Refugee Health Guidelines: Intestinal Parasites Overseas Recommendations

Recommendations for Overseas Presumptive Treatment of Intestinal Parasites for Refugees Destined for the United States

Summary of Recommendations

- All South and Southeast Asian refugees, with exceptions noted in this document, should receive presumptive therapy with a single dose of albendazole (400 mg, 200 mg for children 12-23 months) and ivermectin, 200 µg/kg orally once a day for two days, prior to departure to the United States.
- All African refugees who are not at risk of *Loa loa* infection, with exceptions noted in this document, should receive presumptive therapy with a single dose of albendazole (400 mg for adults and children older than 23 months, 200 mg for children 12-23 months) and ivermectin, 200 µg/kg orally once a day for two days, and praziquantel, 40 mg/kg divided in two doses, prior to departure to the United States.
- All African refugees who are at risk of *Loa loa* infection, with exceptions noted in this document, should receive presumptive therapy with a seven-day course of albendazole (400 mg orally twice a day) and praziquantel, 40 mg/kg divided in two doses, prior to departure to the United States.

Background

Although intestinal parasites are among the most common infections found in migrant populations, particularly those originating in the developing world, little is known about the consequences of infection after departure from an endemic area. A myriad of cestodes, nematodes, trematodes and protozoa may be detected in routine stool examinations, while other parasites, which are less frequently or intermittently excreted in the stool, may produce an elevated eosinophilia count that may be the only clue to infection. In untreated populations, the most commonly detected potentially pathogenic organisms in the stool include the nematodes *Ascaris lumbricoides*, hookworm and *Trichuris trichiura*. In many populations, the protozoan *Giardia intestinalis* is also common.

During the 1980s and 1990s, as newly arrived refugees were screened and rates of infection were documented, it became clear that intestinal parasites were extremely prevalent in these populations. In 1997, the Centers for Disease Control and Prevention (CDC) and the International Organization for Migration (IOM) conducted enhanced screening for intestinal helminthic and protozoan infections in a group of Somali refugees living in refugee camps in Kenya. They found that 38% of those screened harbored potentially pathogenic intestinal parasites. Based on these findings, it was decided to presumptively treat all nonpregnant refugees over the age of two years with a single 600-mg dose of albendazole within three days of

departure to the United States. [1] Subsequently, in 1999, Muennig et al. published a theoretic cost-effectiveness model analyzing three strategies of addressing intestinal parasites in all immigrant populations: "watchful waiting" vs. screening vs. presumptive therapy with five days of albendazole at 400 mg per day. [2] These authors estimated that, compared with watchful waiting, presumptive treatment of all immigrants at risk for intestinal parasitosis would avert at least 870 disability-adjusted life years (DALYs), prevent at least 33 deaths and 374 hospitalizations, and save at least $4.2 million per year. Compared with watchful waiting, domestic medical screening after arrival would cost $159,236 per DALY averted. This early work was a first attempt at estimating the cost-benefit of various strategies of addressing intestinal parasitic infection in refugees. In May 1999, CDC recommended that all refugees older than two years of age departing for the United States from sub-Saharan Africa or Southeast Asia receive a single dose of 600 mg of albendazole.

Experience with pre-departure presumptive treatment

Pre-departure single-dose albendazole treatment has dramatically decreased the likelihood of finding several types of parasites in newly arrived refugees. A reduction from 21.5% to 8.7% in overall prevalence of intestinal helminthic infections has been documented in African and Southeast Asian refugees arriving in Minnesota before and after May 1999, respectively. In this study of 11,856 African and 6,159 Southeast Asian refugees, those who arrived after the widespread initiation of pre-departure presumptive therapy were over 90% less likely to have *Ascaris* (odds ratio [OR]=0.09, 95% confidence interval [CI] 0.06-0.12) or hookworm (OR=0.06, 95% CI 0.05-0.08) infections. Less dramatic, but still substantial reductions of 79%, 48% and 19% were seen for infections with *Strongyloides* (OR=0.21, 95% CI 0.16-0.29), *Trichuris* (OR=0.52, 95% CI 0.46-0.60) and *Giardia* (OR=0.81, 95% CI 0.72-0.91), respectively. [3]

