

# **Operational** guidelines for the implementation **of integrated** deworming **activities**

*a contribution to the control  
of soil-transmitted helminth  
infections in Latin America  
and the Caribbean*



Pan American  
Health  
Organization



World Health  
Organization

REGIONAL OFFICE FOR THE  
Americas



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Washington, D.C. 2015

Also published in:

Spanish (2015): *Pautas operativas para la puesta en marcha de actividades integradas de desparasitación: contribución al control de las geohelmintiasis en América Latina y el Caribe.*

ISBN 978-92-75-31861-4

#### PAHO HQ Library Cataloguing-in-Publication Data

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Pan American Health Organization.

Operational Guidelines for the Implementation of Deworming Activities: A Contribution to the Control of Soil-Transmitted Helminth Infections in Latin America and the Caribbean. Washington, DC : PAHO, 2015.

1. Helminthiasis – epidemiology. 2. Helminthiasis – diagnosis. 3. Helminthiasis – transmission. 4. Neglected Diseases. 5. Parasitic Diseases. 6. Public Health. 7. Americas. I. Title.

ISBN 978-92-75-11861-0

(NLM Classification: WC 800)

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# Acknowledgments

PAHO/WHO would like to acknowledge and express its gratitude to the specialists, organizations, government institutions, and ministries that contributed to the development of the *Operational guidelines for the implementation of integrated deworming activities: a contribution to the control of soil-transmitted helminth infections in Latin America and the Caribbean*.

Thanks to this collective undertaking, the Region has been afforded an instrument to contribute to the control of soil-transmitted helminth infections. The following professionals contributed to this publication (in alphabetical order):

## Ministries of health that made contributions to the technical revision of this document

The following ministries of health provided official observations to the Regional Program for Neglected Infectious Diseases of PAHO/WHO:

Secretariat of Health of Mexico, National Center for Child and Adolescent Health (CeNSIA)

Ministry of Health of Nicaragua

Ministry of Public Health of Cuba

Delegates from the following ministries of health participated in a Regional meeting for training in the use of these guidelines, held in Bogotá, Colombia on 13-17 May 2013, and made contributions and observations that enabled making technical adjustments to the document:

Ministry of Health of Belize

Ministry of Health of Bolivia

Ministry of Health of Brazil

Ministry of Health and Social Protection of Colombia

Ministry of Public Health of Ecuador

Ministry of Health of El Salvador

Ministry of Public Health and Social Welfare of Guatemala

Ministry of Health of Guyana

Ministry of Health of Honduras

Ministry of Health of Panama

Ministry of Public Health and Social Welfare of Paraguay

Ministry of Health of Peru

Ministry of Public Health and Social Welfare of the Dominican Republic

Ministry of Health, Welfare, Human Services, and Gender Relations of Saint Lucia

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This document was prepared with financing from the Government of Canada through the Department of Foreign Affairs, Trade and Development (DFATD), the Global Network for Neglected Tropical Diseases of the Sabin Vaccine Institute (Global Network/Sabin), and Children Without Worms (CWW) of the Task Force for Global Health.



# Acronyms

<b>COMBI</b>	communication for behavior impact
<b>DALY</b>	disability-adjusted life year
<b>DEC</b>	diethylcarbamazine
<b>DFATD</b>	Department of Foreign Affairs, Trade and Development (Canada)
<b>DFID</b>	Department for International Development (United Kingdom)
<b>EPI</b>	Expanded Program on Immunization
<b>ESAVI</b>	event supposedly attributable to vaccination or immunization
<b>FBO</b>	faith-based organization
<b>FRESH</b>	Focusing Resources on Effective School Health
<b>HIV</b>	human immunodeficiency virus
<b>IMCI</b>	Integrated Management of Childhood Illness
<b>JICA</b>	Japan International Cooperation Agency
<b>MDA</b>	mass drug administration
<b>MDG</b>	Millennium Development Goals
<b>NGO</b>	nongovernmental organization
<b>NID</b>	neglected infectious diseases
<b>PAHO</b>	Pan American Health Organization
<b>STH</b>	soil-transmitted helminth infections
<b>UN</b>	United Nations
<b>UNICEF</b>	United Nations Children's Fund
<b>USAID</b>	U.S. Agency for International Development
<b>WASHED</b>	water, sanitation, hygiene and deworming
<b>WFP</b>	World Food Program
<b>WHO</b>	World Health Organization



# Glossary

**Deworming round:** Distribution of antiparasitic drugs to a large group of individuals during one defined time period.

**Disability-adjusted life years (DALYs):** One DALY can be thought of as one lost year of healthy life. The sum of these DALYs across the population, or the burden of disease, can be thought of as a measurement of the gap between current health status and an ideal health situation where the entire population lives to an advanced age, free of disease and disability. DALYs for a disease or health condition are calculated as the sum of the years of life lost due to premature mortality in the population and the years lost due to disability for new cases of the health condition.

**Disease burden:** A measurement of health-related losses that reflects the fatal and non-fatal consequences of different diseases and injuries for the population, and, if necessary, losses attributable to the related risk factors and health determinants.

**Eggs per gram:** The number of parasite eggs in 1 gram of stool, it is an indirect measure of the intensity of helminth infection.

**Egg reduction rate:** The difference in mean count of helminth eggs per gram (epg) of stool following deworming in the population. The post-intervention mean epg count is compared with a baseline or pre-intervention count. It is expressed as a percentage.

**Eligible population:** A group of individuals qualified or selected to receive anthelmintic treatment in preventive chemotherapy interventions. Eligible populations can range from high-risk groups to the entire population in an endemic area. For the purposes of this report, the eligible population in endemic areas includes all preschool and school-age children, women of childbearing age, pregnant women beginning in the second trimester, and adults whose jobs place them at risk for transmission of soil-transmitted helminths (for example, agriculture and mining).

**Homogeneous ecological zone:** Geographical area that is homogeneous in terms of humidity, rainfall, vegetation, population density, and sanitation level.

**Ineligible population:** A group of individuals that does not qualify to receive anthelmintic treatment in preventive chemotherapy interventions. This is usually determined through exclusion criteria based on drug safety. In STH control activities, ineligible populations include critically ill children, children under one year of age, and women in the first trimester of pregnancy.

**Intensity of infection:** The number of helminths infecting an individual. Mean intensity in a population can be expressed by the mathematical or geometric mean. Soil-transmitted helminths can be measured directly by counting expelled worms after deworming or indirectly by counting the number of eggs expelled per gram of stool. The latter method is more convenient and more commonly used. (See definition of reduction rate above.)

**Local level:** The smallest administrative unit in a country's political-administrative structure; for example, a municipality.

**Mass drug administration (MDA):** The periodic distribution of drugs to the entire population at risk in a region, irrespective of the individual infection status. This public health intervention can be implemented in several ways in order to reach the population, including door-to-door distribution, mobile or fixed distribution posts, and using schools, children's homes, or community meeting sites (markets, fairs).

**Morbidity:** The detectable and measurable consequences of a disease. Helminth-related morbidities include anemia, chronic pain or fatigue or, more subtly, growth retardation, poor school performance, and increased susceptibility to other diseases, among others.

**Neglected infectious diseases (NID):** Caused by various microorganisms, most of these are chronic diseases with lasting health effects. They mainly affect populations living in poverty, with low income and schooling levels. NIDs affect the growth, physical and cognitive development, and learning ability of children to the detriment of their future work productivity and ability to make an adequate living. Some NIDs can cause physical disfigurement leading to social stigmatization.

**Preschool-age children:** Children between 1 and 4 years of age.

**Prevalence of infection:** The percentage of individuals in a population infected by helminths.

**Preventive chemotherapy (PC):** The use of anthelmintics, alone or in combination with other drugs, as a public health tool to combat helminths. Early and periodic administration of drugs to reduce the occurrence, extension, severity, and long-term consequences of the disease.

**School-age children:** Children between 5 and 14 years of age, regardless of whether they are enrolled in school. The age range may vary among countries.

**Social mobilization:** The process of bringing together all intersectoral allies, as feasible and practical, to raise community awareness about prevention and control

of a disease, assist in the delivery of resources and services, and strengthen community participation to enhance sustainability and self-sufficiency. Social mobilization entails a broader concept of community that includes local residents as well as a range of social allies such as heads of State, ministers, district and local government authorities, mayors, community and religious leaders, private companies, nongovernmental organizations, service clubs, journalists, movie producers and actors, to mention a few of the more common examples. (Definition adapted from the PAHO/WHO COMBI Guide.)

**Soil-transmitted helminthiasis (STH) or soil-transmitted helminth infection:** Parasitic diseases acquired through contact with contaminated soil. For the purposes of this guideline, the term refers specifically to helminth infections caused by hookworms (*Necator americanus* and *Ancylostoma duodenale*), *Ascaris lumbricoides*, and *Trichuris trichiura*.

# Introduction

Of the diseases that affect human beings, the group made up of neglected infectious diseases (NID) is prominent on the unfinished health agenda because of their causes and consequences. These diseases, which have been with humankind since its origins, thrive among poor and disadvantaged populations living in areas of widespread poverty with scarce resources and little opportunity to improve their quality of life. NIDs have serious repercussions for individuals, families, and communities in developing countries, which are reflected in the disease burden, lost productivity, deepening poverty, and the high costs of long-term medical care.

There is tremendous potential to reduce the incidence of these diseases to the point where they no longer pose a public health problem, which is all the more reason to deploy additional efforts to eliminate them. With new technologies and strategies and improved health services infrastructure, particularly primary health care, these diseases can be controlled and potentially eliminated. Against this backdrop, the Member States of the Pan American Health Organization (PAHO) adopted Resolution CD49.R19 at the 2009 meeting of the Directing Council. The resolution establishes targets for the control and elimination of NIDs in the Region by 2015 and the strategies that should be applied to this end.

Soil-transmitted helminth infections are one of the most important NID. An estimated 49 million children under the age of 15 in 30 Latin American and Caribbean countries are at risk of contracting this disease, which not only has the potential to affect their growth and development, but can have irreversible consequences that carry into adulthood. Safe, low-cost drugs are available for the control of soil-transmitted helminth infections. Preventive measures can reach most families through joint, intersectoral activities to deliver the required drugs and improve access to safe drinking water, basic sanitation, and education. These activities also need to focus on reducing the negative impact of health determinants that enable soil-transmitted helminths to continue to pose a public health problem.

Every country has health programs in place to prevent and treat the most prevalent childhood diseases; most have shifted their focus from disease treatment toward prevention and comprehensive health care. Even so, these programs usually do not include systematic deworming\* of children under 15, although this is sometimes done in isolated cases. While programs specifically for deworming are generally not available, they are not necessarily required since existing programs and infrastructure can be tapped for this activity. Deworming is simple, safe, and easily integrated into other programs with excellent results, as several countries in the Region of the Americas and elsewhere have already demonstrated.

The operational guidelines presented here promote integrating deworming into existing public health components and activities, rather than as a vertical activity separate from joint, comprehensive interventions. The Region's primary healthcare systems provide scaffolding for this. Integration is understood as the joint planning, implementation, and evaluation of these activities. Coordination optimizes resources (human, financial, technical, technological, and logistical) and improves the efficiency of local public health programs, without impinging on areas that are already performing as they should. To the contrary, the idea is to strengthen joint efforts at the local level.

In the absence of a generic instrument tailored to the epidemiology of soil-transmitted helminth infections in the Region, operational guidelines are needed as a reference when introducing or strengthening deworming activities. They are geared towards the integration of deworming activities into existing national or subnational programs as a way of simplifying implementation as much as possible.

This document outlines the factors that should be taken into account when integrating deworming activities to combat soil-transmitted helminths in children under age 15. It describes how to approach internal and external advocacy, conduct situation assessments, and identify at-risk populations as

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\* For the purposes of this report, deworming refers to drug treatment to eliminate soil-transmitted helminths.

well as existing programs and initiatives that would be conducive to integration. It also covers the operational, logistical, and monitoring procedures that should be included in this process. Several instruments designed to ensure operational sustainability are provided in the annexes.

The information provided herein is consistent with the current recommendations of the World Health

Organization (WHO), the guidelines for control of soil-transmitted helminth infections, in particular, the document *Helminth control in school-age children: a guide for managers of control programmes–2<sup>nd</sup> edition*, Geneva, WHO, 2011 ([http://whqlibdoc.who.int/publications/2011/9789241548267\\_eng.pdf](http://whqlibdoc.who.int/publications/2011/9789241548267_eng.pdf)).

# 1. Objective of the operational guidelines

The operational guidelines provide a format to scale up and optimize deworming activities in order to reduce the prevalence, intensity, and sequelae of soil-transmitted helminth infections. Rather than create a separate program, the guidelines approach helminth control activities in conjunction with environmental sanitation and education measures as part of a comprehensive public health policy that reaches preschool and school-age children. The specific aim of this effort is to achieve at least 75% deworming coverage in the at-risk population, thereby contributing to a reduction in prevalence.

The population at risk of contracting soil-transmitted helminth infections includes all those living in geographical areas in which the epidemiological (prevalence of soil-transmitted helminth infection equal to or greater than 20%), ecological (humidity, heavy rainfall, temperature, vegetation, brightness, among others), and socioeconomic (lack of access to improved basic sanitation facilities, safe water,

adequate housing, etc.) characteristics create the conditions for soil-transmitted helminth transmission to persist at levels that cause morbidity and particularly affect child development. Among the at-risk population, deworming activities primarily target preschool and school-age children, women of childbearing age, and pregnant women beginning in the second trimester. Treatment is also given to adults employed in the agricultural and mining sectors. Since soil-transmitted helminth infections have significant developmental consequences for children under 15 (1), deworming activities have mainly targeted this age group. Nonetheless, in the geographical areas described above, where there is a risk of ongoing transmission of these parasites, all of the population groups mentioned should be dewormed.

While this report focuses primarily on deworming of preschool and school-age children, the national and subnational authorities can extend these activities to other groups as they deem necessary.



## 2. Target audience of this report

**T**hese operational guidelines are primarily directed toward national ministries of health, education, housing, and the environment, among others, since experience has amply shown that these programs are most efficient (cost-benefit ratio) and effective (expected results) when they are part of State policy as opposed to a decision taken by a particular administration.

In addition to high-level health authorities, the education authorities must also be involved. In every country, the education system and infrastructure play a pivotal role in achieving the proposed objectives by introducing or strengthening deworming activities. The notion that health problems fall exclusively under the purview of the health sector has frequently led to the failure of initiatives to improve people's well-being, since the determinants of disease are not

confined to the health sector. For this very reason, the Adelaide Statement on Health in all Policies (2010) emphasizes that government objectives are best achieved when all sectors include health and well-being as a key component of policy development (2).

The guidelines are also for the agencies, offices, programs, and activities of the ministries of health and education at the subnational or local levels that are directly involved in serving children. Some examples are the Expanded Program on Immunization, the Integrated Management of Childhood Illness (IMCI) strategy, growth and development monitoring or well-child check-ups programs, food and vitamin A supplementation programs, Healthy Schools, community homes, and school meals and school lunchroom programs.



## 3. Background and frame of reference

### 3.1. Soil-transmitted helminth infections as a public health problem

Neglected infectious diseases (NID) persist in the world's most impoverished and marginalized communities. One of the main features of these diseases is that they usually do not lead to death directly or quickly. Their clinical presentation tends not to be acute or blatant, or accompanied by alarming signs; instead, these infections manifest slowly and insidiously. This explains, at least in part, why health workers rarely assign these diseases the priority they deserve given their sequelae, particularly among preschool and school-age children (Figure 1). At the same time, it is possible to eliminate or drastically reduce the burden of these diseases using existing resources and instruments and appropriate and cost-effective public health interventions are available to combat them. Based on these, and many other considerations, the 49th Directing Council of the Pan American Health Organization adopted Resolution CD49.R19 (3). One of the Resolution's proposed goals is to reduce prevalence of soil-transmitted helminth infections among school-age children to less than 20%, through mass administration of antiparasitic drugs to at least 75% of at-risk children. The aim is to integrate this strategy with others focused on improving access to safe

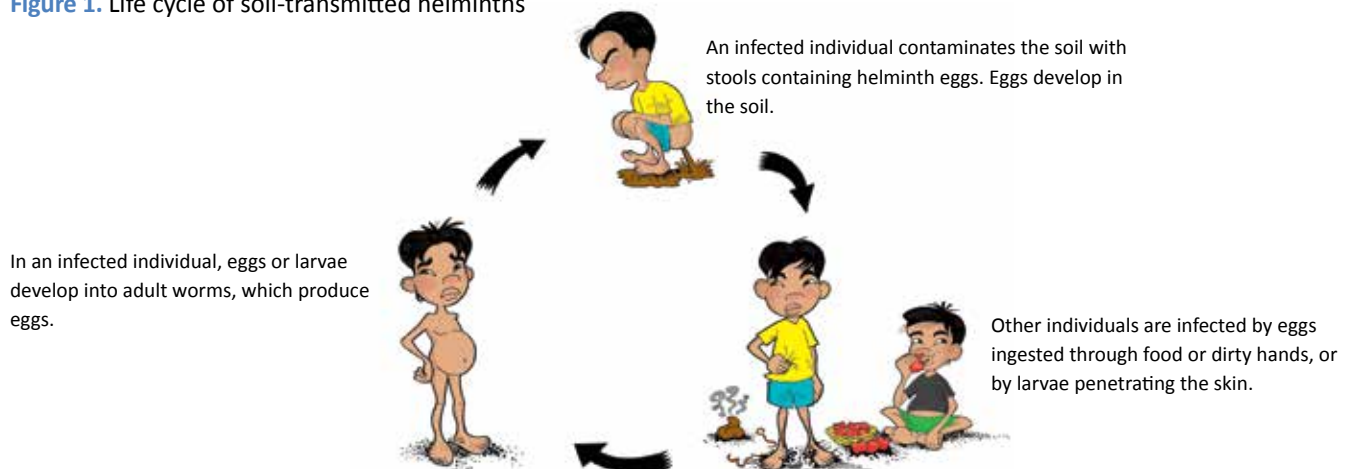
water, basic sanitation, and education in an effort in which there is close collaboration between the health sector and the entities responsible for those types of interventions.

