



A new study finds that giving kids deworming treatment still benefits them 20 years later

Kids who were treated for intestinal worms in 1999 earn far more now than kids who weren't.

By Kelsey Piper | Aug 6, 2020, 8:10am EDT



Children take deworming tablets as part of India's National Deworming Program. | Noah Seelam/AFP via Getty Images

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In 1998 and 1999, public health workers in Kenya set out to treat children in Kenyan schools for common intestinal parasites, including hookworm, roundworm, whipworm, and schistosomiasis. The parasites, prevalent in

poor areas, were affecting kids' nutrition and health. The hope was that mass treatment programs might mean a generation of kids could grow up without negative effects from worm infestations.

In the years since, deworming campaigns have become a favorite initiative of national governments as well as donors looking to give effectively. Some research suggests that such campaigns may be **some of the most important public health interventions** in the world.

But there has hardly been unanimity on the subject of their efficacy. Studies like the original **2003 paper by development economists Edward Miguel and Michael Kremer** of that group of students in Kenya found astounding results from mass deworming campaigns. Students were healthier, stayed in school longer, and earned more money as adults.

But others **criticized that study**, and **other studies of mass deworming** haven't found results nearly as large. As is the case with lots of other public health interventions, the case for mass deworming has some real evidence behind it, but there are still unanswered questions, and questions where our existing research is frustratingly contradictory.

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This year, Miguel and Kremer, along with co-authors Joan Hamory, Michael Walker, and Sarah Baird, returned to the original Kenyan sample where they'd first discovered the potentially life-changing impacts of mass deworming campaigns. Following up with the original participants 20 years later, they wanted to answer the question: Are the benefits they initially discovered from childhood deworming treatment — which included more time in school and higher adult incomes — still showing up?

In a **new paper** published in NBER's working paper series on August 3, they found that they are. "Individuals who received deworming as children experience substantial increases in adult consumption, hourly earnings, nonagricultural employment, and urban residence," the study concludes.

The effects on income and spending are slightly smaller than those observed in a follow-up at the 10-year mark, but they're very notable nonetheless. An extra two or three years of deworming treatments in school translates to 13 percent higher hourly earnings, 14 percent higher consumer spending, and significantly increased odds of working outside of agriculture (in jobs that largely pay better and offer more opportunity for growth). The researchers calculate that the investment in deworming Kenya's children has so far had a 37 percent annualized rate of return.

"What this shows is, even in the very long run, these child health investments have a durable impact on people's living standards," author Edward Miguel told me.

The results are certainly eye-popping. Most global poverty interventions, even if they work, don't produce a 37 percent annualized rate of return that lasts decades (which is perhaps one reason for skepticism about the findings). It's very rare to do anything in public policy that still has significant effects 20 years later — let alone effects this large.

But on the other hand, when interventions do have long-term effects, they tend to be health interventions. Healthier children grow taller, stay in school longer, learn more while they're in school, and are less likely to be sick as adults. If anything can have a lifelong impact, such interventions in health can.

The debate over what the Kenya study teaches us about worms

This study is the latest contribution in a long-running debate in the global public health world over the effects of deworming campaigns.

In 2015, **British epidemiologists Alexander Aiken and Calum Davey** published a reanalysis of the data from the original Kenya schools and argued that when the data was properly analyzed, “we found little evidence for some previously-reported indirect effects of a deworming intervention. Effects on worm infections, nutritional status, examination performance and school attendance on children in intervention schools were largely unchanged.”

Other researchers pushed back. Sure, the first worm study wasn't perfect — its school assignments were not quite perfectly random, there were no placebos (meaning students could have behaved differently because they knew they were in the treatment group), and there were some **genuine errors in the paper**. But its **core result was very robust**. The children exposed to deworming have since had life outcomes that are measurably a lot better. The reanalysis leaned on **statistical techniques that wouldn't find significant results on this data set** even if there were significant results to be found.

Kremer and Miguel also defended their findings. Deworming “is a highly cost-effective policy with evidence from multiple studies on educational and economic outcomes,” Kremer **told my colleague Julia Belluz** in 2015. “There is evidence on the long-term educational and economic impact of deworming from a number of other studies: for example, **Kevin Croke's** work on Uganda, **Owen Ozier's** work on Kenya, and our own **long-term follow-up** in Kenya.” (Kremer went on to **win the Nobel Prize in Economics** in 2019.)