These findings are in agreement with an earlier study of 1,254 African refugees in Massachusetts, which found that refugees arriving after implementation of the program were less likely to have any parasites (OR=0.61, 95% CI 0.47-0.78) and helminths (OR=0.15, 95% CI 0.09-0.24). For individual organisms, pre-departure presumptive therapy was protective for hookworm (OR=0.03, 95% CI 0.00-0.29), *Trichuris* (OR=0.05, 95% CI 0.02-0.13), and *Ascaris* (OR=0.07, CI 0.01-0.58) infections, and resulted in a decrease in *Entamoeba histolytica/dispar* infections (OR=0.47, 95% CI 0.26-0.86). [4]

A recent study of refugee arrivals from Africa, South Central Asia, Eastern Europe and the Middle East to northern California found a relatively low intestinal helminth prevalence of 6% during 2001--2004, after implementation of universal pre-departure treatment. [5]

Re-evaluating the CDC presumptive treatment recommendations for pathogenic organisms that cause morbidity and mortality in refugees

Despite the seemingly impressive success of the intervention program, there has been little documentation whether the organisms most successfully treated with the presumptive albendazole cause significant disease after migration. Unfortunately, the consequences of intestinal parasite infection after migration to a nonendemic area are not well delineated, making it difficult to estimate the benefit of presumptive therapy. Both the previous CDC guidelines and

the Muennig et al. [2] cost-effectiveness model were insufficient, as they did not take into account important factors such as the differential pathogenic potential and extremely long lifespan of certain organisms (i.e., strongyloides), as well as the ineffectiveness of the regimen for more pathogenic organisms (i.e., strongyloides and schistosomiasis). Clearly, certain organisms pose a greater threat to individuals after migration. Therefore, risk and cost of clinical disease and potential public health consequences must be considered for each individual organism. Given the dozens of potential pathogens, this is extremely difficult. Such factors as prevalence in specific populations, parasite load (when related to pathology), lifespan of the organism, ability to spread to other individuals (infectivity, which demands a soil cycle for many organisms), mechanism of pathology (i.e., how it causes disease vs. infection), whether or not subclinical disease occurs, and severity of disease and outcome all must be considered.

Since no prospective data are available measuring the outcome of parasitic infections in migrants moving from endemic to nonendemic settings, indirect evidence must be used to inform clinicians and policy makers about the consequences of intestinal parasitosis following migration. First, information on epidemiology, pathology, pathophysiology, and life cycle of organisms may be used to estimate the importance of the organism and its potential for causing morbidity and mortality. Second, retrospective studies (mentioned above) show good success of single-dose albendazole against a majority of nematodes, with the notable exception of *Strongyloides stercoralis*. Third, published reports of clinical and public health consequences may act as a surrogate measure of the importance of undetected and untreated intestinal parasite infection after migration to nonendemic countries. Lastly, some prospective seroprevalence studies of the most important potential pathogens, *Strongyloides* and *Schistosoma* spp., show high rates of past and current infection.

Taken together, all the indications from available data suggest the two most important organisms causing the majority of the severe morbidity and mortality in migrant populations after leaving endemic areas are *S. stercoralis* and *Schistosoma* spp. As many as 100 million persons worldwide are estimated to be chronically infected with *S. stercoralis*. A serosurvey published by CDC in 2007 found a 46% prevalence rate of strongyloides in Sudanese refugees (n=462) and 23% of Somali Bantu (n=100) despite having arrived in the United States after implementation of the current presumptive albendazole treatment. [6] In Australia, newly arrived refugees had seroprevalence rates ranging from 11% in East Africans to 42% in Cambodian refugees. [7] If the infection is not detected promptly after arrival, screening data indicate that the average time to diagnosis of *S. stercoralis* in the United States is 61 months after migration. [8] In fact, one study found that 24% of Laotian refugees had continued *S. stercoralis* infection for an average of 12 years after migration. [9] Strongyloidiasis hyperinfection or dissemination may occur years after exposure, with reports of two cases occurring >50 years after last known host exposure in an endemic area. [10] [11] The fatality rate of disseminated/hyperinfection strongyloidiasis exceeds 50%. [10] [12] Although antecedent treatment with corticosteroids accounts for a majority of reported iatrogenic cases, numerous case reports have been published of strongyloidiasis hyperinfection that resulted from the immunosuppression associated with HIV, as well as with the use of chemotherapeutic agents. [10] [12] Since hyperinfection generally mimics gram-negative septicemia, this condition is likely an underdiagnosed and underreported complication of chronic infection. [10] [12]

