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## MDA helminth control: more questions than answers



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Soil-transmitted helminths (STH) and schistosomiasis have been recognised as important diseases. Diagnostics, treatments, and understanding of these were accrued throughout the 20th century, and reached the point that control and elimination seemed to be mostly a matter of implementation of mass drug administration (MDA) programmes.<sup>1</sup> However, in 2015, both STH and schistosomiasis are global health problems, so perhaps we do not have the right methods or they are not being effectively applied. To our knowledge, MDA for STH and schistosomiasis has never been reported to eliminate infection without concomitant economic development. What are we missing?

Most understanding about infection and disease is from longitudinal intervention studies completed in the 1980s and 1990s,<sup>2,5</sup> which are now ageing and rarely benefited from modern techniques, such as next-generation sequencing. Very surprising is how much is not fully understood about these infections—eg, the biological or ecological basis of predisposition to high worm burdens, the importance of household-based transmission, the causes and resulting effects of co-infection with many parasites, and how to measure the burden of disease.

Measurement of the burden of disease is particularly vexing. Cochrane reviews, published in 2012<sup>6</sup> and 2015<sup>7</sup>, have emphasised the paucity of information (only 42 and 45 papers were included, respectively) and reported that little evidence was available for any beneficial effect of deworming, even though people in the field were convinced that these result in a great effect on physical and mental health.<sup>8</sup> By contrast, evidence of the effects in livestock and wildlife is accruing.<sup>9</sup> More than 1 billion children worldwide live at risk of helminth infection,<sup>10</sup> and yet the effect on their health and development still cannot be quantified.

In *The Lancet Global Health*, Nathan Lo and colleagues<sup>11</sup> introduce two advances that should be highlighted. First is the inclusion of five different parasites in the same study, which is sensible, in view of the substantial overlap in diagnostic procedures and treatments for the different species. Second, the authors<sup>11</sup> worked with detailed data in one setting (Côte d'Ivoire) and made comparisons between different communities within that setting; such linkage between consistent local data

and models is rare. Helminth infection and disease can be very different in different communities, but well validated models in many settings might allow for the extrapolation to others. We would like to think that this paper<sup>11</sup> marks the demise for universal studies of single helminth species.

Lo and colleagues<sup>11</sup> also add to the evidence that MDA might need to be widened beyond school-aged children (5–14 years). Different frequencies of treatment are known to be needed for communities with different intensities of infection, but less appreciated is that different age groups need to be treated for different circumstances, particularly with the aim to stop transmission of infections.<sup>12</sup> Lo and colleagues' results<sup>11</sup> suggest that widening coverage to additional age groups could be highly cost effective in terms of disability-adjusted life-years averted, motivating wider treatment programmes for effect rather than purely for the aim of local elimination.

Generally, we need interventions that are sustainable in the face of social, economic, and ecological heterogeneities. Models need to guide intervention programmes in terms of what to measure and how to use this information to manage the intervention. However, this task is difficult for modellers to provide because detailed data from many settings do not exist; or in settings where data do exist, the mechanisms to share these are not available in a way that provides useful results for both individual countries and wider policy formulation.

Lo and colleagues' study<sup>11</sup> emphasises the need for additional longitudinal studies of infection and disease—with longer follow-up time than have been done previously, especially if the negative sequelae of infection in children starts while they are very young and lasts for decades. Such future studies need a broadening of research approaches, particularly to include multiparasitism, the concepts of parasite tolerance (ie, that some individuals can harbour high burdens with relatively little effect on their health), social dimensions (ie, people with the highest burdens are less likely to be included in interventions and research studies, possibly because of their high burden, than those with low burdens), and potential reservoirs of transmission (ie, the role of households and environmental

contamination). Confounders and mediators (eg, nutrition, poverty, and microbiota) also need to be taken into account.

Of course, it should be emphasised that whether MDA can eliminate transmission, or whether it will ultimately need improvement in the quality of the water supply, sanitation, and hygiene, is yet to be shown. Nonetheless, MDA is the mainstay of control for the present generations, and we need to know whether, and how, we should use this method.

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We declare no competing interests.

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