Schistosomiasis

Schistosomiasis is a parasitic disease caused by infection with *Schistosoma* trematodes. The disease affects poor rural communities but has spread to urban areas and to tourists visiting endemic areas.

Disease and epidemiology

- Schistosomiasis is a parasitic disease caused by infection with *Schistosoma* trematodes including *S. mansoni*, *S. japonicum*, *s. mekongi*, *S. guineensis and related S. intercalatum* and *S. haematobium*.
- There are two main types of the disease:
  - intestinal schistosomiasis, which results in abdominal pain, diarrhoea, blood in the stool, Katayama fever (mostly with *S. japonicum* only) and, in advanced stages, enlargement of the liver and spleen, fibrosis, portal hypertension and accumulation of fluid in the peritoneal cavity; and
  - urogenital schistosomiasis (*S. haematobium* only), which results in bloody urine, fibrosis of the bladder and damage to the ureter and kidneys; genital forms manifest as pain of the testicle and blood in the sperm in men, abdominal and pelvic pain in women, pain during intercourse, ectopic pregnancies and infertility; association with HIV transmission has been demonstrated in co-endemic areas.
- Human transmission occurs through contact with water (e.g. bathing, swimming, washing clothes) infested with larval forms (cercariae) that develop in freshwater snails, the intermediate host; inadequate sanitation increases risk of transmission.
- The disease affects poor rural communities but has spread to urban areas and to tourists visiting endemic areas.

Progress against WHO 2020 targets

Impact indicator	2020 target	Current status
Regional Elimination	2015 – multiple regions[1] 2020 – multiple regions[2]	0
Percentage of school-aged children covered with preventive chemotherapy	75%	67%

Core strategic interventions

Preventive chemotherapy	• Regular treatment through mass drug administration (MDA) with praziquantel of at-risk groups (school-aged children, preschool-aged children, communities in highly endemic areas, adults in occupations involving contact with infested water)
WASH	• Access to safe water • Improved sanitation and management of excreta across communities (including animal waste) • Individual hygiene education (e.g. use of toilets, personal hygiene)
Vector control	• Snail control with molluscicides, physical removal, and environmental modification
Veterinary public health	• Keeping animals away from transmission sites (for zoonotic transmission) especially in areas endemic for *S. japonicum*
Case management	• Treatment of animals with praziquantel • Treatment with praziquantel on case-by-case basis and individualized disease management (e.g. surgery and self-care) where appropriate
Other	• Behavioural change, self-care and environmental management interventions

Risks that require mitigation

Zoonotic reservoirs could continue transmission; reintroduction of the disease by migration raises the risk of recrudescence; the disease could resurge if regular treatment through MDA is stopped without sustainability interventions in place (e.g. WASH and surveillance)

WHO 2030 target, sub-targets and milestones

Indicator	2020 (provisional estimate)	2023	2025	2030
Number of countries validated for elimination as a public health problem (currently defined as <1% proportion of heavy intensity schistosomiasis infections)	0	49/78 (63%)	69/78 (88%)	78/78 (100%)
Number of countries where absence of infection in humans has been achieved	1/78 (1%)	10/78 (13%)	19/78 (24%)	25/78 (32%)

Burden of disease

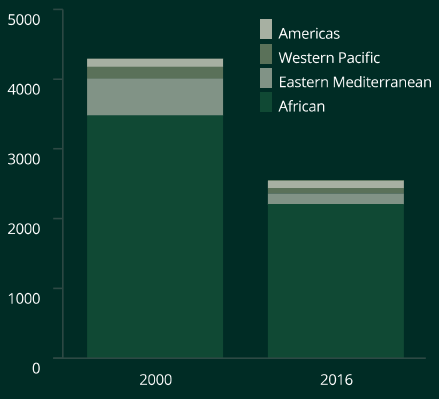
About 236 million
people required MDA in 2019