Schistosomiasis (also known as bilharzia) is highly endemic to parts of Africa and Asia, but can also be found in focal loci in South America, the Caribbean, and the Middle East. An estimated 700 million people are at risk of infection and > 200 million are infected annually. In fact, in some endemic areas infection rates surpass 90%. [13] [14] Schistosomiasis is known to persist in humans for more than 30 years, and untreated infection has been associated with many diseases, such as liver cirrhosis and resulting clinical complications such as portal hypertension (*Schistosoma mansoni, S. japonicum*) and squamous cell carcinoma of the bladder (*S. haematobium*), as well as urinary tract obstruction and renal failure (*S. haematobium*). Potentially devastating clinical manifestations occasionally occur when an egg enters the systemic circulation and travels to a normally sterile site in the body, causing severe inflammation. Eggs may travel to virtually any part of the body, including the brain and spinal cord where, when deposited in the nerve plexus, they may cause paralysis or myelitis (inflammation of the spinal cord).

The epidemiology of schistosomiasis in newly arriving refugee populations is becoming increasingly defined. A CDC serosurvey of Sudanese refugees found seroprevalence rates for schistosomiasis of 46%, with approximately 24% having detectable antigen. [6] In the Somali Barawans, a seroprevalence rate of 73% was detected in stored serum taken prior to departure. [6] A recent study from Australia found a seroprevalence rate of 15% in all East African refugees. [7] Current data from CDC indicate seroprevalence rates exceeding 40% in several refugee groups, including Somali and Liberian refugees (unpublished data). In fact, early data suggest that more than 80% of Somali refugee populations show serologic evidence of infection (personal communication, Marianna Wilson, CDC). Seybolt et al. found that 22% of all African refugees with eosinophilia and a negative stool ova and parasite examination had schistosomiasis on new refugee screening. [15] Although the data of post-arrival morbidity and mortality due to schistosomiasis are limited to cases and case series, [16–21] wide-scale migration from sub-Saharan Africa to the United States has only recently occurred within the last 10 years. Therefore, reports of consequences of untreated infection in the United States would be expected to increase.

Other potential pathogens have long life spans and known pathogenic complications that may affect refugees. These include cestodes (e.g., cysticercosis) as well as other nonschistosomiasis trematodes. *Taenia solium*, which causes cysticercosis, is rarely detected in stool examinations of newly arrived refugees (generally less than 2% of reported pathogens). [22] However, this organism is particularly important since it may infect the brain (neurocysticercosis) and, when the patient is treated with anti-parasitic drugs, may cause adverse effects such as seizures, necessitating adjunctive therapy. Therefore, in persons with known neurocysticercosis, or those at high risk of infection (i.e., Latin American populations), treatment with the anti-parasitic agents albendazole or praziquantel must be used with caution.

The most common non-schistosomal liver fluke reported is *Clonorchus sinensis,* which has been associated with cholangiocarcinoma and biliary obstruction. [23] One case series found that many years after migration populations originating in areas of high prevalence will still harbor the organism. [23] Generally speaking, the relatively low prevalence of these potential pathogenic organisms does not justify wide-scale presumptive therapy—although this may not be true if high prevalence rates are documented in certain populations in the future.

