropriate response, if needed, in adjusting the implementation of the control programme
- ✓ to facilitate the reporting of the impact of the control programme to governments, NGOs, communities and donors in order to obtain or maintain support

To achieve these aims the manual provides:

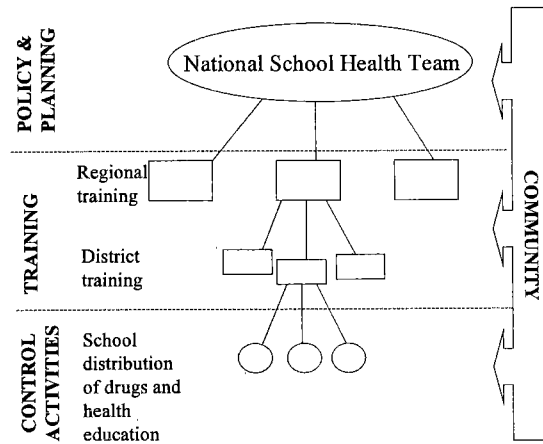
- ✓ guidelines on essential elements for monitoring control programmes for soil-transmitted helminthiasis and schistosomiasis
- ✓ a list of suggested indicators for assessing progress and impact
- ✓ forms to record and summarize results
- ✓ selected examples of case studies highlighting different monitoring activities

1.3 Objective and organizational diagram of a school control programme

IN DEVELOPING COUNTRIES, SCHOOL HEALTH PROGRAMMES ARE PRIMARILY AIMED AT IMPROVING THE HEALTH STATUS OF SCHOOL-AGE CHILDREN (5 TO 19 YRS)

This objective is attained by delivering the appropriate intervention package to as many school-age children as possible. This will include:

- ◆ **ANTHELMINTHIC CHEMOTHERAPY**
- ◆ **MICRONUTRIENT SUPPLEMENTATION**
- ◆ **HEALTH EDUCATION ACTIVITIES ADDRESSING: SAFE WATER SUPPLY, LATRINES, GEOPHAGIA, HAND-WASHING, 'SAFE' DISPOSAL OF WASTE, WEARING OF SHOES, WATER CONTACT**
- ◆ **OTHER INTERVENTIONS WHICH ADDRESS LOCAL PRIORITY HEALTH NEEDS**

Schematic example of a national school health programme:

the national level is expected to be responsible for

- ◆ planning the control activities
- ◆ acquiring and distributing the materials at regional level (drugs, lab equipment, etc.)
- ◆ planning the training activities
- ◆ training the staff at regional level
- ◆ monitoring and evaluation

the regional level is expected to be responsible for

- ◆ distributing the materials at district level
- ◆ training the staff at district level
- ◆ monitoring and evaluation

the district level is expected to be responsible for

- ◆ distributing the materials in each school
- ◆ training teachers on drug distribution, health education delivery and form filling
- ◆ monitoring and evaluation

the community level is expected to participate in

- ◆ programme planning, as appropriate
- ◆ supporting programme activities, as appropriate
- ◆ monitoring and evaluation activities, as appropriate

1.4 Epidemiological basis for control

Four general attributes of helminth infection guide an epidemiological approach to control:

1. Morbidity is directly related to worm burden. The **greater the number of worms** in the infected person, the **greater will be the morbidity** caused by these worms. This relationship is illustrated for the case of hookworms. Evidence shows that the amount of blood lost in the faeces (morbidity) increases as the hookworm epg (measure of worm burden) increases (Figure 1).

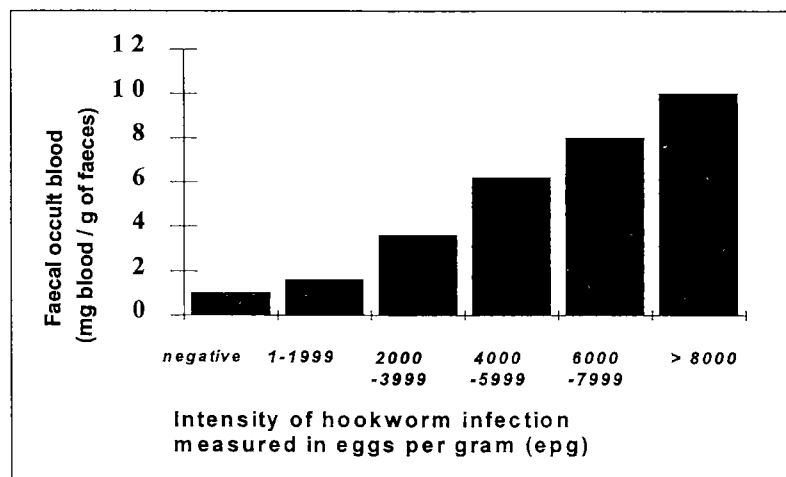


Figure 1. Hookworm infection and intestinal blood loss in Zanzibari schoolchildren (Stoltzfus *et al.* 1996).

Helminth infection and disease adversely affect child growth and development, nutritional status and cognitive capacity. These effects have also been shown to be proportionally associated with worm burden. High-risk groups for morbidity and mortality due to soil-transmitted helminth infections (STH) include pre-schoolchildren, children of school age and women of child-bearing age; and school-age children and various occupational groups (e.g. fishermen, farmers) for schistosomiasis.

The first objective of a control programme is to reduce morbidity. This is done by reducing the proportion of heavily infected individuals in the population.

2. The **helminths of interest for a control programme** (STH and the schistosomes) in contrast to all other infectious agents (viruses, bacteria, fungi and protozoa) **do not multiply in the human host**. Infection and re-infection always result from external sources.

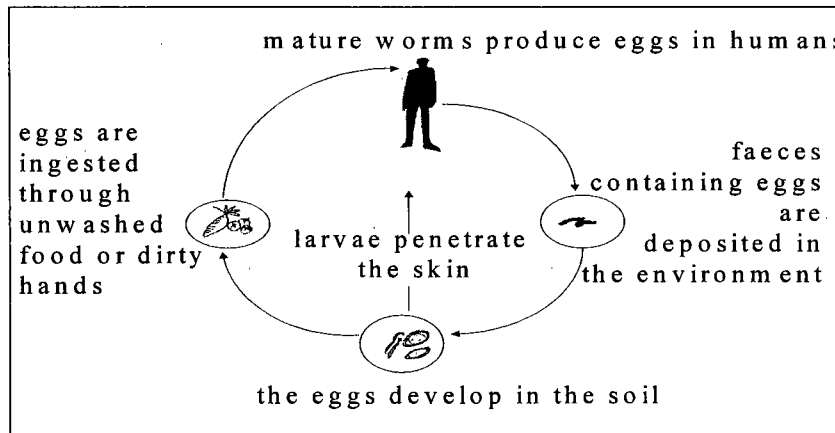


Figure 2. Schematic life-cycle of soil-transmitted helminths

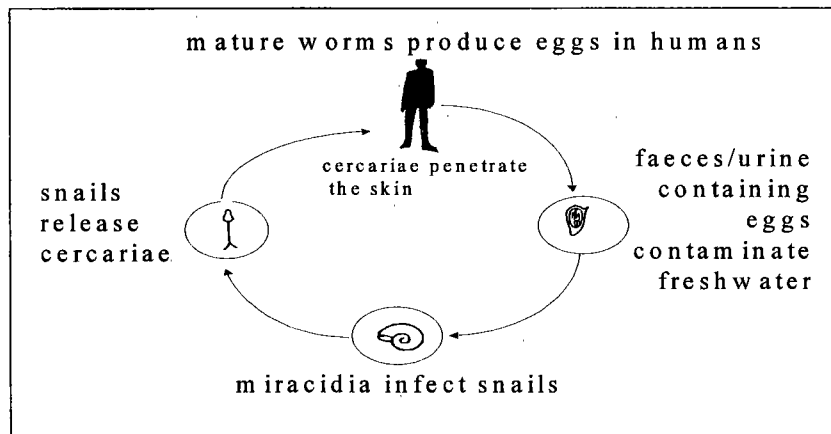


Figure 3. Schematic life-cycle of schistosomes

Treatment will not always kill 100% of the worms.
But because the few remaining worms:
1. do not replicate and 2. pose only a minimal health threat,
control efforts should focus on reducing, rather than
eliminating, the worm burden.