About 24 000
deaths in 2016

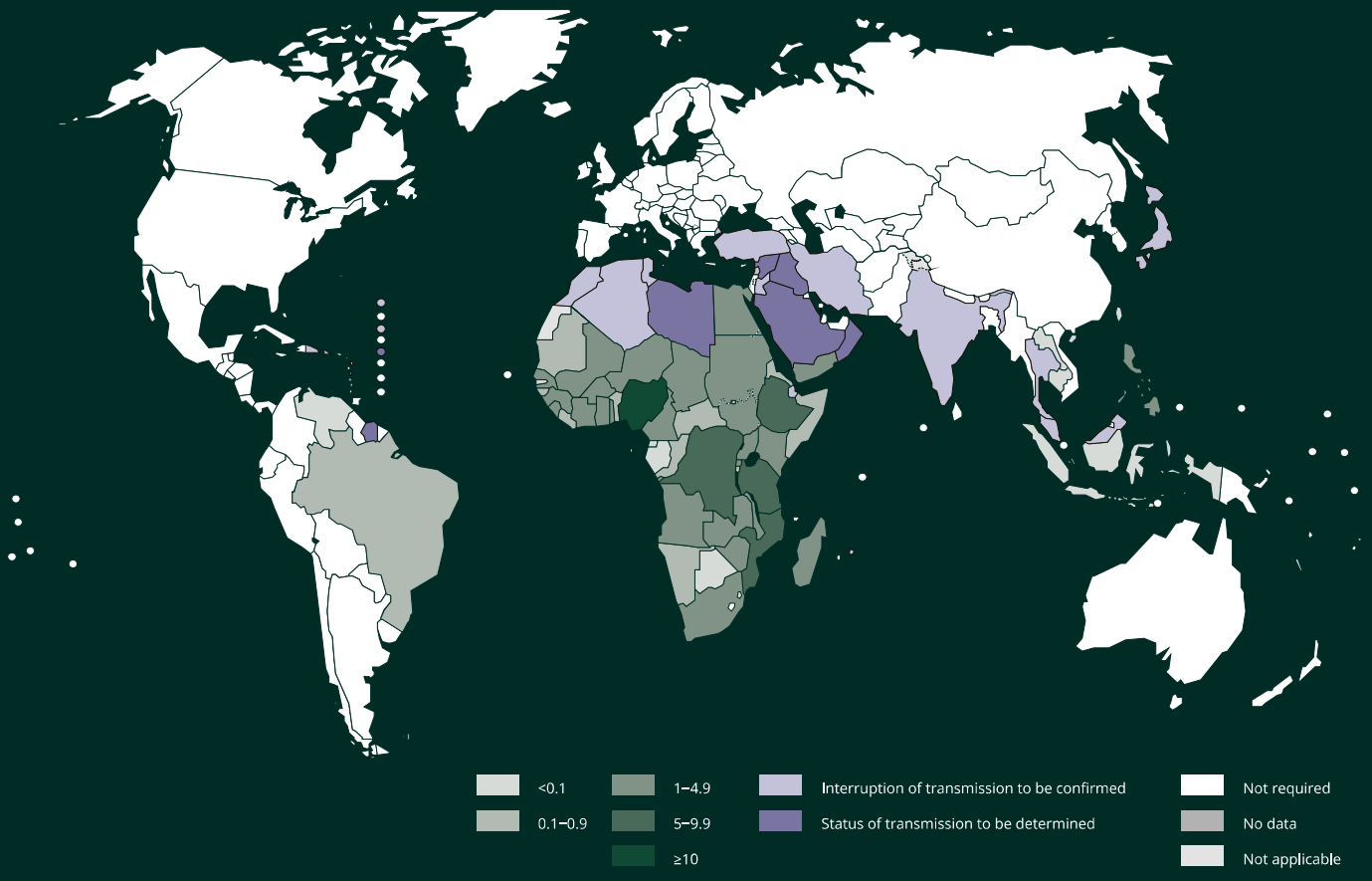
About 2.5 million
DALYs in 2016

As of January 2020, schistosomiasis is endemic in 78 countries, of which 51 countries have moderate to severe transmission and require preventive chemotherapy; more than 90% of people requiring treatment live in Africa. Deaths and DALYs are likely underestimated due to underreporting, method used to assess disability and other factors.