STH are the only NID present in all the countries of Latin America and the Caribbean and they affect an estimated 30% of the population (4). Moreover, STH are the most common infections among the poor of the Americas (5).

In addition to their prevalence in Latin America and the Caribbean, scientific evidence has shown that helminth infections contribute to increased transmission and severity of malaria, tuberculosis, and AIDS, public health problems that have a disproportionate impact on poor and vulnerable populations in those countries (6). There are 21 malaria-endemic countries in the Region, where 560,854 cases and 89 deaths from this disease were reported in 2008. In 2009, 272,000 new cases of tuberculosis were reported, 69% of them in South America. (For additional information on malaria and tuberculosis, see [www.paho.org](http://www.paho.org).)

The epidemiological data and characteristics of STH presented below contribute to a better understanding of the purpose of the operational guidelines:

Figure 1. Life cycle of soil-transmitted helminths



Source: World Health Organization. Helminth control in school-age children: a guide for managers of control programmes. Second edition. Geneva, 2011.

- Unlike viruses, bacteria, fungi, and protozoans, helminths do not multiply in the human body. As a result, reinfection occurs only as a result of new contact with a contaminated environment (eggs expelled in the stool) (7).
- These parasites live in the human host for 1 to 5 years (8).
- The more parasites someone has, the more serious the disease (9), more eggs will be expelled in the stool, and he or she will be more contagious to others (8).
- The intensity of infection in each individual is determined by the number of eggs per gram of stool (10).
- Anthelmintic drugs are effective in eliminating the parasites.
- One gram of stool can contain over 100 parasite eggs (10).
- In a community where soil-transmitted helminth infections are endemic, 80% of infections are concentrated in approximately 20% of the population (10).
- The highest burden of STH is found among children; school-age children have a higher intensity of infection than any other age group (10, 11).
- The state of parasitosis in school-age children is representative of the situation in the community (12). While anthelmintic treatment does not eliminate all the parasites in an individual, the number that survive do not have clinical manifestations or known sequelae. Moreover, once the number of eggs in the stool has been reduced, an individual

who has already been dewormed is no longer a focal point for propagation of the disease, at least until significant reinfection occurs. This is why the same at-risk population should be regularly dewormed.

- Changes in prevalence rates after repeated treatments, even if they are small, can be regarded as achievements (rather than failures) that contribute to meeting control program targets, since the number of heavily infected people will have been reduced (4).

Although several types of soil-transmitted helminths infect humans, the most harmful and common are, in order of frequency: *Ascaris lumbricoides*, *Trichuris trichiura*, and the hookworms *Ancylostoma duodenale* and *Necator americanus*. For the purposes of this document, the terms soil-transmitted helminths or STH refers mainly to these four species (13).

While the countries in the Region are implementing deworming activities and strategies, they tend to be isolated efforts that lack continuity and ties with other programs. This leads to a duplication of efforts and low coverage levels, among other problems.

These operational guidelines were developed in response to the need for a generic instrument, which is currently unavailable, that can be used to introduce or strengthen the deworming activities and facilitate their integration into existing programs in some countries of the Region of the Americas.

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### 3.2. The burden of soil-transmitted helminth infections worldwide and in Latin America and the Caribbean

The percentage of the population affected by STH and schistosomiasis continues to be very high. Of the approximately 2 billion people infected worldwide, an estimated 300 million suffer from associated severe morbidity, and every year some 155,000 people die from this cause (7). To better understand the prevalence of intestinal parasitoses, suffice it to say that the number of cases by far surpasses those of HIV/AIDS, tuberculosis, and malaria combined (5).

The magnitude of the problem is only amplified by the fact that the most impoverished and marginalized communities are most affected by this disease.

The actual prevalence and intensity of STH in Latin America and the Caribbean is unknown, as only a few national and subnational studies are available. Although the Pan American Health Organization has a database of over 526 studies on the prevalence of these parasitoses, only 8 of the 35 countries studied conducted national surveys on this subject in recent years (14). A recent study conducted by PAHO on the state of five neglected diseases (including STH) in

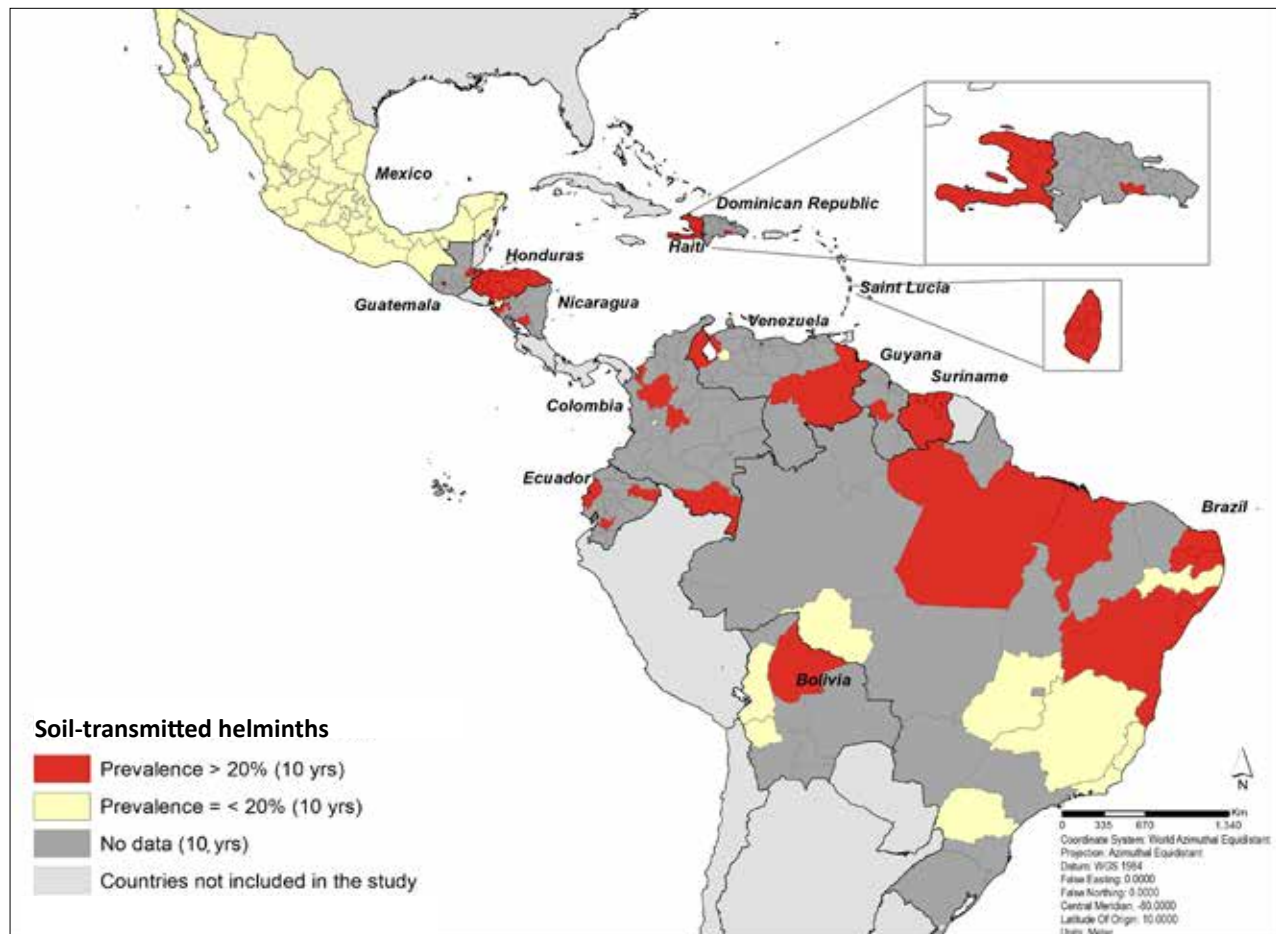
Latin America and the Caribbean classified countries into four groups according to their epidemiological situation, progress in the control or elimination of NIDs, and the type of technical assistance they require in light of the parameters mentioned. In the 17 countries that fall into groups 1 and 2, 94% of preschool-age children and 93.5% of school-age children were at risk for STH. Furthermore, these countries also require more complex technical assistance since, besides having the highest percentage of population at risk, they have made the least progress in control of these parasites (15).

In light of the existing data and the economic, environmental, and hygiene conditions of the high-risk population, there is no doubt whatsoever that STH is a public health problem in the majority of countries in the Region (Figure 2) (16).

Children have the highest burden of these diseases. For example, most people contract ascariasis between the first and third year of life (5). The population of at-risk children in Latin America and the Caribbean is estimated at 49 million: 13.8 million preschool-age and 35 million school-age. While mortality due to STH is not very high, the disease has very significant consequences. Detectable and measurable signs of this disease are:

- Iron deficiency anemia
- Micronutrient deficiency, especially vitamin A
- Growth retardation
- Malnutrition in all its forms
- Intestinal obstruction, invagination
- Rectal prolapse
- Dysentery syndrome
- Chronic dysentery

**Figure 2.** Prevalence of soil-transmitted helminth infections according to available studies, Latin America and the Caribbean, 1998 to 2007



Source: Pan American Health Organization. Database on soil-transmitted helminths, 2008.

- Anemia and the risk of having low birth weight children (17) among pregnant women, with the attendant negative impact on the children's future growth and development

Specific organic disorders caused by soil-transmitted helminths also cause a more subtle but extremely severe morbidity that may be overlooked or not associated with STH:

- Development disorders, such as delays in cognitive development, memory loss (18), and language acquisition difficulties, and problems related to gross and fine motor skills (12), all of which can alter school performance (18, 19). There is a direct correlation between the number of parasites and intellectual quotient lost: it is estimated that for each intestinal parasite infection, children lose, on average, 3.75 points of their intellectual quotient (5).
- School absenteeism and dropout
- Chronic fatigue
- Intermittent abdominal pain
- Low self-esteem
- Social exclusion
- Years of life lost. (According to estimates, between 4.7 and 39 million healthy years of life are lost due to STH.) (10).

- Economic impact. The prevalence and intensity of STH have a significant impact on a country's economy. There is a direct correlation between years of schooling and the wage levels an individual will be able to attain. Due to the sequelae they produce beginning in childhood, these parasites influence job performance, cause job-related difficulties, and may lead to as much as a 40% loss in productive capacity (20,21).

In many countries of the Region, and particularly in certain districts, provinces, and departments, STH pose a public health problem that can only be addressed by tackling their many determinants: poverty; low levels of schooling and illiteracy; malnutrition; shortage of drinking water; defecation in the open due to lack of access to improved sanitation systems; lack of footwear; and poor hygiene perpetuated over generations (22). In turn, STH are a determining factor in poverty and other problems facing the affected populations. For this reason, no single measure such as mass deworming of the at-risk population can break this vicious circle. Instead, a comprehensive and integrated intervention is required in the framework of the determinants of health.

### 3.3. Interventions for control of the soil-transmitted helminth infections

NIDs are heterogeneous but many are characterized by their concentration in certain geographical areas or in certain population groups. From the standpoint of equity, NIDs affect disadvantaged population groups in particular. Thus, more than 70% of the countries and territories affected by this group of diseases are low or low-middle income (23).

Social determinants related to NIDs include (23) access to water and sanitation, housing (including building design and peri-domestic area), housing occupancy (overcrowding), environment (ecological and topographical factors, vegetation coverage, climate change, and water resource development schemes), migration (refugees, nomads, migrant workers, and resettlers), disasters and conflicts (comprising elements of migration and breakdown of health care systems), sociocultural factors, gender, and poverty (inadequate income, subsistence, and wealth).

The foregoing leads to six recommended actions focused primarily on prevention and promotion (23):

1. Focusing work on water, sanitation, and household-related factors.
2. Reducing environmental risk factors.
3. Improving health of migrating populations.
4. Reducing inequity due to sociocultural factors and gender.
5. Reduce poverty in NID-endemic populations.
6. Setting up surveillance and risk assessment systems.

These actions are necessary in order to achieve control and elimination of NIDs, including soil-transmitted helminth infections. Interventions of demonstrated effectiveness, such as short- and medium-term preventive chemotherapy for soil-transmitted helminth infections, are complementary to the above for achievement of control goals.

The cycle of transmission for soil-transmitted helminth infections and the biology of the parasites are related to deficiencies in human stool disposal. Several studies have demonstrated that sanitation, hygiene, education, and access to safe water can reduce soil-transmitted helminth infections (24).

Treatment with anthelmintics (deworming) is intended to reduce morbidity through a reduction in parasite burden or intensity. Periodic massive deworming of high-risk groups can keep the infection below levels associated with morbidity and, frequently, will result in an immediate improvement in children's health and development (25).

From the foregoing, integrating improvement in access to water, sanitation, and hygiene as a part of the package of interventions for achieving control over soil-transmitted helminth infections is a necessity. Recently, there has been a focus on the need for an integrated approach combining control of soil-transmitted helminth infections with work related to safe water, sanitation, hygiene education, and deworming (WASHED) to break the cycle of transmission of these intestinal parasites. The four components of the WASHED Framework (26):

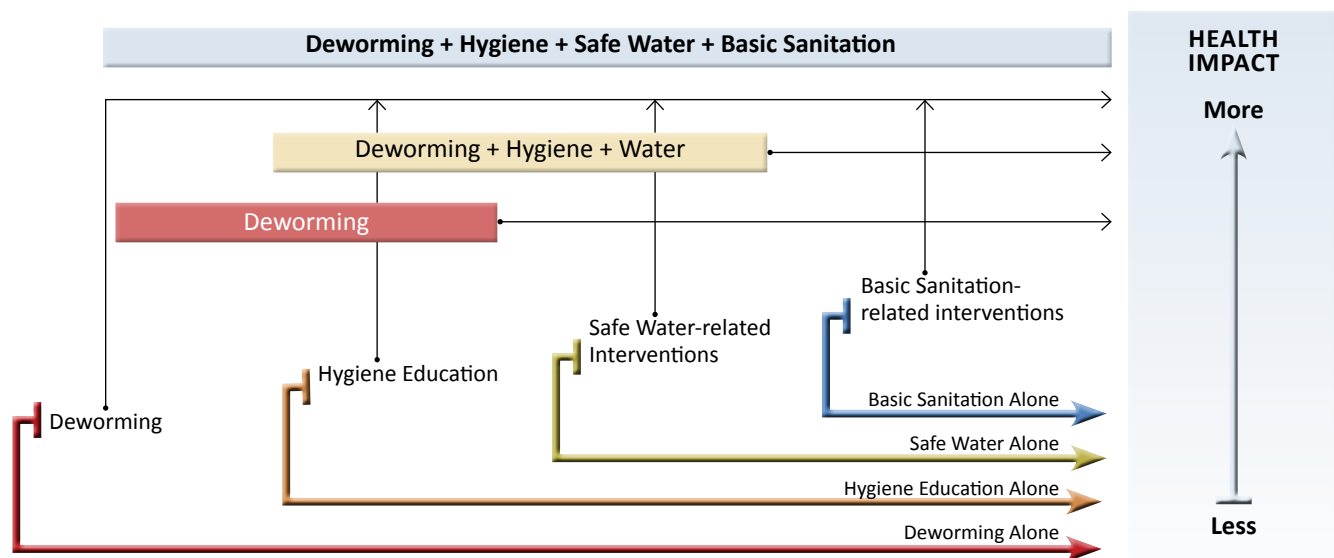
- **Water:** Access to potable water for handwashing and cleaning of food stuffs to minimize the reinfection.

- **Sanitation:** VIP latrines (ventilated improved pit latrines) and septic tanks help keep infected human excreta from the areas where people live, work, and play, further minimizing the risk of reinfection in treated individuals and preventing new infections.
- **Hygiene Education:** Hygiene education promotes personal and environmental hygiene in communities where STH is endemic. When the members of these communities use good hygiene, they reduce the risk of reinfection of treated individuals and prevent new infections.
- **Deworming:** Deworming with broad-spectrum anthelmintic drugs like albendazole and mebendazole kills intestinal worms in infected individuals, thereby reducing the number of individuals with high-intensity infections who can spread infection to others.

Use of the WASHED Framework, which requires strong intersectoral work, is expected to improve children's health, as well as contribute to control of soil-transmitted helminth infections (Figure 3).

These operational guidelines concentrate on one of the WASHED components: implementation of deworming, for the purpose of strengthening this activity as a responsibility of the health sector.

**Figure 3.** Graphic representation of the potential health impact of deworming measures



Source: Figure adapted from a talk given by Mr. Henry Hernández (PAHO/WHO Regional Adviser on Environmental Health in Emergencies) at the meeting "Intensifying the Integrated Efforts for the Control of Soil-transmitted Helminth Infections in the Region of the Americas: Working Together for a Common Goal," in Bogotá, Colombia, 16-17 May 2013. Figure originally produced by Dr. Jonathan Drewry (PAHO/WHO Consultant on Environmental Health and Health Impact Assessment).



### 3.4. Deworming as an integral component of control of soil-transmitted helminth infections

#### What is deworming?

Deworming is the early (beginning after the first year of life) and periodic (one or two cycles a year over several years) administration of antiparasitic treatment to the population at risk of infection (children ages 1 to 14, pregnant women beginning in the second trimester, agricultural and mining workers, etc.).

Control of soil-transmitted helminth infections requires a coordinated, intersectoral effort that encompasses the use of antiparasitic drugs, promotion of good hygiene, and increased access to adequate sanitation. These interventions are intended to act on the conditions that perpetuate transmission of soil-transmitted helminths and reduce the incidence, severity, transmission, and long-term consequences of the infections they cause (5).

Antiparasitic drugs can be distributed to every individual by the health services, regardless of their infection status. In this case, an anthelmintic drug can be delivered through the following mechanisms:

- Regular visits to the health services (primary health care, tuberculosis and malaria care, IMCI, EPI, integrated health brigades, emergency services, etc.).
- Growth and development monitoring activities.
- Food supplementation activities (vitamin A and other micronutrients) at the individual level in the health services.

Antiparasitic drugs can also be distributed on a mass scale, regardless of individual level of infection (preventive chemotherapy). This public health intervention can be carried out using different methods:

- **Mass drug administration (MDA).** Anthelmintic drugs are distributed at regular intervals to the entire population in a particular geographical area (such as a state, region, province, district, municipality, or community).
- **Targeted preventive chemotherapy.** Anthelmintic drugs are distributed at regular

intervals to specific at-risk population groups, defined by age (e.g., school-age children), sex, or other characteristics, such as occupation (e.g., farmers).