3. **Soil-transmitted helminths and schistosomes are overdispersed, or aggregated, in human populations** such that the majority of persons in a community will have 'light', or low intensity, infections while only a small number of persons will have 'heavy', or high intensity, infections (Figure 4).

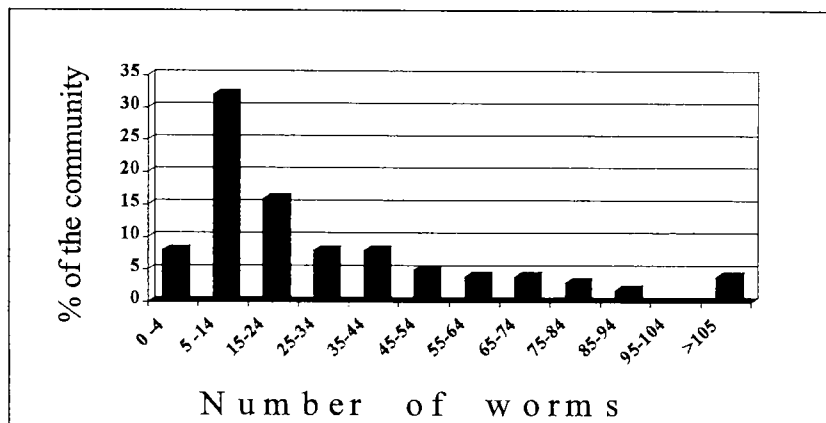


Figure 4. An example of a typical distribution of a soil-transmitted helminth (hookworm) in a community (from Schad and Anderson (1985)).

- Heavily infected individuals suffer most of the clinical consequences of the infections and are the major source of infection for the rest of the community, although their proportion in the community may be small. Lightly infected individuals have minimal health consequences.
- Prevalence is a measurement of the number of infected people in a community, but it does not take into account the intensity of the infection. For this reason, prevalence alone should not be used as an indicator of the epidemiological situation – both prevalence and intensity should be measured. Intensity of infection can be measured directly (worm count following expulsion chemotherapy) or indirectly, and much more conveniently, by egg count. Thresholds for the classification of each infected **individual** into categories of “light”, “moderate” and “heavy” infection are provided in Annex 7.1. Each **community** can then be classified according to a combined prevalence/intensity rating in order to determine its appropriate treatment regimen (Annex 7.2).

Both prevalence and intensity of infection are important baseline measures.

4. An **equilibrium state** exists between parasite populations, host populations and the environment. If environmental and/or behavioural conditions are not changed at the same time that a chemotherapy programme is being implemented, the prevalence and intensity of infection will tend to return to original pre-treatment levels through re-infection.

If only prevalence measurements are collected, then the major impact seen in the reduction of the most heavily infected group will be missed.

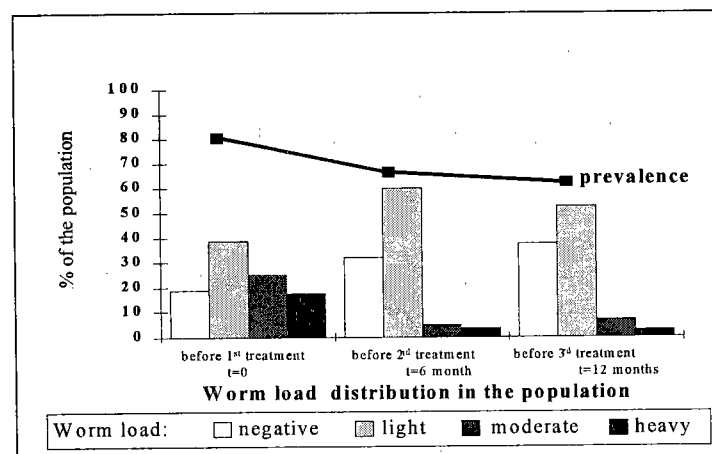


Figure 5. Repeated treatments at 6-month intervals produce a 20% reduction in prevalence but an 88% reduction in the proportion of heavily infected people (Data from Holland *et al.* 1989)

Minor changes in prevalence after repeated drug treatment should not be considered as a failure of the control programme. Even in this case important benefits are achieved by chemotherapy in terms of a significant reduction in the number of heavily infected people, reductions in micronutrient loss and an improvement in nutritional status of the community, among others.

**Control programmes are designed to reduce worm burdens.
Children will become re-infected, but they will have much less
worms for longer periods throughout the year.
This will have a positive effect on their health.**

1.5 Aim of a control programme

There are many interventions which can interrupt the transmission cycle of soil-transmitted helminths and schistosomes.

1. **Chemotherapy** aimed at reducing worm burden and decreasing transmission
2. **Improvement in sanitation** aimed at reducing soil or water contamination
3. **Health education** aimed at encouraging healthy behaviour

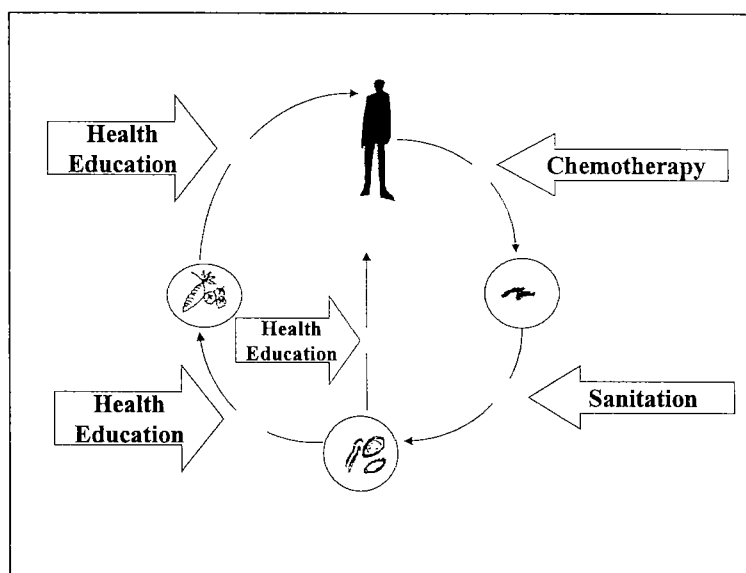


Figure 6. Diagrammatic representation of how transmission of soil-transmitted helminths can be interrupted.

One or all three interventions can be applied in a community depending on the epidemiological situation and the amount of resources and support available (see Annex 7.2). When intensity of infection is high, chemotherapy should be considered as a first-line rapid control measure. Improvement in sanitation and behavioural modification through health education interventions are longer-term measures which should be considered within a comprehensive community strategy. Increased awareness and involvement of the community is an important aim of school health programmes. Families can be important resources to improve sanitation and to reinforce school education activities.

The overall aim of control programmes is to reduce morbidity. For soil-transmitted helminthiasis and schistosomiasis, morbidity is directly related to the intensity of the infection. Consequently, the aim of control programmes is to reduce the number of heavily infected persons and to maintain this number at low levels with repeated chemotherapy interventions. In control programmes aimed at school-age children, health education can be integrated into control activities and is strongly encouraged.

1.6 Effects of anthelmintic treatment

Regular anthelmintic treatment will always reduce the intensity of infection, and consequently, the morbidity.

There may or may not be a significant effect on reducing the prevalence of infection. For this reason, a reduction in **intensity** must always be measured to accurately assess the impact of the control programme (and not only reductions in prevalence). The reduction and the maintenance of low worm burdens have an important impact on the health of the community.

Some of the most important effects of treatment are:

- ◆ improved iron stores and haemoglobin levels
- ◆ improved growth
- ◆ improved food intake
- ◆ improved cognitive performance
- ◆ reduced incidence of clinical complications

The first sign of improvement is parasitological with a reduction of heavy infection, then nutritional, with an increase in iron stores, followed by an increase in haemoglobin level and finally by an increase in growth. At least two years of intervention are normally required before an increase in haemoglobin becomes evident -- more time is required to show an improvement in growth. Additionally, improved indicators of school effects (school attendance, re-enrolment, retention and achievement) have been observed.

Four drugs are recommended by WHO for the treatment of soil-transmitted helminths: albendazole, levamisole, mebendazole and pyrantel and two for the schistosomes, praziquantel and oxfamiquine (Annex 7.3). Each can be given in a single oral administration. Treatment intervals in the community as a whole will differ according to the community's category (based on prevalence and intensity of the infection(s), as described in Annex 7.2).

