School-based deworming:

A planner's guide to proposal development for national school-based deworming programs

Conference Ready Edition

Produced by Deworm the World with input from: The Partnership for Child Development, the World Bank, the Education for All–Fast Track Initiative, the World Health Organization, the World Food Programme, the Ministries of Health and Education in The Gambia, Kenya, Liberia, Nigeria and Sierra Leone, Innovations for Poverty Action, Kenya Medical Research Institute, and Helen Keller International.

Deworm the World
1000 Thomas Jefferson Street NW
Washington, D.C. 20007, USA.
Telephone: +1-202-403-5714.
Fax: +1-202-403-5994.
Email: contact@dewormtheworld.org

For further information on worm control in school-age children please visit the following websites:
www.dewormtheworld.org; www.schoolsandhealth.org; and www.who.int/wormcontrol/en/

How to use this guide

This guide is intended to assist policymakers and planners in proposal writing and initial design for national school-based deworming programs. It is also a detailed aid for construction of an accompanying budget.

Based around 8 Steps for developing a school-based deworming program the guide highlights all the key pieces of information which will be needed at the planning and proposal stage and how they should be used in designing the program.

When planning a school-based deworming program or writing a proposal each step should be addressed and the relevant information sought. Where information or action is not available or concluded, the proposal and plan should include next steps for completion.

The 8 Steps for developing a school-based deworming program

Step 1: Developing a policy framework.

Step 2: Targeting school-based deworming.

Step 3: Procuring and distributing deworming tablets.

Step 4: Training of teachers.

Step 5: Community sensitization.

Step 6: Sequencing of implementation.

Step 7: Monitoring and evaluation.

Step 8: Preparing a budget.

Rather than being prescriptive, the guide provides a template for planning. It draws from and includes two detailed case studies of school-based deworming scale up which demonstrate implementation strategy for the 8 Steps and their adaption to fit unique country settings.

The step by step overview of school-based deworming programs is the entry point for a suite of technical assistance packages available through Deworm the World, the Partnership for Child Development (PCD), the World Health Organization (WHO), and other development partners. The packages which can support policymakers at each stage are listed in the Resources section along with notes on applying for funding, and a checklist for good practice.

Contents

Why school-based deworming?

Over 400 million school-age children worldwide are infected with parasitic worms. These infections harm their health and development, and limit their ability to both access and benefit fully from the education system. In 2001, WHO set the goal of treating 75% of school-age children at risk of infection by 2010. However, by the fall of 2006, only 10% of these children were receiving regular treatment.

There is a safe, simple, and cost-effective solution: **school-based deworming.** It has been shown to reduce absenteeism by 25%, and at less than 50 US cents per child per year, school-based deworming is one of the most cost-effective methods of improving school participation ever rigorously evaluated.

In pursuit of achieving the Education for All (EFA) and the Millennium Development Goals (MDGs), Ministries of Education, United Nations agencies, the World Bank, and civil society organizations have made school-based deworming an education policy priority. The overwhelming effects of school-based deworming are a crucial step towards achieving universal global education. If there are any best buys or “silver bullets” to support progress in meeting these goals, then school-based deworming is surely one.

• Worms affect both the health and education of children

During a period of both intense physical growth and learning, school-age children suffer the highest burden of worm infections and, consequentially, the greatest morbidity (see Figure 1) *(Bundy et al. 1992a; Bundy et al. 1992b).* The two types of worms that most commonly affect children are schistosomes (also known as bilharzia) and soil-transmitted helminths (STH), which include roundworm, whipworm, and hookworm.

Worms affect children's health, potentially causing:

- Anemia.
- Malnourishment.
- Impairment of mental and physical development *(Hotez et al. 2006; Stephenson 1987).*

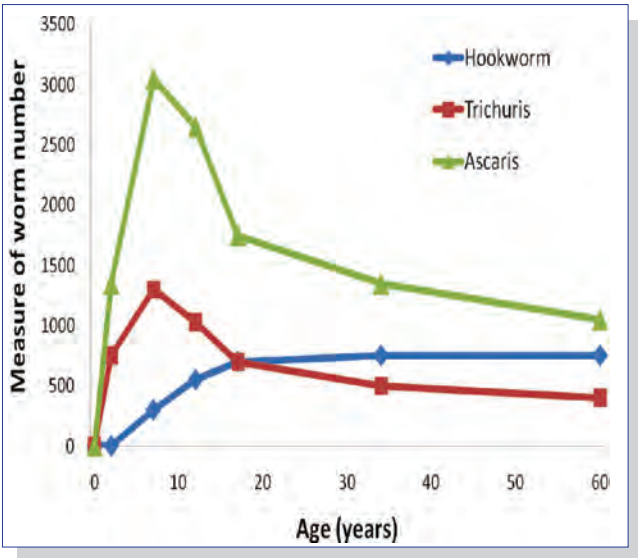
Short term, children with worms may be too sick or tired to attend school or to concentrate. Long term, like under nutrition, worms are associated with:

- Impaired cognitive development and decreased educational achievement (*Simeon and Grantham-McGregor 1990; Mendez and Adair 1999*).
- Poor performance on cognitive function tests which delays reaction times *(Watkins and Pollitt 1997).*
- Poor short term memory *(Jukes et al. 2002).*

Even longer term it is estimated that:

- Infection leads to an average IQ loss of 3.75 points per child.
- Children persistently infected with hookworm are less likely to be literate (13%) and earn less as adults (43%) than those who grow up free of worms *(Bleakley 2007).*

Figure 1: The intensity of worm infection is greatest in schoolchildren.



• School-based deworming contributes to the achievement of EFA

School-based deworming alleviates or prevents the many health impacts mentioned, and by doing so contributes to:

- Reduction of absenteeism *(Miguel and Kremer 2004).*
- Increased potential to learn *(Grigorenko 2006).*
- Having the greatest impact on the neediest children. School-based deworming is pro-poor.

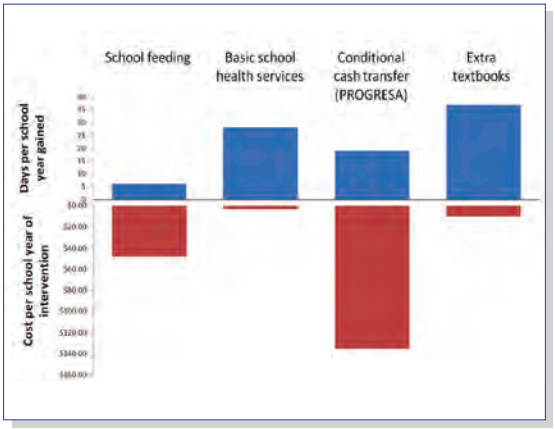
• School-based deworming is cost-effective

- The estimated cost for school-based deworming is less than 50 US cents per child per year, inclusive of teacher training, drug procurement and distribution *(PCD, 1999).*
- Compared with other education interventions, mass school-based deworming is an extremely cost-effective method of improving school participation (J-PAL, 2005; Bundy *et al*. 2006).
- Treating only school-age children reduces the total disease burden due to worm infections in the community by reducing the number transmitting infection.

• Delivery through schools by teachers is effective and feasible

- As the health sector may prioritize the needs of pregnant women and under-fives, and as a proven education intervention, school-based deworming should be a priority for the education sector.
- The best way to reach large numbers of school-age children is through the existing infrastructure of schools and community links of teachers.
- Where prevalence is high WHO recommends regular mass treatment of schoolchildren (Montresor *et al*. 2002) without the need for individual diagnosis.
- Deworming tablets are cheap and effective with minor side-effects, so with little training teachers can safely and easily administer them.

Figure 2: Cost-effectiveness of different education interventions.



Note: **In this analysis, basic school health services primarily include deworming.**

8 Steps to school-based deworming

Developing a policy framework

STEP 1

Targeting school-based deworming

STEP 2

Procuring and distributing deworming tablets

STEP 3

Training of teachers

STEP 4

Community sensitization

STEP 5

Sequencing of implementation

STEP 6

Monitoring and evaluation

STEP 7

Preparing a budget

STEP 8

STEP 1

Developing a policy framework

A strong policy framework that supports school-based deworming is critical to the development of a systematic and sustainable national program. Endorsement by high level officials from the relevant ministries enables effective action at all levels during the planning and implementation stages. Key to the success of any school-based deworming program is the partnership between the Ministries of Education and the Ministries of Health, and key policy decisions to be made include the joint identification of roles and responsibilities for each element of the program.