DALYs per region, thousands



Proportion (%) of global population requiring preventive chemotherapy, 2019



Schistosomiasis: assessment of actions required to meet 2030 sub-targets

Summary of critical actions to achieve targets

- Define indicator for measuring morbidity.
- Implement effective interventions, including extending preventive chemotherapy to all populations in need and ensuring access to the necessary medicines; implement targeted snail control with updated guidelines; continue micro-mapping and targeting.
- Develop diagnostic tests, including standardized point-of-care diagnostic, and develop new interventions, including alternatives to praziquantel and methods of snail control.
- Create effective cross-sectoral governance mechanisms to coordinate with WASH, vector control, animal health, environment and other key sectors.
- Ensure sufficient resources, including domestic financing, for access to interventions (including MDA for children and adults as well as snail control), development of new tools and strengthening of health care capacity.

Category and current assessment	Current status	Actions required
Technical progress		
Scientific understanding	• Decent understanding of transmission and parasite life cycle • Unclear understanding of resurgence pathways • Gaps in understanding of specific snails, hybrid species and zoonotic reservoirs; zoonotic reservoirs maintain transmission • Insufficient understanding of spectrum of morbidities	• Determine causes and strategies to prevent resurgence and to sustain elimination as a public health problem once achieved • Understand zoonotic transmission and interventions to address zoonotic reservoirs • Determine causes and develop strategies to address areas not responding to treatment • Determine impact of female genital schistosomiasis and association with HIV • Define both economic and health impact of clinical and "subtle" morbidity
Diagnostics	• Kato–Katz and urine filtration used to measure prevalence and intensity but suboptimal in low prevalence areas • More sensitive and specific rapid diagnostic tests are being used and others are under development	• Develop and introduce standardized, sensitive, point-of-care diagnostics for different prevalence settings and all schistosome species; use for mapping and transmission assessment • Create biorepository of sera, urine and stool for diagnostic development, validation and evaluation • Develop test for resistance to praziquantel • Develop molecular test for xenomonitoring and surveillance • Develop point-of-care diagnostic for female genital schistosomiasis
Effective intervention	• Regular treatment with praziquantel, through MDA or test and treat, reduces infections and prevalence • Research on improved formulations of praziquantel and paediatric formulation is ongoing • Tailored snail control is being implemented in some countries; however, environmental concerns exist • There is a need to strengthen the evidence of effective WASH and behavioural change interventions	• Utilize or implement current strategies according to guidelines (e.g. expand treatment to adults, implement WASH) and conduct operational research simultaneously to inform future interventions • Introduce or improve micro-targeting of MDA and other interventions at community level • Develop new, alternative medicines to complement praziquantel in case of resistance • Develop and launch safer, cheaper and effective snail control technology considering the environment • Conduct operational research to improve effective WASH and behaviour interventions for prevention • Consider development of a vaccine for humans and animals to prevent reinfection and reduce transmission • Improve morbidity management including coinfection and secondary infection • Coordinate with WASH services and organizations effectively to ensure access to sufficient clean water for bathing and washing and provide health education