Re-evaluating the CDC presumptive treatment recommendations for pathogenic organisms that may pose a public health risk

Although there are public health concerns with certain primarily protozoan organisms, a vast majority of intestinal parasites have limited, if any, infectious potential once the host is outside an endemic area. This is largely because many parasites demand a soil cycle (e.g., *Ascaris*, hookworm) or particular foods and transmission routes (e.g., watercress, freshwater crabs, snails). Intestinal parasites routinely found in refugees that should be considered to be potentially transmissible in the United States include *G. intestinalis*, cryptosporidia, *E. histolytica,* and cestodes, particularly *T. solium*. The most common organism found in refugees that may pose a public health concern is *G. intestinalis*. However, there is little evidence that refugees serve as a nidus for disease outbreaks. Likewise, some evidence indicates that asymptomatic cryptosporidium infection is relatively common in some refugee populations (Stauffer, unpublished data; Barnett, personal communication). However, no outbreaks of cryptosporidium infection have been associated with refugees. *E. histolytica* accounts for 2%-10% of reported pathogenic parasites found on routine stool screening examinations for refugees. [22] [23] However, this organism is generally overreported, since it is not often distinguished from the more common, nonpathogenic, *E, dispar*. Asymptomatic infection generally lasts less than 3 months, and no outbreaks have been associated with refugees. [24] The cestode *T. solium*, although relatively uncommon, accounting for <2% of detected pathogens on screening stool examination, is of concern since the asymptomatic carrier is responsible for spreading the infection and subsequent disease to other individuals. This spread occurs in nonendemic areas, but the frequency and extent of risk are not well characterized. Therefore, although there are some public health concerns with several of the intestinal parasites, particularly the protozoan parasites and *T. solium*, there is little evidence of substantial threat posed by refugee migration.

The current presumptive therapy regimens do not adequately treat the intestinal parasites associated with the most severe morbidity and mortality in newly arriving refugee populations, particularly strongyloides and schistosomiasis. Further, although not discussed in this document, the screening test most widely available (stool ova and parasite [O&P] examination) is not a sensitive test for the detection of either of these parasites. In addition, alternative screening modalities, such as serologic and antigen testing, are not widely available and may be cost-prohibitive. Therefore, CDC, Division of Global Migration and Quarantine (DGMQ), has revised and broadened the pre-departure guidelines for presumptive treatment for refugees in this document. These guidelines supersede any previous guidelines issued by the CDC regarding presumptive therapy for intestinal parasites.

Guidelines for Overseas Presumptive Treatment of Intestinal Parasites for Refugees

Refugees originating from South and Southeast Asia

All refugees originating from South Asia or Southeast Asia should receive presumptive therapy for strongyloides infection prior to departure for the United States with two consecutive days of ivermectin (Table 1). Dosing may be based on weight or height (Table 2). Although ivermectin has been shown to have some activity against *A. lumbricoides,* it has very little or no activity against *T. trichiura* or hookworm. [25] [26] Therefore, all refugees should continue to receive

presumptive therapy with one day of albendazole for roundworms other than strongyloides (Table 1) .

Refugees originating from Africa

All refugees originating from Africa should receive presumptive therapy for strongyloides prior to departure (Table 1) . In addition, all African refugees originating from countries where schistosomiasis is endemic* should receive presumptive therapy with praziquantel for schistosomiasis prior to departure, based on weight or height (Table 3) .

*The only country in Africa considered non-endemic for schistosomiasis is Lesotho.

Refugees originating from Loa loa-endemic countries in Africa: Issues regarding presumptive treatment of strongyloides and other roundworms

The drug of choice for strongyloides infection is ivermectin. However, several cases of encephalopathy have occurred in patients treated with ivermectin during large-scale public health campaigns in areas of Africa where *Loa loa* is endemic. Although rare, this reaction may occur in persons co-infected with *Loa loa* who have a high microfiliarial load. Therefore, the combination of ivermectin (for two consecutive days) and albendazole (a single dose), should only be given to persons originating from Africa who have resided in or originated from countries where *Loa loa* is not endemic (List 1) . African refugees who have resided in or are originating from countries endemic for *Loa loa* should not receive presumptive ivermectin, but should receive seven consecutive days of albendazole treatment for the presumptive treatment of strongyloides (Table 1, List 1) .