Key processes

1. Objectives of the program should be defined, this will provide the context for school-based deworming.They should support and build upon existing School Health and Nutrition strategy and policy.
2. Strategic partnership on school health and nutrition should be developed between the Ministries of Education and Health as well as with other stake holders such as the United Nations World Food Programme (WFP), the United Nations Children's Fund (UNICEF), and non-governmental organizations (NGOs). This should include mapping and coordinating any current activities which are occurring.
3. A memorandum of understanding (MoU) should be drawn up between the Ministries of Health and Education to define which areas of the program each have responsibility for. While it is tempting to assign tasks to 'both', division of responsibility should be made where possible according to ministerial roles and expertise. A draft MoU is available from Deworm the World.
4. A Joint Committee or Task Force can be formed to oversee and coordinate the processes, and take the program forward as a unified education and health endeavor.
5. A Policy for Action should finally be developed specifically for school-based deworming. This should be based on WHO treatment and surveying guidelines *(WHO 2006)*. In the case of school-based deworming, the Ministry of Health will be responsible for safety of the medicines, and the Ministry of Education will be responsible for the training of teachers for mass school-based deworming.
6. The education sector plan, school health policy, and the health sector plan should all specify deworming through schools. If this is not the case, the documents should be reviewed to include school-based deworming. This will enable funding applications to be submitted to funding agencies including the EFA-Fast Track Initiative (FTI) for catalytic funds (See Resources section).

Step completion

On completion the documents below should be in place, developed collaboratively and inclusively. Initial plans and proposal drafts can refer to the draft documents and ongoing processes.

1. MoU between the Ministries of Health and Education with key responsibilities outlined.
2. Clear written Policy for Action on school-based deworming.

What is program objective?

Consider:

Number/proportion of children

which children

time frame

rationale

Who are the key stakeholders and what role in school-based deworming do they currently play?

Does an MoU or equivalent exist? If not, what is the strategy for development?

Potential roles in school-based deworming for the Ministries of Education and Health

Ministry of Education	Ministry of Health

Who should be in the stakeholder group: additions to current stakeholders?

STEP 2

Targeting school-based deworming

An important step in planning for school-based deworming is determining **location**, **prevalence**, and **species** of worms. As many areas will not have worms not all children need to be treated. Mapping allows targeting to those who need treatment thus, maximizing cost-effectiveness. Schistosomiasis and STH will both need to be mapped as the treatment strategy for each is different and often one can be present without the other (See Table 1).

There has already been appraisal of many areas and predictive maps are available on www.dewormtheworld.org. Deworm the World can assist with mapping existing data on request.

Stages for mapping worms and targeting delivery

1. Existing data, and surveys etc., should be collected and mapped.
2. This should be combined with predictive data which can identify areas where worm transmission is not occurring.
3. Rapid appraisal can be carried out at low cost to fill in data for areas where no data exists or is out of date but where it is shown worm transmission could be occurring (see Resources section).
4. Based on the data, the country's population, and administrative levels, it should be decided on what level to target, for example, targeting all schools in a state/district/zone for STH or by focal area for schistosomiasis.
5. Data on schools and school populations can be mapped onto the same map to form a useful planning tool.

School-based deworming can be geographically targeted according to the WHO guidelines *(WHO 2004)* set out below.

Table 1: Prevalence thresholds on STH and schistosomiasis for mass school-based deworming.

	Moderate Risk		High Risk	
	Prevalence Threshold	**Treatment Schedule**	**Prevalence Threshold**	**Treatment Schedule**
STH (Area/District Level)	>=20% – <50%	Treat all children once a year	>=50%	Treat all children twice a year
Schistosomiasis (School Level)	<30% Urinary >=10% – < 50% Intestinal	Treat school children once every 2 years	>=30% Urinary >=50% Intestinal	Treat school children once a year

Source: WHO 2004; WHO 2007.

Technical assistance

In this step, it is possible to get technical assistance, to determine what mapping needs to be done, and to plan treatment targeting.

STEP 2 – NOTES

What do we know about worms and how can data be collated?

Consider:

National surveys

academic data

previous mapping exercises

predictive map on website

How is the country divided up into administrative levels (the number of zones, divisions, districts etc)?

What corresponding population data is there available?

Is there a school database? If so, does it show locations of schools by Global Positioning System (GPS) points?

STEP 3

Procuring and distributing deworming tablets

Using mapping from Step 2 along with details of school-age population and the dosage guidelines below (see Table 2), estimations of numbers of drugs required can be made. Include 25% extra for out-of-school children, younger siblings etc., who may be present on the school deworming day.

Stages of planning when arranging the procurement and distribution of drugs

1. Determine and follow existing government procedures for drug importation and adhere to any procurement policy, or regulations. Procurement procedures may also be determined by donor regulations and conditions.
2. Any drugs imported should be quality assured and will need to be on the approved pharmaceutical list or on the list of essential medicines and drugs.
3. Should drug donation be needed, many organizations may be able to supply the drugs. Deworm The World may be able to assist with procurement.
4. Determine the storage and shipping address for drugs, a 'consignee' must be nominated as responsible for receipt. Many government agencies have storage and distribution facilities or if more expedient an alternative can be sought.
5. Specify who will bear the costs for shipping and delivery of drugs.
6. Procurement and importation must be arranged in a timely manner.
7. Prior to distribution consider the number of tablets per container. Either small containers should be ordered or drugs should be repackaged to enable distribution to schools in appropriate quantities.
8. Distribution of drugs can be via the health or the education sector's scheduled visits or may occur via the training cascade (detailed in Step 4).
9. Distribution should occur close to the school deworming day and distribution plans should include return of unused drugs to central stores soon after deworming.

Table 2: **Available drugs with dosages for mass school-based deworming.**

Worm Infection	Drugs and Dosages	Notes	Cost (US)
STH	Albendazole 400mg (single dose) OR	• 1 – 2 years of age – ½ a tablet. • 2 years of age and above – 1 tablet.	3 cents per tablet
	Mebendazole 500mg (single dose)	• 12 months old and above – 1 tablet. • <12 months – do not treat children.	
Schistosomiasis (Urinary or Intestinal)	Praziquantel 600mg (Praziquantel 40mg/kg)	Where there are scales, doses can be based on weight otherwise it should be based on height using a praziquantel tablet pole.	10 cents per tablet

STEP 3 – NOTES

Calculation of drugs required: For proposal writing, use best estimate of children requiring treatment available at time of writing based on existing data, predictive maps or on treating all children. This can be amended as better data is acquired.

STH: Number of albendazole/mebendazole tablets required = number of children in areas targeted + 25%.

Schistosomiasis: Number of praziquantel tablets required = number of children in areas x 2.5 tablets + 25%.

Are there already deworming tablets in the country? If not, what is the procurement strategy?

What is the storage, distribution and return plan?

STEP 4

Training of teachers

Training for teachers to deliver deworming medication in schools, to educate children on worms and to sensitize the local community is essential. This should be delivered at a local level.

Developing materials for training

- In many instances resources already exist for personnel at various levels, and these should be reviewed, developed and piloted.
- Training materials could include a Guide for District Level Managers; a Teaching Training Kit, Drug Distribution Instructions for Teachers and a Handout for Teachers. Teacher training materials are available from Deworm the World.
- It is important to contextualize materials with respect to cultural issues related to sanitation, names of worms and worm infection in local languages, etc.