Anthelmintic chemotherapy and administration of other health interventions at the same time within a single control programme are likely to be cost-effective and should be considered with regard to the needs of the community and the resources available. Attention should be paid to establishing an appropriate distribution schedule (avoiding overburdening of personnel, ensuring feasibility). When warranted, operational research will need to be undertaken to determine the treatment interval, age-targeting, the presence of any interactive side effects, and other issues.

Example 1: THE SCHOOL CONTROL PROGRAMME IN GUINEA

Teacher training and drug management

In 1997, the programme started with 36,500 children from 6 sous-préfectures*

In 1998, it was extended to all sous-préfectures in the 6 préfectures* (350,000 children)

By 2000, the programme is expected to expand to the whole country

General Objective: To improve the health and nutritional status of school-age children in order to enhance their learning capacity and overall well-being

Strategies:

- ◆ Treatment of intestinal helminths, schistosomiasis, and cases of fever
- ◆ Distribution of micronutrients (iodine, iron and folic acid)
- ◆ Development of a strategy for achieving behavioural change in target groups
- ◆ Participation with Parent-Teacher Associations [*Associations de Parents d'Elèves et Amis de l'Ecole (APEAE)*]

Teacher training and drug management activities:

A central team organized teacher training activities in the first 6 sous-préfectures. This involved teachers from the 6 sous-préfectures and also personnel from the préfecture. One teacher from each school in the 6 sous-préfectures participated in the training that was conducted in one big school.

The training activities were organized into 4 modules:

1. Feedback to teachers and parents of baseline survey data collected in the préfecture
 2. Discussion of possible preventive measures
 3. Discussion of objectives of the School Health Programme
 4. Practical distribution of drugs and discussion of health education activities by each teacher
- At the end of the training, each trained teacher returned to their school with the amount of drugs required to treat all the schoolchildren in that school
 - Once trained, personnel from the préfecture level were responsible for training other teachers in the other sous-préfectures in the préfecture – using the same methods

This process was found to be extremely efficient and enabled the:

- Training of at least one teacher from each school in each sous-préfecture on health education and drug administration
- Training of personnel at the préfecture level on teacher training activities
- Distribution of an adequate amount of drug tablets for each school

♦♦ *Immediately before a new round of drug distribution, trained teachers and interested colleagues were invited to a meeting to discuss operational issues and experiences acquired during the previous round. This consolidated knowledge acquired, provided on-going support and encouragement and created an interactive resource network.*

* 'sous-préfecture' and 'préfecture' are administrative units similar to 'district' and 'region'

2. MONITORING CONTROL ACTIVITIES FOR SCHISTOSOMES AND INTESTINAL PARASITES

2.1 *Cost*

Monitoring of the control programme focuses on delivering the programme in the most efficient way possible. Monitoring is therefore an important part of the managerial process –and it should be carried out with a minimum of cost, so as not to divert resources from the intervention phase. At the planning stage, it is recommended that approximately 5% of the programme budget be reserved for monitoring activities. It is important to keep in mind that the 5% proportion applies also to non-financial inputs of monitoring activities (such as personnel energy, overtime, fuel, subsistence) which may subtly encroach on core control activities.

The monitoring indicators presented in this manual are divided into four groups: indicators for monitoring the **process**; for monitoring the **parasitological impact**; for monitoring the **reduction in morbidity**, and other special indicators. Not all of these indicators need to be collected in each control programme; however, there is a core set of indicators which should always be collected and other indicators which may be considered at particular times or when additional resources are available.

2.2 *Target populations*

2.2.1 *School-age children*

The benefits of targeting helminth control programmes to school-age children include reducing morbidity, improving learning capacity and improving growth. Health gains have also been observed in the children's families and in the community as a whole. The infrastructure provided by the school system enhances the management and delivery aspects of control activities. Moreover, schoolchildren can be effective change agents in their communities.

2.2.2 Non-enrolled school-age children

Reaching non-enrolled school-age children is a challenge for any control programme. Special methods will need to be identified in each community, usually from information supplied by local groups, women's groups, religious leaders, community committees, family representatives and teachers, to decide on how best to reach this population group. Schoolchildren can bring their non-enrolled friends to school on 'treatment day', a town crier can broadcast treatment dates and times, music, theatre, radio, and so on, can be used to inform and invite non-enrolled school-age children to obtain treatment and to participate in health education activities. Several of these approaches will, in fact, draw in other risk groups such as pre-schoolchildren and mothers. A special form (Form C) for recording outreach should be used to monitor the extent of this activity, especially to determine the adequacy of the outreach activities to all non-enrolled risk groups. The magnitude of non-enrolment can be estimated by comparing census records with school enrolment records. School enrolment figures can also be obtained from reports of international organizations such as UNICEF, UNESCO and UNDP.

2.2.3 Other groups

Pre-school children, adolescent girls, women of childbearing age and whole communities are other target groups to be considered for inclusion in helminth control programmes depending on infection and disease burden, and available resources.

Example 2: THE SCHOOL HEALTH PROGRAMME IN ZANZIBAR

Outreach to non-enrolled school-age children

The control programme began on Unguja Island in 1994 with 65,800 children; outreach activities started in 1998.

Objective of the outreach activities: To reach school-age children not enrolled in school in order to give them anthelmintic treatment and micronutrient supplements.

Strategy:

The problem of how to reach the high number of non-enrolled school-age children was discussed at **district-level teacher meetings** which had been organized to train teachers about drug administration and health education activities. Each group of teachers identified ways to inform families about the availability of treatment at the school on special 'treatment' days.

A small sum of money (20 US\$) was given to each school to buy the necessary materials for outreach activities

Possible outreach activities identified were:

- a) Posters, handmade by students in the village
- b) Traditional music group performing in the school on the day of the drug distribution
- c) Messages distributed via megaphones and radio, and by religious leaders to inform the village about the drug distribution
- d) Child-to-child communication (enrolled children actively communicate to non-enrolled siblings and friends about treatment days, etc.)

Using a combination of c) and d) approaches, resulted in more than 20,000 non-enrolled school-age children being treated. These activities also succeeded in providing treatment to a similar number of women of child-bearing age, adolescent girls and boys, and pre-school children.

◆◆ *Group discussions at teacher meetings provided the opportunity for each teacher to creatively express her/his view on the problem. Teachers in the drug distribution activities were very involved in identifying appropriate outreach activities.*

2.3 Steps in the monitoring of the control programme

A group of students in Grade 3 (9 and 10-year-olds) should normally be the study population for the baseline survey and for the periodic evaluations throughout the programme because of the epidemiological importance of this age group with respect to intestinal helminth and schistosome infections. Moreover, in an on-going control programme, the infection status of this age group will best reflect the result of several drug distribution cycles.

Monitoring includes a baseline survey and periodic evaluations, which are conducted around the schedule of drug distribution.

2.4 Baseline data collection

In order to decide which control measures to include in a control programme, it is important to determine the baseline situation. This is done by completing a baseline survey -- as outlined in the *Guidelines for the evaluation of soil-transmitted helminthiasis and schistosomiasis at community level* (WHO/CTD/SIP/98.1). The survey is conducted in a random sample of the school-age population. After the survey data have been analysed and the type and frequency of intervention(s) established, the components of the control programme are finalised and implemented. Forms for collecting process indicators related to training and drug distribution (in Annex 7.4) should be reviewed and adapted, as needed.

The baseline survey can include different components but, as a minimum, should include a stool (and urine, where appropriate) examination for parasitological indicators and a brief questionnaire. If resources are available, the baseline survey may also include a more detailed assessment, such as a KAP (Knowledge, Attitude and Practice) survey. As an example of the type of information which should be collected from a minimum baseline survey, the Child Form for parasitological/nutritional data, or a modified version, should be used (Annex 7.4, Form D).

2.5 Monitoring the process

Once the control programme has been initiated, the first monitoring activity involves estimating the number of participating schools, the number of teachers trained, the distribution and quantity of drugs administered and the number and type of health education activities conducted. Among these, the most important indicator is the estimation of drug coverage (i.e. what proportion of the school-age population, both enrolled and non-enrolled, received the drug(s)). Depending on resources available, one or all three methods can be used.