Presumptive treatment of schistosomiasis in refugees originating in Africa

Prior to departure for the United States, all African refugees who resided or are originating from countries where schistosomiasis is endemic (all countries except Lesotho) should receive presumptive pre-departure therapy with praziquantel based on weight or height (Tables 1 and 3). If the refugee has never received presumptive therapy as part of a mass anti-helminth treatment campaign, praziquantel administration should be completed prior to therapy with albendazole and ivermectin. This timing is to reduce the risk of adverse events caused by the release of antigens by dying parasites in persons with high parasite loads. However, if the refugee has received previous presumptive therapy, the parasite load can be assumed to be lower and there is no contraindication to administering praziquantel together with albendazole and ivermectin.

Special instructions for administration of presumptive pre-departure treatment

- Intestinal parasite pre-departure presumptive treatment regimens should be administered as directly observed therapy.
- Test results and pre-departure treatment should be documented on a form that is attached to the outside of the packet or included in the envelope with the packet carried by the refugees to the United States. The form should be placed in a sealed envelope so that this medical information about treatment is handled with confidentiality. If treatment was not administered,

this should be clearly documented on the paperwork along with the reason that treatment was not administered.

- Although there is no known contraindication to co-administration of these intestinal treatment regimens with malaria treatment medications, CDC recommends spacing these regimens to allow better monitoring of effects of treatment and tolerability. Intestinal parasite regimens should be administered first. The malaria treatments should be administered at least two days after completion of the intestinal parasite regimen.
- Ivermectin and albendazole may be administered concurrently per the World Health Organization (WHO). Published data indicate that ivermectin, albendazole and praziquantel co-administration is well tolerated. [27]
- In African refugees, praziquantel, if not co-administered, should be administered prior to either ivermectin or albendazole if the refugee has never received previous presumptive therapy to reduce the risk of adverse events due to exposure to high levels of antigen from the dying parasites.

Precautions and Contraindications to Presumptive Treatment

The exceptions to presumptive treatment are as follows:

1. **Children**
   - *Albendazole*
     Children <1 year of age should not receive presumptive treatment with albendazole.
   - *Ivermectin*
     Children weighing < 15 kg or measuring < 90 cm should not receive ivermectin.
   - *Praziquantel*
     The safety of praziquantel has not been established in children < 4 years of age, so they should not receive presumptive therapy.
   - For refugee children overseas who do not meet the minimum age, weight or height requirements for presumptive therapy, the need for subsequent evaluation should be indicated on the paperwork accompanying the refugee. Post-arrival domestic medical screening should be conducted according to current guidelines.
2. **Pregnant women**
   - *Albendazole*
     Although albendazole is considered a pregnancy Class C drug, WHO recommends the presumptive treatment of pregnant women during the second or third trimester of pregnancy for hookworm in areas where any soil-transmitted helminth infection (*Ascaris*, hookworm, and *Trichuris*) exceeds 20%. Studies indicate that refugee

populations resettling to the United States from Africa and South and Southeast Asia, prior to institution of presumptive albendazole, exceeded this threshold. [3] [22] Therefore, it is reasonable to presumptively treat all pregnant women who are in the second and third trimester with a single dose of 400 mg of albendazole. However, pregnant women should not receive the seven-day treatment with albendazole for strongyloides.

- *Ivermectin*
  Ivermectin is a pregnancy category C drug. This medication should not be administered as a presumptive medication to a pregnant woman. When a reliable history of last menstrual period (LMP) cannot be obtained, a pregnancy test should be performed prior to presumptive treatment.