Planning the training schedule

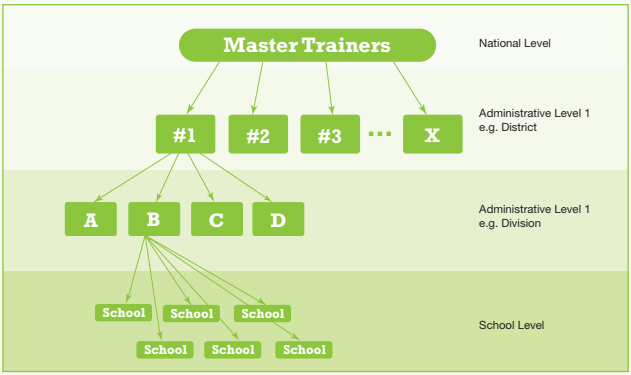
In order to train a large number of teachers, cascading training sessions or step down training can be effective. For example from national to regional, regional to local, then local to school etc. (see Figure 3.) Cascaded training design also provides opportunity for training materials, monitoring forms and medication to be distributed from holding at a national level through the levels to teachers at individual schools.

Master training: Should be carried out in a team comprising both the Ministries of Education and Health, and any key technical bodies. The number of master trainers is determined by the number of next level trainings to be conducted with 3 or 4 master trainers attending each. In approximately 2 days, master trainers can be briefed thoroughly on a roll out plan and extensively trained in school-based deworming, equipping them to begin conducting next level of training sessions.

Next level of training: In approximately 3 days master trainers train the next level of personnel on how to deworm in schools. The master trainers then supervise as level 1 personnel train level 2. The necessity of these cascade levels are determined by population and country size as well as the number of schools and teachers and administrative setup.

Teacher Training: Takes approximately half a day where one teacher training session should cater for approximately 30 teachers. The training should aim to encompass two teachers from each school involved in the school-based deworming program, ideally inclusive of the headteacher and will be led by two previously trained individuals from one level above (master trainers, administrative level 2 or 3 depending on the cascade size).

Figure 3: Overview of a training cascade.



STEP 4 – NOTES

Planning the training cascade

Consider:

Number of schools

2 teachers per school

number teacher trainings required

grouping of teacher trainings by area

number of next level trainers required

structure of cascade

master trainers required

Who should attend master training?

STEP 5

Community sensitization

A final key step in the program prior to mass school-based deworming involves communicating with parents, community leaders, religious leaders and local health agents about the objectives of school-based deworming in schools and what they should expect.

Community sensitization ensures that teachers, parents and children are aware of the occurrence, reasons, benefits and safety of school-based deworming. Previous programs have failed where sufficient community sensitization have not occurred; due time and planning should be invested in this crucial step.

The campaign should be made appropriate for the area in which it is occurring in terms of language and media. Potential community sensitization methods include press conferences, the use of radio, television, posters and sporting events, as well as communicating via any existing community groups, religious leaders or community infrastructures.

Once trained, teachers and community leaders are good resources in community sensitization due to their position and influence in society.

The involvement and endorsement of the Parent Teacher Association (PTA) or School Management Committee (SMC) will be crucial to the community understanding and acceptance of the school-based deworming program.

Good community sensitization is vital to the success and sustainability of a program. It will ensure good turn out on the school deworming day, including children who are not enrolled in school, and will prevent hysteria over minor side-effects which can occur when treating children with heavy worm loads.

Examples of community sensitization and Information, Education and Communication (IEC) materials are available from Deworm the World.

Large parade and media event in India prior to the school deworming day.

STEP 6

Sequencing of implementation

The sequence of implementation is important and the following are key stages to ensure the smooth running of a school-based deworming program. A checklist of good practice for school-based deworming including implementation is also provided in the Resources section.

Key stages ahead of the school deworming day

1. Initial planning and mapping is crucial for implementation.
2. The school deworming day should be planned to occur during term time and during a season when most children, teachers and drug supplies will be able to get to all schools.
3. Drugs and tablet poles should be procured early to allow for arrival prior to implementation and storage arrangements should be made.
4. Training of teachers and delivery of drugs to schools should occur close to the school deworming day so knowledge is fresh.
5. Community sensitization campaigns should run for several months prior to the school deworming day.
6. Children enrolled should be requested to invite their non-enrolled brothers, sisters, and cousins etc., to come along for treatment on the appointed treatment day in the school.
7. It is ideal if all schools within an area can be dewormed on the same day and if children are dewormed regardless of whether they are enrolled in school or not.

Key stages during the school deworming day

1. School-based deworming should be carried out by two teachers per school who attended the teacher training session and the PTA or SMC should be in attendance. The trained teachers can also train their colleagues to help in the school-based deworming activities if there are many children to be dewormed in a school.
2. The target groups for school-based deworming include schoolchildren aged around 6 years to 15 years, since the prevalence and the intensity of worm infection are high in this age group. Preschool-age children who are usually infected only with STH can also be dewormed.
3. Children will require food with the medication and either the school should provide this or children should be requested to bring some food from home.
4. On average, each pupil will need 1 tablet of either albendazole (400mg) or mebendazole (500mg) for STH, and 3 to 5 tablets of praziquantel (600mg) for schistosomes. In case the two types of worms co-exist in the same area, both treatments should be carried out at once.
5. School-based deworming should be carried out openly and systematically with the names of all children treated recorded and all supplied monitoring forms completed.

STEP 7

Monitoring and evaluation

National school-based deworming programs should be monitored and evaluated to ensure they are functioning properly and effectively.

Process monitoring

1. Process monitoring should be continuous.
2. This will include monitoring the number of children dewormed and number of tablets distributed.
3. This monitoring should also apply to the teacher training as a method of assuring the quality.
4. Monitoring forms should be provided to schools and teachers at the training sessions and training should explicitly detail how these should be completed, by who and to what deadline.
5. There should also be in place a system for collating and using the data which is generated and captured on the forms given.
6. A feedback system will also be required.
7. The following should be tracked as a minimum:
    a. The number of tablets received by each school;
    b. the number of teachers trained in each school;
    c. the date of school deworming;
    d. the number of children dewormed;
    e. the number of tablets utilized;
    f. the number of tablets damaged, destroyed or lost through accidental spillage; and
    g. the number of tablets returned (this should be confirmed).

Impact monitoring

1. Impact monitoring includes assessing things such as change in prevalence of infection, changes in school participation attributable to children having been dewormed.
2. Impact assessments should occur every 2 to 3 years using rapid appraisal techniques. This is another reason why initial situation assessment and mapping is essential.
3. Baseline and follow-up measures should be decided upon and measured before interventions begin (baseline) and 2 to 3 years later (follow-up).
4. Common measures followed include worm prevalence, school attendance and severity of anemia. Tools are also under development that allow the impact of school-based deworming on children's cognitive function to be measured over time.

Monitoring forms are available from Deworm the World as part of the teacher training materials.

STEP 8

Preparing a budget

The budget for a national school-based deworming program should include the cost of the following items and should specify who is funding or supplying each:

1. The drugs (albendazole, mebendazole, and praziquantel).
2. The shipping of drugs from the manufacturer to the ministry (including the freight, insurance and clearance).
3. Distribution of the drugs within the country.
4. Height tablet poles for praziquantel.
5. Staff involved within the phases of the program.
6. Travel costs for staff involved within the phases of the program.
7. Printing of all training materials and planning and monitoring forms.
8. Per diems and allowances for trainers and trainees.
9. Cost of radio or television broadcast time.
10. Cost of materials for sensitization i.e., flyers, and brochures etc.
11. Cost of returning both pills and monitoring forms and their collation at various levels.

Where rapid appraisal for baseline data and mapping is being carried it must also be included in the out budget, in particular:

1. Kato-Katz Kits: A method to measure STH and intestinal schistosome eggs. A kit for about 40 US dollars will be for about 2,000 tests.
2. Urine Filtration Kits: A technique to measure urinary schistosomes. A kit for 50 US dollars will be for about 500 tests.

You will require the following pieces of information to ensure your budget and related plan are accurate:

1. Areas of the country to be treated and for which worm infections.
2. Number of children to be treated for each.
3. Number of pills required.
4. Number of schools and their locations.
5. Number of teachers to be trained and the likely training plan.
6. Likely community sensitization campaign.
7. Schedule for drug importation, storage and method of distribution.

Notes on how to source funding for school-based deworming from the EFA-FTI can be found under the Resources section.