- ◆ Coverage determined from the forms (Forms B-C) routinely filled in by the teachers after each drug distribution in the school
- ◆ Coverage determined from a specially organized survey in which the coverage teams randomly select between 10 and 15 schools and in one class of each selected school, all the children are asked if they have received deworming drugs
- ◆ Coverage determined from specially organized survey of a random selection of households.

In many cases, coverage estimated using the first two methods will be sufficient to provide an adequate approximation of coverage in the whole school-age population. Results obtained in a special survey are usually more accurate although more expensive to collect than routinely collected data.

Timing of the collection of this indicator is crucial. It should take place preferably within 1 week after drug distribution. Other process indicators can then be collected – either concurrently or subsequently. Additional aspects may also be evaluated when warranted (e.g. content of health education activities, drug storage conditions (e.g. humidity, expiry dates), conditions of school latrine and water supply).

2.6 Parasitological monitoring

Parasitological monitoring focuses on the assessment of the impact of the control programme on the intensity of parasitic infections. See the *Guidelines for the evaluation of soil-transmitted helminthiasis and*

schistosomiasis at community level (WHO/CTD/SIP/98.1) for details on performing the parasitological assessment, including quality control.

Parasitological monitoring is done just before a drug distribution cycle (see chronogram on page 28) so that the impact of the previous cycle can be assessed. The timing is critical in that this is when there will be maximal information on the re-infection profile occurring since the previous treatment. A representative sample of regions (and districts within regions and schools within districts) should be selected for monitoring purposes. To avoid singling out particular regions (or districts or schools), new representative regions, districts and schools should be selected for each monitoring event. Not all parasitological monitoring will include monitoring for schistosomiasis because of its more focal nature. However, where schistosomiasis is endemic, care should be taken to draw up a sampling frame (or list) of schools, districts and regions in the endemic area and then to select representatives from among these. In large-scale programmes, monitoring for drug efficacy should be considered (see section 6.4).

2.7 Morbidity monitoring

The impact of a control programme on morbidity is most easily demonstrated using clinical and nutritional indicators. Clinical indicators may include measures of overt morbidity such as, for example, hepatosplenomegaly ('big belly') or pallor, or longer-term sequelae such as hospitalizations due to complications of schistosomiasis. Haemoglobin should be considered as a basic indicator of nutritional impact, especially where hookworm infection is prevalent. It should be kept in mind that improvements in nutritional indicators are likely to be seen only over a longer period of time. Both clinical and nutritional monitoring can be carried out at the same time as parasitological monitoring (i.e. immediately before a drug distribution cycle), or also at other times. Baseline measurements will be essential for comparison. As much as possible, the same monitoring team should carry out the monitoring at the different times.

If adequate resources are available, other nutritional indicators such as height and weight, arm circumference and hematocrit can also be

considered, when warranted. There should be a quality assurance component to all measurements taken to ensure data validity. The collection of morbidity indicators requires experienced personnel and precise instruments (e.g. ultrasound equipment, digital haemoglobinometer, stadiometer, digital scale). Details on methods of taking nutritional measurements are presented in the WHO manual *Measuring Change in Nutritional Status* (WHO, Geneva, 1983).

If programme resources do not permit purchase of specialized equipment to be used by trained personnel, it is wiser *not* to measure these indicators – rather than measuring them without the necessary precision.

2.8 Other related types of monitoring

Other types of monitoring can be considered depending on specific questions that may be raised (and for which appropriate planning has been undertaken). For example, an evaluation of the knowledge acquired by the study population as a result of the control programme can be assessed in a KAP study. Monitoring for drug efficacy, improvements in waste management, improvements in water quality and quantity, school attendance, re-enrolment and retention, and so on, will need to be considered, when appropriate.

3. SUGGESTED INDICATORS

The indicators listed below are considered important for monitoring the results of a School Health Programme that incorporates chemotherapy for soil-transmitted helminthiasis and schistosomiasis, micronutrient supplementation and health education. They have been grouped into four types: **process indicators** which monitor the organizational aspects of the programme; **parasitological indicators** which monitor the impact of the programme on the occurrence of the parasite infections; **morbidity indicators** which monitor the impact of the programme on selected clinical and nutritional outcomes closely associated with parasite infections; and **other indicators** which may be selected on an *ad hoc* basis to monitor the impact of specific programmes. Additional indicators can be appended to each group as specific conditions warrant.

INDICATOR**Process indicators:**

- a) Number of schools participating in the programme
- b) Percentage of schools participating in the programme
- c) Number of teacher training sessions
- d) Number of teacher trainees
- e) Number of tablets distributed to teachers during training activities
- f) Number of school-age children treated (enrolled, non-enrolled) and other high risk groups
- g) Coverage of the intervention
- h) Proportion of classes participating in at least one health education activity
- i) Any other(s) reflecting your particular situation

Parasitological indicators:

- j) Overall prevalence of STH infections
- k) Prevalence of each STH infection
- l) Overall proportion of 'heavy intensity' STH infections
- m) Proportion of 'heavy intensity' infections, for each STH species
- n) Prevalence of intestinal schistosome infections
- o) Proportion of 'heavy intensity' intestinal schistosome infections
- p) Prevalence of any haematuria or urinary schistosome egg count
- q) Proportion of visible haematuria or 'heavy intensity' urinary schistosome infection
- r) And any other(s) reflecting your particular situation

Morbidity indicators:

- s) Proportion of children with defined clinical signs or symptoms
- t) Percentage of children with anaemia
- u) Percentage of children with severe anaemia
- v) And any other(s) reflecting your particular situation

Examples of other selected indicators:

- w) Results of a Knowledge-Attitudes-Practice (KAP) study
- x) Assessment of drug efficacy
- y) Presence or use of latrines
- z) School effects

4. COLLECTION OF SUGGESTED INDICATORS

Monitoring is an important component of each control programme; however, not all the indicators listed in the table on the previous page need to be collected. The selection of the indicator(s) to be collected should be based on a rationale for their use and the resources available.

A control programme organized with local resources in a medium size district (e.g. 100 schools) can be adequately monitored using only process indicators; a regional control programme could probably afford to include a yearly parasitological monitoring in a sample of schools in a few selected districts and a national control programme having the collaboration of Ministry of Health and Ministry of Education would probably also include morbidity – especially if an external donor is supporting the control activities.

Data collection is normally done using forms. Examples of forms are given in Section 7.4, but it is suggested that programme managers adapt these forms to each specific control programme. Forms should be pre-tested before initiating a control programme.

4.1 Timing of the intervention and sampling of population groups

In order to provide maximal information, each indicator has to be collected at the appropriate time and in the appropriate population group:

- **Process indicators** such as teachers' attendance at training sessions and drug distribution coverage, are normally more accurate if collected **immediately after** their completion.
- Two or three years of repeated intervention are normally necessary before improvements in the health of school-age children can be measured with **parasitological or morbidity indicators**. For this reason, after the baseline data collection, parasitological or morbidity

