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NEWS

Evidence for spending millions on deworming schoolchildren is inadequate, report says

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New analysis of a landmark paper on the health and economic benefits of eliminating worm infections in children has found little evidence that it does any good.

Deworming programmes have been heavily promoted by the World Bank, the World Health Organization, and international charities as a key to improving health, school performance, and, by inference, economic development in poor and middle income countries. India has recently launched the world's largest deworming programme, with the aim of treating 240 million children once or twice a year with albendazole, a drug that can eliminate worm infections.[1]

The policy relies on a limited evidence base, with a single randomised trial carried out in 75 Kenyan schools regularly cited by its proponents. In this 2004 study Edward Miguel of the University of California at Berkeley and Michael Kramer of Harvard University found that the treated children had a lower prevalence of worm infestation, improved nutritional status, and higher school attendance.[2] Importantly, they also found that these benefits extended to untreated children in the treated schools and to children in the wider area up to 6 km from the schools, effects the authors referred to as "positive externalities."

Their analysis has now been replicated, using the original data, by a team from the London School of Hygiene and Tropical Medicine, which published its findings in the *International Journal of Epidemiology*.[3] They found a number of rounding and coding errors that, when corrected, eliminated the claimed indirect effect on children in neighbouring schools and that made the effect on school attendance of treated children no longer statistically significant. Similarly, a claimed benefit on the prevalence of anaemia was not supported by the replication study.

"If you are saying there is an improvement in school attendance, you have to posit some improvement in health to account for it, either better nutritional status or reduced anaemia," Alexander Aitken, the new study's lead author, told *The BMJ*. "Without these, there is nothing coherent remaining in the chain of causality."

The team also carried out a second replication in which they used epidemiological methods more familiar to doctors, rather than the econometric approach of the original authors, to reanalyse the original data.[4] This found that the evidence for any effect at all was weak when measured one year at a time, though the effect was strong when the two years of the study (1998 and 1999) were combined. "That doesn't make sense," Aitken said. "You would expect similar effects in each year but wider confidence intervals because the numbers are smaller. What we found was no effect for each year taken on its own but a large effect when they are combined, and we suspect that this is the result of some feature of the study design."

Miguel and Kramer have disagreed. They acknowledged the errors but said that they were minor and did not affect their conclusions.[5] They agreed that the effect they found on infections between 3 km and 6 km from the treated schools was no longer statistically significant but argued that disaggregating the data in the year by year analysis was inappropriate. Far from disproving the claims, they said that the replications "strongly support the findings of positive deworming treatment externalities and school participation impacts."

In an editorial in the same issue of the *International Journal of Epidemiology*, Paul Garner, from the Liverpool School of Tropical Medicine, and colleagues said that the replication found very similar effects of deworming on children in the treated schools whether they took the drugs or not.[6] This could, they suggested, be the result of a health promotion exercise that was conducted at the same time in 27 of the 75 schools and that was not part of the randomised intervention.

Garner and his colleague David Taylor-Robinson were authors of the 2012 Cochrane Collaboration report on deworming that found the evidence weak and the claimed effects on economic development barely credible. There is, they said, only one other study that has examined the effect of deworming on school attendance, and it showed no obvious effect.

"Given these uncertainties, we simply don't know if there is truly an effect on school attendance from the data," their editorial says. "But what weakens the case for deworming still further is that there is now quite good evidence of no effect for most of the main outcomes, including nutritional status, haemoglobin, cognition, and school performance. This is important because without these effects it seems implausible that deworming itself would have an independent effect on school attendance or economic development."

It was, they said, "delusional" to believe that deworming would have a substantial effect on economic development when you looked at the results of reliable controlled trials. But the belief in deworming is deep rooted in US history. In 1909 the Rockefeller Sanitary Commission sought to eradicate hookworm from the southern United States, where it was seen as a cause of "some of the proverbial laziness of the poorer classes." These

beliefs and assumptions continued, they said, and they have recommended that policy makers read the replication studies, the original authors' responses, and an imminent 2015 version of the Cochrane review before making up their minds.

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