Case studies

Case study 1: Kenya

Case study 2: Cambodia

Case study 1: Kenya

The national school-based deworming program in Kenya was rolled out in 2009 and was a great success with huge government commitment, technical assistance from external development partners, and with a price tag of only 36 US cents per child. The program trained 1,000 district and division level personnel, and over 16,000 teachers around the country. Over 3.6 million Kenyan children at over 8,200 schools were dewormed.

Step 1: Developing a policy framework

Kenya has developed a national school health and nutrition policy that includes school-based deworming. This policy has been adopted and endorsed by the Ministers and Permanent Secretaries of both the Ministry of Education and the Ministry of Public Health and Sanitation (MoPHS). The development of this policy has involved a number of key stakeholders and has helped structure coordinated planning and action among partners. For school-based deworming, the Ministry of Education coordinates the program, working in close partnership with the MoPHS. In addition to government cooperation, the school-based deworming program has benefited from technical, logistical, and financial support from a number of development partners, including the Kenya Education Sector Support Program (KESSP) donors, Deworm the World, Feed The Children, Kenya Medical Research Institute (KEMRI), Eastern and Southern Africa Centre of International Parasite Control (ESACIPAC), KEMRI-Wellcome Trust, PCD, Innovations for Poverty Action (IPA), and Japan International Cooperation Agency (JICA). As detailed below, the program is a clear example of successful cooperation and partnership among a wide range of government and non-governmental stakeholders. The program deworms children in a targeted fashion according to WHO guidelines (WHO 2006).

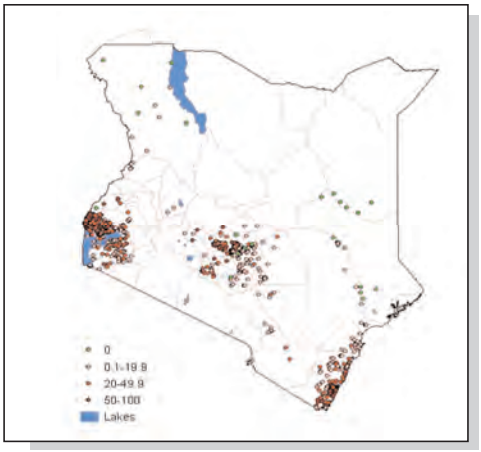
Step 2: Targeting school-based deworming

In Kenya, worm prevalence levels were established by scientists at KEMRI-ESACIPAC and the KEMRI-Wellcome Trust in three stages:

1. Over 1,200 existing worm incidence and prevalence surveys were collated and mapped.
2. School health questionnaires were used to identify schools where blood in the urine was reported, these schools were designated to receive praziquantel treatment.
3. Information gaps that would require more surveys were identified.

In the case of STH, the survey data (see Figure 4) was used to generate a map of worm prevalence across Kenya. The three geographic areas with the highest worm prevalence in Kenya are the Coast Province, parts of Eastern and Central Provinces, and Western and Nyanza Provinces. Based on the evidence, the first phase of the program targeted 45 districts in these 3 areas appropriate for mass treatment. Estimates of the number of enrolled and non-enrolled children in these districts helped approximate the number of drugs needed.

Figure 4: Observed worm prevalence (%) in Kenya *(Brooker et al. 2009).*



Step 3: Procuring and distributing deworming tablets

Procurement: Deworming drugs for schools were donated by Feed The Children through Deworm the World.

Shipping: Tablets were shipped by air freight to Kenya from the manufacturer.

Importing: After arrival a permit form was needed from the Pharmacy Review Board in order to clear the tablets through customs. The MoPHS was essential in helping obtain this certificate of analysis in a timely manner.

Storage and distribution: Given the quantity of tablets, the need for re-packaging and distribution to individual schools, it was considered more expedient in Kenya to make unique storage arrangements. Once cleared through customs, the drugs were stored at KEMRI in Nairobi rather than at the Kenya Medical Supplies Agency (KEMSA) which is the government agency who usually stores and distributes drugs. The training cascade was used as an efficient drug distribution system where drugs were taken to each district during district level training and onto the local areas and schools during teacher training. Health personnel were involved at all levels to help ensure safe and proper handling.

Step 4: Training of teachers

Teachers giving the deworming medication needed to be trained on the benefits of school-based deworming; how to deliver mass treatment to children at school; and how to sensitize the local community. Training was arranged by area and emphasized the teachers' role in delivering the treatment to children.

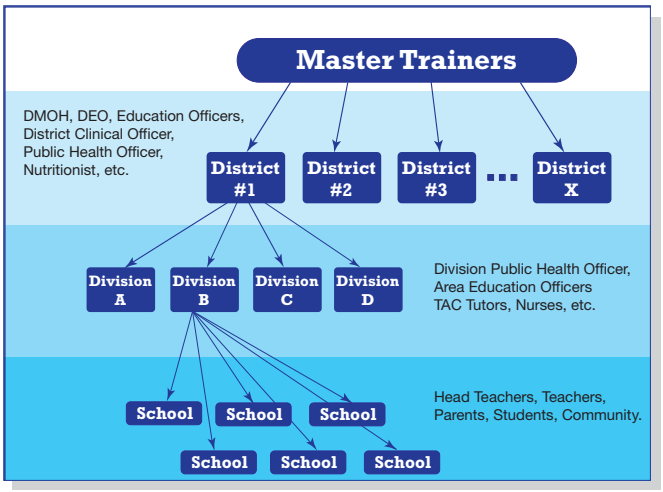
In Kenya many resources already existed on training materials for personnel at various levels, and experience with pilot school-based deworming programs helped inform this step for the national school-based deworming program. Based on the piloting experience, materials that were developed in Kenya included: a Guide for District Level Managers, a Teaching Training Kit, Drug Distribution Instructions for Teachers, and a Handout for Teachers. These materials were organized into packets for each district for ease of distribution.

In Kenya, the administrative units are provinces, districts, and divisions. The Ministry of Education further splits divisions into zones. Knowing this and the relative number of units at each level, a roll out plan was developed that involved master training at the national level, combined training for district and divisional levels, and teacher training at the zonal level. An overview of the training cascade with the key participants at each level is shown in Figure 5.

Master training at the national level

A team of 30 master trainers were assembled at the national level, 1/3 from the Ministry of Education, 1/3 from the MoPHS, and 1/3 from KEMRI. The number of master trainers was determined based on the number of district trainings that needed to be conducted with three to four master trainers attending each. The 30 master trainers attended a 2-day meeting at KEMRI where they were trained on school-based deworming and briefed on the roll out plan. The master trainers liaised with the district level Ministry of Education and MoPHS officials to schedule district level trainings, and the district level officials then identified venues for the trainings and invited division level officials.

Figure 5: **Overview of the training cascade and the key participants at each level.**



A 1-day deployment meeting of master trainers was also convened at KEMRI to distribute materials, per diems, and specific instructions, etc. Following this meeting, master trainers began conducting district level training sessions.

District level training sessions

On the first day, the master trainers trained four to six district level personnel (i.e. District Education Officer – DEO, and the Deputy Medical Officer of Health – DMOH, etc). On the second day, the master trainers became supervisors, and the district level personnel trained the division level personnel. This provided the master trainers an opportunity to ensure that the district level personnel fully understood the material.

On the third day, sub-groups of master trainers and district and division level personnel were assembled. Each sub-group developed a detailed training and implementation plan for one division. This session was vital for involving the district and division level personnel in planning activities in their district, as the session gave them ownership of the program.

Finally, as the last part of district and division level training, a summary form was filled out by each district (see Figure 6). This generated more accurate information about the number of schools and enrolment, and created a set of transparent and agreed upon deadlines for implementation.

Figure 6: District summary forms completed during planning sessions.

District Summary Information Form – National Deworming Programme

DISTRICT NAME: _____

DEO NAME: _____ DEO PHONE #:_____

DMOH NAME: _____ DMOH PHONE #:_____

Names of Master Trainers:

1.		4.	
2.		5.	
3.		6.	