Category and current assessment	Current status	Actions required
Strategy and service delivery		
Operational and normative guidance	• Process for verification of elimination of transmission under development • WHO manual on indicators of morbidity published • New guideline includes treatment of all at-risk groups	• Create guidance on how to sustain elimination as a public health problem and elimination of transmission • Develop methodological guidance for measuring progress and impact assessment • Develop intervention and monitoring strategies for urban and periurban settings
Planning, governance and programme implementation	• Good coordination among stakeholders • National programmes at different stages of development concerning multisectoral integration of snail control, WASH and behavioural change interventions	• Adopt and implement current strategies nationally (e.g. expand to other groups including adults, school-aged children (SAC) not at school); improve compliance of MDA and WASH by strengthening social mobilization and behavioural change • Implement test, treat and track strategies in countries striving for elimination of transmission • Develop a coherent cross-sectoral governance structure (e.g. WASH, vector, education, animal) within countries to deliver interventions effectively; include schistosomiasis in their packages of universal health coverage
Monitoring and evaluation	• Epidemiology of the disease currently not well understood • Working group established to provide new guidance for M&E, granular mapping and impact assessment	• Improve data quality and mapping to support target and track progress at the lowest level; implement granular mapping (harnessing new technologies) to support targeted MDA and other interventions at lower administrative or community levels • Collect M&E data from pre-SAC, SAC and adults to inform optimal treatment strategy • Implement impact assessments for potential strategy adjustment • Use endemicity data to target WASH investment and track progress to elimination • Improve reporting on distribution, leveraging new tools • Implement monitoring for efficacy of and drug resistance to praziquantel • Develop economic impact indicators to assess disease burden and programmatic progress
Access and logistics	• Donation of 250 million tablets of praziquantel from Merck available for treatment of school-aged children and some adult treatment through community delivery in the African Region • Some countries use alternative sources of praziquantel • Reliance on school-based delivery of treatment can miss children not attending school, preschool-aged children (pre-SAC) and adults	• Utilize donor coordination, supply and logistic tools to ensure access to sufficient quality-assured praziquantel to treat all in need • Ensure access to and delivery of treatment to all at-risk populations, including adults, according to the guidelines (e.g. through strengthening logistical aspects) • Ensure access to paediatric formulation of praziquantel for pre-SAC once available • Ensure access to molluscicides and zoonotic interventions as available • Ensure access to diagnostics as available
Health care infrastructure and workforce	• Health care infrastructure and laboratory capacity variable, with certain regions lacking capacity • Low availability of skills in malacology and snail control • Lack of awareness of female genital schistosomiasis by health care providers	• Integrate schistosomiasis into primary health care • Build laboratory capacity for surveillance • Strengthen health care capacity for morbidity assessment and case management • Build capacity in malacology and snail control
Enablers		
Advocacy and funding	• Currently, treatment programmes rely heavily on external funding, which in many countries can be short-term	• Advocate to international and domestic stakeholders and policy-makers to strengthen ownership of schistosomiasis control and elimination programmes and their integration into universal health coverage • Mobilize extra resources for progress towards the ultimate goal of elimination of transmission, which would allow MDA to be stopped; mobilize resources for medicines, molluscicides and other needs • Develop a request of interest for WASH investments in areas endemic for schistosomiasis
Collaboration and multisectoral action	• Manual (2013) and Global strategy on WASH and NTDs (2015) published • Advocacy document on female genital schistosomiasis and HIV published (2019) • Level integration with other sectors (e.g. WASH, agriculture, education, vector control, environment) • Coordination organizations include the Global Schistosomiasis Alliance and the Neglected Tropical Diseases NGO Network	• Coordinate cross-sectoral interventions to implement treatment, WASH and behavioural strategies in communities, schools and health facilities; ensure access to clean water • Integrate schistosomiasis interventions with other NTDs for efficiencies (e.g. MDA/preventive chemotherapy) • Strengthen collaboration with other actors in the health care sector for genital manifestations, coinfections and severe morbidity management • Promote snail control as part of the Global Vector Control Response and coordinate with environment groups • Coordinate with animal sectors and the One Health approach
Capacity and awareness building	• Female genital schistosomiasis atlas published to help in diagnostics (2015) • Manual on morbidity management under development • Manual on malacology, web training platform and App under development • Manual on field use of molluscicides published (2017)	• Support training of health staff in laboratory diagnostics, clinical management of cases and genital manifestations, malacology and snail control; integrate trainings with other NTDs and sectors • Develop epidemiological skills in workforce to enable assessment of treatment strategies and their tailoring • Adopt strategy for long-term sustainability and greater national ownership • Raise awareness among general public of the disease and its transmission, prevention and WASH and NTD interventions through production of manuals

Soil-transmitted helminthiases including strongyloidiasis

Soil-transmitted helminthiases are caused by infection with intestinal parasites (*Ascaris lumbricoides* and *Trichuris trichiura*), hookworms (*Necator americanus* and *Ancylostoma duodenal*e) and roundworms (*Strongyloides stercoralis*).