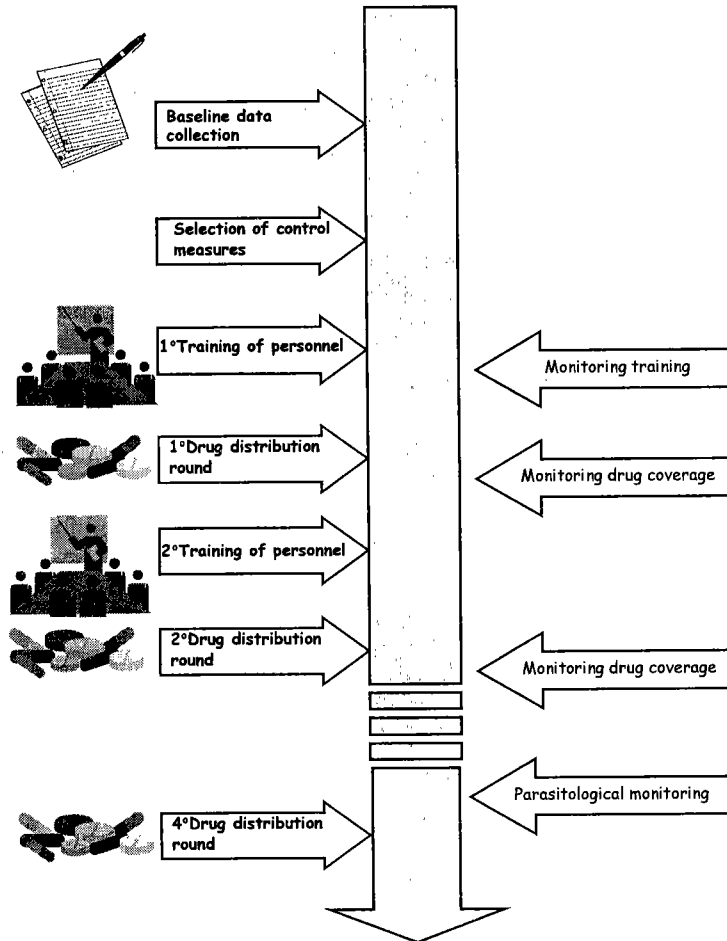
data are collected at two to three years' interval (see chronogram on page 28). Baseline indicators are essential for planning the type of intervention which will be included in the control programme and for serving as a reference against which later years will be compared. In order to obtain data on the impact of the intervention, it is important to monitor a group of children that is likely to have received at least two years of intervention. Therefore, grade 3 would be the optimal group for monitoring purposes. Monitoring Grade 1 children should be done when information is sought on the change of the epidemiological situation in the community which may have come about as a result of environmental and behavioural changes. Monitoring Grade 1 can also give useful information on possible changes needed in the drug distribution schedule.

- Collecting parasitological data immediately after drug distribution will give an indication only of the efficacy of the drug and this is not normally the main aim of the data collection. **Parasitological data should be collected just before the drug distribution** when maximal re-infection has taken place. This allows the magnitude of the re-infection and, most importantly, the proportion of heavily infected children to be estimated. In this way, the impact of the intervention is clearly observed. This provides essential information for planning the type and frequency of future interventions.

The following chronogram provides a visual representation of the time sequence of different intervention and monitoring activities:

Chronogram

Timeline of control and monitoring activities



5. CALCULATING THE INDICATORS

- To calculate **Numbers** you need to sum the pertinent fields in the forms
- To calculate **Percentage, Prevalence or Proportion** you need to divide a Numerator by a Denominator

5.2 Process indicators

a) **Number of schools participating in the programme**

b) **Percent of schools participating in the programme**

Numerator Number of schools participating

Denominator Total number of schools in the area of intervention

c) **Number of teacher training sessions**

d) **Number of teacher trainees**

e) **Number of tablets distributed to teachers during training activities**

f) **Number of school-age children treated (enrolled, non-enrolled) and other high risk groups**

g) **Coverage of the intervention**

This indicator is one of the most important since reaching *75% of the school-age population* has been identified by WHO as a minimal target for endemic countries.

Numerator Number of school-age children receiving the intervention

Denominator Total number of school-age children in the area of intervention

Note that school-age children include both enrolled and non-enrolled children. This denominator is normally available at country level or can be derived from census data. Normally, school-age children are 20-25% of the total population in developing countries. If census data are not available or are not up-to-date, the denominator could be estimated by knowing the number of the children enrolled or by the enrolment proportion. This proportion can be obtained from the UNICEF publication: *The State of the World's Children* published annually, or other similar report.

Examples of estimating denominators for coverage calculation (Data for Unguja Island, Zanzibar, United Republic of Tanzania)

Example A – using census data

Census data: Total population in 1999 = 461,856

20% x 461,856 = 92,373

25% x 461,856 = 115,464

Estimated number of school-age children: $(92,373 + 115,464) \div 2 = 103,918$

Example B -- using the enrolment proportion

Number of children enrolled in Unguja (from MOE reports) = 65,500

Gross enrolment proportion for the United Republic of Tanzania = 67%

Estimated number of school-age children: $65,500 \times (100 \div 67) = 97,761$

h) Proportion of classes participating in at least one health education activity

Numerator Number of classes that have participated in at least one health education activity

Denominator Total number of classes in the area of intervention

5.2 Parasitological indicators

For parasitological indicators, the denominator will always be the TOTAL number of children examined for parasites. See page 54 for the 'heavy intensity' thresholds.

j) Overall prevalence of any soil-transmitted helminth infection

Numerator Number of children positive for any of the three soil-transmitted helminth infections

k) Prevalence of each soil-transmitted helminth infection

For each of the soil-transmitted helminth infections:

Numerator Number of children infected with that helminth infection

l) Overall proportion of any soil-transmitted helminth 'heavy intensity' infection

Numerator Number of children heavily infected with any of the three soil-transmitted helminths

m) Proportion of 'heavy intensity' infections, for each soil-transmitted helminth infection

For each of the soil-transmitted helminth infections:

Numerator Number of children heavily infected with that helminth infection

n) Prevalence of intestinal schistosome infections

Numerator Number of children infected with the parasite

o) Proportion of 'heavy intensity' intestinal schistosome infections

Numerator Number of children heavily infected with the parasite

p) Prevalence of any haematuria or parasite egg count

Numerator Number of children with any haematuria or any egg count at filtration

q) Proportion of visible haematuria or 'heavy intensity' infection

Numerator Number of children presenting visible haematuria or 'heavy intensity' infection

5.3 Morbidity indicators**s) Proportion with clinical signs or symptoms**

Appropriate clinical signs to be investigated must be selected for each parasite.

For:

<i>Ascaris lumbricoides</i>	intestinal obstruction
<i>Trichuris trichiura</i>	diarrhoea and rectal prolapse
Hookworms	anaemia
<i>Schistosoma haematobium</i>	ureteric and bladder fibrosis and calcification
<i>Schistosoma mansoni</i>	colonic polyposis, focal fibrosis
<i>Schistosoma japonicum</i>	liver enlargement, portal hypertension
<i>Schistosoma mekongi</i>	liver enlargement, portal hypertension

These signs and symptoms can be ascertained from different sources; for example, in the sample of children who have been parasitologically investigated, in a specific survey (i.e. ultrasound survey for schistosomiasis) or from reports in hospitals, health centers or dispensaries.

Example calculation:

Numerator Number of children with portal hypertension

Denominator Number of children in the area of intervention

t) Percentage of children with anaemia

Numerator Number of children with Hb<11 g/dl

Denominator Total number of children investigated for haemoglobin status

u) Percentage of children with severe anaemia

Numerator Number of children with Hb<7 g/dl

Denominator Total number of children investigated for haemoglobin status

6. USING THE INDICATORS

6.1 Process indicators

This component of the monitoring system measures the efficiency of the programme in reaching the target population and will enable problem areas to be identified. These data also enable the selection of an appropriate representative site for the implementation of the parasitological evaluation. The following indicators are important in evaluating this component of the programme:

➤ **TRAINING**

- a) Number of schools participating in the programme**
- b) Percent of schools participating in the programme**
- c) Number of teacher training sessions (in total, by district and by school)**
- d) Number of teacher trainees (in total, by district and by school)**

Use of the indicators -- to evaluate whether the training activities are satisfactory and to implement additional training sessions where needed.

Expected results -- at least one teacher in each school is able to organize health education activities, to distribute anthelmintic treatment and micronutrient supplements, and to fill in the appropriate forms.

➤ **DRUG DISTRIBUTION**

e) Number of tablets distributed to teachers during training activities (in total, by district and by school)

Use of the indicator -- to estimate the amount of drug needed; to evaluate the efficiency of the drug distribution system and to identify areas where the distribution is not satisfactory.

Expected results -- enough drugs in each school to treat all school-age children (and non-enrolled school-age children and other high risk groups, where appropriate)

➤ **DRUG COVERAGE**

f) Number of school-age children treated (enrolled and not enrolled, in total, by district, by school and by sex)

g) Coverage of the intervention (in total, by district, by school and by sex)

Use of the indicators -- to evaluate whether the drug distribution activities are satisfactory.

Expected results **≥75% of school-age children have been treated**

➤ **HEALTH EDUCATION ACTIVITIES**

h) Proportion of classes participating in at least one health education activity

Use of the indicator -- to evaluate whether the health education activities are satisfactory.

Expected results >90 % of classes have participated in at least one activity

i) OTHER PROCESS INDICATORS

It is important to decide which other process indicators will be measured at baseline and subsequently. Examples: drug management (ordering, storage and others); school effects (attendance, retention, achievement and others).