	# OF SCHOOLS	ENROLLMENT	TABLETS NEEDED (enrollment + 20%)
PUBLIC PRIMARY			
PRIVATE PRIMARY			
ECD			
TOTAL			
TEACHERS (= # of Schools X 2)			

Number of tablets available in district: _____

Location of tablets in district: _____

Availability confirmed by: _____ (name) _____ (phone)

DISTRICT TRAINING DATES: _____, **2009 (e.g. 1-3 May, 2009)**

TEACHER TRAINING DATES: _____, **2009 (e.g. 4-6 May, 2009)**

DEWORMING DATE(S): _____, **2009 (e.g. 7 May, 2009)**

REPORTING DATES:

SCH -> AEO: _____, **2009 (e.g. 12 May, 2009)**

AEO -> DEO: _____, **2009 (e.g. 15 May, 2009)**

DEO -> MOE: _____, **2009 (e.g. 20 May, 2009)**

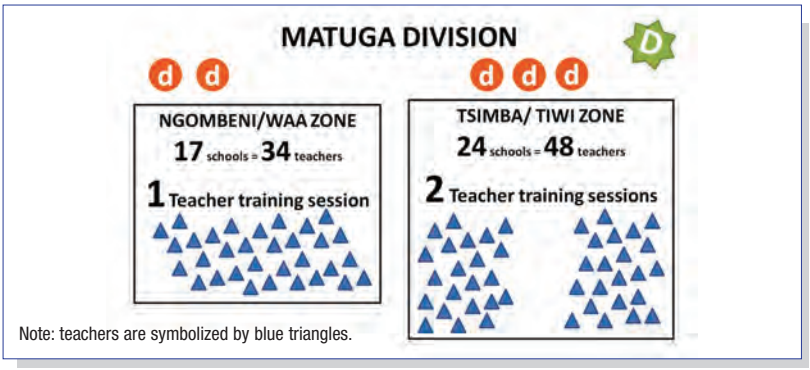
Form filled by: _____ **Submitted on:** _____ **(date)**

During district level trainings, the drugs, training materials, and monitoring forms were also distributed for the district and division officials to deliver to the teacher training sessions. The monitoring process is detailed in Step 8, but as regards to distribution, each district received two boxes of monitoring forms: one set of forms to be used during training sessions, and one for the actual school-based deworming exercise.

Teacher training sessions

Each half day training session was led by two to three division level personnel and supervised by district level officials who circulated between sessions. Each school sent two teachers to the teacher training session i.e., the headteacher and one other teacher. Figure 7 represents an example of one division.

Figure 7: Structure of one teacher training session in Matuga division, Kwale district, Kenya.



Each zone had between one and three teacher training sessions, depending on the number of schools in the zone. Approximately 30 teachers (maximum of 40) attended each teacher training session. In order to minimize transport and per diem costs, teacher training sessions were held for teachers within the boundaries of individual zones wherever possible.

Division level officials transported the deworming medication, training materials, and monitoring forms from the district office to the schools where the teacher training sessions were held. Teachers then brought the teacher handouts and monitoring forms along with the medication from the teacher training sessions to their school, where it was stored until their school deworming day.

Step 5: Community sensitization

Communication with parents, community leaders and local health agents about the objectives of the deworming in schools and what they should expect was a key step in the program. The effort in Kenya was undertaken at all levels from: the Ministers of Education, and Public Health and Sanitation, who participated in a joint press conference to launch the program; to the Permanent Secretary of Education, who appeared on a morning show on national TV; through to the local level, where each zone was provided with a small fund for the purpose of community sensitization. As sensitization activities varied by area, division level officials had discretion over how the funds were spent in their zones. Additionally, Public Relations Officers at the Ministry of Education produced radio advertisements on school-based deworming in seven local languages. These advertisements were aired on vernacular language radio stations in the areas of the country targeted by the program. All these activities were essential to ensuring that parents and other community members understood that school-based deworming is safe and highly beneficial and that non-enrolled children could come to school for treatment. The high rates of turn out on school deworming days coupled with low reported adverse reactions were evidence to the success of the effort.

Step 6: Sequencing of implementation

In Kenya, all schools within a zone aimed to have school deworming on the same day. As advertised, all children could be dewormed, whether or not they were enrolled in school, and children brought food from home to consume along with the medication to ensure proper absorption.

Step 7: Monitoring and evaluation

In Kenya, monitors appointed by the national team attended a selection of training sessions and school deworming days around the country. District and division level officers from both the Ministry of Education and MoPHS also helped supervise and monitor the deworming in schools.

Another important aspect of the program was the school deworming forms that were included in the training materials and were filled in on the school deworming days. Forms were completed at each school to record which children received deworming medication, the number of tablets remaining, and any observed side-effects. The forms and remaining tablets were then sent to the Area Education Officers, who summarized the data and passed them with the extra tablets to the DEO. The DEO then collated all the information from the district and submitted a report and the extra tablets to the Ministry of Education. Data from the area and district levels was entered, cleaned, and analyzed by a team at KEMRI-ESACIPAC, supported by Deworm the World.

Case study 2: Cambodia (in draft)

Following the formation of a National Task Force to deal with worm infections in Cambodia, the Ministry of Health rolled out Phase I of its school-based deworming program between December 2002 and March 2003. Reaching 11 of 24 provinces in Phase I, more than 945,000 children were dewormed. During Phase II between July 2003 and January 2004, all schoolchildren were targeted for treatment and 96% coverage of those enrolled were reached, equating to 2,774,564 children.

The cost of school-based deworming was calculated at only 12 US cents per child in Phase I and only 6 US cents per child in Phase II. With limited ongoing training costs it is estimated the program can continue to deworm all children at a cost of only 4 US cents per child.

In 2004, Cambodia became the ***first country in the world*** to reach the global target of deworming 75% of at-risk children. The Cambodian case study provides examples for each of the 8 Steps on school-based deworming and how they can be practically carried out *(Sinuon et al. 2004 and 2007).*

Step 1: Developing a policy framework

The policy framework for Cambodia falls under the mandate of the Ministry of Health as opposed to the Ministry of Education.

Within the Ministry of Health strategic plan (2003-2015) helminths are listed as a communicable disease and a health priority with treatment being an essential service. Goals 2 and 3 of the strategic plan specify reduction of communicable diseases and behaviors that lead to them as key objectives.

In 2002, in response to the World Health Assembly target of deworming 75% of at-risk children by 2010, the Cambodian Ministry of Health launched the National Task Force for the Control of Soil-Transmitted Helminthiasis, Schistosomiasis and for the Elimination of Lymphatic Filariasis (NTF). The NTF (composed of staff from the Ministries of: Health; Education Youth and Sports; Rural Development; Water Resources and Meteorology; as well as WHO, and UNICEF) had the goal of achieving the target of deworming 75% of schoolchildren in Cambodia.

The NTF complied and launched national guidelines for school-based deworming, and a National Policy for Helminth Control now held under the mandate of the Ministry of Health.

Step 2: Targeting school-based deworming

As previously determined, the highest prevalence and morbidity of helminth infection is with children of school-age. Since school enrolment rates are estimated at 88% in Cambodia, deworming through schools was utilized as the method of targeting the at-risk population. Surveys carried out in 15 of 24 administrative districts indicated STH prevalence of over 50% in many areas, in some cases 70%, and on the basis of this and to simplify logistics, the Ministry of Health chose to deworm the entire country twice a year utilizing WHO treatment guidelines for areas of high prevalence.

Step 3: Procuring and distributing deworming tablets

The Ministry of Health in Cambodia funded the procurement of over 4 million mebendazole tablets, chosen for efficacy and low cost, as one of the WHO recommended anthelmintic drugs. This was at a cost of merely 2 US cents per 500mg tablet.

Drugs were distributed via the trucks from the Ministry of Health within their regular planned deliveries. Drugs were delivered to each peripheral health unit, where each school cluster director collected their tablets and distributed the appropriate numbers to each school.

Step 4: Training of teachers

The NTF developed a school health kit and standardized reporting forms. The Embassy of Japan funded the development and printing of the training materials.

Teachers giving the deworming medication needed to be trained on the benefits of school-based deworming; how to deliver mass treatment to children at school; and how to sensitize the local community.