- **Selective preventive chemotherapy.** Following regular detection in a population group in an endemic area, anthelmintic drugs are delivered to all infected individuals (or those with suspected infections).

In a preventive chemotherapy program, rather than detect and treat every infected person—a costly and difficult proposition—entire communities or population groups are evaluated. When the prevalence of helminthiasis is 20% or more, the community is prioritized for distribution of anthelmintic drugs, either alone or combined with other interventions. Deworming is therefore approached as a public health intervention in which drugs are administered early and periodically to reduce the occurrence, magnitude, severity, and long-term consequences of morbidity from soil-transmitted helminths. In addition to treating parasitized individuals, this type of intervention—the technical term for which is preventive chemotherapy—also seeks to prevent new infections in the healthy population, and reinfection among individuals who were previously infected and treated.

Preventive chemotherapy can be carried out in the following ways:

- **Door-to-door distribution (mobile teams).** The person in charge of distributing the drug picks it up at a central location and delivers it door to door. This method ensures coverage of the entire target population; however, it is intensive and costly, especially in low-density demographic areas. Moreover, household members may not be home when the drug is distributed.
- **Distribution posts (stationary team).** These distribution sites are accessible to the population. The person responsible for the drug administers it to beneficiaries who visit the post. While this system is practical in urban areas, coverage levels are contingent on the initiative of the population and the stationary post's capacity for beneficiary capture.
- **Distribution at designated locations.** The drug is distributed in places where there are high

concentrations of at-risk population groups, such as students in schools, children in preschools, or refugee or displaced persons centers, etc.

- **Distribution in community meeting places.** Markets, bus and train stations, fairs, festivals, and parks, all of which are accessible to the community.

### Groups that benefit from deworming

Because Resolution WHA54.19, adopted at the 2001 World Health Assembly, and Resolution CD49.R19, adopted by the Directing Council of PAHO, establish a deworming target of 75% of school-age children (5-14 years), deworming activities in Latin America and the Caribbean have focused mainly on that group. School-based administration has been the method of choice since that is where the population is concentrated (15). In recent years, however, it has become increasingly clear that preschool-age children should be included in these efforts for the following reasons:

- Coverage of this group is lower in the countries of Latin America and the Caribbean relative to the other WHO regions (27).
- Children under five are at greater risk of acquiring intestinal parasites because of their social circumstances (living with their peers in overcrowded conditions) and because they have yet to assimilate good hygiene practices (28,29).
- Preschool-age children account for an estimated 10% to 20% of people living in areas with endemic soil-transmitted helminth infections around the world (27), which means 3.5 billion children (30).
- The prevalence of intestinal parasitoses among preschool-age children is high. Some studies show prevalence rates ranging from 20% to 80% among children under 24 months of age (31,32).
- Early infection by soil-transmitted helminths causes initial organic harm that remains subclinical for years, only to manifest itself later on (6).
- Children under two years of age with parasites present with problems of development of language and of gross and fine motor skills (18,29).
- Growth problems are more common in the population ages 6 months to 2 years old (30).
- Three developmental stages are conducive to infection with STH among preschool-age children: weaning, the oral stage, and onset of crawling.
- STH have irreversible consequences at this age, especially in children under two (27).
- Children who are malnourished when they reach two years of age experience a 10% loss of future productivity (27).
- Preschool-age children are more susceptible to malnutrition and anemia, both of which are closely linked to STH (33).

In light of the above, there are clear benefits to mass deworming of at-risk populations, and especially of preschool and school-age children, as summarized in Table 1. Furthermore, deworming combined with interventions targeted to factors associated with STH transmission should be part of the group of actions that are promoted in countries to control soil-transmitted helminth infections (Box 1).

**Table 1.** Benefits of deworming, by type

Nutritional, growth-related, and susceptibility to other infections	In relation to cognitive performance and social, economic, and environmental impact
It prevents and reduces anemia and vitamin A and other micronutrient deficiencies (34).	It reduces school absenteeism by as much as 25% (8,10,27).
It reduces anemia in pregnant women, thereby improving fetal health and increasing the birth weight of their children (8,17,35).	It enhances motor and language development in preschool children (27,36).
It contributes to weight gain in malnourished preschool-age children by as much as 35% (27).	It improves community acceptance of and buy-in to other health programs.
It increases appetite in 48% of children (33).	It helps reduce STH contamination of soil (37).
It prevents 82% of growth retardation (27).	It helps increase the earning power of adults (economic productivity) by 40% (21).
It contributes to the control of other parasites, such as pinworm.	
It reduces the establishment of HIV infection and the progression of AIDS (6).	
It helps to reduce the burden of malaria and tuberculosis (6,38).	
It reduces alterations in the individual's immunological response to the cholera toxin (39).	

#### Box 1. Deworming and control of soil-transmitted helminth infections

To achieve better results, especially in the short and medium term, national and subnational deworming activities must include school- and preschool-age children, as they are the most affected by morbidity (40). As a result, these guidelines will emphasize the inclusion of deworming for these two age groups. Nevertheless, STH control programs should ideally include deworming interventions for all population groups at risk of infection; that is, those who live in geographical areas where ecological and socioeconomic conditions perpetuate the cycle of transmission of these intestinal parasites (women of childbearing age, pregnant women, and adults who perform work that involves a risk of STH infection, such as farmers, miners, and others).

Deworming is one of the interventions that contributes to the control of soil-transmitted helminth infections and, although this document focuses on deworming as an activity led by the health sector, national and local governments need to adopt other measures that contribute to control, among them:

1. Pharmacological treatment that in the short and medium term helps reduce parasite burden.
2. Health and hygiene education, which helps to establish healthy habits that reduce the risk of transmission.
1. Interventions that have an impact on those health determinants that are closely related to intestinal parasite infection, such as access to safe water, basic sanitation, houses with floors not made of dirt, use of footwear, education, and hygiene, to reduce the prevalence of STH infections.



## Deworming and the Millennium Development Goals (MDGs)

The deworming program is a practical and effective way to make progress towards the Millennium Development Goals. In light of the benefits described above and the MDGs, ongoing, large-scale deworming is a cost-effective intervention that contributes to the achievement of several of these goals:

- Objective 1. Eradicate extreme poverty and hunger
- Objective 2. Achieve universal primary education
- Objective 3. Promote gender equality (6,41)
- Objective 4. Reduce child mortality
- Objective 5. Improve maternal health
- Objective 6. Combat HIV/AIDS, malaria, tuberculosis, and other diseases (6)

## Deworming in the context of gender equality and the intercultural approach

MDG 3 seeks to promote gender equality and women's autonomy. Based on the standards and guidelines established by international organizations such as PAHO/WHO, the United Nations Children's Fund (UNICEF), and the World Food Program (WFP), among others, STH control offers equal opportunity to men and women, as well as to the most vulnerable groups. In order to draw attention to this aspect, this report recommends that deworming planning processes always stress the benefits for girls, boys, and vulnerable groups in the following ways:

- Advocacy, dissemination, and messaging strategies for social mobilization should reflect a gender approach based on roles and responsibilities in the family and at the school, institutional, and community levels.
- Drug supply registries should include the beneficiaries' age, sex, and ethnic group, since

these data aid in detecting any disparities in access.

- Deworming strategies should be implemented for boys and girls who are not enrolled in school.
- Strategies should be tailored to the circumstances and world view of indigenous peoples, people of African descent, Roma peoples, and other ethnic groups at risk for STH infection.

## Antiparasitic drugs for soil-transmitted helminth infections: dosage, frequency, and side effects

The two antiparasitics most commonly used to treat soil-transmitted helminth infections are albendazole and mebendazole. To date, millions of doses have been administered to children with a high degree of safety and only minimal and occasional side effects such as gastric discomfort and nausea. Both drugs have similar efficacy (measured by the reduction in prevalence of eggs in the stool) after a single dose. Since these drugs eliminate the parasites, but not the eggs, education on good hygiene and implementation of sanitation measures must go hand in hand with deworming efforts. Both drugs yield optimal results when administered periodically over several years, regardless of the species of soil-transmitted helminth (42).

Table 2 specifies the frequency of deworming cycles or rounds, according to STH prevalence.

The drug dosages for each age group are presented in Table 3. Based on experience, 500 mg tablets of mebendazole are preferable; 100 mg tablets should be avoided as they increase the number of tablets the child must take, which can be detrimental to treatment compliance.

**Table 2.** Deworming strategies based on prevalence of soil-transmitted helminths

Target	STH Prevalence Categories	Deworming Strategy <sup>6,42</sup>
At least 75% coverage in population at risk of infection (6)	High-risk areas: >50%	Treat all children twice a year (every 6 months)
	Low-risk areas: >20 to <50%	Treat all children once a year (every 12 months)
	< 20%	Individual treatment

Source: World Health Organization. *Preventive chemotherapy in human helminthiasis: coordinated use of anthelmintic drugs in control interventions: a manual for health professionals and programme managers*. Geneva, 2006.

World Health Organization. *Helminth control in school-age children: a guide for managers of control programmes – Second Edition*. Geneva, 2011.

### 3.5 Integrating deworming into other public health activities, strategies, and programs

Based on the evidence and the benefits of deworming in the short-, medium- and long-term, it is necessary to implement strategies to reduce the health, social, and economic burden of STH. If they are to have a significant impact, deworming activities must be carried out on a mass scale to ensure coverage of the entire population at risk of infection and follow a specific schedule in geographic areas with prevalence rates over 20%.

**Implementing deworming programs or strategies that require additional infrastructure is not recommended.** Ideally deworming should be carried out as part of existing public health programs (e.g., healthy schools, immunization, IMCI, nutrition,

vector-borne disease control, tuberculosis, healthy environments and basic sanitation, among others), as part of a comprehensive package of health services, which can include the programs or components that the country considers relevant. Deworming initiatives specifically for soil-transmitted helminths have been integrated into other deworming programs or activities like the fight against lymphatic filariasis. In this example, diethylcarbamazine is distributed in combination with albendazole to the at-risk population. In other instances, praziquantel to treat schistosomiasis has been distributed along with albendazole or mebendazole to at-risk populations. The main benefits of integrating deworming activities into the countries' existing public health strategies and programs are described in Table 4.

**Table 3.** Antiparasitic dosages by drug and age group, complementary interventions, and adverse effects

Drug	Dosage by age			Complementary control interventions	Adverse effects
	12 to 23 months	24 to 59 months	School-age 5 to 14 years		
Albendazole (400 mg tablets) or mebendazole (500 mg tablets)	Albendazole (200 mg) or mebendazole (500 mg)	Albendazole (400 mg) or mebendazole (500 mg)	Albendazole (400 mg) or mebendazole (500 mg)	Health education and environmental sanitation	Minor and transitory (gastric discomfort and nausea)

Source: World Health Organization. *Preventive chemotherapy in human helminthiasis: coordinated use of anthelmintic drugs in control interventions: a manual for health professionals and programme managers*. Geneva, 2006. World Health Organization. *Helminth control in school-age children: a guide for managers of control programmes*. Second edition. Geneva, 2011.

**Table 4.** Benefits of integrating deworming activities into existing public health strategies and programs in the countries

Benefits of integration
Existing programs have trained, sensitized human resources who are familiar with the community. They are equipped to recognize and address cultural and social barriers, which increases acceptance by the population.
Existing programs and strategies have economic resources, health infrastructure, logistics, and established processes in place, which ensures sustainability over time (15).
Integration is an opportunity to enhance the accessibility and supply of health services.
Integrating deworming into existing programs like EPI or food supplementation, reduces the costs of this activity by as much as 47% (10,27,33,43).
Integration boosts confidence among health services and workers.
It reinforces the results of other activities like vitamin A supplementation (27) and nutritional recovery (44).
Integration increases school enrollment of girls by more than 40% (44).
Administration of antiparasitic drugs can be directed by nonmedical personnel who have received short and simple training beforehand (teachers, community volunteers, community leaders, etc.) in coordination with the ministry of health and in accordance with each country's regulations (45).
School-based mass treatment of STH is one of the best buys in global health (8).

Some countries have already integrated deworming into other programs and platforms with results that only reinforce these arguments. Nonetheless, it is important to bear in mind that in addition to the technical aspects, integration processes require financial resources in order to be truly beneficial. In Annex 1 some experiences of that type are briefly described.

### 3.5.1. Opportunities for integrating deworming activities into other public health components or programs

The characteristics of deworming activities must be considered in order to select the public health components and program(s) for integration that will optimize their effectiveness. It is also important to identify allies, partners, and other stakeholders involved in local deworming efforts or other public health activities that might lend themselves to the integration of deworming, such as nutrition, education, or child health programs. This will be part of coordination, especially when those partners and allies have infrastructure and resources—whether technical, physical, human, or financial—in place that

can be strengthened in order to include deworming. Deworming activities should, at a minimum, have the characteristics listed in Table 5.

Based on these characteristics, Tables 6 and 7 provide examples of components and programs with potential for integrating deworming activities, by beneficiary age group and by their level of development in each country. Important elements to consider when integrating deworming activities are also noted. It is important to emphasize that, in addition to integrating deworming into other health platforms or programs, every country should determine which national and subnational control measures should involve intersectoral work; e.g., improvement of access to safe water, basic sanitation, education, and hygiene.

**Table 5.** Recommended characteristics of deworming activities

- Have coverage of at least 75% of the population at risk of infection (population groups in areas where baseline prevalence of infection is  $\geq 20\%$ : preschool- and school-age children, women of childbearing age and pregnant women, and adults whose jobs place them at risk of infection by soil-transmitted helminths, such as farmers, miners, and so forth).
- Include monitoring and evaluation indicators: prevalence of soil-transmitted helminth infections, intensity of infection, prevalence of anemia, coverage achieved, monitoring, and impact.
- Cover, at a minimum, preschool- and school-age children.
- Be an integrated activity rather than a separate, vertical program. It could be part of a package carried out with intersectoral coordination, since persistence of soil-transmitted helminth infections is associated with health determinants and, as a result, actions should address these factors.
- Include community participation as a cornerstone of community buy-in.
- Include post-treatment monitoring of serious adverse events.
- Be a regular activity until prevalence has been reduced in the communities (including addressing the health determinants that help maintain the cycle of transmission).
- Include sentinel surveillance during deworming implementation and assessments of the impact of deworming on infection prevalence and intensity.
- Allocation of resources for activity planning, implementation, monitoring, and evaluation.

**Table 6.** Components and programs with potential for integrating deworming of preschool-age children (ages 12 to 59 months)

Expanded Program on Immunization—EPI	
Key Elements	Elements to Consider
Exist in all countries in the Region.	Integration of deworming should not jeopardize proper implementation of immunization program activities.
Recognized and rooted in the community.	The idea is to carry out the activities jointly, rather than shift responsibility for deworming to the immunization program.
It has established infrastructure.	The immunization program mainly reaches children under 1 year, which means that a strategy will have to be developed to continue deworming activities after the first year of life.
Recognized as a successful program given the coverage levels achieved relative to the proposed targets.	Although the immunization program covers all population groups, strategies will have to be adapted for vulnerable populations (displaced persons or refugees, families living in extreme poverty, indigenous populations, etc.).
Has vaccination procedures in place for preschool-age children, from birth to 5 years.	Communications and monitoring strategies for events supposedly attributable to vaccination and immunization (ESAVI) and serious adverse events caused by antiparasitics should be complemented and strengthened.
Includes adverse events monitoring and epidemiological surveillance.	Modification or adaptation of the individual vaccination card or record to include the antiparasitic dose (in Nicaragua, a box to record antiparasitic treatment has been added to the vaccination card). These records also make it possible to monitor coverage.
Data registries and vaccination cards can be used to monitor the doses administered. It has an information, monitoring, and evaluation system.	Supplies (vaccines and antiparasitics) should be available simultaneously to avoid any change in the coverage of either activity. Planning and implementation of immunization and deworming activities should be thorough and detailed and involve joint coordination to identify any additional costs and supplies and logistical support that the EPI might require.
Endowed with well-defined and stable human and financial resources.	
Its annual national campaign strategy (Child Health Days, Vaccination Campaigns, or National Health Week) facilitates access to at-risk populations. It also carries out regular door-to-door vaccination and vaccination catch-up days.	
Experiences with integrating deworming into the EPI exist in Honduras, Nicaragua, and Mexico, among others.	
Vitamin A Supplementation Component	
Includes the same age groups at risk of soil-transmitted helminth infections.	It is important to verify that the target population of the vitamin A supplementation component is consistent with the deworming strategy and target.
Administration in semiannual basis, in some countries through subnational or local campaigns.	Sufficient supplies should be available (vitamin A and antiparasitics) simultaneously to avoid any change in the coverage of either activity.
High coverage: every year 167 million preschool-age children around the world receive vitamin A supplementation.	
Deworming and the administration of vitamin supplements (30) are synergistic activities; demand for vitamin A grows since deworming is very popular among parents (34,46). Integrating deworming into vitamin A distribution strengthens the latter intervention, rather than undermining or interrupting it.	
STH and vitamin A deficiency are public health problems found in the same geographical regions where the most vulnerable populations live, with the attendant repercussions for child growth and development.	
Training to administer vitamin A and antiparasitics can be combined to lower training costs [integrated delivery].	
Several countries, including Cambodia, Honduras, Nepal, Democratic Republic of the Congo, and Uganda, have successfully integrated deworming into vitamin A supplementation programs (22,34).	

