Deworming important for children's health, has limited impact on infection in wider communities

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Although they have an important impact on children's health and education, school-based deworming programmes have a limited impact on the level of infection in the wider community, according to a mathematical modeling study conducted by researchers at Imperial College London.

Parasitic worms called soil-transmitted helminths (STH) infect more than a billion people in developing countries; these worms rob the infected person of nutrition and negatively affect physical growth and cognitive development, especially in children. They also can cause anemia, which is especially harmful in women of child-bearing age causing abdominal pain, anaemia, and weakness. STH occurs primarily in tropical areas where sanitation is poor, and typically affects the poorest of the poor—adding yet another burden on communities already held back by illness and poverty.

These STH infections, which can be easily treated with drugs, are among the neglected tropical diseases that last year pharmaceutical companies and health organizations made a commitment to eliminate or control. Johnson & Johnson (J&J) and GlaxoSmithKline (GSK) have made available up to 600 million doses of deworming drugs every year between now and 2020 – enough to achieve the target of treating up to 75% of school-age children at a global level. Deworming programmes often focus on administering treatments in schools because of the huge

toll that infections take on children's growth and education, plus the ease of reaching large numbers of children in rural areas.

Researchers at Imperial College London used statistical analysis and simulations of STH transmission in a mathematical model to investigate whether programmes targeting schools are effective at restricting infection in the wider community. Their study, published in *PLOS Neglected Tropical Diseases*, concludes that although these programmes have many important benefits for school-aged children, they only target a small proportion of parasites in the community. They also showed that the impact of school-based treatment depends on the extent to which school children over-contribute to transmission in the community than adults - something which hasn't been studied since the early 1990s.

Other strategies need to be considered as part of efforts to control and eliminate STH, the authors say.

Professor Sir Roy Anderson of Imperial College London, Director of the London Centre for Neglected Tropical Disease Research and lead author of the study, said: "Following the London Declaration on Neglected Tropical Diseases, pharmaceutical companies are making large donations of treatments for soil-transmitted helminths, which is great news for reducing the burden of these parasites. To make best use of donations, we need more calculation based on sound understanding of disease transmission, as opposed to just relying on opinion.

"Since there are very few studies which look at the indirect effect of school-based treatment, we need to do more studies to estimate mixing patterns and the impact on transmission in order to design effective programmes in the future."

In an accompanying expert commentary in the same issue journal, Dr. David Addiss, Director of Children Without Worms, says the study

raises critical questions which organizations working to control STH need to consider. "These results open a fundamental conversation about the goals and expectations of current global STH control efforts." Addiss notes that World Health Assembly (WHA) resolution 54.19, which set a target of treating at least 75% of school-age children with deworming drugs, also urged member states to promote access to safe water, sanitation and health education and to treat women at risk of STH.

In order to indicate the importance of the paper by Anderson and colleagues, Addiss draws on an analogy from the late 1800s: during that period, when massive trees were cut by handsaw and the logs floated down river by the hundreds to be milled, they occasionally jammed. Skilled lumberjacks could often identify a single "key log," which, once released, opened the way for all the logs to continue their journey. Addiss suggests that the paper by Anderson and colleagues reveals the presence of such a key log.

"In showing that the effect of deworming school children may have little long-term effect on STH transmission in the community, the analysis by Anderson and colleagues invites us, as a community, to clarify our goals and vision for STH control," Dr Addiss said.

More information: Anderson RM, Truscott JE, Pullan RL, Brooker SJ, Hollingsworth TD (2013) How Effective Is School-Based Deworming for the Community-Wide Control of Soil-Transmitted Helminths? PLoS Negl Trop Dis 7(2): e2027. doi:10.1371/journal.pntd.0002027

Addiss DG (2013) Epidemiologic Models, Key Logs, and Realizing the Promise of WHA 54.19. PLoS Negl Trop Dis 7(2): e2092. doi:10.1371/journal.pntd.0002092