The administrative levels of Cambodia are provinces within which schools are grouped into clusters of approximately two to five neighbouring schools. Each school cluster has a director (of which there are 1,231) and health center chiefs (of which there are 1,135) are employed to manage school clusters and health centers. With approximately three 1-day workshops per province all school cluster directors and health center chiefs were trained on how to deworm in schools, who then disseminated this information during regularly held weekly meetings. Training activities were funded by WHO and UNICEF.

Step 5: Community sensitization

Community sensitization and the understanding and welcoming of a school-based deworming program played a great part in the success of this program and is reflected in the high coverage. Further details on the community sensitization campaign which took place will be supplied in the post conference edition.

Step 6: Sequencing of implementation

Deworming was completed during school time and drugs were administered by trained teachers. In Phase I, 11 provinces were targeted and in Phase II all provinces were targeted. The Cambodian Ministry of Health intends on continuing to deworm school-age children every 6 months in schools.

Step 7: Monitoring and evaluation

The National Center for Parasitology, Entomology and Malaria Control designed forms for the monitoring of the program which were completed by each school and then returned to the Ministry of Health for analysis via the cluster director. These standardized forms were used to measure coverage in each school, cluster, and province, and was validated via coverage confirmation surveys in randomly selected districts and schools.

Resources

1. Resources for each step
2. Conducting a rapid appraisal
3. Notes on sourcing funds
4. Checklist of good practice

Resources for each step

This step-by-step guide to proposal writing and planning for national school-based deworming programs is an entry point to a suite of technical assistance packages produced by Deworm the World, WHO and other development partners. The following list is complementary to each step as laid out in this guide but is not exhaustive. As this list indicates, a range of technical assistance packages produced by these development partners is available on www.dewormtheworld.org.

Step 1: Developing a policy framework

A draft/template MoU between the Ministries of Education and Health is available from Deworm the World.

Step 2: Targeting school-based deworming

Predictive maps of countries are available on www.dewormtheworld.org.

Technical assistance with designing surveys and sampling populations is available from Deworm the World, WHO and other development partners and is accessible on www.dewormtheworld.org. Materials are also developed for training of technicians and roll out of surveys including standard operating procedures, methodological guidance and recording forms to enable surveys to be in accordance with WHO guidelines.

Following on from the surveys, data mapping and treatment map development is available through Deworm the World.

Step 3: Procuring and distributing deworming tablets

Deworm the world may be able to assist with drug procurement.

Step 4: Training of teachers

Training materials provided by Deworm the World are developed for training master trainers and equipping them to cascade training all the way to teachers.

Step 5: Community sensitization

IEC materials are available from Deworm the World and can be adapted to country context.

Step 6: Sequencing of implementation

A checklist of good practice is provided below which looks at four issues that have emerged central to the implementation of a school-based deworming program.

Step 7: Monitoring and evaluation

Monitoring and evaluation forms and instructions for use are included in the teacher training packs provided by Deworm the World.

Step 8: Preparing a budget

Notes on how to source funds from the EFA-FTI for school-based deworming programs are provided under Notes on sourcing funds.

Conducting a rapid appraisal

Worm infection	Rapid appraisal notes
Sampling for STH	• Choose 5 to 10 schools in different areas of your district. • In each school, randomly select 50 children from any of the three upper classes (where the infection rates will be the highest). • Take a stool sample from each child and examine it for STH eggs using the Kato-Katz method. • In the same sample you will also see the intestinal schistosome eggs if they are present. • Target districts on the basis of the determined prevalence according to WHO treatment guidelines.
Sampling for schistosomiasis	• To survey for schistosomiasis, you need to specifically survey some schools that are near lakes or near irrigated areas. • If schistosomiasis is suspected, select a few schools near the water and some a little further away and investigate as follows: **For Intestinal Schistosomiasis** • From each school you have chosen, select 50 children from the upper classes and ask each child to provide a stool sample. • Using the Kato-Katz method, examine the samples for intestinal schistosome eggs. **For Urinary Schistosomiasis** • For urinary schistosomiasis, select the schools in the same way. • The simplest approach is to use the standard questionnaire about blood in the urine. • Send 50 questionnaires to each school (one per child in the upper classes).

Source: WHO 2004. Note: Materials for planning this survey and training of technicians to carry out the survey are available from Deworm the World.

Notes on sourcing funds

A wealth of evidence demonstrates the contribution of school-based deworming towards the achievement of EFA and the MDGs, and as such a variety of funding opportunities may be available.

Given the educational benefits it provides and the potential of being rapidly taken to scale, school-based deworming is supported by the EFA-FTI as an excellent entry point for school health. EFA-FTI is used as an example of a funding source here to demonstrate key considerations.

In order to source funds on school health, nutrition and HIV&AIDS from the EFA-FTI, there must be an Education Sector Plan (ESP) either already endorsed and in place or in the process of being developed.

Where an endorsed ESP is in place:

- An education project proposal must be developed and costed by the government in consultation with the local donors and civil society representatives, in preparation of its financing framework, which identifies all funding sources, including the Catalytic Fund request.

- The Local Education Group (LEG) ensures that school health, nutrition, and HIV&AIDS, including school-based deworming are included.

Where an Education Plan/Project has been developed without elements of school health and is already being funded from the Catalytic Fund:

- The LEG can request a restructuring of the existing Catalytic Fund Project to include school health, especially when its rate of disbursement is poor. This would lead to faster implementation for results with focus on quicker expenditure related to school health, nutrition, and HIV&AIDS.

- The joint Annual Reviews and ESP updates provide opportunities to ensure that these areas (i.e., school health, nutrition, and HIV&AIDS including school-based deworming) are taken into consideration.

Where an ESP is in the process of being developed:

- School health, nutrition, and HIV&AIDS, including school-based deworming are critical education-related issues that a credible plan should not exclude.

Checklist of good practice

Accelerating school-based deworming by the education sector

This checklist is based on experiences of implementing national school-based deworming programs in multiple countries in Africa and Asia during 2009. It reflects dialogue during workshops and country missions and the major learning points which have resulted in the formation of sustainable, successful and low cost programs.

The checklist is not intended as a guide to a minimum or ideal package, but rather to provide an Aide Memoire of issues that have consistently emerged as central to an effective education sector response and that might be considered in preparing an effective school-based deworming program. Each country response will be different, and the relevance of the items listed here will vary depending on local needs and circumstances.

The checklist addresses four issues that have consistently emerged as central to an effective school-based deworming program:

1. Education sector policy framework for school-based deworming.
2. Education sector management and planning to implement school-based deworming.
3. Implementation and monitoring school-based deworming.
4. Complementary actions to support school-based deworming and to maximize success.

Sector policy framework checklist

Check Item	Comments	Related Step in Plan
National school health nutrition policy and strategy • Adopted by the government. • Includes school-based deworming as a multi-sectoral approach led by the Ministry of Education with key technical support from the Ministry of Health.	• Demonstrates the government's recognition of school health interventions, the benefits of school-based deworming. • The inclusion of the education sector and the health sector shows the recognition of the role of each sector and their collaboration in the response.	Step 1
Education sector policy for school-based deworming: • Sector-wide (addresses all subsectors). • Adopted by the Ministry of Education. • Shared with all stakeholders and disseminated. • Addresses evidence-base, prevalence, worm types, targeting, and treatment guidelines.	• Addresses sector-specific school-based deworming issues. • Establishing policy is the essential first step in an effective sectoral response. • The policy will only be effective if it is owned by the relevant stakeholders and if it is widely known and understood. • Allows the definition of education sector roles and the support and collaboration with the Ministry of Health. • Addressing this at this stage will facilitate better communication and ownership of different aspects of the program. • Inclusion of strategic policy related to prevalence, targeting and strategy at this stage can facilitate much improved planning for implementation in the future.	Step 1
National education sector school-based deworming strategy: • Incorporated in the national sector plan as part of the school health strategy. • Sector-wide (addresses all subsectors). • Adopted by the Ministry of Education. • Budgeted plans of action. • Addresses targeting specifically.	• Shows how the sector plans to take ownership of deworming through schools nationally. • Costing its plan of action and inclusion in the education plan (and EFA) indicates how this strategy will be implemented. • Targeting is a crucial part of the strategy as it is usually unnecessary to treat all children and much more cost-effective to select the areas where children are at-risk and treat according to WHO guidelines (WHO 2004).	Step 1