The new paper adds to that body of evidence. But critics likely still won't be fully satisfied.

For instance, they might ask: If deworming had such enormous and profound effects in Kenya, why haven't similar effects been found **elsewhere?**

“There’ve been some reviews that found modest or no effect,” Miguel agreed. But he argued they were mostly from settings with lower worm prevalence, which would make the effects much harder to detect.

“If you just look at the settings where earlier short-run studies were done, and you only look at the studies with at least a prevalence of 20 percent, in the short run there are gains in nutrition,” he told me. “But no one’s taken experimental data with a large sample and seen what happens over time.” And it’s the long-term effects of deworming programs that are most notable and most important.

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That opens up another question: How does treating intestinal parasites increase income two decades later? Especially when the short-term medical impacts are quite minimal? “The surer we are that the short-term impacts are small, the harder it is to believe that the long-term impacts are big,” David Roodman, writing for GiveWell, **summarized this concern** in 2016.

Some of the effects of deworming come through causing students to stay in school longer, but other research on keeping students in school does not find effects on income of this magnitude 20 years down the line. So if deworming is really creating such large benefits, they likely can’t just be a consequence of keeping students in school. What might account for the rest of the benefits?

One possibility, Miguel told me, was effects on a community from all of its students having stayed in school longer. Students whose school did deworming programs are likely to work in a job they heard about from a school friend, for example. But this, too, can’t account for the full effect

size. And students who got worm treatment are now likelier to have left the rural communities they grew up in to live in a big city — perhaps being healthier makes the big risks of moving to a city seem more worthwhile.

It would be really valuable to understand how deworming has the effects it does on income, but we may not be able to determine that just from data from trials like this one. “The analysis does not resolve the issue of exactly why and through what channels deworming affected adult outcomes,” the paper acknowledges. It’s hard to tease apart each of the different possible avenues by which deworming might affect people because many of them are related — early boosts in income might lead to longer-lasting boosts in income, for example, as well as lead people to be more likely to migrate, as well as lead them to seek other medical care when needed and be healthier.

Then there’s the question of how well the results generalize. Most of the world **does not have worm prevalence as high as Kenya did in the late 1990s**. So mass deworming will show smaller effects in other communities — and indeed, that’s what studies have found. And even setting aside specific concerns like those, researchers **often find that interventions work less well when scaled up and offered in other regions**, even when there’s no clear reason why that’d be the case.

Questions over deworming remain — but it’s still a good public health bet

But even with some questions still unanswered, what evidence we do have suggests that the potential long-term benefits are big enough to make mass deworming programs one of the best bets we know of to improve outcomes for children in poor countries.

They’re consistently among the top charities **recommended by GiveWell** as cost-effective interventions. (GiveWell considers it **likely that deworming does much less good in the typical case than the measured results from Kenya**, but still considers it a top global health intervention.)

No single study will likely ever clear away all of our doubts, but studies can be put together to formulate a best guess. My best guess is that, at least in areas with high worm prevalence, school-wide deworming programs are a very good idea.

And policymakers have been taking that very seriously for the last two decades, rolling out large-scale deworming programs that have treated many of the most vulnerable students. “We’ve reached over 78 percent of all vulnerable children [in Kenya] at an average cost of 45 cents per child per year,” spokesperson Gabriel Plata of Evidence Action, which runs top deworming program Deworm the World, said. But the problem is far from solved. “There’s an estimated prevalence of over 800 million people still at risk,” Plata said.

And things are getting worse. Schools are canceled throughout much of the world due to the coronavirus, and that means public health interventions that typically happen at schools aren’t happening at all. The new study from Kenya is just our latest reminder that that is an enormous loss, and the children affected may still be disadvantaged from it 20 years later.

“Our study suggests that we have to find some way to deliver those services to kids,” Miguel told me, “or else the long-run costs could be really large.”

One key takeaway: We don’t have to have settled all the questions about deworming in order to pursue cost-effective deworming programs based on the evidence we do have. There’s still more to learn about deworming. Formulating global public health policy is confusing, difficult, frustrating, and always much easier in hindsight. But it’s also really important. All we can do is keep trying, keep learning, stay curious, and move ahead with our current best guess.