Disease and epidemiology

- Soil-transmitted helminthiases (STH) are caused by infection with intestinal parasites (*Ascaris lumbricoides* and *Trichuris trichiura*), hookworms (*Necator americanus* and *Ancylostoma duodenale*) and roundworms (*Strongyloides stercoralis*).
- Infection results in anaemia, malnutrition, impaired physical and cognitive development, abdominal pain and diarrhoea.
- Human transmission occurs through eggs or larvae in faeces, which contaminate soil in areas with poor sanitation.
- *S. stercoralis* is transmitted similarly to other STH, requires a different diagnostic method and can cause hyper-infection syndrome leading to death; it has not been addressed due to lack of access to ivermectin.

Progress against WHO 2020 targets

Impact indicator	2020 target	Current status
Proportion of preschool and school-aged children in need of treatment that are regularly treated	75%	59%
Number of endemic countries with 75% treatment coverage in preschool and school-aged children	75	21

Core strategic interventions

Preventive chemotherapy	• Strategy for preschool and school-aged children: - albendazole or mebendazole against *A. lumbricoides, T. trichiura* and hookworms: • twice per year where STH prevalence is ≥50% • once per year where STH prevalence is ≥20% - ivermectin should be added where prevalence of *S. stercoralis* exceeds 10% and as a complement for areas with high prevalence of *T. trichiura* • Women of child-bearing age treated with the same medicines through antenatal care
WASH	• Provision of adequate sanitation and waste management facilities • Improved hygiene practices (e.g. prevention of open defecation, hand washing) and access to safe water at the household level and beyond (e.g. in schools)
Vector control	N/A
Veterinary public health	N/A
Case management	• Provision of treatment to individuals living in areas endemic for STH and *S. stercoralis* is a way to increase universal health coverage
Other	• Education for behavioural change targeted to population group at risk

WHO 2030 target, sub-targets and milestones

Indicator[1]	2020 (baseline)	2023	2025	2030
Number of countries validated for elimination as a public health problem (defined as <2% proportion of soil-transmitted helminth infections of moderate and heavy intensity due to *Ascaris lumbricoides*, *Trichuris trichiura*, *Necator americanus* and *Ancylostoma duodenale*)[2]	0	60/101 (60%)	70/101 (70%)	96/101 (96%)
Number of countries including ivermectin in preventive chemotherapy in all areas endemic for *S. stercoralis*	0	10/101 (10%)	15/101 (15%)	96/101 (96%)

Burden of disease (*A. lumbricoides*, *T. trichiura* and hookworms only)

About 1.5 billion
people estimated to be infected with STH[1] in 2016

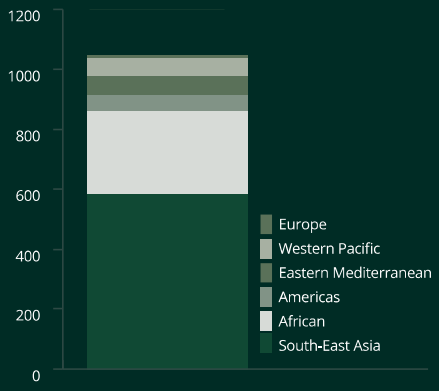
About 6300
deaths reported in 2016[1]

About 3.5 million
DALYs in 2016[1]

