Community-wide soil-transmitted helminth treatment is equity-effective

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Among the 20 diseases included on the WHO list of neglected tropical diseases, the soil-transmitted helminths (*Ascaris lumbricoides*, hookworm, and *Trichuris trichiura*) are the most prevalent (>1 billion people infected) and the most burdensome (global burden of 3 million disability-adjusted life years).[1,2] At the turn of the new millennium, preventive chemotherapy—the periodic administration of donated anthelmintic drugs to pre-school-age and school-age children—had been embraced as the global strategy for morbidity control of soil-transmitted helminths.[3] In view of the more ambitious goals stipulated in the 2012 London Declaration on neglected tropical diseases, the ultimate target is to break transmission of soil-transmitted helminth infection by 2020. A comprehensive strategy, consisting of preventive chemotherapy at high population-level coverage, coupled with improvements in water, sanitation, and hygiene, and changes to risk behaviour through information, education, and communication might be necessary for sustainable control of soil-transmitted helminths.[4] Furthermore, mathematical modelling[5] and a meta-analysis[6] suggest that community-wide treatment including all age groups might interrupt soil-transmitted helminth transmission.

In an Article in *The Lancet*, Rachel Pullan and colleagues[7] have taken this a step further. They did a large, cluster-randomised trial, comparing three different treatment strategies: annual school-based intervention, treating all children aged 2–14 years (current standard), and annual or biannual community-wide treatment. They included 120 community units serving approximately 150 000 households in Kenya. The primary outcome was community hookworm prevalence 12 months and 24 months after treatment, and secondary outcomes were the prevalence of the other two soil-transmitted helminth species, infection intensity, equity, and cost. 24 843 individuals were included in the assessment survey for the primary outcome at 12 months and 22 188 at 24 months. Community-wide treatment was more effective in reducing the prevalence and intensity of hookworm infection compared with standard school-based treatment (risk ratio 0·59, 95% CI 0·42–0·83, p<0·001), with little additional benefit of biannual community-wide treatment (0·46, 0·33–0·63; p<0·001). The authors also observed that coverage and the effects of the intervention in the community-wide strategy were equitable across demographic and socioeconomic subgroups.[7] Therefore, community-wide treatment might arise as a key equity tracer for Sustainable Development Goal 3—that is, ensuring healthy lives and promoting wellbeing for all at all ages, specifically target 3.8 that aims at achieving universal health coverage.

We commend the authors for a well designed, timely, and definitive study. Together with additional evidence that will arise from ongoing DeWorm3 trials in Benin, India, and Malawi,[8] this study will undoubtedly shape the post-2020 strategy for the control and elimination of soil-transmitted helminths and other neglected tropical diseases.

What is required before expansion and scale-up of preventive chemotherapy targeting soil-transmitted helminths? First, implementation research is still required to help determine the exact role of community-wide treatment, as part of a multifaceted, intersectoral control strategy that will provide the necessary evidence on how to achieve highest benefits in reducing the prevalence and intensity of soil-transmitted helminth infection in an equity-effective manner.[9] Besides implementation research, comparison of the costs of community-wide treatment and standard school-based treatment will be important since the economic analysis by Pullan and colleagues was restricted to the community-based approaches.

Second, with regard to open issues on the treatment component of an integrated control package, future studies will need to address the effects of community-wide treatments on *A lumbricoides* and *T trichiura*. In the Kenyan setting where Pullan and colleagues pursued their study, hookworm was the predominant soil-transmitted helminth species, whereas very low prevalence of *A lumbricoides* and *T trichiura* was observed. With regard to *T trichiura*, the authors observed no difference in the prevalence and intensity by treatment group. Each soil-transmitted helminth species has distinct epidemiological features and age-dependent patterns of infection prevalence (maximum prevalence of *A lumbricoides*

and *T trichiura* is usually attained in young children, whereas the peak prevalence of hookworm is observed in adolescence or early adulthood),[10] reinfection rates, and differing sensitivity to albendazole,[11] which could influence the effects of different treatment strategies. Of note, hookworm infection intensity was low; therefore, findings from the current study are not generalisable to other, higher infection intensity settings. Although considerably more expensive, future studies should consider use of higher sensitivity PCR-based diagnostics, providing more accurate prevalence estimates compared with the Kato-Katz method,[12] particularly when used on a single stool sample, as done in this study. Because hookworm eggs disintegrate within 1 h on Kato-Katz thick smears, quality control is restricted to the other soil-transmitted helminth species,[13] a diagnostic dilemma that can be overcome by PCR.

Third, considerable concern that expansion of anthelmintic drug coverage might trigger the development and spread of resistance exists. Albendazole and mebendazole are widely used in preventive chemotherapy against soil-transmitted helminths, and evidence from veterinary medicine suggests that resistance developed quickly.[14] Since the optimal treatment dosage of albendazole has yet to be established in different age groups, underdosing—especially in the adult population—is an issue that would compound the risk of drug resistance development. Hence, a pressing need exists for control programmes to routinely monitor drug efficacy to promptly discover the development of drug resistance. The use of drug combinations (eg, albendazole and ivermectin), instead of albendazole or mebendazole alone, would not only delay the development of drug resistance but also broaden the spectrum of activity, particularly against *T trichiura* and *Strongyloides stercoralis* infections and should, therefore, be considered the treatment of choice.[14]

Fourth, we need to investigate whether platforms are readily available that extend treatment beyond the schools, such as to health centres or to the community. Experiences and lessons from community-wide treatments of other neglected tropical diseases (eg, lymphatic filariasis, onchocerciasis, and trachoma) must be considered. Moreover, whether pharmaceutical companies will be able to meet increasing drug supply demands remains to be seen. Finally, careful consideration should be given to attitudes and practices when treating entire communities to achieve high treatment coverage. Although high coverage was observed in this study using a unique partnership model,[7] whether similarly high coverage can be achieved during routine programmatic activities, as observed elsewhere in sub-Saharan Africa,[15] warrants rigorous monitoring.

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