Table 6. (continued)

IMCI Strategy: Integrated Management of Childhood Illness	
Key Elements	Elements to Consider
The strategy is being implemented in the majority of Latin American and the Caribbean countries.	Deworming coverage by IMCI-trained health workers should be verified, since the clinical component is contingent on staff capacity to apply comprehensive care algorithms in the health services.
It targets children from before birth to 59 months of age and pregnant women. Its clinical component includes deworming in the package of individual care provided in the health services.	IMCI implementation levels should be assessed in order to integrate deworming in areas where components of the strategy are being implemented. If deworming is taking place as part of the clinical component, this involves individual deworming, not mass administration, and therefore is a complementary strategy for remote areas.
STH are one of the IMCI's prevalent diseases.	
Deworming begins at 12 months for children living in areas of endemic ascariidiasis, trichuriasis, and hookworm disease (47,48).	
According to WHO's updates of IMCI, children under two (12 to 23 months old) should receive the antiparasitic drug regardless of whether their infection status can be confirmed (49).	Ensure that monitoring and evaluation of IMCI indicators includes tracking of deworming coverage in health services.
The strategy includes strong educational content for families, communities, and social stakeholders focused on health promotion and prevention of the most common diseases, which are closely related to STH (50,51,52,53).	Identify strategies that complement IMCI's individual deworming activities in areas requiring MDA and provide for deworming of children not covered by the strategy (over 5 years of age).
It has monitoring, follow-up, and evaluation instruments in place (54).	
Community participation that promotes IMCI as part of its protocols is of great value, especially with regard to the program's coverage (55,56).	
Several countries have successfully integrated deworming into IMCI (47,48).	
Growth and Development Monitoring Programs	
Growth and development monitoring mainly target preschool-age children in the first years of life.	Deworming in this type of program is done individually and not as mass administration; as a result, it is a complementary strategy for remote areas.
These programs have health workers trained in growth assessment, immunization, and detection of developmental problems in the health services.	Coverage is limited to children enrolled in the program. This aspect would have to be examined if deworming is to be included.
They include active family involvement and a strong educational component on disease prevention.	Strengthen work to reduce drop-out rates, especially after age 2.
These programs are regulated and established as health policies under the ministries of health in most countries.	
They include indicators to closely track appointments for growth and development monitoring of children (for example, compliance, missed appointments, and drop-out rates).	
The programs have a decades-long track record and many sites enjoy community recognition.	

Table 6. (continued)

Food Supplementation Programs	
Key Elements	Elements to Consider
<p>These programs mainly target children in the first 24 months of life. Their work concentrates on populations in geographical areas where factors exist that contribute to high STH prevalence rates, which means that it is possible to integrate deworming activities (27). Their beneficiary families are believed to be at high risk of STH.</p>	<p>Ascertain whether the program's interventions cover the entire population at risk of contracting soil-transmitted helminth infections in order to determine potential coverage if deworming activities are added.</p>
<p>Malnutrition, anemia, and intestinal parasites are intimately linked (57).</p>	<p>The program's potential sustainability over time should be examined since its activities may be contingent on the availability of funds and financing cycles.</p>
<p>The programs have monitoring and follow-up instruments.</p>	<p>The educational component and community participation should be strengthened to promote safe food and hygiene practices.</p>
<p>Nongovernmental organizations and the World Food Program (WFP) recognize the importance of combined nutritional and deworming interventions (20,58). Similarly, UNICEF and other international organizations support deworming. In the countries, ministries other than the health ministry, as well as NGOs and other organizations, carry out nutritional interventions; all of them already have logistical capacity in place.</p>	
<p>Several countries, such as Nepal and Guinea, have had successful experiences (37).</p>	
Kindergartens (preschools or early childhood education)	
<p>Deworming activities target preschool-age children, one of the population groups requiring this intervention.</p>	<p>These programs only cover the population of enrolled children, so it will be necessary to examine the coverage that deworming could achieve.</p>
<p>These are established programs with trained staff and active family participation.</p>	<p>Determine whether this type of program exists in rural areas; if not, deworming of children in rural areas will need to be supplemented by other types of programs.</p>
<p>Children are concentrated in the childcare centers, which facilitates drug administration and ongoing contact.</p>	<p>If deworming is included in these programs, close monitoring must be conducted in conjunction with the authorities and sectors responsible for this type of program to guarantee adequate deworming coverage.</p>
<p>These programs feature appropriate child healthcare agendas and parenting models.</p>	
<p>They are located in the areas of large cities and peri-urban areas where low-income families live.</p>	

**Table 7.** Components, programs, and platforms with potential for integrating deworming activities for school-age children (ages 5 to 14 years)

School Health Programs		
Key Elements	Elements to Consider	
Intensity of STH is higher among school-age children than any other age group. Deworming at this age is a very cost-effective strategy (10).	School-based deworming strategies must be supplemented with strategies to reach out- of-school children in this age group and to include the comprehensive approach, ranging from determinants of access to safe water up to personal hygiene education (9,32). Example: An “Anti-parasite Day” in which out-of-school children are invited to participate in deworming activities. A school-based outreach plan should be in place to promote commitment to treatment.	
70% of the burden of STH can be eliminated in a community just by deworming school-age children (59).		
Schools are the ideal venue for educating about deworming (40), and they are present in urban and rural areas.		
Logistics, opportunities to reach families, and educational research are more cost-effective among this “captive” population and existing school infrastructure can be used.		Ongoing advocacy and close coordination with the ministries of education, educational institutions, and municipalities are necessary to promote administration of antiparasitic drugs as part of intersectoral efforts.
Primary school attendance in Latin America and the Caribbean is 92% for boys and 93% for girls (60). At the local level, however, there are significant gaps in access to the school system, and this affects deworming coverage when anthelmintic drugs are only distributed through the educational system.		
Teacher training for distribution of antiparasitic drugs is short, simple, and low-cost, and there is a simple system for administering the drug in this setting (61).		
The school is a familiar place and enjoys the respect of the population. It is the gathering point for all kinds of community events and a strategic setting for food supplementation and balanced feeding (8).		
One school-based experience is the FRESH Initiative (Focusing Resources on Effective School Health) sponsored by the World Bank and other partners. It has four components: health-related school policies, provision of safe water and sanitation facilities, skills-based health education, and school-based health and nutrition services (34).		
Some of the organizations and partners involved in activities targeting schools might be interested in participating in deworming integration strategies.		

### Growth and Development Monitoring Programs

These programs provide an opportunity in countries where they continue into school-age.	Determine what percentage of the population at risk for STH is reached by the program and select strategies to cover the children who are not regular participants.
After the age of five years, growth and development are monitored once a year, which would facilitate the administration of antiparasitics at each monitoring visit.	

The conditions that components or programs ideally should offer to facilitate integration of deworming to control soil-transmitted helminths are described in Table 8. **The score assigned each ideal condition is contingent on the experience and developmental state of the components in each country.** On some occasions it will not be possible to identify a single component or

program that has all the ideal characteristics. In such cases, deworming activities can be attached to more than one program or adapted to a program that is already underway. These decisions will depend on the findings of the assessment conducted in each country or subnational area and on the most feasible alternative from the operational standpoint.







## 4. Operational framework

### 4.1. Steps for implementing deworming activities at the national and subnational level

Since this is a general overview, the steps described below (which are not necessarily consecutive) can be tailored to existing programs and integrated initiatives, program development levels, previous deworming activities, existing epidemiological studies, coverage levels achieved, and so forth.

It is helpful to organize a work team to reinforce advocacy and coordination among public health components and programs for the implementation of deworming activities. The team could include professionals from the following fields: epidemiology,

environmental sanitation, drugs, communicating for health, planning, services delivery, and information systems, as well as academics. If the integrated deworming plan is to be implemented at the subnational level, then the composition of the work team should reflect local circumstances. Indeed, it may not be necessary to form a new group. The issue of deworming could be added to the agenda of existing committees or groups, which will facilitate integration.

In light of the above, Table 9 proposes some next steps, which are not necessarily sequential and in some cases could be taken simultaneously.

**Table 9.** Steps for integrating deworming into other public health components or programs

1. Conduct an epidemiological situation analysis of STH (baseline studies on prevalence and intensity of infection)
2. Mount an advocacy effort to obtain political buy-in, and identify and establish partnerships for implementation
3. Draft and implement a plan integrated into public health components or programs
4. Conduct monitoring, evaluation, and operations research

#### STEP 1: Conduct an epidemiological situation analysis of STH

The national, subnational, and local situation of STH (baseline) can be assessed through epidemiological studies and infection mapping exercises that elicit two basic indicators: prevalence and intensity of infection. This step is key to determining which population groups require deworming, the number of people who will need deworming, required annual cycles or rounds, and program duration and impact, etc. These and other data will help to determine which programs would be most conducive to the integration of deworming activities. Data on STH prevalence and intensity can also be obtained from earlier studies or be estimated using other indicators to identify areas at risk of STH transmission. Guidelines are available with detailed information on how to estimate those indicators (42). One such indicator is the percentage of population without access to improved basic sanitation facilities. Each country should obtain

the most reliable and recent information available. It is also necessary to seek, compile, and analyze information on existing deworming programs for preschool and school-age children and include it in the situation analysis.

Given that STH infection is related to communities' ecological, social, and economic conditions, the situation analysis should include indicators that make it possible to determine the status of access to safe water, basic sanitation, housing-related aspects (dirt floors), education, use of footwear, and hygiene practices. This information can be used to do an analysis of the determinants of the persistence of STH transmission in the community. Baseline data will enable not only determining whether at-risk population groups need deworming, but also the selection of intersectoral interventions that should be implemented to reach the goal for STH infection control.

## STEP 2: Mount an advocacy effort to obtain political buy-in; identify and establish partnerships for implementation

The next step is to present the magnitude of the problem to the national authorities, and the ministries of education and health in particular, including prevalence and social and economic consequences, as well as prior experiences with the control of STH and the social and economic benefits of combating these infections. In order to sustain the presentation it will be necessary to use the available reports in that country and not to have them state the experiences of countries with similar conditions.

While interventions to control STH are in place in some countries, in others these activities are only sporadic and lack systematic programming. In many instances, infection prevalence and intensity is unknown and as a result, there are no indicators in place to measure the magnitude of the problem or the impact of the interventions. Advocacy is a critical tool for establishing or improving mass deworming programs.

**1. Advocacy objectives.** Advocacy is carried out with the following objectives:

- Show that STH are a public health problem that must be addressed and placed on the public health agenda.
- Demonstrate that the best way to control STH is through mass deworming of the at-risk population, rather than treating confirmed cases individually, complemented by efforts to act on determinant factors such as access to improved sanitation facilities, safe water, and housing with non-dirt floors, footwear use, health education, etc. This makes it possible to strengthen the concept of an intersectoral approach to STH infections and, as a result, the shared sectoral responsibility for local interventions addressing determinants.
- Argue and persuade the relevant authorities that based on myriad experiences in many countries, the best way to control these diseases is by integrating mass deworming activities into existing public health components and programs.

**2. Internal advocacy<sup>1</sup>—internal positioning.** In light of the above, and depending on how much progress has already been made in each country, internal advocacy can, for example, include the following:

- An initial meeting is held with representatives of the ministries of health and education—which PAHO and other partners or allies could also attend—to present the proposed objectives, backed by statistical data from each country (preschool and school-age population, prevalence and intensity of STH, leading causes of morbidity and mortality in the target age groups with an emphasis on malnutrition and anemia; absenteeism and dropout rate, percentage of school-age children who do not attend school, percentage of children who attend public preschools, etc.). The goal of this and subsequent meetings is to secure a national political decision to integrate deworming into an existing program. These projections can also be delivered to national or subnational committees for the control and elimination of neglected infectious diseases, which already have high-level political backing in order to achieve their goals.
- This is followed by meetings or workshops with technical staff from both ministries (especially the heads of programs to which deworming will be added) to come up with a plan that coordinates and lends cohesion to the various steps and to try to organize the work team mentioned earlier.
- The next step, once the points outlined above have been addressed and national buy-in obtained, is to hold advocacy meetings with subnational health and education authorities at each of the country's political-administrative levels (department, state, province, canton, etc.). The purpose of these meetings is to present the objectives, discuss data and statistics on STH at each level, if they are available, and reiterate the need to determine which geographical areas are most affected by STH in each region in order to program activities more realistically and prioritize resources.
- Finally, advocacy must also take place at the level of local authorities in municipalities or population centers. Once the objectives and rationale

<sup>1</sup> Internal refers to advocacy targeting decision-makers for a particular program.

have been explained, it is hoped that local and municipal health and education authorities will take ownership of the deworming program and of addressing the determinants of the persistence of the disease; likewise, they will hopefully make it one of their core functions, since the interventions are actually carried out at this level.

**3. External advocacy processes.** Based on the objectives of the advocacy effort, and with buy-in from the central level, it is equally important to take it to other sectors since the goal is to create an integrated, rather than vertical, deworming program whose implementation will involve multiple social stakeholders.

To this end, when implementing or strengthening a deworming program, it is useful to make contact with the following partners and allies:

- Academia: mainly scientific institutions and human resources educators in the health and education fields.
- Professional trade associations: Professional trade associations: it is essential to have the backing of teachers, physicians, and nursing associations, among others.
- Grassroots organizations: parent's associations or school representatives, groups of consumers of health services, community mothers, etc.
- Mass media (radio, press, television).
- Faith-based organizations (FBO): religious congregations, priests, pastors, etc.
- Partner agencies and international allies, such as PAHO/WHO, UNICEF, WFP, World Bank, DFATD, JICA, Inter-American Development Bank, the Global Network for Neglected Tropical Diseases led by the Sabin Vaccine Institute, etc.
- Nongovernmental organizations that serve children and families.
- Pharmaceutical companies that manufacture and donate antiparasitic drugs.
- Grassroots community organizations: e.g., associations of community mothers, women heads of household, rural organizations, among others.

Once a plan has been developed in a country or region, it is hoped that the advocacy efforts in all these settings will mobilize resources and society in order to optimize program coverage and commitment and make sure the interventions reach the groups that need them most.

Political commitment should be a natural consequence of advocacy. Deworming should be part of the health policy in all countries in the Region where children are living in areas at risk of transmission of soil-transmitted helminth infections. Ideally, these efforts should lead to a legal mandate, guidance, or standards that reflect the commitment of the ministries of health, education, housing, the environment, and so forth. This step is crucial from the hierarchical and strategic standpoints since it goes a long way in ensuring that the program will indeed go forward at the other levels.

**4. Partnering.** Experience has shown that partnerships, which can be with international organizations (e.g., PAHO/WHO, WFP, UNICEF), NGOs, FBOs, and grassroots organizations, are quite valuable, both for plan development and implementation, and for resource mobilization, integration of deworming, and its implementation. They are also indispensable for obtaining resources and support for developing and implementing the STH infection control plan, goal setting and developing useful and feasible indicators, and for seeking participation of the community, the health services, and other institutions or sectors.

It is important to map the potential partners at the local level with whom partnerships can be developed, not only to carry out deworming, but also to address the determinants of the maintenance of the cycle of transmission. The map can include the partners' structures, functions, capacities, and actions, which can be used to determine the best way to integrate them into STH infection control measures. Often, local partners and allies have alliances among themselves, which means that linking them to the STH infection control plan will have value added.

### STEP 3: Draft and implement a plan integrated into public health components or programs

If the first steps are carried out, there will be a good level of support and sufficient instruments in hand to develop a plan with clear objectives, realistic time frames, and interventions of proven effectiveness (62). The initial plan must include integration of deworming into other health programs, to carry out short- and medium-term actions. However, national and subnational plans can also include from the start the integration of actions to address the determinants of the persistence of STH transmission in the community (access to improved water, basic sanitation, education, and hygiene). The third step includes the following actions:

1. **Identify the at-risk population and geographical areas where deworming activities will be implemented.** Both of these should be selected based on the most up-to-date mapping of STH prevalence in each district or region. The percentage of people without access to improved sanitation facilities can be used as an alternative indicator to calculate the size of the at-risk population.
2. **Identify the components or programs into which deworming activities will be integrated.** After a) the advocacy effort has been carried out, b) national or subnational authorities have made the decision to carry out or reinforce deworming activities, and c) at-risk geographic areas and age groups have been identified, the planning team will determine which program or programs are best suited for integration. Some recommendations for doing this are provided below:
  - Review the basic characteristics that a program that might integrate deworming activities needs to have (see Table 5) and use them to identify actual components or programs where these activities could be integrated in each country (see Tables 6 and 7). It will also be necessary to assess current levels of development, coverage, infrastructure, financing, human resources, and other aspects of each of those programs.
  - Develop a proposal including the most suitable programs for integration based on the review

mentioned in the previous point. Remember that one or more components or programs can be selected for each age group. In addition, specific programs can be integrated for a particular area based on its epidemiological conditions and needs.

3. **Coverage.** According to PAHO/WHO guidelines, deworming coverage of at least 75% of the at-risk population can contribute to the control of STH.6 Consequently, this is the minimum percentage of coverage of the preschool and school-age population.
4. **Procurement of drugs and supplies.** At the national level, the ministry of health will be responsible for ensuring the availability of drugs and establishing procedures for their procurement, distribution, and final delivery to the target population. If deworming is going to be carried out in certain areas of the country, the person who will be responsible for that process should be identified. It is important to bear in mind that PAHO/WHO has global agreements with the pharmaceutical industry for the donation of drugs for neglected infectious diseases, including soil-transmitted helminth infections. As a result, any country or region that is planning to carry out mass deworming should contact the PAHO/WHO Representative Office in the country or visit the Organization's website to find out the requirements for requesting the donation. Donations of anthelmintic drugs that come through PAHO/WHO (albendazole and mebendazole) are for school-age children. At the latest, the Ministry of Health should make the donation request by 15 August in the year prior to the year for which deworming has been programmed (e.g., if deworming is planned for 2015, the donation request should be made by 15 August 2014 at the latest). To apply for a donation, each country must submit a report on the previous year's preventive chemotherapy activities, the donation application form, and the annual work plan for the year in which the deworming rounds will be done. More information on the donation process is available at [http://www.who.int/neglected\\_diseases/preventive\\_chemotherapy/reporting/en/](http://www.who.int/neglected_diseases/preventive_chemotherapy/reporting/en/).

Anthelmintic drug management and quality assurance must adhere to national procedures and standards.

**5. Distribution and storage.** Distribution from the central area to the departments, states, districts, provinces, or municipalities should follow the procedures established for this purpose in each country and make use of existing infrastructure. If these procedures are either absent or unclear, this is an excellent opportunity to strengthen them, which would benefit deworming activities and other programs with a drugs component. Antiparasitics take up very little space (an estimated 250,000 tablets in packages of 200 take up 1 cubic meter of space) (34,42). Drugs should not be stored where they will be exposed to extreme temperature or moisture. The system to monitor quantities of drugs available and distributed, expiration dates, batch number, and other data, should be closely supervised (this is commonly done by the country's drugs management system). Logistics may differ at each site, depending on available resources, ease of access to the community, the programs identified for integration of deworming, available trained personnel, length of the cycle (one day, one week), and other factors. When planning distribution and storage, take into account educational materials, records, and other necessary supplies for the deworming rounds.