Example 3: THE SCHOOL CONTROL PROGRAMME IN NEPAL**Monitoring the process****1. Background**

Since 1996, a School Feeding Programme (SFP) has been organized by the World Food Programme (WFP) in Nepal with the immediate objective of encouraging school enrolment.

A parasitological survey in 780 primary schoolchildren indicated a very high prevalence and intensity of soil-transmitted helminth infections. The establishment of helminth control activities was identified as an important measure to strengthen the benefits of the SFP in terms of improvement in children's health, nutritional status and school performance through the reduction of soil-transmitted helminth infection.

According to WHO recommendations, the following control measures in schools were identified:

- Twice yearly anthelmintic distribution to schoolchildren involved in SFP
- Health education activities especially addressed to the soil-transmitted helminth infections;
- Improvement of sanitation in the schools and in villages (long-term objective)

2. Target and objectives

The de-worming programme was targeted to all the 200,000 primary schoolchildren, aged 5-13 years, in approximately 2,000 public primary schools in 10 districts covered by the project in 1998/99; and will reach 250,000 schoolchildren in 12 districts in the 1999 and 2000 academic years. The quantifiable immediate objective was to reduce to less than 1% the number of heavily infected schoolchildren (from >10% in the baseline survey).

3. Review of Progress

Forms were developed to be filled in by teachers, Ministry of Education staff and District Health Officials for reporting of training, drug distribution and coverage.

a. Procurement of Drugs:

A total of 400,000 albendazole tablets (400 mg) needed for administering two doses per year treatment for 200,000 schoolchildren was procured in May and October 1998 from a local manufacturer after evaluation of the quality of the drug and competitiveness of the price.

b. Training of Trainers and Preparation of Training Materials:

Technical assistance was received from WHO, Geneva for preparing training materials and for conducting Trainers' Training Workshop before administering drugs to schoolchildren. In May/June 1998 Ministry of Health Officials and WFP staff from Kathmandu, supported by WHO, provided Trainers' Training Workshops in four districts. Two District Health Officials and two Ministry of Education staff, from each of the ten project districts participated in the first level training (100% participation). These Trainers, in turn, provided second level training to schoolteachers and parents (80% participation).

c. Printing and Distribution of Posters:

3200 Posters illustrating (a) how worms develop in the human body, (b) how they can kill people, and (c) the ways to prevent worm infection; and 3000 Flash Cards depicting sanitation scenarios for children's educational purposes were re-printed for training and distribution to schools.

d. Distribution of Drugs:

Tablets were distributed to the primary schools through the WFP channel together with foods. The trained school teachers then administered the first dose of albendazole tablets to schoolchildren (>90% coverage in the target districts).

e. Monitoring and Evaluation:

Technical assistance is being received from WHO, Geneva for monitoring the progress of the programme. Forms have been developed to be filled in by teachers and District Health Officials for the reporting of training activities and drug distribution; and for the parasitological team for school survey/laboratory test reporting. A mid-term impact evaluation is planned for mid-1999 to assess the results of this programme.

6.2 Parasitological indicators

This component of the monitoring system will directly measure the effects of the drug distribution and health education activities on the occurrence of helminth infections, and indirectly, on the efficacy of the programme in improving health status. The following indicators are evaluated:

Soil-transmitted helminths (STH)

- j) Overall prevalence of any STH infection (by district and by school)**
- k) Prevalence of each STH infection (by district and by school)**
- l) Overall proportion of any 'heavy intensity' STH infection (by district and by school)**
- m) Proportion of 'heavy intensity' infections for each STH infection (by district and by school)**

Intestinal schistosomes

- n) Prevalence of intestinal schistosome infections**
- o) Proportion of 'heavy intensity' intestinal schistosome infections**

Urinary schistosomes

- p) Prevalence of any haematuria (visible and micro haematuria) or parasite egg count**
- q) Proportion of visible haematuria or 'heavy intensity' infection**

Use of the indicators -- to evaluate if the number of infected children, and especially those with heavy intensity infection, is decreasing. (These indicators are an indirect measure of the efficacy of the programme in reducing morbidity.)

Expected results -- to reduce and maintain to near 0% the 'heavy intensity' group.

It is important to present the data by class of (parasite) intensity -- to determine the proportion of children who are still in the **heavily infected group** and to determine whether the number of children in this group is decreasing. It is also important to keep in mind that schoolchildren in the first few grades will only have been involved in a small number of intervention rounds and may therefore initially show less improvement compared with older schoolchildren.

6.3 Morbidity indicators

This component of the monitoring system will measure the direct effects of the drug distribution and health education activities on the efficacy of the programme in improving health status. The following indicators are evaluated:

- s) **Proportion with clinical signs or symptoms**
- t) **Percentage of children with anaemia (in total, by district, by school and by intensity of infection)**
- u) **Percentage of children with severe anaemia (in total, by district, by school and by intensity of infection)**

Use of the indicators -- to evaluate whether the number of children with morbidity is decreasing

Expected results -- to reduce and maintain to near 0% the number of children with clinical signs or symptoms, anaemia or severe anaemia.

It is important to present the data by class of (parasite) intensity -- to determine the proportion of children who are still **severely anaemic** in the heavily infected group and to determine whether the number of children in this group is decreasing.

6.4 Other possible indicators

There may be special circumstances in which additional indicators are warranted. The formulation of additional indicators can be considered at the national, regional or district levels if financial resources are large enough at the outset, or if additional funding from outside the budget of the control programme becomes available.

The following four indicators serve as examples only -- others can be formulated to reflect special needs or concerns.

w) Knowledge-Attitudes-Practice (KAP)

A KAP study can be incorporated into the baseline survey to assist in the planning of the control programme. Where it has been decided to assess whether a change in knowledge, a change in attitude or a change in practice (behaviour) has followed from control activities, a KAP study can also be conducted. This type of study is based on interviews and /or questionnaires of a representative sample of the study population, usually at two or more points in time. Changes are assessed by comparing results between time points. KAP results should be linked to the health education component of the control programme.

x) Assessment of drug efficacy

Modern anthelmintic drugs are extremely effective for the treatment of worm infections. **If the programme managers are concerned that the drugs are not working as effectively as expected, and can satisfy themselves that a good quality drug was properly given to the children, WHO should be consulted.** There is always the possibility that drug resistance might develop, but its correct detection needs expert support. A recent summary on this topic is available from WHO: *WHO/CPC/SIP/99.1 Report of the WHO Informal Consultation on Monitoring of Drug Efficacy in the Control of Schistosomiasis and Intestinal Helminths. Geneva: World Health Organization, July, 1998.*

Example 4: THE SCHOOL CONTROL PROGRAMME IN SEYCHELLES

Parasitological monitoring

Intestinal parasitic infections have been perceived as a public health problem in the Seychelles for decades. A comprehensive strategy to reduce morbidity and, in the long term, transmission of intestinal parasites, has been implemented since 1993. The programme involved 20,000 children (coverage 99.4%). Management of the programme was integrated into the well-established primary health care system, with control activities being undertaken through existing health facilities. The strategy is based on periodic chemotherapy of schoolchildren, intense health education and improvement of sanitation and water supply.

The programme has been parasitologically monitored with the following results:

Parasite	Survey 1		Survey 2		Survey 3	
	Pre-valence	% heavy infection	Pre-valence	% heavy infection	Pre-valence	% heavy infection
<i>A. lumbricoides</i>	17.7	1.0	9.8	0.7	4.4	0.1
<i>T. trichiura</i>	53.3	1.1	36.1	1.3	27.3	0.7
Hookworms	6.3	0.6	8.6	0.2	4.2	0.1
Cumulative	60.5	---	44.4		33.8	

After 3 interventions the percentage of infected children was reduced by more than 44 % and, more importantly, the total proportion of heavily infected was reduced to less than 1%. These results were possibly due to the concomitant rapid socio-economic development of the country, legislation to enforce implementation of sanitation in the whole country and the high level of school attendance which significantly facilitated the programme.

y) Latrine presence and use

Where the construction, repair, maintenance or health education about latrines have been a component of the control programme, it may be appropriate to include a specific assessment of their impact. Additional process indicators should be formulated to reflect the specific nature of the latrine intervention.

z) School effects

These include school attendance, re-enrolment, retention, and achievement indicators, among others. The success of outreach originating from school-based activities to other risk groups, and even to the community as a whole, where appropriate, can also be ascertained.