Management and planning checklist

Check Item	Comments	Related Step in Plan
Strategy to target school-based deworming to at-risk children: • Existing prevalence data in country mapped and overlaid with any climatic limiters to indicate where worms might be. • Identification of gaps in data and plan to implement surveys to gather data. • Use of WHO treatment guidelines (WHO 2004) to determine which areas require treatment.	• Demonstrates commitment to a sustainable and cost-effective program. • Targeting at-risk children rather than every child reduces the cost of the program and maximizes cost benefit. • Where technical skills for mapping do not exist in-country, external technical support agencies will be able to provide predictive maps for each species (www.dewormtheworld.org). • Where gaps exist, surveys can be carried out at low cost, WHO can advise on how to carry out these (WHO 2004).	Step 2
Use of WHO treatment guidelines (WHO 2004) and available data to guide drug procurement: • Use of maps to determine areas which need treatment. • Use of the Education Management Information System (EMIS) or school survey data to determine number of schools, children, and teachers in areas to be treated. • WHO guidelines used to determine quantities of drugs required to treat identified at-risk children. • Albendazole/mebendazole/ praziquantel procured from reputable supplier in appropriate quantities. • Drugs importation procedures known and followed and drugs stored in appropriate location.		Step 3
Teacher training materials and structure developed: • Training cascade from master trainers at national level to teachers in individual schools developed based on number of schools to be treated and administrative breakdown of country. • Training plan/schedule inclusive of level of quality assurance. • Training materials specific to country in language and cultural reference. • Training materials and training inclusive of monitoring mechanisms		Step 4

Implementation checklist

Check Item	Comments	Related Step in Plan
Implementing drug distribution according to need: • Drugs required in each area, district and school are identified. • Drugs repackaged and labeled accordingly. • Drugs distributed via training cascade all the way to school level.		Step 3
Training all teachers: • Training cascade occurs and all teachers who will be delivering deworming in schools are trained. • Training includes the background on school-based deworming, drug storage and drug administration, potential side-effects, and monitoring and reporting. • Developing a strategy to deal with adverse events.		Step 4
Adequate community sensitization must take place: • High level politicians and ministers publicly on board with policy. • Media coverage extensive, in appropriate language and delivery mode: radio, television, and posters, sporting events and church etc. • Sensitization campaign directly pertains to benefits and safety of school-based deworming, expected side-effects of drugs as well as dates, places and welcoming children not enrolled in school. • Country-specific issues identified and dealt with within community sensitization.	• Good community sensitization is crucial in the successful implementation and sustainability of a program. • Deworming drugs (albendazole and mebendazole) are extremely safe and side-effects experienced are due to the effects of the drugs on the worms where infections are heavy rather than an adverse reaction to the drug itself. • Having good community sensitization will ensure maximum turn out on the day, the presence of children not enrolled, and will prevent hysteria over perceived side-effects.	Step 5

Implementation checklist cont…

Check Item	Comments	Related Step in Plan
Implementation of school-based deworming: • Timeline takes into account shipping times as well as key dates and requirement of some activities to occur close together. • Coordinated within districts. • Children not enrolled in school also welcome/present.		Step 6
Monitoring and evaluation: • Monitoring forms are distributed to schools which record the following: number of tablets utilised; number of tablets lost due to damage or accidental spillage; number of tablets utilized; number of children treated; number of drugs returned; and the number of adverse events reported. • System in place for collation and analysis of monitoring forms.	• Monitoring and evaluation of the program is important to record how many children were reached in each area and to ensure drugs are not being misused. • It also enables future tailoring of the program and measurement of which areas have had a sustained program. • It is possible for small prevalence surveys to be carried out in parallel with the school-based deworming itself which can help verify and increase the accuracy of mapping and monitor the effects of the program.	Step 7

Complementary actions checklist

Check Item	Comments
Complementary approaches:	
• Media campaigning specifically addressing hand washing, wearing shoes, hygiene, and prevention issues.	• A holistic approach is ideal to maximize benefits from school-based deworming and to reduce the risk of re-infection.
• Implementing policy to improve toilet facilities in schools and to ensure that clean water for hand washing is always available there.	• Combining school-based deworming with education campaigns for 'prevention' via schools and the school curriculum is another aspect of the program which the education sector should have ownership of.
• School feeding to provide additional benefits for children's cognitive abilities and educational achievement.	• The education sector can also collaborate with other key ministries on school feeding and micronutrient supplementation with other ministries to improve school participation; alleviate short term hunger; and increase children's ability to concentrate, learn, and perform specific tasks.
• Inclusion of worm transmission information in school curriculum.	• Long term investments in school hygiene facilities will help reduce worm transmission.

Glossary and Abbreviations

Glossary

Albendazole	An anthelmintic drug commonly used to treat children who have STH or intestinal worms. At school, albendazole tablets can be given safely to children from the age of 12 months and onwards irrespective of their height. One tablet is sufficient, where a child chews and swallows the tablet in front of the teacher.
Anthelmintics	Anthelmintics are drugs which destroy parasitic worms (helminths) from the body.
Bilharzia	See schistosomiasis.
Catalytic Fund	A multi-donor trust fund managed by the World Bank to provide transitional financial assistance to FTI countries who have difficulties at the country level to mobilize funds due to limited donor resources, and whose education sector plans have been reviewed through the FTI process.
Community sensitization	An important activity for the success and sustainability of a program, to avoid misconceptions, and to ensure good turn out on the school deworming day. Members of the community (i.e., teachers, parents, children, community leaders and local health agents) are informed about the occurrence, reasons, benefits and safety of school-based deworming. Press conferences, radio/television broadcasts, and posters are a few of the methods used to sensitize community members. The methods used (in terms of language and media) should always be culturally-specific to the area.
Deworming	The provision of anthelmintic drug treatment which can be used safely and cheaply on a mass scale to remove and destroy parasitic worms that are in the body of adults and children.
EFA-FTI	The EFA-FTI is a global partnership between donors and low income countries to meet the MDG of universal primary education by 2015. The EFA-FTI provides financial support to low income countries wishing to achieve free universal primary education.
IEC materials	These are materials which inform, educate and communicate on school-based deworming. IEC materials can be delivered through both traditional and modern channels of communication including posters, guides, brochures, radio/television broadcasts, drama, and songs etc.
Intestinal worms	See soil-transmitted helminths (STH).
Kato-Katz method	A method which tests the appearance of STH and intestinal schistosome eggs in human feces through smearing the feces on a slide and observing the eggs through a microscope. This technique is carried out by a laboratory technician(microscopist).

Mebendazole	The other anthelmintic drug which is commonly used to treat children who have STH or intestinal worms. At school, mebendazole tablets can be given safely to children from the age of 12 months and onwards irrespective of their height. One tablet is sufficient, where a child chews and swallows the tablet in front of the teacher.
Praziquantel	An anthelmintic drug used for adults and children who have schistosomiasis/ bilharzia. At school, praziquantel tablets are given to children over the age of 4. The number of tablets given to each child is based on their height by using a tablet pole. The child swallows the tablet(s) in front of the teacher.
Schistosomiasis (bilharzia)	Schistosomiasis is also known as bilharzia and is a parasitic disease which in children can cause chronic illness impairing cognitive development and growth. Children can be contaminated through swimming or playing in infected water. Being the second infectious disease after malaria, schistosomiasis can impact a country socioeconomically and is most commonly found in low income countries such as Africa, Asia, and South America.
Soil-transmitted helminths	Commonly known as intestinal worms such as hookworm, roundworm, and whipworm. They are transmitted from eggs excreted in human feces or urine that contaminates the soil in areas where there is poor sanitation. Children and adults can be infected with STH when they ingest the infected eggs through contact with food and/or hands that have been contaminated from the soil.
Tablet pole	A tool used for the treatment of schistosomiasis which determines the correct number of praziquantel tablets that need to be given to a child based on their height.
Urine filtration technique	A technique that tests the appearance of schistosome eggs in the urine. The child provides a sample of urine (10ml) which is passed through a filter with a syringe and then placed on a slide to observe the number of schistosome eggs under the microscope. This technique is carried out by a laboratory technician (microscopist).