**6. Logistics for joint delivery of antiparasitics and supplies for other public health interventions.** The most efficient channels in each region should be tapped to deliver antiparasitic drugs to vaccination posts, schools, and health centers. These drugs can be distributed through the same channels used for vaccines, food supplements, and other drugs or supplies can be used for this purpose. Since antiparasitics do not require a cold chain or any of the other special conditions that vaccines require, each country can look for the most expeditious and cost-effective way to deliver them, always taking care not to interfere in the operations of the component or program into which deworming activities have been integrated.

In addition to the antiparasitics and educational materials described earlier, each distribution point must have drinking water, cups for the children, and spoons to crush the tablets, especially for administration to children ages 12 to 24 months (Annex 2).

**7. Personnel and training needs.** Training should be provided to all staff responsible for administering antiparasitics at each site. This includes staff from other programs who will participate in distribution of anthelmintics in health posts (vaccinators, people responsible for providing other drugs, etc.), as well as staff in schools, rural areas, or responsible for house-to-house visits. The training can be delivered in district, provincial, or departmental capitals. It is more practical and cost-effective to concentrate the training in one city, than to send one or more teams to each location or municipality. It may also be useful to apply the cascade training strategy, in which a group that has been trained can in turn train colleagues in their workplace as a cost-saving measure.

Very little staff training is required to perform deworming activities (6). The training proposal in Annex 3 outlines a four-hour session for approximately 30 to 40 participants that can be delivered to vaccinators, teachers, and community health workers, among others (42). The session should include how to administer drugs based on the age of the children and what to do in case of choking (Annex 2) (63).

If resources are available, a brochure or pamphlet could be designed to offer a more visual explanation of the types of infection, the consequences of STH, and how to prevent new infections (7). These materials would be designed with parents and other social stakeholders like teachers, community health workers, and local health teams in mind and anyone administering the antiparasitic should be familiar with them. In this way, the materials can be used to promote the program and facilitate community outreach. Sample materials are provided in Annex 4.



**8. Type of antiparasitic delivery as part of activities integrated into other component or programs.**

There are two ways to deliver antiparasitics to the population:

- **Individual deworming.** In some countries, the antiparasitic is administered to every child who visits the health services, for services such as vaccination, medical care (outpatient services, emergencies), or growth and development monitoring, and who did not receive antiparasitics during the previous cycle as part of his or her individual health care. Figure 4 illustrates opportunities for deworming when it is integrated into individual care, such as vaccination, although the process is similar in other programs.

- **Mass deworming.** Deworming days or campaigns can be scheduled to coincide with vaccination days. It can also be included in regular scheduled events such as National Health Week (in Mexico, for example) (64), Children’s Day, and so forth.

Ideally, both approaches should be available to ensure broader coverage. When an antiparasitic and an injectable vaccine are to be administered in the same visit, the antiparasitic should be given first to make sure that any crying and pain caused by the vaccine does not hamper administration of the anthelmintic.

**Figure 4.** Opportunities to deworm children in the health services



If a child seen in any of the services requires deworming, he/she should be referred to a program or service that administers the drug on site.

Source: Pan American Health Organization. Regional Program of Neglected Infectious Diseases, Washington, DC., 2012.

**Table 10.** Packages of STH control measures

Basic Package	Optimal Package
Drugs available in the health services	The basic package plus interventions that target the determinants of STH infection: access to safe water and improved basic sanitation facilities; improved housing, particularly without dirt floors; and health education to improve hygiene
Periodic treatment for high-risk groups (mass deworming)	
Hygiene education	

- 9. Calculating drugs and supplies.** The target population is identified using the most recent population data. In this case, it includes all children ages 1 to 14 living in endemic areas. The estimate should take into account the number of rounds per year based on prevalence and the number of children between 1 and 2 years old in the case of albendazole, since they require a half dose (Annex 5) (34,65).
- 10. Social mobilization plan.** Family and community support is the most important element in the sustainability of deworming programs. Community participation and social mobilization are key, and should not be regarded as secondary to drastically reducing intestinal parasitism. An active and committed community can do much to ensure that the benefits reach the majority of the target population, especially those most in need of them. That being the case, the community must be engaged from the outset and in all stages of the program. Investment in social mobilization is pivotal to achieving broad coverage (6). Social mobilization should not be confined to antiparasitics delivery, however. More specifically, it should help bring about change in people's knowledge, attitudes, and habits; even more, it should attempt to act on determinants related to water, basic sanitation, and hygiene.

The three components mentioned in previous chapters, particularly in Box 1, are contingent on family and community buy-in and support and on the integration of intersectoral actions in places that, due to their ecological, social, and economic conditions, are conducive to maintaining the cycle of STH transmission. The application of these three lines of action in a community will depend on available resources and coordination among the sectors in charge of the interventions. There are two packages

of services that can be implemented in populations at risk for STH infection: a basic package, for more precarious financial situations, and an optimal package, for use when resources and intersectoral coordination permit (Table 10) (4).

Health education must take place even in the most difficult circumstances so that families not only support the deworming campaigns but also learn to practice proper hygiene in the home.

*How to ensure community participation.* Although early deworming activities, as indicated by national guidelines, are organized vertically—from the ministries down to the local health services—at the local operational level, a cross-cutting approach should be used in planning, implementing, and monitoring a deworming program. It will require the collaboration of the staff responsible for the program into which deworming activities will be integrated and with other social stakeholders, at every stage. Therefore, a local intersectoral committee should be set up in each municipality or population center when organizing a local program. Steered by the local health and education authorities (municipal health and education secretaries, hospital or health center director, school principal), the committee should take advantage of existing meetings or committees to avoid duplication. From the outset, the intersectoral committee should have representatives from the community, such as health services consumers associations and school parents, community health workers, community mothers, the media, the religious community, and others. The participants at each site will be elected based on their availability and the potential benefits they bring to the program.

*Community representatives and leaders participate in, among others:*

- A simple training on STH that teaches the following: What are intestinal parasites, how are

they acquired, and what are their consequences?; How are they treated and how can they be prevented (antiparasitics, health education, environmental sanitation)? (Annex 4).

- Planning processes to integrate deworming activities.
- Focus groups to assess local STH status.
- Processes to identify the at-risk population.
- The review of materials for dissemination (to make sure the language used is accessible to the community).
- Feedback: that is, they should be informed about coverage, supplies, achievements, and any problems that have been detected, among others.
- Community announcements about campaigns (dates, schedules and antiparasitic distribution sites, periodicity, drug safety, side effects, etc.).
- Administration of antiparasitics in the case of teachers and community health workers. These participants should receive a different training (see Annex 3).

Community representatives and leaders serve as multipliers of knowledge about the harmful effects of intestinal parasites and how to combat them. As such, they help galvanize the social mobilization necessary for achieving optimal coverage. These initiatives must go hand in hand with mass dissemination strategies involving radio, press, and television, as well as leaflets, posters, and other materials.

**11. Identifying costs and financing sources.** The planning process must include a cost analysis for use in drawing up a reasonable budget that ensures program sustainability (data on costs for advocacy is also important). Financial resources may come from the ministry of health, local governments, municipalities, donors, international organizations, pharmaceutical companies, or a combination of these sources. A sample calculation of drug needs and costs is provided in Annex 5 (65). In addition to the drugs, it is necessary to clearly identify costs associated with the logistics of deworming activities integrated into other programs, activities, or components; human resources and training; a records and information system; and supervision, monitoring and evaluation. Although integration is recommended to optimize the use of limited

resources, it is still necessary to include the costing mechanism and calculate the costs of the integration throughout the planning process.

**12. Information system.** Integrating the information system into existing systems or strengthening it as part of the integration process is recommended.

*Information collection and flow.* Every deworming location should keep a daily log of children who have been given the drug directly. Each child should be registered by age group, sex, and ethnic group (see Annex 6). At the end of the month or periodically until the end of the campaign, each drug administration site (vaccination post, health center, growth and development monitoring site) should prepare a consolidated report to submit to the local health authorities responsible for the program. This information is vital for ascertaining progress with coverage and identifying difficulties and any necessary corrective actions, according to the baseline established in the planning process. Every area, municipality, or location sends the consolidated reports to the subnational level, where they are consolidated again and forwarded to the national level and from there to the Regional/global level (PAHO/WHO). Each country will establish the reporting schedule.

In order to avoid duplication, verify which individuals were dewormed in the previous cycle, and notify mothers of the date of the next drug dosage, the name of the drug, date it was administered, and date of next dosage (in six months or one year) should be noted on each child's vaccination card. When integrating deworming activities into vaccination or other programs, it is strongly recommended that the vaccination cards include a space to record the antiparasitic dose, which has, among others, several advantages:

- Most children already have a card.
- Most mothers and health posts recognize it.
- Mothers do not need to carry additional documentation.
- Antiparasitics are accorded the same importance as vaccines.
- Antiparasitics become compulsory, like vaccines.
- It aids health officials and families in monitoring



each child's deworming status.

- It only includes recorded doses of antiparasitics (just as with vaccines). Doses that are not recorded are considered missing, which greatly improves the quality of coverage records.
- It is used for preschool and school-age children.

*Data collection and analysis.* Data should be analyzed by sex, ethnic group, and age group. It is also important to assess data quality, making sure, among other things, that the dosages of antiparasitics administered and the number of individuals registered as having received the drug are consistent, that coverage levels do not exceed 100%, and that all the forms are from the same program round. Corrective measures should be taken as necessary based on the findings of this analysis.

**13. Monitoring.** See Step 4, below.

**14. Schedule and responsibilities for deworming preschool and school-age children.** The national plan should include a calendar of activities and time frames and identify who will be responsible for each one. Every aspect must be clearly defined. The work calendar should include all natural and legal persons involved in the activities, especially representatives of social stakeholders and sectors outside the health sector.

A sample national work calendar is provided in Annex 15 and one for local use in Annex 16. Each work calendar will vary according to the circumstances in each country and the program or programs selected for integration of deworming activities.

A checklist of the basic elements in the planning, implementation, and monitoring of deworming activities is provided in Annex 17. Finally, a list of addresses for website where additional information can be found on implementation of deworming actions is provided in Annex 18.

**Integrating deworming activities into programs for school-age children (with the education sector).** From the outset, the plan developed and implemented in each country should include deworming integrated into the school system. Using school infrastructure to administer antiparasitics is

among the simplest, most cost-effective, and efficient methods for treating a large number of school-age children and has become a cornerstone in the control of neglected tropical diseases around the world. Every year, hundreds of teachers administer antiparasitics to their students and deliver health education messages to students and parents (42).

The strategy for integrating deworming in the schools follows virtually the same steps described previously, with the following variations:

- **Staff training:** The aim is to ensure that at least one teacher in each school can administer the drug, fill out the forms, and deliver health education and environmental sanitation messages. The materials provided in Annexes 1, 2, and 3 can be used for this training.
- **Logistics of drug and supplies distribution:** The channels in place for the vaccination program can be used for distribution from the central to the local level; in other words, from the ministry of health to the subnational and municipal health authorities. Local health and education authorities will conduct a census of school-age children and will distribute the supplies to each school. These authorities, in conjunction with other local participants, will also be tasked with scheduling deworming dates and days.
- **Costs and budget:** for every million children treated, some US\$20,000 should be budgeted for drugs and \$33,000 for components such as training, distribution, and monitoring (61). The country can access drug donations from PAHO/WHO, thus saving money, which it could reallocate to drug distribution and monitoring and evaluation.
- **Data collection and consolidation:** Each school must send all record forms and a condensed report to local program managers (education and health authorities). They will consolidate the information, forward it to the district level, and provide feedback to all the participants in the round. It is recommended that the schools use one form to record the treatment administered to each child (Annex 13) and another to record treatments administered on a mass scale during a deworming day or campaign (Annex 14). The latter facilitates the registration of a large number

of children in one day since it only requires filling in a circle for each child in the sex and age columns.

- Community participation and social mobilization: The advantage of integration into the school system is that the school is an ideal venue for delivering health education, whether through assignments given to students, parent meetings, articles in the school newspaper, and so forth.

#### STEP 4: Monitoring, evaluation, and operations research

Monitoring and evaluating deworming activities are important, because this is less a supervisory activity than a system for monitoring program workers that is capable of detecting problems that might arise during the activity and intervening in a timely manner. Monitoring drug coverage is the first step, and a critical one, since it is impossible to assess a program's performance without reliable information on its coverage (9). Staff responsible for deworming at the local and national levels should know how many of the individuals requiring treatment actually received it, and when and where it was administered.

Deworming program managers can use quantitative results obtained from drug monitoring to:

- Determine actual coverage levels, which facilitates decision- and policy-making for the control of STH.
- Detect difficulties encountered in mass treatment rounds and identify sites where the number of individuals who received antiparasitics was lower than planned.
- Generate accurate information for health authorities, donors, partners, and support groups on the way in which the activities are being implemented. This in turn, helps maintain confidence in the program and enhances its sustainability over time.
- Provide feedback to workers and volunteers involved in the strategy or program on the results of their efforts, which helps keep field teams committed.
- Strengthen trust by notifying target communities that coverage targets were achieved.
- Boost public confidence and reinforce the work of the health teams by raising awareness that

many people are receiving treatment; maintaining adequate coverage levels strengthens advocacy efforts.

- Elicit information to improve accuracy when estimating future drug needs (67).
1. **How to monitor deworming coverage.** Monitoring and evaluation should include the following steps:

*1.1. Define and measure coverage.* Coverage is the percentage of individuals in a defined age group that received the drug relative to the targeted number of individuals or defined population. The defined population may be: a) a target group for treatment, for example, school-age children; b) the population in a geographical region, administrative area, or highly endemic communities, or c) the entire population of a country. These three categories are referred to as program coverage, geographic coverage, and national coverage, respectively (65). Deworming activities should cover at least 75% of the population defined in each round, since this percentage contributes to control of the disease.

The three categories of coverage mentioned above should be monitoring when deworming is conducted in a country. A country may decide to initiate deworming in certain priority geographical areas or only in schools; however, the goal should be to cover the entire at-risk population in the country. For example, a country can report satisfactory deworming coverage in a program (e.g., a program to deworm public schoolchildren), but it may be that its coverage only applies to a few geographical areas and not to all where deworming is needed. As a result, it is useful to monitor all three types of coverage to measure deworming performance.

**Program coverage.** In some cases, such as a deworming program targeting children enrolled in school, the target is confined to a group of individuals within a defined endemic area that is covered by a specific program that has integrated deworming.

$$\frac{\text{Number of individuals in the defined population who took the drug in a given identified endemic area and in a specific program}}{\text{Total number of individuals selected to receive treatment}} \times 100$$

Using this formula, if a country decided to begin deworming children enrolled in schools in a single region of the country (e.g., a coastal area where 95,000 children are enrolled in school), the calculation would be as follows:

- Number of people selected to receive treatment: 95,000 children enrolled in coastal area schools.
- According to the country's reports, 85,000 children enrolled in coastal area schools were dewormed.

$$\text{Program coverage} = 85,000 / 95,000 \times 100$$

Thus, program coverage is 89.5%.

**Geographic coverage.** This is an indicator of program expansion in a country. It refers to the percentage of administrative units that are implementing the program relative to the total units that should be covered by a particular control program.

$$\frac{\text{Number of endemic administrative units in which deworming is carried out}}{\text{Total number of administrative units where deworming is required}} \times 100$$

The objective is to achieve 100% coverage of the administrative units as soon as possible.

Using this formula, if a country recognizes that three of its five geographical regions require deworming actions (coastal area, plains area, and Amazon area) for children enrolled in school, but at this time actions are only being carried out in the coastal area, the calculation would be as follows:

- Number of endemic administrative units where deworming is being implemented: coastal area
- Number of administrative units where deworming is needed: three geographical areas: coastal area, plains area, and Amazon area

$$\text{Geographic coverage} = 1/3 \times 100$$

Thus, geographic coverage is 33.3%.

**National coverage.** This is the percentage of individuals in the country that have received the drug relative to the total number that require deworming (65).

$$\frac{\text{Number of individuals that received the drug in a country}}{\text{Number of individuals that require the drug in a country}} \times 100$$

Using this formula, if a country recognizes that there are 250,000 children enrolled in school in the three geographical regions that require deworming actions (coastal area, plains area, Amazon area), but, that at this time, deworming has only been done in the coastal area, which reported 85,000 children treated in the deworming round, the calculation would be as follows:

- Number of individuals who received the drug in the country: 85,000
- Number of individuals who require the drug in the country: 250,000

$$\text{National coverage} = 85,000 / 250,000 \times 100$$

Thus, national coverage is 34%.

The WHO manual on monitoring coverage for preventive chemotherapy (65) provides additional information on calculating the indicators described.

**1.2. Coverage reporting.** It is very important to report coverage at the subnational and national levels, for the reasons outlined above in 1.1. The information should be shared with health and education authorities, donors, health workers, representatives of social institutions, the media, and family, underscoring the coverage outcomes and their benefits.

**1.3. Feedback.** This is key to maintaining the interventions. This activity is useful for:

- Advocating for expansion of the deworming program or activities when it has been decided to begin in priority areas.

- Recognizing and thanking all those who worked on the program.
- Improving the quality, completeness, and timely submission of data collection forms.
- Fostering team spirit and a sense of ownership of the program.
- Boosting the confidence of workers and the community in the next program round (65).

*1.4. Integration with other monitoring and evaluation systems.* In cases where deworming is integrated into another program that has its own monitoring and tracking system in place—as is the case with the EPI—it is not difficult to adapt the monitoring component. It is simply a matter of adding one more element to it (as if it were a new vaccine in the program). The EPI monitors coverage disaggregated by biological product, age, sex, and rural or urban place of residence, side effects, vaccination refusal, etc. If the deworming activity is integrated into a program that does not have a monitoring and evaluation component in place, then the integration process can be used to create one to the benefit of both programs.