6.5 Dissemination of summary report on indicators

It is important to disseminate the results of monitoring activities to those who will be able to use this information to continue control programme activities. This will include several government ministries, NGOs, communities and donors. Both health and school authorities can use this information to gauge how successful the programme is, to identify where the programme requires strengthening and to make any adjustments to ensure maximal operational efficiency.

Example 5 : KAP SURVEY IN NEPAL**Planning a control programme**

Background and objectives: In order to appropriately plan the health education component of a helminth control programme mainly addressed to primary schoolchildren in Nepal, a KAP survey was organized by the Japanese International Cooperation Agency (JICA) in 1998 with five main objectives:

- Identify community perception of the STH problem
- Evaluate community knowledge about the problem and about prevention
- Evaluate personal hygiene practices
- Identify care-seeking behaviours in the community
- Investigate community willingness to participate in the programme

Research methodology: Information was collected through Focus Group Discussions (FGD) among schoolchildren and the community. Attention was paid to involve people of different social, ethnic and religious backgrounds in the groups. The study involved 28 communities in one district. The staff responsible for moderating and recording data from the FGD were trained (lectures, group discussion, role play) on the methods to be used. Guidelines for FGD were prepared.

Fieldwork: The fieldwork was carried out by three teams each one composed of one moderator and two recorders (recording both on paper and with tapes). Following each FGD, a report was prepared incorporating all the information collected.

Results: A long list of useful information has been collected from the KAP survey regarding hand- washing practices, use of shoes, defecation practices, perception of the relevance of the disease by children and adults and preventive and curative measures taken. The information gathered will permit health education activities to target specific behaviours (i.e. on the use of shoes, and hand and food washing) and will stress the importance of modifying 'bad health' practices (i.e. defecation of small children in the yard).

More than 50% of the 28 communities were found to be ready to pay some amount of money for the helminth control programme, which gives a hope for implementing the programme in a sustainable way.

7. ANNEXES

7.1 Thresholds for the classification of individuals

Presentation of the results in classes of intensity allows the proportion of individuals suffering severe consequences to be quantified. The following thresholds are proposed for use by WHO. See:

- *Control of schistosomiasis* (1993) Second report of WHO Expert Committee
- *Control of intestinal parasitic infection* (1987) Report of WHO Expert Committee
- *Guidelines for the evaluation of soil-transmitted helminthiasis and schistosomiasis at community level* (1998)
- *Guidelines for the use of iron supplements to prevent and treat iron deficiency anaemia* (1998)

(Some flexibility in setting thresholds may be necessary depending on local epidemiological characteristics.)

FOR SOIL-TRANSMITTED HELMINTH AND INTESTINAL SCHISTOSOME INFECTIONS:

	Light intensity infections	Moderate intensity infections	Heavy intensity infections
<i>A. lumbricoides</i>	1 – 4,999 epg**	5,000 – 49,999 epg	≥ 50,000 epg
<i>T. trichiura</i>	1 - 999 epg	1,000 - 9,999 epg	≥ 10,000 epg
Hookworms *	1 – 1,999 epg	2,000 - 3,999 epg	≥ 4,000 epg
<i>S. mansoni</i> <i>S. japonicum</i>	1 - 99 epg	100 - 399 epg	≥ 400 epg

* For hookworm infections the degree of severity varies not only according to the number of worms present but also to the species of hookworm and the age and nutritional intake of iron of the individual. Fixed categories were not defined by the 1987 WHO Expert Committee. The above categories are given according to the faecal loss of haemoglobin found by Stoltzfus *et al.* in 1996 in Zanzibari children infected mainly with *Necator americanus*, and are given as a possible threshold:

-Light intensity infections are related to a loss of less than 2 mg of haemoglobin per gram of faeces

-Heavy intensity infections correspond to a loss of more than 5 mg of haemoglobin per gram of faeces.

** epg = eggs per gram of faeces

FOR URINARY SCHISTOSOMIASIS:

	Light intensity infections	Heavy intensity infections
<i>S. haematobium</i>	<50 eggs/10 ml of urine	≥50 eggs/10 ml of urine or visible haematuria

FOR HAEMOGLOBIN:

	Anaemia haemoglobin (g/dl)	Severe anaemia haemoglobin (g/dl)
Children 6 mo to 5 yrs	< 11.0	< 7.0
Children 5 – 11 yrs*	< 11.5	< 7.0
Children 12 – 13 yrs*	< 12.0	< 7.0
Non-pregnant women	< 12.0	< 7.0
Pregnant women	< 11.0	< 7.0
Men	< 13.0	< 7.0

* In order to facilitate the classification of anaemia for the school-age population as a whole, one cut-off, at < 11.0 g/dl, can be used. There is no change in cut-off values for severe anaemia (i.e. <7.0 g/dl for all age groups).

7.2 Categories for community diagnosis and selection of control measures

The following tables summarize WHO recommendations for community-based chemotherapy control programmes for soil-transmitted helminthiasis and schistosomiasis. (The reader is referred to the book entitled *Guidelines for the evaluation of soil-transmitted helminthiasis and schistosomiasis at community level (WHO/CTD/SIP/98.1)* for information on assessing the prevalence and intensity of infection in a community and for the basis on which specific treatment regimens have been suggested.)

Soil-transmitted helminthiases:

Community category	Prevalence	Proportion of heavy intensity infections	Recommended Interventions
I Heavy intensity	ANY	≥ 10%	1. Universal treatment (1/yr) 2. More intense treatment of high risk groups (2 or 3/yr) 3. Health education activities 4. Sanitation improvement
II High prevalence Light intensity	≥ 50%	< 10%	1. Targeted treatment of high risk groups 2. Health education activities 3. Sanitation improvement
III Low prevalence Light intensity	< 50%	< 10%	1. Health education activities 2. Sanitation improvement 3. Case management

High risk groups: women of childbearing age, pre-school and school-age children

Schistosomiasis:

Community category	Prevalence	Recommended interventions
I High prevalence	≥ 50 %	Universal treatment (1 or 2/yr)
II Moderate prevalence	≥ 20% < 50%	Targeted treatment of high risk groups
III Low prevalence	< 20%	Selective treatment of high risk groups (every 2 yrs)

High-risk group: school-age children and some occupational groups

7.3 Available drugs for control

There are safe, efficacious and effective drugs for the most common soil-transmitted helminthiasis and schistosomiasis.

Infection caused by:	Drugs	Dose*
Soil-transmitted helminths: ¹	Albendazole or Levamisole or Mebendazole or Pyrantel pamoate	400 mg ^α 80 mg ^β 500 mg ^α 10 mg/kg
Schistosomes: ²	Praziquantel or Oxamniquine (for <i>S. mansoni</i> only)	40 mg/kg 15-30 mg/kg

¹ *Ascaris lumbricoides*, hookworms (*Necator americanus*, *Ancylostoma duodenale*), *Trichuris trichiura*

² *Schistosoma mansoni*, *S. haematobium*, *S. japonicum*, *S. mekongi*, *S. intercalatum*

* **Use in children under 2 years old:** Although not generally approved for children, evidence of side effects from these drugs has been reported in children 9-23 months of age.