Abbreviations

AIDS	Acquired Immune Deficiency Syndrome
CIAT	International Center for Tropical Agriculture
CIESIN	Center for International Earth Science Information Network
DEO	District Education Officer
DtW	Deworm the World
DMOH	Deputy Medical Officer of Health
EFA	Education for All
EMIS	Education Management Information System
ESACIPAC	Eastern and Southern Africa Centre of International Parasite Control
ESP	Education Sector Plan
FTI	Fast Track Initiative
GPS	Global Positioning System
GPW	Gridded Population of the World
HIV	Human Immunodeficiency Virus
IEC	Information Education Communication Materials
IPA	Innovations for Poverty Action
IQ	Intelligence Quotient
JICA	Japan International Cooperation Agency
KEMRI	Kenya Medical Research Institute
KEMSA	Kenya Medical Supplies Agency
KESSP	Kenya Education Sector Support Program
LEG	Local Education Group
MDG	Millennium Development Goal
MoPHS	Ministry of Public Health and Sanitation
MoU	Memorandum of Understanding
NGO	Non-governmental organization
NTF	National Task Force for the Control of Soil-Transmitted Helminthiasis, Schistosomiasis and for the Elimination of Lymphatic Filariasis
PCD	The Partnership for Child Development
PTA	Parent Teacher Association
SMC	School Management Committee
STH	Soil-transmitted helminths
TAC	Teachers' Advisory Center
UNICEF	United Nations Children's Fund
US	United States
WFP	World Food Programme
WHO	World Health Organization

References

References

Abdul Latif Jameel Poverty Action Lab (2005) "Fighting Poverty: What Works?" *Education: Meeting the Millennium Development Goals*, 1-4.

Bleakley H (2007). "Disease and development: Evidence from Hookworm eradication in the American South." *The Quarterly Journal of Economics* **122**(1): 73-117.

Brooker, S., N. B. Kabatereine, J. L. Smith, D. Mupfasoni, M. T. Mwanje, O. Ndayishimiye, N. J. S. Lwambo, D. Mbotha, P. Karanja, C. Mwandawiro, E. Muchiri, A. C. A. Clements, D. A. P. Bundy and R. W. Snow (2009). An updated atlas of human helminth infections: the example of East Africa. *International Journal of Health Geographics* **8**:42.

Bundy, D. A., A. Hall, G. F. Medley and L. Savioli (1992a). "Evaluating measures to control intestinal parasitic infections." *World Health Statistics Quarterly* **45**(2-3): 168-179.

Bundy, D. A. and G. F. Medley (1992b). "Immuno-epidemiology of human geohelminthiasis: ecological and immunological determinants of worm burden." *Parasitology* **104 Suppl**: S105-S119.

Bundy, D. A. P., S. Shaeffer, M. C. H. Jukes, K. Beegle, A. Gillespie, L. Drake, S.-h. F. Lee, A.-M. Hoffman, J. Jones, A. Mitchell, D. Barcelona, B. Camara, C. Golmar, L. Savioli, M. Sembene, T. Takeuchi and C. Wright (2006). School-based health and nutrition programs. *Disease control priorities in developing countries, 2nd Edition.* ed. New York, Oxford University Press.

Grigorenko, E. L., R. J. Sternberg, M. C. H. Jukes, K. Alcock, J. Lambo, D. Ngorosho, C. Nokes and D. A. Bundy (2006). "Effects of antiparasitic treatment on dynamically and statically tested cognitive skills over time." *Journal of Applied Developmental Psychology* **27**(6): 499-526.

Hotez, P. J., D. A. Bundy, K. Beegle, S. Brooker, L. J. Drake, N. de Silva, A. Montresor, D. Engels, M. C. H. Jukes, L. Chitsulo, J. Chow, R. Laxminarayan, C. M. Michaud, J. Bethony, R. Correa-Oliveira, X. Shu-Hua, A. Fenwick and L. Savioli (2006). Helminth Infections: Soil-Transmitted Helminth Infections and Schistosomiasis. *Disease Control Priorities in Developing Countries (2nd Edition*). ed. New York, Oxford University Press.

Jukes, M. C. H., C. A. Nokes, K. J. Alcock, J. K. Lambo, C. Kihamia, N. Ngorosho, A. Mbise, W. Lorri, E. Yona, L. Mwanri, A. D. Baddeley, A. Hall and D. A. Bundy (2002). "Heavy schistosomiasis associated with poor short-term memory and slower reaction times in Tanzanian schoolchildren." *Tropical Medicine and International Health* **7**(2): 104-117.

Jukes, M. C. H., L. J. Drake and D. A. P. Bundy (2008). *School health, nutrition and education for all: levelling the playing field.* Wallingford, UK ; Cambridge, MA, CABI Publishing.

Mendez, M. A. and L. S. Adair (1999). "Severity and timing of stunting in the first two years of life affect performance on cognitive tests in late childhood." *Journal of Nutrition* **129**(8): 1555-1562.

Miguel, E. and M. Kremer (2004). "Worms: Identifying Impacts on Education and Health in the Presence of Treatment Externalities." *Econometrica* **72**(1): 159-217.

Montresor, A., D. W. T. Crompton, T. W. Gyorkos and L. Savioli (2002). *Helminth control in school-age children: A guide for managers of control programmes.* Geneva, WHO.

Partnership for Child Development (1999). "The cost of large-scale school health programmes which deliver anthelmintics to children in Ghana and Tanzania." *Acta Tropica* **73**(2): 183-204.

Simeon, D. T. and S. M. Grantham-McGregor (1990). "Nutritional Deficiencies and Children's Behaviour and Mental Development." *Nutrition Research Reviews* **3**(01): 1-24.

Simeon, D. T., S. M. Grantham-McGregor, J. E. Callender and M. S. Wong (1995). "Treatment of Trichuris trichiura infections improves growth, spelling scores and school attendance in some children." *Journal of Nutrition* **125**(7): 1875-1883.

Sinuon, M., R. Tsuyuoka, D. Socheat, A. Montresor and K. Palmer (2005). "Financial costs of deworming children in all primary schools in Cambodia." *Transactions of the Royal Society of Tropical Medicine and Hygiene* **99**(9): 664-668.

Sinuon, M., R. Tsuyuoka, D. Socheat, P. Odermatt, H. Ohmae, H. Matsuda, A. Montresor and K. Palmer (2007). "Control of Schistosoma mekongi in Cambodia: results of eight years of control activities in the two endemic provinces." *Transactions of the Royal Society of Tropical Medicine and Hygiene* **101**(1): 34-39.

Stephenson, L. S. and C. Holland (1987). *The impact of helminth infections on human nutrition : schistosomes and soil-transmitted helminths.* London, Taylor & Francis.

Watkins, W. E. and E. Pollitt (1997). "Stupidity or worms": do intestinal worms impair mental performance?" *Psychological Bulletin* **121**(2): 171-191.

WHO (2004). How to set up a deworming programme. *Action Against Worms*. PPC Newsletter, Issue 4. Geneva, WHO.

WHO (2006). Coordinated use of anthelminthic drugs in control interventions: a manual for health professionals and programme managers. *Preventive chemotherapy in human helminthiasis*. Geneva, WHO.

WHO (2007). Deworming young children. *Action Against Worms*. PPC Newsletter, Issue 8. Geneva, WHO.

NOTES

NOTES

Deworm the World
1000 Thomas Jefferson Street NW
Washington, D.C. 20007, USA.
Telephone: +1-202-403-5714.
Fax: +1-202-403-5994.
Email: contact@dewormtheworld.org

For further information on worm control in school-age children please visit the following websites:
www.dewormtheworld.org; www.schoolsandhealth.org; and www.who.int/wormcontrol/en/