- *Praziquantel*
  Praziquantel is considered a pregnancy Class B drug, and WHO recommends the presumptive treatment during any trimester of pregnancy for women from schistosomiasis-endemic areas. Pregnant women who do not receive presumptive treatment overseas should have documentation stating need for subsequent treatment on a form attached to the outside of the packet or included in the envelope with the packet carried by the refugees to the United States. The form should be placed in a sealed envelope so that this medical information about treatment is handled with confidentiality.

- ***Summary for pregnant women***
  Therefore, with the exception of a single dose of albendazole administered to pregnant women after the first trimester to presumptively treat hookworm, and praziquantel for women at risk of schistosomiasis, presumptive overseas pre-departure treatment for pregnant women should be deferred until after delivery. Treatment for pregnant women who were immunocompromised prior to pregnancy or have clinical signs and/or symptoms of disease should be discussed with clinicians in DGMQ. For pregnant women who are overseas, the need for subsequent treatment after delivery should be indicated on the document accompanying the refugee.

3. Women who are breastfeeding

- *Albendazole*
  Albendazole presumptive therapy may be administered to women who are breastfeeding.

- *Ivermectin*
  Ivermectin is excreted in human milk in low concentrations. Women who are breastfeeding should not use ivermectin during the first week after birth.

- *Praziquantel*
  Praziquantel can be administered to women who are breastfeeding per WHO. The manufacturer suggests discarding milk for 72 hours following the administration of the dose.

- For refugee children overseas who do not meet the minimum age, weight or height requirements for presumptive therapy, the need for subsequent treatment should be indicated on the form accompanying the refugee. Post-arrival domestic medical screening should be conducted according to current guidelines

4. **Refugees who are immunocompromised**
   - Refugees who are immunocompromised, including refugees with AIDS, HIV infection, or cancer; chronic steroid users; and persons who have had an organ transplant or who may receive an organ transplant should receive presumptive treatment for strongyloidiasis and schistosomiasis under the routine protocols. Immunocompromised refugees should also receive post-arrival domestic screening according to the Domestic Medical Screening Guidelines for Intestinal Parasites. For immunocompromised refugees who do not receive presumptive therapy, the need for subsequent follow-up after resettlement should be indicated on the form accompanying the refugee

5. **Refugees with cysticercosis infection**
   - Persons who have neurocysticercosis infection may have seizures following treatment with albendazole or praziquantel. This reaction may occur when these medications kill *T. solium* cysticerci in the brain parenchyma, causing inflammation and provoking seizure activity. Although the disease is more prevalent in some populations (e.g., Latin America), the true prevalence of cysticercosis in refugee populations is not well documented. Refugees with a history of seizures should be evaluated for cysticercosis prior to receiving these anti-parasitics. Refugees with known neurocysticercosis, an unexplained seizure disorder, or subcutaneous nodules consistent with cystercercosis should not receive presumptive treatment with either albendazole or praziquantel. Physicians with questions regarding cysticercosis infection and its evaluation can consult clinicians from DGMQ at RefGuidelines@cdc.gov.

Physicians should consult the package inserts for additional information about ivermectin, albendazole and praziquantel.

Post-Treatment Guidelines And Follow-Up

Follow-up testing for strongyloidiasis is not routinely necessary after presumptive treatment is completed. Persons who are immunocompromised or may become immunocompromised in the near future, including persons with AIDS, HIV infection, or cancer; chronic steroid users, and persons who have had a transplant or who may receive a transplant, or have conditions such as asthma that may be treated with steroid therapy are at risk for *Strongyloides* hyperinfection syndrome. All refugees who have been treated should be counseled about this risk, and refugees who are immunocompromised will need follow-up after resettlement according to the domestic protocols. Symptoms (e.g., chronic abdominal pain) or signs (e.g., persistent eosinophilia) of ongoing infection may indicate failure of presumptive therapy and these persons should have appropriate follow-up evaluation.