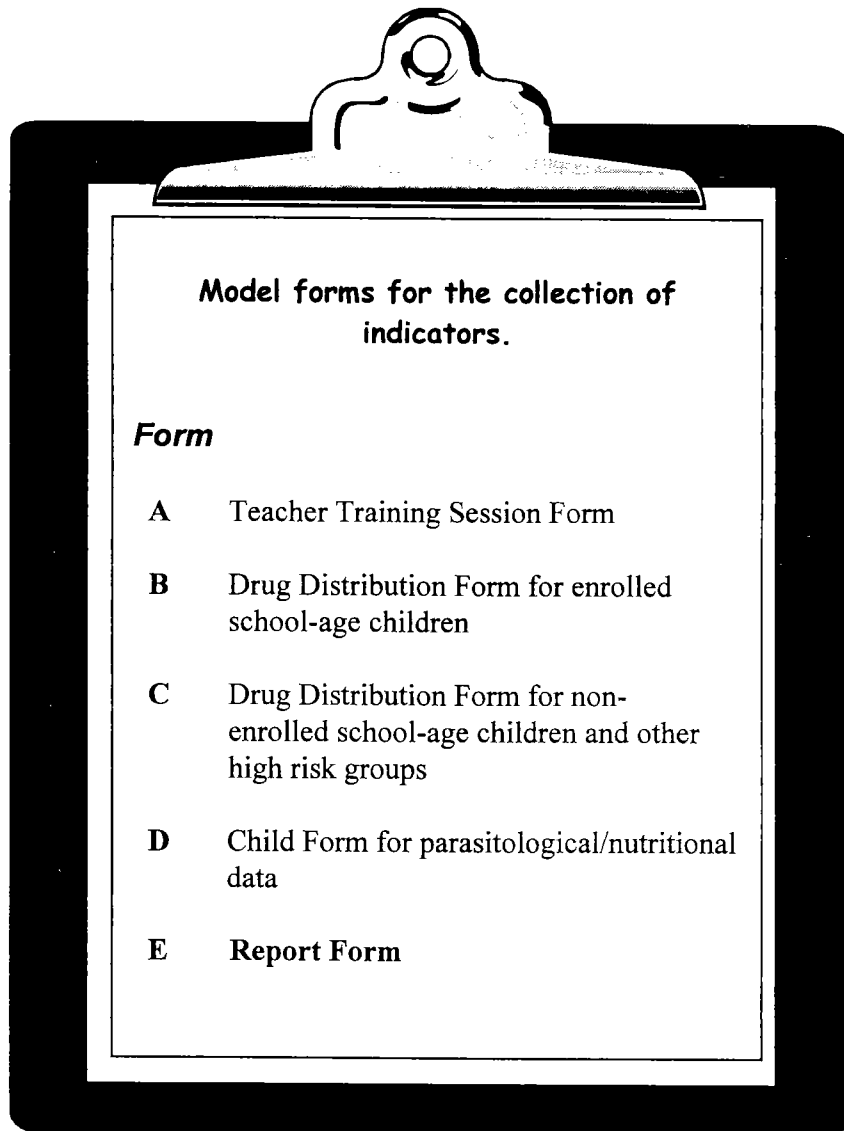
Use in pregnancy: A single oral dose can be given to pregnant and breast-feeding women; however, as a general rule, these drugs should not be given in the first trimester of pregnancy

α The single tablet formulation of these drugs makes them particularly attractive for use in school-based control programmes because there is no need for a scale to weigh the children

β For use in school-age children, two tablets of 40 mg each, are given in a single dose.

It is important to ensure the quality of the drugs used in control programmes, as there have been reports of sub-standard and counterfeit drugs. The source of the drugs must be reputable. Irrespective of the source of the drug, it is advisable to test for drug quality. WHO has identified several laboratories who can do this type of testing. It is sufficient to test a small number of samples (obtained randomly) from one drug lot to establish drug quality. WHO should be contacted for referral to a testing laboratory and in any instance where drug quality cannot be ascertained or where drug quality is suspect.

7.4 Forms



The following forms are proposed as examples only. They should be used to collect and report data on the training of teachers, on the drug distribution, on the collection of clinical data and on the assessment of the coverage. Each programme manager (in collaboration with persons filling in the forms) must adapt these forms or prepare new ones according to the organization and priorities of each particular programme.

All indicators proposed in this guide can be obtained by compiling data from the fields on the forms which have been highlighted in grey shading. Simple analyses can be done by hand or using simple computer statistical packages (e.g. EPI-Info). It is advisable to keep the forms divided by school, district and region in separate boxes in a secure dry place. The information collected, especially from the baseline survey, will need to be consulted at later dates.

SOIL-TRANSMITTED HELMINTHIASIS AND SCHISTOSOMIASIS

B - DRUG DISTRIBUTION FORM FOR ENROLLED SCHOOL-AGE CHILDREN

To be filled in by the Teacher after each class drug distribution

School Name _____ Location _____ Class _____

Teacher _____ Region _____ District _____

Health education activities performed? Yes No

Describe health education activities on the reverse side of this form →

Names of the enrolled children (from the class roster)	Sex		Received Drug*		
	M	F	1 st round date _/ _/ _	2 st round date _/ _/ _	3 rd round date _/ _/ _
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
Total Number					

* For children who are absent on the day of drug distribution, indicate the date when they are later given the drug (this date should ideally be as close to the date the class was given the drug.)

SOIL-TRANSMITTED HELMINTHIASIS AND SCHISTOSOMIASIS

C —DRUG DISTRIBUTION FORM FOR NON-ENROLLED SCHOOL-AGE CHILDREN AND OTHER HIGH RISK GROUPS

To be filled in by the **Teacher** after each drug distribution

School Name _____ Location _____
 Region _____ District _____ Date / / _____

Name of the person receiving treatment	Sex		Risk group			OTHERS
	M	F	Pre-school children <5 years	Non-enrolled children 6-19 years	Women 20-45 years	
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
Total Number						

TEACHER NAME _____

D- CHILD FORM FOR PARASITOLOGICAL / NUTRITIONAL DATA

To be filled by the survey team

I Personal data

Date: ___ / ___ / ___

ID Number _____	School (or village) _____
Name _____	
Sex M <input type="checkbox"/> F <input type="checkbox"/>	Age _____ (years)

II Nutritional data

Weight _____, ___ Kg	Height _____ cm	Hb _____, ___ g/dl
Anaemia (<11 g/dl) Yes <input type="checkbox"/> No <input type="checkbox"/>	Severe anaemia (<7 g/dl) Yes <input type="checkbox"/> No <input type="checkbox"/>	

III Parasitological data

a) Stool examination	eggs/slide	eggs/gram	Heavy intensity threshold	Heavy intensity infection	
				Yes	No
<i>Ascaris lumbricoides</i>			≥ 50,000 epg	<input type="checkbox"/>	<input type="checkbox"/>
<i>Trichuris trichiura</i>			≥ 10,000 epg	<input type="checkbox"/>	<input type="checkbox"/>
Hookworms			≥ 4,000 epg	<input type="checkbox"/>	<input type="checkbox"/>
<i>Schistosoma mansoni/japonicum</i>			≥ 400 epg	<input type="checkbox"/>	<input type="checkbox"/>
Other parasites identified _____					
b) Urine visual examination				Yes	No
Visible haematuria				<input type="checkbox"/>	<input type="checkbox"/>
Microhaematuria (<i>reagent strips</i>)				<input type="checkbox"/>	<input type="checkbox"/>
c) Urine examination by microscope					
	Number of eggs in 10 ml of urine	Heavy intensity threshold	Heavy intensity infection		
			Yes	No	
<i>S. haematobium (filtration)</i>		≥ 50 eggs/10 ml	<input type="checkbox"/>	<input type="checkbox"/>	

E- REPORT FORMTo use for reporting summary results at the **district, regional or national level**

PROCESS INDICATORS		Date:	
a. Number of schools participating			
b. Percent of schools participating			
c. Number of teacher training sessions			
d. Number of teacher trainees			
e. Number of tablets distributed to teachers during training			
f. Number of school-age children treated		Enrolled:	Non-enrolled:
g. Coverage of the intervention			
h. Proportion of classes participating in at least one health education activity			
PARASITOLOGICAL INDICATORS			
j. Overall prevalence of STH infections			
l. Overall proportion of 'heavy intensity' STH infections			
k. and m.	Prevalence and 'heavy intensity' of infections	Prevalence	% heavy intensity
	<i>Ascaris lumbricoides</i>		
	Hookworm		
	<i>Trichuris trichiura</i>		
	Others		
n. and o. Prevalence and 'heavy intensity' of intestinal schistosome infections			
p. Prevalence of visible and micro haematuria or <i>S. haematobium</i> egg count			
q. Proportion with visible haematuria or 'heavy intensity' urinary schistosome infection			
MORBIDITY INDICATORS			
s. Proportion with defined clinical sign or symptom			
		Overall	Hookworm heavy intensity
			<i>S. haematobium</i> heavy intensity
t. Percentage of anaemia (Hb<11g/dl)			
u. Percentage of severe anaemia (Hb<7g/dl)			
OTHER INDICATORS (to add, as needed)			

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