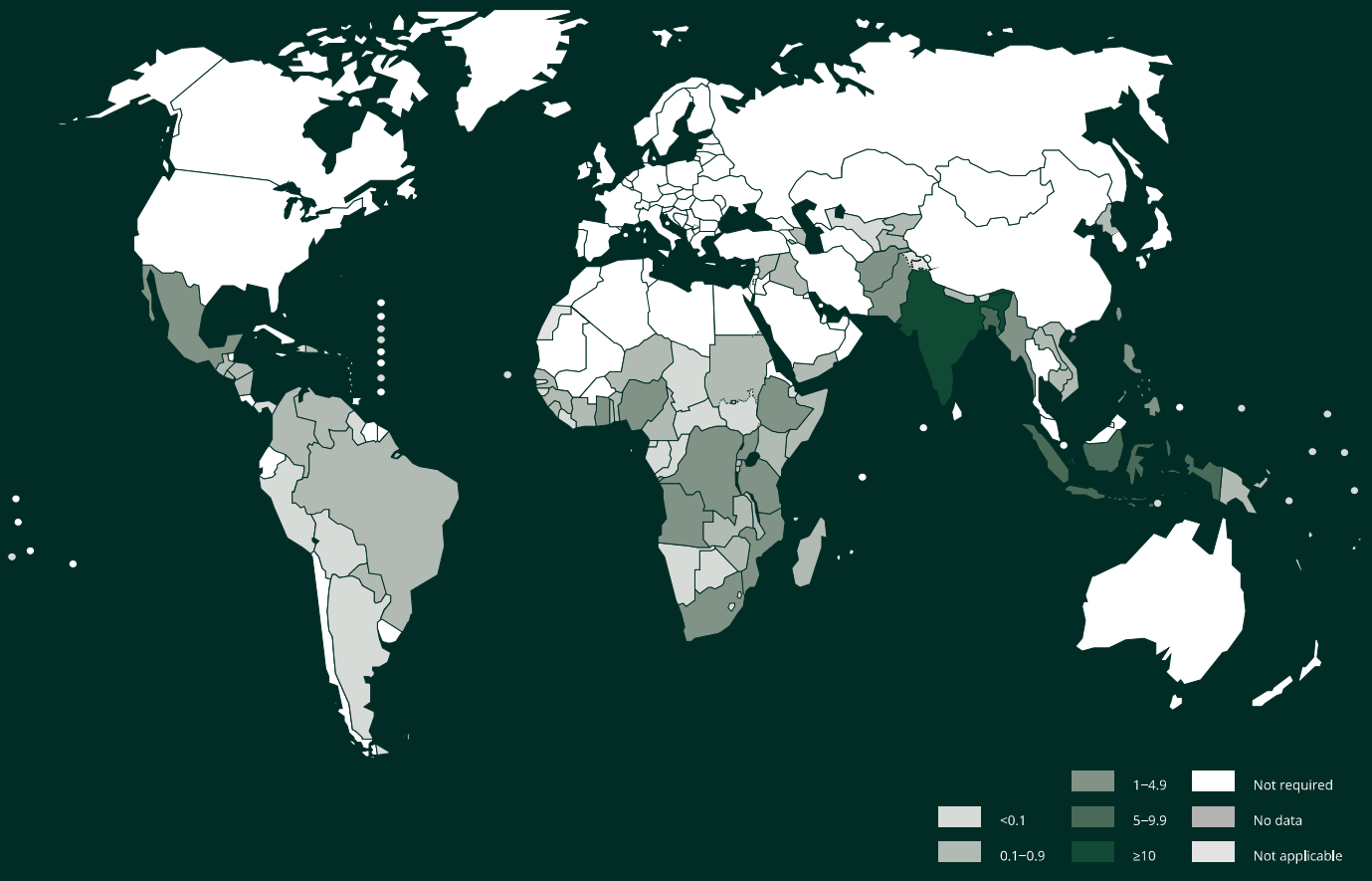
In 2019, 92 countries required MDA, mostly in tropical and subtropical areas across sub-Saharan Africa, Latin America and Asia but also in some areas of the European Region.

The burden of *S. stercoralis* should be quantified precisely.

Population requiring preventive chemotherapy for STH by WHO region, 2019, million



Proportion (%) of children requiring preventive chemotherapy globally, 2019



Soil-transmitted helminthiases: assessment of actions required to meet 2030 sub-targets

© WHO/Yoshi Shimizu

Summary of critical actions to achieve targets

- Increase political commitment to ensure sustainable domestic financing.
- Develop more effective medicines and medicine to improve patient outcomes and in case of drug resistance.
- Develop comprehensive surveillance and mapping systems to target treatment and monitor drug resistance.