- 2. When and how to monitor coverage.** Monitoring and evaluation of deworming coverage should be done at the end of each deworming cycle or round, according to the sphere of implementation.

*2.1. Local level:* Municipal or community records of the drugs administered in each round are monitored, including deworming sites and programs such as schools, vaccination posts, food and vitamin A supplementation programs, health centers, door-to-door activities, and others. A deadline for submitting the consolidated report is established for each implementation level. In addition to submitting the report, the information should be disseminated among the entities and individuals that participated in the round.

*2.2. Intermediate subnational level.* At the end of each round, once all of the municipalities have submitted their reports, the data are

completed, reviewed, and compiled, and the condensed report is forward to the national level within the established time frame.

*2.3. National level.* The reports from each district or subnational level is reviewed as needed and a national summary is prepared for dissemination among the relevant national and international entities, including cooperation agencies and sectors outside the health sector.

At each level, it is recommended to compare actual coverage with program targets, detect problems related to supplies, community participation, and serious adverse effects, among others, and take measures to correct them. Monitoring and evaluation should be substantiated by a minimum set of indicators, as discussed later on.

Monitoring at each level should always include an assessment of data quality and information flow. To this end, the following steps are recommended:

- Verify that all the forms and other necessary inputs are on site when the round begins.
- Determine how many forms from the local level reach the intermediate level.
- Determine how many forms arrived at the intermediate level by the deadline.
- Determine how many forms reached the national level by the deadline.
- Verify the accuracy of peripheral records through interviews conducted with the community in sentinel sites; the team that kept the records should not be involved in this process.
- In areas where endemicity is more intense, provide specialist advice.

**3. Indicators that should be monitored.** Three classes of indicators will need to be used, the use and frequency of which are shown in Table 11 (6,42). These indicators can be integrated in the health situation analysis rooms, health observatories, or other national initiatives that monitor public health actions and their impact.

Process and performance indicators are used for monitoring beginning prior to implementation of the deworming activity. Performance and especially

impact indicators are used for the evaluation, as summarized in Figure 5.

Examples of indicators, their use, and the targets to be measured are provided below. It is hoped that each country will adopt the indicators it deems essential to its program. The forms used to obtain these indicators, which are provided in the annexes to this document, can be tailored to national circumstances. While the indicator tables refer to schools and teachers in the assumption that deworming will be integrated into the school system, the same indicators can be used for other programs as well. Indicators can be monitored in the administrative unit where the deworming activities are carried out, which is also where optimal results should be obtained for every indicator.

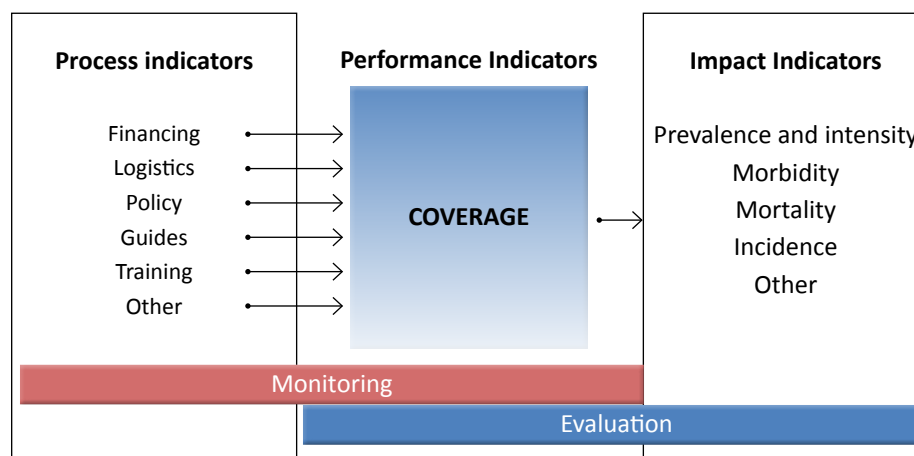
**3.1. Process indicators.** These indicators concern the operational aspects of the program while it is underway. Once the program has been launched, the first activity that should be monitored is the availability of antiparasitic drugs (purchase or donation, importation, date of arrival, quantity available, drug quality, expiration date, subnational and local distribution). Training for staff responsible for administering the drugs, educational materials, recording forms, and other supplies should also be monitored (42). Several process indicators, their use, how they are measured, and their targets are listed in Table 12.

**Table 11.** Category of indicators, use, and collection frequency

Category of Indicator	Use	Collection Frequency
Process	Determine whether the materials for the deworming program are on site and in proper condition (for example, inputs and supplies such as drugs, water, glasses, registration forms, etc.)	Each antiparasitic treatment round
Performance	Evaluate whether the coverage target was achieved.	Each antiparasitic treatment round
Impact	Evaluate whether the program has had an impact on health.	At the beginning to establish the baseline, and every five years thereafter

Source: World Health Organization. Helminth control in school-age children: a guide for managers of control programmes. Second edition. Geneva, 2011.

**Figure 5.** Use of indicators in the monitoring and evaluation



Source: World Health Organization. Monitoring Drug Coverage for preventive chemotherapy. Geneva, 2010.

Table 12. Process indicators

Process indicator	Measurement and Source (expressed as numerator/denominator)	Use	Targets
<b>Drug quality<sup>a</sup></b>	Quality report (Ministry of Health). Expiration or use-by date.	To evaluate the efficiency of drug supply and storage systems.	Drugs were received at least 2 years before their expiration or use-by date.
<b>Drug availability<sup>a,b,c</sup></b>	Quantity of drugs received/quantity required. Example: 150,000 400 mg tablets of albendazole received / 150,000 400 mg tablets of albendazole required = 100% of the required drug was received.		100% of the necessary drugs were received on time.
<b>Distribution to peripheral units<sup>a,b</sup></b>	No. of sites <sup>d</sup> that receive the drug on time in the proper quantity / Total sites designated for deworming activities. Example: 40 sites received the required quantity of albendazole prior to the deworming day/ 45 drug distribution sites = 88% of drug delivery sites received albendazole on time.		100% of distribution sites received the drugs on time and in the proper quantity.
<b>Drug shelf life or expiration<sup>a,b,c</sup></b>	No. of tablets that expired in storage/No. tablets received. Example: 0 tablets expired/ 150,000 tablets received = 0% of expired tablets. In addition, drug loss due to inadequate storage conditions, especially with regard to temperature and humidity, can be monitored.		Less than 5% of the tablets were expired.
<b>Availability of registration forms<sup>b,c</sup></b>	No. of sites that received the forms on time and in the required quantities / Total sites designated for deworming activities. Example: 45 sites received the forms on time and in the proper quantities/ 45 drug distribution sites = 100% of drug distribution sites received the forms on time and in the required quantities.	To evaluate the efficiency of distribution of support materials.	All the sites received the forms.
<b>Availability of health education material<sup>b,c</sup></b>	No. of sites that receive the materials on time and in the required quantity/Total number of sites that carry out health education activities. Example: 40 sites received the materials and in the required quantities/ 50 sites carry out health education activities = 80% of sites that carry out health education activities received the materials on time and in the required quantities.		All the sites received the materials in time to prepare the educational sessions.
<b>Availability of training materials<sup>b,c</sup></b>	No. of facilitators who received the material on time and in the required quantity/Total sites designated to deliver training. Example: 40 sites received the teacher training materials on time and in the required quantities / 50 sites conduct teacher training activities = 80% of sites that conduct teacher training activities received the materials on time and in the required quantities.		All the sites received the materials on time and in the required quantities.



Table 12. continued

Process indicator	Measurement and Source (expressed as numerator/denominator)	Use	Targets
<b>Number of training sessions<sup>b,c</sup></b>	The data can be taken from the program forms.	To determine whether the activities were sufficient.	At least one teacher at each school is trained in health education, drug administration, and filling out the forms.
<b>Number of schools with at least one trained teacher<sup>a,b,c</sup></b>	The data can be taken from the program forms.	Evaluate the need to revise training materials.	
<b>Percentage of change in knowledge among trained personnel<sup>a,b,c</sup></b>	Questionnaire for staff members trained: pretest and post-test.		

<sup>a</sup> Indicators recommended for the national level.

<sup>b</sup> Indicators recommended for the subnational level.

<sup>c</sup> Indicators recommended for the local level.

\* Depending on which program has been chosen for integration of deworming activities, site can refer to districts, schools, vaccination posts, health centers, etc.

Source: World Health Organization. Helminth control in school-age children: a guide for managers of control programmes. Second edition. Geneva, 2011.

3.2. *Performance indicators.* They evaluate program success vis-à-vis the target population. They evaluate the number and percentage of participating institutions and children who received the antiparasitic (target population that received the antiparasitic) and health education interventions. The data are extracted from the forms filled out when the drug is administered. The most

important indicator is coverage, which WHO uses to monitor each country's progress towards the target of reaching at least 75% of children (42). These indicators should be compiled at the end of each deworming round. Some performance indicators and their recommended use are listed in Table 13.

**Table 13.** Performance indicators

Performance Indicator	Measurement (expressed as: numerator/denominator)	Use	Target
<b>Percentage of schools participating in the program</b> <sup>a,b,c,d</sup>	No. of participating schools x 100/Total schools in the selected area  Example: 28 schools participated in the distribution of antiparasitics in El Cálido municipality / 32 schools in El Cálido = 87.5% of schools in El Cálido municipality participated in the distribution of antiparasitics.	To evaluate the scope of the program and its significance in the school system.  Optimize the quantity of drugs supplied to the sites (schools).	>90% of area schools participate.
<b>No. of tablets administered to children</b> <sup>b,c,d</sup>	The data can be obtained from program forms, by tabulating the number of children who received the dosage of antiparasitic. Note: take into account children aged 1 to 2 years that each receive half a tablet of albendazole or one of mebendazole.		More than 90% of the tablets are administered to children.
<b>Percentage of schools with a sufficient drug supply (that received the required amount based on the number of children to be dewormed)</b> <sup>c,d</sup>	No. of schools with an adequate drug supply x 100 /No. of selected schools  Example: 28 schools received the required amount of antiparasitics for the deworming treatment day held in El Cálido municipality / 28 schools in El Cálido needed antiparasitics for that day = 100% of schools in the El Cálido municipality received the required quantity of antiparasitics for deworming day.		Each school received enough drugs to treat both children who attend and those who do not attend school.
<b>No. of unused tablets according to the information provided by teachers</b> <sup>d</sup>	The data can be taken from program forms, counting the number of tablets not used by teachers on deworming day.		Less than 10% of tablets were not used.
<b>Coverage percentage</b> <sup>b,c,d</sup>	No. of school-age children that receive the drug x 100 / Total at-risk school-age children in the intervention area  Note: At-risk individuals can also be used. Example: 135,000 school-age children received antiparasitics on deworming day in El Cálido municipality / 150,000 school-age children in El Cálido municipality = 90% of school-age children in El Cálido received antiparasitics on deworming day.	To determine the percentage of at-risk children that receive the intervention.	>75% of at-risk school-age children given treatment.



TABLE 13. continued

Performance Indicator	Measurement (expressed as: numerator/denominator)	Use	Target
<b>Percentage participated in at least one educational activity<sup>c,d</sup></b>	No. of classes that participated in at least one educational activity x 100 / Total classes in the intervention area  Example: 260 classrooms participated in at least one educational activity in the municipality of El Cálido / 280 classrooms in 28 schools in El Cálido municipality participated in deworming day = 92.8% of classrooms in El Cálido municipality that participated in deworming day attended at least one educational activity	To determine whether enough educational activities are being delivered.	> 90% of classes have participated in health education activities.
<b>Percentage of school parents that attended an educational activity<sup>d</sup></b>	No. of parents that attended an educational activity x 100 / Total school parentse  Example: 4,000 parents attended an educational activity/ 4,400 parents at 28 participating schools in deworming day = 90.9% of parents attended at least one educational activity.	To optimize community participation and social mobilization.	>90% of the parents of school children participate in an educational activity.
<b>Percentage of teachers or skilled educators who were trained</b>	No. of educators trained in STH infection education x 100/ Total educators the intervention area.  Example: 120 educators were trained in measures to prevent STH infection and the benefits of deworming/ 300 educators at 28 schools participating in deworming day = 40% of educators in the intervention area were trained.	Optimize the active participation the educators in education and promotion actions.	>90% of the educators participate in an educational activity.

<sup>a</sup> While the table focuses on schools, it can be another site, based on the program into which deworming is integrated (health centers, vaccination posts, preschools, etc.).

<sup>b</sup> Indicators recommended for the national level.

<sup>c</sup> Indicators recommended for the subnational level.

<sup>d</sup> Indicators recommended for the local level.

<sup>e</sup> Counting at least one parent for each school child.

Source: World Health Organization. Helminth control in school-age children: a guide for managers of control programmes. Second edition. Geneva, 2011.

### 3.3 Impact indicators. The objective of the program is to help reduce morbidity and ultimately the

prevalence of STH by reducing the number of infected children, especially those suffering from moderate to heavy infection. Impact indicators evaluate the program's effects on improving health. Specifically with regard to deworming, they can serve as parasitological indicators—to measure prevalence and intensity of infection, for example—or indicators of morbidity such as degree of malnutrition, anemia, poor school performance, and absenteeism, among others. These indicators are usually measured by specific surveys or studies or by sentinel surveillance in areas where a potential program is being considered or where

interventions have been implemented for a time.

*Parasitological indicators.* Periodic collection of these indicators yields a direct measure of the program's effects on the prevalence of helminth infection and indirectly measures improvement in health status. Specifically, these indicators show whether the percentage of infected children has declined relative to the baseline and whether the number of cases of serious infection has declined.

**Timeline for collecting parasitological indicators.** It takes two years before the health results of interventions in children can be measured using parasitological and

other indicators. The indicators should be measured at this time. Measurements should be taken just prior to the next round in order to obtain accurate information on how much reinfection occurred since the previous treatment cycle, as well as the effect of the treatment.

The most objective way to measure the impact of deworming activities is through parasitological indicators that show changes in prevalence and intensity. Sentinel sites are a practical, reliable, and cost-effective means of obtaining these indicators. Steps for setting up these sites, a list of the necessary materials, the forms to fill out at each site, and a form to evaluate each child from whom a

stool sample is taken are provided in Annexes 7, 8, 9, and 10 (42).

*Morbidity indicators.* These indicators will only show improvement at a site where the program has been underway for some time. Trained staff and specific devices such as scales, stadiometers, and digital hemoglobinometers are required for this. Absent such resources, it will be impossible to collect accurate data, in which case it is better not to use such data. They indicators can be obtained through parasitological studies or at another time. Some impact indicators are presented in Table 14.

**Table 14.** Impact indicators

Impact Indicator	Calculation (expressed: numerator/denominator)	Use	Targets
<b>Parasitological indicators</b>			
<b>Overall prevalence of any STH infection<sup>a,b,c</sup></b>	<p>No. of children with positive results for any of the three STH x 100 / Total children screened for parasites</p> <p>The following formula is used to calculate prevalence for any STH:</p> $\frac{(a + t + h) - (a \times t + a \times h + t \times h) + (a \times t \times h)}{1.06}$ <p>For which:</p> <p>a = prevalence of ascariasis (expressed as a proportion)</p> <p>t = prevalence of trichuriasis (expressed as a proportion)</p> <p>h = prevalence of hookworm (expressed as a proportion)</p>	<p>To measure the effectiveness of control measures.</p> <p>To assess the need to adjust frequency of treatment. For example, if after 5 to 6 years of deworming, prevalence continues to be &gt;50%, mass deworming should be done three times per year. If prevalence is &lt;1%, suspend mass deworming.</p>	<p>Reduction in prevalence over time, especially when drug administration is combined with behavior modification and improved sanitation.</p>
<b>Prevalence of each of the 3 STH<sup>a,b</sup></b>	<p>No. of children infected by each of the three STH species x 100 / Total of children screened for parasites</p>	<p>Prevalence of each STH can differ. Thus, the prevalence of each parasite must be established (<i>A. lumbricoides</i>, <i>T. trichiura</i>, and the hookworms). Various ecological and epidemiological conditions can influence the presence of one or more of these parasites.</p>	

Table 14. (continued)

Impact Indicator	Calculation (expressed: numerator/denominator)	Use	Targets
<b>Parasitological indicators</b>			
<b>Total percentage of children with a heavy infection by any STH<sup>a,b</sup></b>	No. of children severely infected with any of the STH/Total children screened for parasites	To measure the program's effectiveness in reducing severe infections.	The percentage of children with heavy infections (of total children screened for parasites) is reduced to less than 1% within 2 to 3 years.
<b>Percentage of heavy infections by each STH<sup>a,b</sup></b>	No. of children severely infected by each STH x 100 /Total children screened for parasites (Annex 7, Table 1)	To assess the need to adjust frequency of treatment.	
<b>Morbidity indicators</b>			
<b>Percentage of children with clinical signs and symptoms<sup>c</sup></b>	No. of children with clinical signs x 100 /Total of children screened for these signs	To determine the programs' impact on health status.	The percentage of children with morbidity due to STH (of total children screened) has dropped to <1% in 5 years.
<b>Percentage of children with anemia</b>	No. of children with anemia (Hb <115 g/l) x 100 / Total children screened for hemoglobin status		
<b>Percentage of children with severe anemia<sup>b,c</sup></b>	No. of children with Hb <70g/l x 100 /Total children screened for hemoglobin status		

<sup>a</sup> Indicators recommended for the national level.

<sup>b</sup> Indicators recommended for the subnational level.

<sup>c</sup> Indicators recommended for the local level.

Source: World Health Organization. Helminth control in school-age children: a guide for managers of control programmes. Second edition. Geneva, 2011.