For questions regarding these guidelines, please contact CDC, DGMQ at RefGuidelines@cdc.gov

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Table 1. Recommended Medication Regimen for Presumptive Treatment of Intestinal Parasites Prior to Departure for the United States

Refugee Population	Regimen		
	Albendazole [1]	**Ivermectin** [2]	**Praziquantel** [3]
South and Southeast Asia	400 mg orally for 1 day	Ivermectin [2],200 µg/kg orally once a day for 2 days [1]	Not recommended
Africa [4]**, non-*Loa loa*-endemic area**	400 mg orally for 1 day	Ivermectin [2], 200 µg/kg/day once a day for 2 days [1]	Praziquantel [3], 40 mg/kg divided in two doses.
Africa [4]**, *Loa loa*- endemic area**	400 mg orally twice a day for 7 days.	Not Recommended	Praziquantel [3], 40 mg/kg divided in two doses.
Pregnant women from South or Southeast Asia	400 mg orally for 1 day (if in 2nd or 3rd trimester). First trimester, not recommended	Not recommended	Not recommended
Pregnant women from Africa	400 mg orally for 1 day (if in 2nd or 3rd trimester). First trimester, not recommended	Not recommended	Praziquantel, 40 mg/kg divided in two doses.

Although WHO states ivermectin and albendazole may be given concurrently, it is recommended that ivermectin be taken on an empty stomach and albendazole with fatty foods. Mohammed KF, et al. found no increased adverse events when ivermectin, praziquantel and albendazole were co-administered. [27]

[1] Children 12-23 months should receive 200 mg orally for one day. Presumptive albendazole therapy is not recommended for any infant less than 12 months of age.

[2] Children who weigh ≤15 kg should not receive presumptive treatment with ivermectin.

[3] Children under ≤ 4 years of age should not receive presumptive treatment with praziquantel. Praziquantel, if not co-administered, should be administered prior to either ivermectin or albendazole. Praziquantel should be taken with liquids during a meal.

[4] All African countries are considered endemic for schistosomiasis except Lesotho.

Table 2. Ivermectin [1] dosing based on height

Height	Dosing
< 90 cm	**Not recommended**
90-119 cm	1 tablet (3 mg)
120-139 cm	2 tablets (6 mg)
140-159 cm	3 tablets (9 mg)
>159 cm	4 tablets (12 mg)

[1] Using 3-mg Ivermectin tablets

Table 3. Praziquantel [1] , [2] dosing based on height

Height	Dosing
< 94 cm	**Not recommended**
94-109 cm	1 tablet (600 mg)
110-124 cm	1 ½ tablets (900 mg)
125-137 cm	2 tablets (1200 mg)
138-149 cm	2 ½ tablets (1500 mg)
150-159 cm	3 tablets (1800mg)
160-177 cm	4 tablets (2400 mg)
≥178 cm	5 tablets (3000 mg)

[1] Better tolerated if divided into two doses
[2] Using 600-mg Praziquantel tablets

List 1. *Loa loa* in countries with schistosomiasis

Schistosomiasis-endemic countries of Africa [1] (praziquantel for presumptive therapy for schistosomiasis)

African countries NOT endemic for Loa loa *(may use ivermectin for presumptive strongyloides therapy)*

- Algeria
- Botswana
- Burkina Faso
- Côte d'Ivoire
- Egypt
- Eritrea
- Gambia
- Ghana
- Guinea
- Kenya
- Liberia
- Libya
- Madagascar
- Malawi
- Mali
- Mauritania
- Mauritius
- Morocco
- Mozambique
- Namibia
- Rwanda
- Senegal
- Somalia
- South Africa
- Swaziland
- Tanzania
- Togo
- Zambia
- Zimbabwe

African countries endemic for Loa loa *(use albendazole for seven days for presumptive strongyloides therapy)*

- Angola
- Burundi
- Cameroon
- Central Africa Republic

- Chad
- Congo
- Democratic Republic of the Congo
- Equatorial Guinea
- Eritrea
- Ethiopia
- Gabon
- Guinea-Bissau
- Niger
- Nigeria
- Sierra Leone
- Sudan
- Uganda

[1] Lesotho is the only country in Africa not considered endemic for schistosomiasis.