



The ITFDE has considered schistosomiasis for potential elimination twice prior to this meeting, first in 2001 and then in 2012, and came to the same conclusion both times: that interrupting transmission was still not yet possible with the available tools in most endemic countries, even though it was considered by WHO in 2012 for inclusion in its list of diseases for elimination. Considering the view

Schistosomiasis is a parasitic disease caused by *Schistosoma* spp. parasites and has two major parasites (*S. malindianum* and *S. japonicum*) and three major species (*S. haematobium*, *S. guineensis*, *S. intercalatum*), which are regionally specific to parts of Africa, Asia, and the Americas. Current WHO estimates show that 78 countries and territories remain endemic for the

Given that antibody responses to antigens used in schistosomiasis immunoassays remain detectable long after treatment, antibodies may not be a good candidate biomarker for monitoring and evaluation tests. However, antibodies may be useful for assessing transmission interruption and for conducting surveillance as communities close to interruption of transmission or undergoing post-transmission surveillance are unlikely to have experienced much recent transmission. The very high specificity requirements for tests used at end stages of the program require a combination of two tests: a screening test that should be conducted at point of care and a confirmatory test for active infection that could be conducted at point of care or in a laboratory setting.

translate into 500 million¹ tablets of praziquantel annually, vastly exceeding current global praziquantel production capacities. While it is unlikely that demand at this level can be met in the foreseeable future, endemic countries will increasingly seek to follow treatment guidelines by escalating their respective praziquantel demand. Together with WHO, Merck is creating decision-making criteria to allocate some of its praziquantel for adult treatment, which will cover some of the expected increased demand, and will continue to provide up to 250 million tablets of praziquantel per annum. Additionally, three sources of praziquantel are now available in WHO's list of prequalified manufacturers to ensure quality of praziquantel tablets procured outside of Merck's donation.

Currently, most efforts to model the feasibility of schistosomiasis elimination use individual-based models, which look at each individual in an endemic community who may act as a host for a number of worms, leading to excretion of a certain number of eggs. Their history of infection, as well as their current infection, may also be tracked, allowing the potential for modeling morbidity. The wide variability in non-human animal hosts and environmental factors in different settings is a significant hurdle in modeling feasibility of elimination. Uncertainties in snail dynamics mean that different modeling assumptions can result in starkly different rates of bounce-back in infection following treatment, and variable predictions on the impact of snail control. Moreover, many models do not consider factors such as hybridization (i.e., interbreeding between two species) or zoonotic transmission (i.e., transmission of disease from animals to humans or vice versa), systematic lack of access or non-compliance with treatment regimen, and each round of MDA may be reaching and overlooking the same groups.

The degree of aggregation of eggs amongst hosts (the fact that some people have many eggs and others have very few) is critical in understanding the dynamics of transmission, especially for persistent hotspots. Communities with the same level of prevalence can have different degrees of egg aggregation, which can have a profound impact on which control strategies will be most effective. For example, highly aggregated populations where worms are concentrated in a small number of people can maintain transmission, despite generally good coverage of control and treatment interventions. Mass treatment may be ineffective in such cases, as these smaller groups may be harder to reach and overlooked.

Taking into consideration these uncertainties, modeling suggests that MDA alone may achieve

1. *The Americas*

Schistosomiasis has been historically endemic in 11 countries in the Americas: Antigua and Barbuda, Guadeloupe, Martinique, Montserrat, Saint Lucia, Saint Kitts, and Nevis, Saint Martin, Dominican Republic, Puerto Rico, Brazil, and Venezuela. Schistosomiasis transmission has likely been eliminated in most countries and territories in the Caribbean, but persists in Brazil, mainly in the Atlantic coast in the states of Alagoas, Bahia, Minas Gerais, Pernambuco, and Sergipe, and in Venezuela, in the states of Aragua, Carabobo, and Guarico. However, the average prevalence in Brazil and Venezuela is below 10%. The total estimated population at risk in the Americas Region is 1.6 million people, most of them in Brazil.

Evidence suggests that some countries that seem to have interrupted transmission, such as Dominican Republic, Puerto Rico, and St. Lucia, have been aided in decreasing prevalence due to economic development, urbanization, improvement in water and sanitation, and growth in tourism.

Following WHO's recently published new guidelines, PAHO is supporting countries and territories in the Caribbean to carry out studies in school-age children, adults, and snails to assess the status of transmission and verify whether transmission has been interrupted. Verification of interruption of transmission seems feasible in the Caribbean by 2030 at the latest. To further reduce disease burden and transmission, recommendations for Brazil and Venezuela include implementing a test-and-treat approach, WASH and environmental interventions (including snail control), and behavioral interventions.

2. *Zanzibar*

Urogenital schistosomiasis has been a major public health problem in Zanzibar over the past century. Since the early 2000s, the -and-

strategy is implemented, which consists of active surveillance in schools, reactive surveillance in households of positive children, reactive surveillance at water bodies that are used by positive children, reactive snail control in water bodies used by positive children where the intermediate

advocate for forming productive links with organizations outside the NTD sector. Examples of the need for better and wider integration extend to education, social sciences, engineering, One Health, and reproductive health services. The GSA also coordinates a genital schistosomiasis community of practice and has an active group of GSA Ambassadors across Africa who exchange information and explore topics relating to schistosomiasis control and elimination in line with their country's experiences.

Elimination, whether as a public health problem or interruption of transmission, is generally appealing to donors and they seem to be aligned with WHO's overall NTD elimination agenda. However, current schistosomiasis funding is not nearly enough to achieve WHO NTD Roadmap 2030 targeted goals. Part of the challenge is the disease itself – schistosomiasis is a complex disease that is difficult to eliminate due to several factors. Although some countries have achieved elimination, it is not feasible everywhere with current tools and resources. More attention is needed to contextual factors including consideration of morbidity associated with light-intensity infections as they contribute to the burden of disease.

context, given the wide variability of the disease depending on the type of parasite, various non-human animal hosts, and environmental factors. Although implementation of integrated interventions can be a challenge, strategies such as cross-training of drug distributors, coordination with other NTD programs, working directly with communities, establishing a platform for intervention delivery, and providing MDA at the community level may aid in promoting effective interventions.

5. Given the new recommendations for treatment, WHO estimates that the amount of praziquantel needed to achieve elimination will increase to around 500 million praziquantel tablets annually. As praziquantel demand is expected to soar with the implementation of new WHO guidelines, more attention needs to be directed toward increasing praziquantel supplies. The development of eligibility and allocation criteria for praziquantel by Merck in partnership with WHO is a positive step in this direction. However, the inevitable need for increased manufacturing should be addressed. The ITFDE also commends Merck for continuing its commitment to donating 250 million tablets of praziquantel annually until the elimination of schistosomiasis as a public health problem is achieved.
6. With funding for NTDs on the decline for the past four years and significant budgetary cuts made by the United Kingdom's FCDO (Foreign Commonwealth Development Office) for NTD elimination efforts, donors need to be engaged now more than ever. Donor fatigue is a challenge in this area that merits attention. Highlighting the link between FGS/MGS and sexual and reproductive health issues such as HIV, sexually transmitted infections and cervical cancer may help to attract additional interest, support, and funding.
7. Countries should be encouraged to take ownership of schistosomiasis control and elimination efforts and promote sustainability of programs at the national level. This requires countries to carry out robust active and passive surveillance, especially to combat and prevent reinfections.