**3.4 Other important indicators.** Other indicators may be used depending on the circumstances in each country or municipality. Some examples include:

- Indicators on knowledge, attitudes, and practices applicable to students or parents. These can be measured using a questionnaire or direct observation (e.g. how many people wash their hands with soap?).
  - Evaluation of the effectiveness of the antiparasitic. The egg reduction rate is calculated as the decrease in the average number of eggs per gram of stool following treatment (66).
  - Availability of drinking water and adequate latrines, to monitor the number of schools, homes, or preschools equipped with these services, which in turn may prompt their construction or repair. An example of this type of indicator is the percentage of schools in the municipality equipped with drinking water and latrines in the appropriate number and quality for boys and girls.
- Effects on the school. Absenteeism and the dropout rate can be monitored, as well as student performance and other indicators.
- 4. When can the frequency of drug administration be reduced.** After several rounds of deworming have taken place, the parasitological indicators taken in the sentinel sites should show a reduction in prevalence and intensity of infection, but there is no way to predict whether that reduction is permanent or whether prevalence will return to its previous levels if treatment is interrupted. To give guidance on this crucial matter, the table provided in Annex 11 can be used to decide whether the frequency of deworming should be reduced or increased and when preventive chemotherapy can be suspended. The proposed measures are applicable if coverage levels remain consistently above 75% after five years of intervention. An algorithm for determining program duration based on prevalence of infection is provided in Annex 12.

Situational data collected prior to the deworming activity (baseline); process, performance, and particularly impact indicators; and the information obtained from monitoring can be used to conduct simple studies that will help to address any problems present and strengthen deworming activities in a country or region (7,67).

Possible research topics include:

- Changes in knowledge, attitudes, and habits among families, especially in relation to measures to prevent STH, drug acceptance and adherence, and recognition of the impact of antiparasitics on child health and development.
- Environmental conditions and hygiene in the home, schools and preschools.
- Quality of the water consumed by families, refuse and feces management, insect and rodent control, and pet care.
- Potential impact of deworming on absenteeism and school performance, physical activity, etc.
- Effect of deworming on anemia and malnutrition in the activity's beneficiary child population (68,69).
- Effects on the program chosen for integration of deworming activities (e.g., vaccination coverage or food and vitamin A supplementation) before and after integration.
- Detection of possible signs of resistance to drugs.
- Drug surveillance to identify and register serious adverse effects of antiparasitics.

*Intestinal parasites have sequelae in childhood and into adulthood. The countries of the region have the resources they need to successfully control intestinal parasite infections. It is a moral obligation to do whatever is necessary to achieve this.*

## 5. Annexes

### Annex 1. Experiences integrating deworming activities into other health programs, Nepal, Nicaragua, and Mexico

#### Experience in Nepal

- First country to launch a deworming program.
- First step: a 1996 study found high prevalence and intensity among schoolchildren.
- 1998 to 2001: a feeding and deworming program targeted 250,000 schoolchildren is implemented (1 meal a day and two rounds of deworming each year). Ministry of Health, WHO, WFP, DFATD, JICA.
- Results: prevalence and intensity were reduced and nutritional status improved; hemoglobin increased by 1g/dl.
- Based on these outcomes: the program was scaled up to the national level.
- Integration into UNICEF's vitamin A supplementation program (treatment for preschool children twice a year).
- Two million children under 5 were treated.
- Achievements: 95% coverage, 77% reduction in anemia, decline in prevalence of STH infections.
- Health of pregnant women, birthweight, and child survival improved.

#### Conclusions

- It started as a local program that targeted schoolchildren through the school meals program.
- It was later extended to preschool children through the vitamin A supplementation program.
- Based on the initial results, it was scaled up to the national level.

*Nepal offers a model of how a small-scale pilot program can be scaled up at the national level. It also demonstrates how inter-organizational collaboration and complementarity can occur at the practical level in the field in order to meet a country's needs*

Source: World Health Organization. Deworming for Health and Development: report of the third global meeting of the partners for parasite control. Geneva, 2004 (WHO/CDS/SPC/PVC/2005.14).

## Experience in Nicaragua

- 1994: Mass implementation campaigns are launched with annual rounds.
- Children ages 2 to 14 years were dewormed as part of the annual vaccination campaign.
- In the 1990s, the Ministries of Health and Education joined forces around a more coherent school health strategy (health services, clean water for consumption and hand washing, garbage dumps, drainage systems).
- Prevalence of soil-transmitted helminth infection in 2005: between 0% and 84%.
- 2007: high intensity for 2 annual rounds; higher in rural areas.
- 2007-2008: semiannual deworming started.
- 2010: 87% coverage is achieved.
- The existing EPI infrastructure was used.
- Example of intersectoral integration: participating entities included the Ministries of Health, Education, and Finance, NicaSalud, NGOs, FBOs, and the Nicaraguan Company of Water and Sewage Company.
- UNICEF Healthy Schools Program: implemented for the past 10 years.
- In order to improve coverage, a new vaccination card introduced in 2011 includes deworming as a new category.
- Joint efforts: the Vitamin Angels, Children Without Worms, Save the Children, Medical Assistance Program International, Amigos for Christ, and Rainbow partner for the distribution of antiparasitic drugs, vaccines, and micronutrients in government clinics.

## Lessons learned

- Coordination among all the organizations makes massive drug administration possible.
- The Government Committee and capacity to sustain the program were strengthened.
- The integration of deworming into the National Vaccination System of Vaccination is a model for the other countries.
- Administering antiparasitics as part of regular vaccination programs virtually guarantees national coverage, with minimum additional costs.
- The program is continuing preventive activities, which are a government priority.
- Preschoolers are covered by integrating deworming into the vitamin A program.
- Activities under the water, sanitation, and hygiene (WASHED) strategy should be integrated to reduce prevalence of soil-transmitted helminth infections (70).

*Source: A Call to Action: Addressing Soil-transmitted Helminths in Latin America and the Caribbean. 2011. Inter-American Development Bank, Pan American Health Organization, Sabin Vaccine Institute.*

Lucien F, Janusz CB. Worms and WASH(ED). Nicaragua. A case study on control of intestinal worms in youth populations. 2011 (Unpublished report, facilitated by Children Without Worms).

Pan American Health Organization, McGill University. Report from the Workshop on integrating a deworming activity into preschool child packages in the Americas. 2011; 1-77.

## Experience in Mexico

- In the 1980s, National Health Week (Vaccination) was launched under the purview of the Ministry of Health and other government entities.
- 1993: deworming was integrated into National Health Week (NHW).
- Children ages 2 to 14 years: 1 dose of albendazole every 8 months.
- 1993-1998 evaluation of 90,000 children (after 12 NHW):  
Prevalence in 1993: ascariasis 20%, trichuriasis 15%  
Prevalence in 1998: ascariasis 8%, trichuriasis 11%
- All public health institutions are involved: 90% of the population.
- Each NHW benefits 13 million preschool and school-age children.
- Prevalence range within a single country: Tabasco: 94.7%, Jalisco, 2.5%.

### Reasons to include deworming in National Health Week

1. There is overwhelming scientific evidence on the effectiveness and efficiency of this program.
2. It is the WHO's and World Bank's recommended policy.

3. It improves cognitive performance among school-age children.
4. The high disease burden (it ranks first) measured in DALYs among children ages 5 to 14 years.
5. Studies in Mexico found prevalence rates of STH infection above 50%.
6. A strong national, state, and institutional policy in Mexico.
7. The drug is manufactured in Mexico.
8. The successful track record of National Week of Health since its inception in the 1980s.

**Evidence:** Deworming activities can take advantage of an existing structure.

- Mexico's National Deworming Program is among the longest lasting: 14 years.
- Coverage: over 400 million children over the years.
- For future evaluation: reduction in prevalence and intensity, effects on the school: absenteeism, failure, gender-related effects.
- More rigorous evaluation required to determine treatment duration, frequency, and ages.

*The National Health Week approach can be replicated in other countries with national vaccination campaigns. The challenge will be to maintain the program until environmental, behavioral, and socioeconomic changes have occurred.*

Source: Flisser A, Valdespino J L, García L, Guzman C, Aguirre M T, Manon M L, González G, Gyorkos T W. Using national health weeks to deliver deworming to children: lessons from Mexico. *J Epidemiol Community Health* 2008;62:314–317.

Pan American Health Organization. Framework for a Regional Program for Control of Soil-Transmitted Helminth Infections and Schistosomiasis in the Americas, Dominican Republic, 2003.

Quihui-Cota L, Valencia ME, Crompton DW, Phillips S, Hagan P, Diaz-Camacho SP, Triana Tejas. Prevalence and intensity of intestinal parasitic infections in relation to nutritional status in Mexican schoolchildren. *Trans R Soc Trop Med Hyg*. 2004 Nov;98(11):653-9.



## Annex 2. Recommendations for administering antiparasitics (42)

Antiparasitics are very safe drugs and most children take them easily. Antiparasitic drugs donated to mass deworming programs for school-age children are in the form of non-chewable tablets that can be crushed if need be, as illustrated below. Chewable and flavored tablets are an option for preschool-age children, provided the resources are available to purchase them. The drugs can provoke reactions such as crying, vomiting, spitting out the tablet, or even choking. According to the available data, these types of problems occur in 1% to 3% of cases.

**Safety first.** Trained staff should provide the antiparasitic tablets. The program manager should also conduct regular supervision and repeat the training periodically.

**The child should never be forced.** If the child does not swallow the tablet, do not force him/her or hold his/her nose. Administration of the drug to that child is postponed until the following round. Photo from: World Health Organization. Newsletter. Action Against Worms. February 2007 Issue 8.



Photos from: World Health Organization. Newsletter. Action Against Worms. Number 6 January 2006, and Number 8 February 2007.

**For younger children.** Children under 2 to 3 years old are often unable to chew and swallow the tablets, in which case, they will need to be crushed between two spoons and mixed with water. Staff should have sufficient time to administer the drug this way. Otherwise, it is preferable to limit deworming activities to children over 3 years.

**Direct supervision.** The child should take the drug in the presence of the person administering it (teacher, vaccinator, nurse, community health worker). It should not be given to the mother to administer at home.



Chewable tablet for older children.



Crushed table for younger children.

Photos from: World Health Organization. Newsletter. Action Against Worms. Number 6 January 2006 (71) and Number 8 February 2007.



**In case of choking.** If the child chokes on the tablet, proceed as follows:

**Young children:** Lay the child face down on the adult's thigh, leaning the head. Thump on the child's back 5 times with the palm.



If choking persists, lay the child on the adult's lap facing upward. Press on the lower and middle thoracic area 5 times using two fingers. Repeat the maneuver if necessary.



**For older children:** Lay the child on his/her abdomen on the adult's thigh, leaning the head down. Thump on the middle part of the child's back 5 times using the palm.



If the emergency is not resolved: The adult should hold the child from behind in a standing position, positioning his/her hands below the child's arms. Placing the hands under the thorax, apply sharp upward pressure. Repeat if necessary.



### Annex 3. Sample training schedule for teachers, vaccinators, and community health workers

**Objectives:** train the teachers on the form, to organize an efficient drug administration, give simple messages on education and sanitation, and fill adequately the registration forms.

#### Program

9:00-9:30	Welcome. Introduce aims of the deworming program
9:30-9:45	Discuss situation of intestinal parasites in the area
9:45-10:00	Discuss drug safety, how it is administered, and storage conditions
10:00-10:30	Questions and clarification
10:30-11:00	Coffee break
11:00-11:30	Presentation and explanation of educational materials (if they are available).
11:30-12:30	Practical exercise – drug administration. Demonstration with several children. Participants in groups of 3 or 4 administer the drug to the rest of the class.
12:30-13:00	Practical exercise – health education. The facilitator provides a demonstration to the class or to a group of families. Participants in groups of 3 or 4 offer a demonstration to the rest of the school or to the participating families.
13:00	Distribution to each participant of drugs and educational materials for his or her school.

*At the end of each course, the participants will be able to participate in and promote activities for the control of these parasitoses and self-care in the family and in the schools.*

Source: World Health Organization. Helminth control in school-age children: a guide for managers of control programmes. Geneva, 2002.

## Annex 4. Proposed content for educational materials geared towards families

Each country will develop a simple message that is easily grasped by most families, with brief texts and drawings that illustrate how parasites are acquired and how to prevent infection. These materials should be used by all those participating in deworming activities: teachers, vaccinators, health workers, community agents, communicators, and other social stakeholder.

The following elements should be considered when designing educational materials (45).

### What is deworming?

It is a treatment to eliminate intestinal parasites, also known as worms.

### Why is it necessary to deworm or purge the children?

Because parasites cause anemia, malnutrition, and stomach pain. They also retard growth and alter children's capacity to learn.

### How are intestinal parasites eliminated?

By administering an antiparasitic tablet every six or twelve months to all children ages 1 to 14 years.

### How are parasites acquired?

Through dirty hands, unwashed fruits and vegetables, drinking contaminated water, not washing hands before eating or after using the bathroom, not using latrines, and walking barefoot.

### How can parasites be avoided?

With three very simple steps:

1. Deworming children over 1 year of age every 6 or 12 months.
2. Teaching children good hygiene habits such as hand washing before eating and after using the latrine or toilet or playing with dirt, washing fruits, wearing shoes.
3. Applying sanitation measures such as having drinking water and soap for hand washing available, clean latrines, proper waste management, etc.



Deworming



Health Education



Sanitation

*Sanitation and health education reduce environmental contamination.*

*Health education reduces infection.*

*Treatment reduces intensity of infection and severity of the disease.*



## Let's feed the child, not the parasites

**A dewormed child makes better use of food and grows up healthier.**



## Annex 5. Calculating drugs and costs of deworming as part of a vitamin A supplementation program (34)

### Calculating the quantity of antiparasitic drugs required

It is important to remember that the target population for vitamin A supplementation will be children ages 6 to 59 months, whereas the target group for deworming will be those ages 12 to 59 months. There are two ways of calculating the number of albendazole or mebendazole tablets needed:

- I. In an established vitamin A supplementation program, the vitamin may have two presentations: the first is 100,000 IU capsules, which is the recommended dose for children ages 6 to 11 months. In some countries, the capsules are blue. The second is 200,000 IU capsules, color red, which is the recommended dose administered to children ages 12 to 59 months old every 6 months. In this example, the number of antiparasitic tablets will be equal to the calculated number of 200,000 IU capsules if, based on STH prevalence, it has been determined that two cycles or rounds a year should be carried out (this is ideal when prevalence is  $\geq 50\%$ ). If prevalence is between 20% and 50%, the program will only have to carry out one round annually. In the latter case, the number of anthelmintic tablets will be half the number of 200,000 IU capsules per year.
- II. Calculating population size
  1. The population ages 6 to 59 months old is calculated based on census data or other sources of information.
  2. Of this total, 88% corresponds to the estimated population of children ages 12 to 59 months. These children will be the target population for the intervention.
  3. The target population is multiplied by the percentage of coverage desired (WHO recommends a minimum coverage of 75%).
  4. Add 5% for potential drug wastage.
  5. The total obtained is equal to the number of tablets required for each round.
  6. If two rounds are carried out each year, this amount is doubled.

It is also important to take into account that the cost of drugs is just part of the total cost. Additional costs for human resources, logistics, training, records and information system, and monitoring and evaluation will have to be clearly identified. Countries can save on drug purchases by accessing donations of albendazole and mebendazole from PAHO/WHO.

Source: World Health Organization, United Nations Children Fund. How to add deworming to vitamin A distribution. Geneva, 2004. (WHO/CDS/CPE/PVC/2004.11).

### Example

- The population ages 6 to 59 months in a district or province is 1 million.
- The target population for deworming (children from 12 to 59 months old) is:
  - $1,000,000 \times 0.88 = 880,000$
  - Expected coverage is 75%, so:
    - $880,000 \times 0.75 = 660,000$
  - The total quantity of deworming tablets needed per round is 700,000, (including a wastage factor of 5%).
- If mebendazole is used, the number of tablets needed is 700,000 (one per child).
- If albendazole is used, since only  $\frac{1}{2}$  tablet (200 mg) is needed for 12-24 month-old children, the calculation is:  $700,000 \times 0.87 = 612,500$  tablets per round.

**Cost calculation:** The cost of a tablet, including transportation and insurance, is about US\$0.02. In the previous example, a round using albendazole for a target population of 660,000 children ages 12 to 59 months will cost  $612,500 \times 0.02 = \text{US}\$12,250$ .

When drugs are acquired abroad (as in the case of a donation), customs and nationalization costs should be taken into account.

## Annex 6. Generic form for registering children by age, sex, and ethnic group. Registration of children who receive antiparasitics in a cycle or round (42)

### Program for deworming children ages 1 to 14 years

Country: \_\_\_\_\_ District (province, state): \_\_\_\_\_ Municipality: \_\_\_\_\_

Drug distributes: \_\_\_\_\_ Date: \_\_\_\_\_ Location: \_\_\_\_\_

Name of the person administering the drug: \_\_\_\_\_ Position: \_\_\_\_\_

NOTE: only children who take the drug in the presence of the person administering it are recorded.

NO.	Name of boy or girl	Age (years)	Sex (M or F)	Ethnic Group
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				
26				
27				
28				
29				
30				



## Annex 7. Organizing sentinel sites (42)

The program should have a system in place for the regular collection of parasitological data for proper monitoring from the outset. Sentinel sites are the most efficient system for accomplishing this. In a school-based control program, the sentinel site is a school in which a parasitological stool study of 50 third grade students is done. Schoolchildren in this grade are selected because it is likely that they will have received antiparasitics in previous rounds. First graders, in contrast, will not have been dewormed at school before. This last group can be used to establish a baseline at the beginning of the program.

The sentinel site method assumes that changes in prevalence and intensity observed in a limited number of sites will yield sufficient information about the program's progress in a given area.

**Location of the sites.** Each homogeneous ecological zone in a country. It should be noted that one such area can cover several districts.

**Number of sentinel sites.** A sentinel site is required for every 200,000 to 300,000 students. Fifty children from each school are evaluated.

**Site selection method.** The stratified sampling method is used. For example, if five sentinel schools are needed in an ecological zone encompassing 20 districts, a number is assigned to each district; then, five numbers between one and 20 are chosen randomly and the corresponding districts will be assigned a sentinel school. Next, each district selects a school, also randomly.

Once a school has been selected, a meeting should be held with the district or municipal health and education authorities to obtain authorization to visit the school, explain the program's objectives and its benefits for the community, and proceed with the sampling. Parents should also be informed about the scope of the program.

**Selection of the children.** Fifty third-graders are chosen randomly. If there are fewer than 50 children in this grade level, then the total is completed with children at higher grade levels.

**Personnel requirements.** A team comprised of one coordinator, two or three technical staff, and one assistant is required, which should be able to collect and analyze 50 stool samples in one to two days.