Category and current assessment	Current status	Actions required
Technical progress		
Scientific understanding	• Good understanding of epidemiology and pathology • Research ongoing into the feasibility of elimination of transmission	• Estimate precisely the epidemiology and burden of *S. stercoralis*
Diagnostics	• Current Kato–Katz diagnostic method involves examination of stool samples under a microscope • No standard method for diagnosis of *S. stercoralis*	• Develop rapid, more sensitive and specific, easy-to-use point of care diagnostics for mapping and surveillance including for *S. stercoralis* • Devise sensitive and specific biomarkers for a field test • Design field-deployable tests to detect resistance • Standardize diagnostic procedure and develop guidance to limit variation in prevalence
Effective intervention	• Anthelminthic medicines are effective but their number is limited to albendazole and mebendazole, which may be an issue in case of increasing drug resistance • Ivermectin is highly effective but difficult to procure	• Develop more effective medicines and drug combinations against *T. trichiura* and hookworm infections • Promote prequalification of generic ivermectin at affordable cost or/and donated ivermectin

Category and current assessment	Current status	Actions required
Strategy and service delivery		
Operational and normative guidance	• Guidelines on preventive chemotherapy to control STH in at-risk population groups published (2017) • Manual on indicators and procedures to measure the reduction of morbidity due to STH exists • Initial estimation of the need of ivermectin, prequalification of a generic ivermectin and pilot interventions are under way for control of strongyloidiasis	• Develop guidelines on preventive chemotherapy to control strongyloidiasis • Devise practical guidelines for interventions for women of reproductive age
Planning, governance and programme implementation	• STH control is currently integrated into child health days (with vitamin A and vaccination) for preschool-aged children and into school health programmes for school-aged children • Strongyloidiasis control is potentially very easy to integrate into school health programmes for school-aged children	• Adopt policies for effective quality control of diagnostics and medicines by countries based on WHO global guidance including control procedures • Integrate deworming in endemic areas in universal health coverage policies and programmes • Prioritize control efforts against strongyloidiasis
Monitoring and evaluation	• M&E done principally on report from implementers • Currently limited scope of additional M&E activities due to lack of resources • Guidance exists on continuing surveillance after preventive chemotherapy has been suspended • Currently, there is no reported drug resistance; however, the risk is high	• Utilize new technologies (drone mapping, environmental DNA, etc.) to decrease the costs of surveillance and mapping • Develop a surveillance guide with standard indicators • Establish an M&E system or integrate M&E with the national health information system • Simplify impact assessment survey • Monitor the efficacy of medicines and of drug resistance
Access and logistics	• Albendazole and mebendazole for school-aged children are donated and distributed through WHO • Ivermectin is neither donated nor available as a prequalified generic medicine	• Improve access to medicines for women of reproductive age and preschool-aged children • Increase the availability of ivermectin for control of *S. stercoralis* and *T. trichiura*
Health care infrastructure and workforce	• Albendazole and mebendazole are distributed through schools and communities using teachers and community health workers as drug distributors • Teachers are not trained in distributing ivermectin	• Include distribution of ivermectin • Increase the number of testing facilities for routine laboratory testing of STH • Ensure transition to school-based programmes in settings where LF MDA stops
Enablers		
Advocacy and funding	• Many countries depend on drug donations and external funding for programme implementation • The number of donated tablets needed is expected to decrease substantially as populous countries become self-sufficient and as the frequency of preventive chemotherapy decreases after successful intervention; the number of individuals in need of treatment is expected to remain similar • No funds or donations are currently available for control of strongyloidiasis	• Increase domestic financing to ensure sustainability • Secure drug donations for women of reproductive age and preschool-aged children • Secure funding for *S. stercoralis* • Advocate for expanded sanitation in endemic areas and develop a return on investment for WASH investments in STH-endemic areas
Collaboration and multisectoral action	• Collaboration with ministries of education for school-based programmes is ongoing and highly productive and can be used for strongyloidiasis control • Collaboration with vaccination programmes during child health days is ongoing and highly productive	• Integrate PC with other programmes (e.g. nutrition, vaccinations) to increase cost–effectiveness and coverage • Integrate surveillance and mapping across diseases (e.g. lymphatic filariasis, schistosomiasis, onchocerciasis, polio, scabies) • Ensure effective WASH strategies to prevent resurgence • Coordinate effectively with other ministries (water, education, housing)
Capacity and awareness building	• Teachers and community health workers are partially trained • Laboratory technicians are trained on STH diagnostics but more rarely on strongyloidiasis diagnosis • Training manuals are available	• Integrate training in the routine activities of health facilities