### Team tasks and functions

#### Coordinator

- Contact community leaders and health and education authorities to obtain authorization for the field work.
- Organize the logistics of sample collection.
- Conduct regular monitor the forms filled out.
- Evaluate the performance of laboratory technical personnel on a regular basis.
- Summarize the data collected and prepare a preliminary report for the health authorities and the community.
- Provide antiparasitic treatment to all children in the school.

#### Functions of the laboratory technical personnel

- Receive the samples in marked containers.
- Prepare and examine the samples.
- Record the results.

#### Functions of the assistant

- Keep the work area clean
- Make sure clean containers and slides and other materials needed to examine the samples are on hand.
- Handle contaminated materials safely.
- Measure and record the children's weight and height (optional).

**Sample collection.** Provide each child with a container and wooden blade and explain how to take the sample and the quantity required. Preferably the samples should be collected in the morning and processed immediately.

**Table 1.** Classification of intensity of infection in each individual by type of helminth (4)

Parasite	Light-intensity infection	Moderate-intensity infection	Heavy-intensity infection
<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

EPG: eggs per gram of stool

Source: World Health Organization. Helminth control in school-age children: a guide for managers of control programmes - 2nd ed. Geneva, 2011.

The analysis will require a light microscope, a Kato-Katz set and slides. The study can be done at school, immediately after collecting the samples (39).

The intensity of STH infection in each patient is classified by the number of eggs per gram of stool of each helminth, using the classification system in Table 1.

**Safety procedures.** Team members should use latex gloves throughout the process. Contaminated

materials should be washed with soap and water and then treated with sodium hypochlorite. Containers and slides should be washed and dried for reuse, or discarded and burned.

**Data analysis.** Each child is classified as positive or negative for a given parasite. A positive result is classified as light, moderate, or heavy. Once all the data is available, prevalence of infection is calculated as follows:

$$\text{Prevalence} = \frac{\text{No. individuals testing positive}}{\text{Total individuals studied}} \times 100$$

Prevalence is calculated separately for each parasite or for all of them combined.

Intensity of infection is the percentage of individuals in each category, the most important being heavy, and is calculated as follows:

$$\text{Prevalence of heavy infections for all STH} = \frac{\text{No. individuals with heavy infections from any STH}}{\text{Total individuals studied}} \times 100$$

Since the primary objective of any control program is to reduce the percentage of individuals with heavy

infections, this indicator is extremely important for monitoring program progress.



## Annex 8. List of materials for sample collection in sentinel sites

Materials Required	Number
<b>For collecting stool specimens</b>	
Containers with covers for stool specimen	250
Wooden blades for sampling by the child	250
Light microscope (10x objective)	2
Microscope slides	250
Forceps	2
Disposable gloves (non-sterile)	1 package of 100
Kato-Katz kit for 500 stool specimens	1
Glycerin	200 ml
<b>For cleaning recyclable materials</b>	
Brushes	3
Heavy-duty rubber gloves	3 pairs
Bucket	2
Powdered soap	250 g
Sodium hypochlorite (bleach)	3 liters
<b>For data registration</b>	
Pencils	10
Registration forms	300
<b>For treatment</b>	
Albendazole (400 mg) or mebendazole (500 mg) tablets	To treat all students in the school, not only those who participated in the research

Source: World Health Organization. Helminth control in school-age children: a guide for managers of control programmes. Second edition. Geneva, 2011.

Note: Suggested list for obtaining data from 250 children.

## Annex 9. Sentinel Site Form

### Intestinal Parasite Control Program School Survey

To be completed by the work team

School \_\_\_\_\_

District \_\_\_\_\_ Municipality \_\_\_\_\_

Total number of forms collected \_\_\_\_\_ From No. \_\_\_\_\_ to No. \_\_\_\_\_

#### I COMPOSITION

Total number of schoolchildren \_\_\_\_\_ Total number of girls \_\_\_\_\_

Number of classes \_\_\_\_\_ Number of teachers \_\_\_\_\_

#### II WATER

Is there a source of water at the school? Yes \_\_\_\_\_ No \_\_\_\_\_

If yes, what is the water quality? Potable \_\_\_ non-potable \_\_\_

#### III SANITATION

Are there functional latrines in the school? Yes \_\_\_\_\_ No \_\_\_\_\_

Are they separate for boys and girls? Yes \_\_\_\_\_ No \_\_\_\_\_

#### IV HEALTH

Nearest health facility \_\_\_\_\_

Type of service \_\_\_\_\_ Distance \_\_\_\_\_ km

#### V TREATMENT

No. of children treated for STH

Enrolled \_\_\_\_\_ Non-enrolled \_\_\_\_\_

## Annex 10. Child evaluation form for sentinel sites

### Intestinal Parasite Control Program School Survey Parasitological/Nutritional Data

To be completed by the work team

#### I PERSONAL DATA

ID Number \_\_\_\_\_ School \_\_\_\_\_

Name \_\_\_\_\_ Age (years) \_\_\_\_\_ Sex: M \_\_\_ F \_\_\_

#### II NUTRITIONAL STATUS

Weight \_\_\_\_\_ kg Height \_\_\_\_\_ cm

Anemia: Yes \_\_\_\_\_ No \_\_\_\_\_ Severe anemia: Yes \_\_\_\_\_ No \_\_\_\_\_

#### III STOOL EXAMINATION

Parasite	Eggs/slide	Eggs/gram of stool	Heavy-intensity threshold	Heavy-intensity infection	
				Yes	No
<i>Ascaris lumbricoides</i>			≥50.000 EPG		
<i>Trichuris trichiura</i>			≥10.000 EPG		
Hookworms			≥4.000 EPG		

EPG: eggs per gram of stool

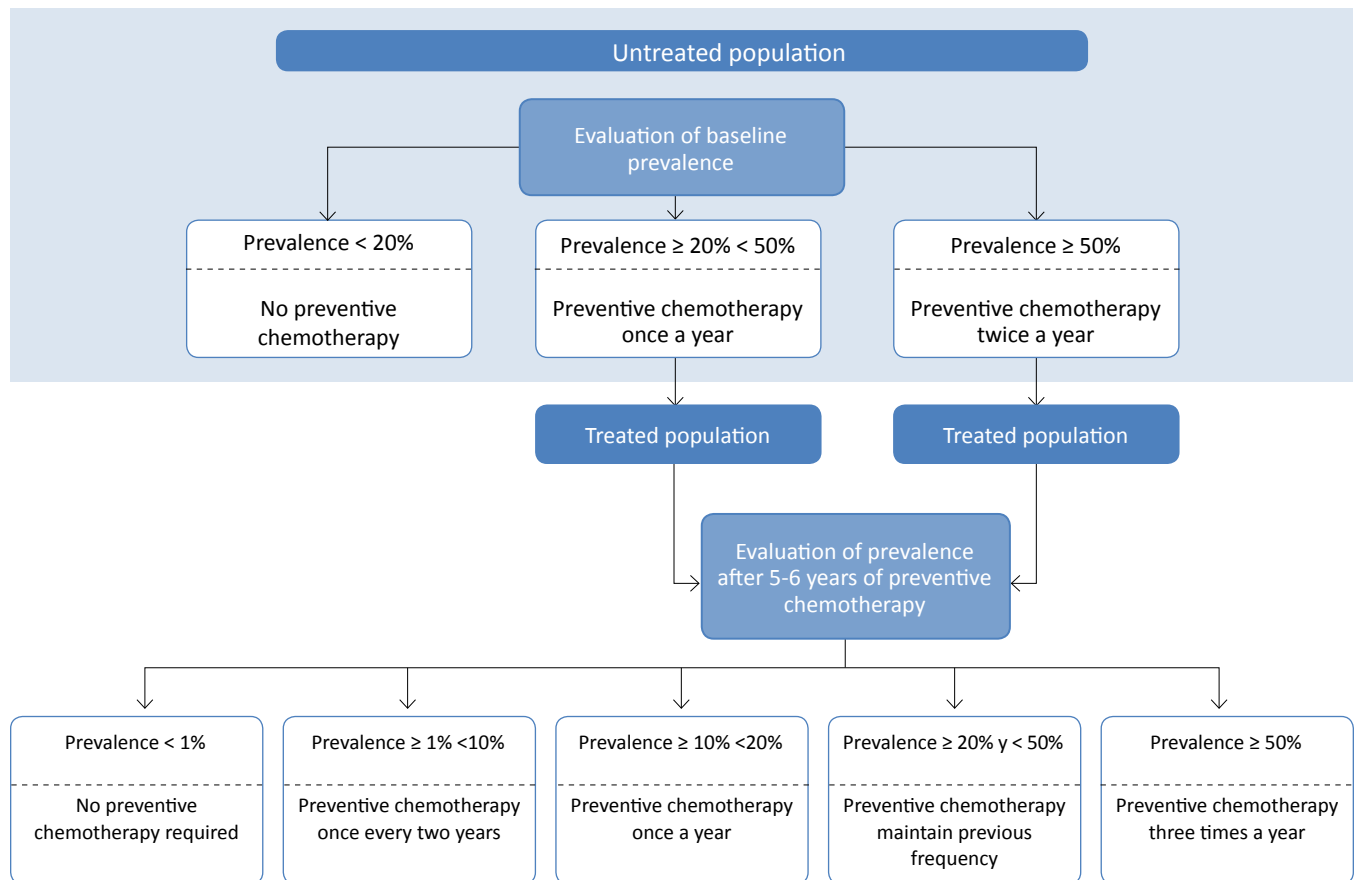
Source: World Health Organization. Helminth control in school-age children: a guide for managers of control programmes. Second Edition. Geneva, 2011.

## Annex 11. Suggested changes in frequency of drug administration after 5 years of interventions

Prevalence	Comment	Suggested frequency of interventions	Additional measures
Over 50%	Prevalence or morbidity is not controlled: intensify frequency of interventions	Increase frequency of rounds per year. Check coverage and compliance.	Extend coverage to other at-risk groups or possibly to the entire population in the area.
Between 20% and less than 50%	Prevalence or morbidity has not been sufficiently controlled: maintain frequency of interventions	Maintain treatment of school-age children at previous level for the next 4 years.	Reinforce measures for safe water, sanitation, and health education.
Between 10% and less than 20%	Morbidity is under control but the risk of reappearance is high: reduce frequency of interventions	Administer 1 round of anthelmintic treatment every year for the next 4 years.	
Between 1% and less than 10%	Morbidity is under control and the risk of re-emergence is low: reduce the frequency of interventions.	Administer 1 round of antiparasitics every 2 years for the next 4 years.	Continue sentinel site monitoring annually (even when the drug is not distributed) to detect possible recrudescence of the infections.
Less than 1%	No need of preventive chemotherapy.	No preventive chemotherapy.	

Source: World Health Organization. Helminth control in school-age children: a guide for managers of control programmes. Second Edition. Geneva, 2011.

## Annex 12. Deworming algorithm, according to prevalence of infection



Source: World Health Organization. Helminth control in school-age children: a guide for managers of control programmes. Second edition. Geneva, 2011.

### Annex 13. Antiparasitics distribution form for school-based rounds

District: \_\_\_\_\_ Municipality: \_\_\_\_\_

Teacher: \_\_\_\_\_ Group or class: \_\_\_\_\_

Health education activities performed? Yes: \_\_\_\_\_ No: \_\_\_\_\_

Antiparasitic: \_\_\_\_\_

Describe the activities on the reverse side of this form

Name of students	Sex		1st round date _/_/___	2nd round date _/_/___	3rd round date _/_/___
	M	F			
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
No. of children enrolled:					
No. of children treated:					
Total number of tablets:					

Source: World Health Organization. Helminth control in school-age children: a guide for managers of control programmes. Second Edition. Geneva, 2011.

**Annex 14. Tally sheet for recording antiparasitic treatments at a distribution post**

District: \_\_\_\_\_ Municipality: \_\_\_\_\_

Place: (school, vaccination center, health center) \_\_\_\_\_ Dates: \_\_\_\_\_

Antiparasitic administered: Albendazole: \_\_\_\_\_ Mebendazole: \_\_\_\_\_ Expiration date: \_\_\_\_\_

Laboratory: \_\_\_\_\_ Number of treated children: \_\_\_\_\_

Age Group	Sex			Female		
	1 to 4 years	5 to 14 years	≥15 years	1 to 4 years	5 to 14 years	≥15 years
	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000
	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000
	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000
	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000
	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000
	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000
	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000
	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000
	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000
	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000
	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000
	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000
	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000
	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000
	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000
	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000
	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000	0000 0000
Number of children treated by age group						
Number of children treated by sex						
Number of children treated (M + F)						

No. of tablets received: \_\_\_\_\_ No. of tablets distributed: \_\_\_\_\_ No. of tablets lost: \_\_\_\_\_ Balance: \_\_\_\_\_

Source: World Health Organization. Helminth control in school-age children: a guide for managers of control programmes. Second Edition. Geneva, 2011.



## Annex 15. Calendar of activities: national level

Activity	Responsible entity(ies)	Time (months)											
		1	2	3	4	5	6	7	8	9	10	11	12
Advocacy	PAHO, ministry of health, community representatives	●	●	●									
Political commitment	PAHO, ministries of education and health		●										
Epidemiological studies	Ministries, PAHO, statistical officers			●	●								
Search for partner and financial resources	Ministries, PAHO, International agencies			●	●	●							
Preparation of a plan	Ministries of health and education, representatives community, NGO, FBO, PAHO					●	●						
Start of the program	Local authorities (health, education, others), community leaders, EPI managers, food and vitamin A supplementation, others.								●				
Monitoring and evaluation						●	●	●	●	●	●	●	●
Feedback on results (coverage, difficulties, achievements)											●	●	●
Impact assessment		Two years after program start											

## Annex 16. Calendar of activities: local level

Activity	Responsible entity(ies)	Time (months)											
		1	2	3	4	5	6	7	8	9	10	11	12
Advocacy	Local health authorities and education	●	●	●									
Political commitment	Local health and education authorities, community and religious leaders, EPI managers, school principals, food supplementation, media outlets, NGO		●	●									
Search for partner and financial resources	Local health and education authorities, community leaders			●	●	●							
Preparation of a plan	Local health and education authorities, community and religious leaders, EPI managers, school principals, food supplementation, media outlets, NGO					●	●						
Supply request (tablets, forms, educational materials)	Local health authorities							●					
Staff training	Staff at the national or district level						●	●					
Supply verification	Local health authorities and education								●				
Start of the program	Local authorities (health, education, others), community leaders, EPI managers, food and vitamin A supplementation, NGOs, FBOs, media outlets.									●			
Monitoring and evaluation	Those responsible for the program at local level					●	●	●	●	●	●	●	●
Feedback on results (coverage, difficulties, achievements)												●	●
Impact assessment	Those responsible for the program at local level	Two years after program start											

## **Annex 17. Checklist for planning, implementing, and monitoring integrated deworming activities (42)**

1. Epidemiological data available that justify the intervention.
2. Commitment from the ministries of health and education, municipalities, and the community.
3. Initial budget to present to decision-makers and potential partners.
4. Detailed costs estimated, financial gaps identified, and possible mechanisms identified to fill them.
5. Potential partners consulted (UN agencies, NGOs, foundations, etc.).
6. Financial resources secured.
7. Drugs of good quality ordered in appropriate quantity.
8. Customs procedures carried out (if necessary).
9. Training program designed and opportunities for joint training of all individuals, workers, and volunteers involved in deworming rounds identified.
10. Mechanism for dispatching inputs to districts, municipalities, schools identified.
11. Mechanisms and strategies to include not-in-school children identified.
12. Communication and social mobilization strategies designed and education and outreach materials developed, validated, and distributed.
13. Appropriate timing to conduct a round identified (avoiding school holidays, examination times, religious observance days, and the harvest season).
14. Mechanisms for distributing and collecting forms identified and information system procedures and flow determined (including adverse effects monitoring).
15. Supervision plan and monitoring and evaluation tools approved.
16. System for monitoring indicators including treatment coverage and prevalence and intensity of infection identified.
17. Reporting system on each step following each treatment round: successful experiences analyzed and problems to take into account when planning the next round identified.

## Annex 18: Useful addresses when seeking cooperation to integrate deworming

### Advisory services and materials:

Department of International Development of the United Kingdom (DFID)  
<http://www.dfid.gov.uk/>

Japan International Cooperation Agency (JICA)  
<http://www.jica.go.jp/english/>

U.S. Agency for International Development (USAID)  
<http://www.usaid.gov>

Inter-American Development Bank  
<http://www.iadb.org>

Bill and Melinda Gates Foundation  
<http://www.gatesfoundation.org>

Children's Investment Fund Foundation  
<http://www.ciff.org/>

Global Network for Neglected Tropical Diseases  
<http://www.globalnetwork.org/>

Foundation Ivo de Carneri  
<http://www.fondazioneocarneri.it/>

Task Force for Global Health  
<http://www.taskforce.org/>

### Drug donation initiatives (albendazole or mebendazole)

GlaxoSmithKline (albendazole)  
<http://www.gsk.com/media/pressreleases/2011/2011-pressrelease-616401.htm>

Johnson & Johnson (mebendazole)  
<http://www.jnj.com/connect/caring/corporategiving/preventing-disease/intestinal-worms>

Merck KGaA (praziquantel)  
<http://www.merckgroup.com/en/media/extNewsDetail.html?newsId=1FD7AA717642503CC1257964005220E8&newsType=1>

Children Without Worms  
<http://www.childrenwithoutworms.org/>

Deworm the World  
<http://www.dewormtheworld.org/>

Source: Helminth control in school-age children: a guide for managers of control programmes. Annex 1—2nd ed. World Health Organization 2011

For further information on donations of deworming drugs, please contact the PAHO/WHO Representative Office in the country or its Regional Program on Neglected Infectious Diseases at:

Pan American Health Organization  
 525 Twenty-third Street, N.W.  
 Washington, DC 20037-2895  
[eid@paho.org](mailto:eid@paho.org)  
[www.paho.org/neglecteddiseases](http://www.paho.org/neglecteddiseases)  
[www.paho.org/enfermedadesdesatendidas](http://www.paho.org/enfermedadesdesatendidas)



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ISBN 978-92-75-11861-0



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