

Predatory prawns effectively combat major parasite, research finds

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In the late 1970s, a new drug held the promise of wiping out a disease that currently affects more than 250 million people. Nearly 40 years later, the drug, praziquantel, has yet to make a dent in the global burden of schistosomiasis, an infestation of parasitic flatworms that can cause liver failure, bladder cancer and lasting cognitive impairment. A new Stanford-led analysis of national health interventions over the past century shows that controlling the snail populations through ecological interventions keeps the disease in check more effectively than drugs alone.

The findings, published in *PLOS Neglected Tropical Diseases*, upend the current status quo of drug-only treatment by showing that ecological tactics such as introducing snail-eating prawns to local water sources have consistently proven the most effective way to reduce schistosomiasis prevalence.

After praziquantel's introduction, environmental interventions such as snail control fell out of favor and became seen as "old-fashioned," according to the researchers. While the drug has been used successfully to treat millions of people – for less than 30 cents a treatment, it clears parasites from infected people with minor side effects – its lasting impact is limited. That's because treated people often re-enter contaminated water to bathe and clean clothing, among other chores, repeatedly exposing themselves to reinfection.

"We have to examine the drivers of infection and address transmission

and reinfection cycles from both the human and environmental angles if we want to make a long-term impact," said lead author Susanne Sokolow, a research associate at Stanford's Hopkins Marine Station. "For schistosomiasis control, that means addressing the snails that carry the parasite."

"Our work adds a crucial piece to the puzzle of effective strategies to fight schistosomiasis," said co-author Giulio De Leo, a biology professor at Hopkins Marine Station and a senior fellow at the Stanford Woods Institute for the Environment.

After examining the history of schistosomiasis control strategies in 83 countries and territories, the researchers found programs that used widespread snail control, either alone or in conjunction with drug administration, reduced the proportion of the population infected with the disease by over 90 percent. By comparison, programs that used little or no snail control reduced schistosomiasis prevalence by less than 40 percent.

Sokolow and De Leo lead a team that has pioneered work to curb schistosomiasis's spread by reintroducing native prawns that eat disease-carrying snails. The team received early funding from the Stanford Woods Institute's Environmental Venture Projects seed grant program. Preliminary results from a demonstration project in Senegal show that the reintroduction of prawns in pens at river access points led to fewer snails and reduced transmission of schistosome parasites to people.

Through a grant from Seed, the Stanford Institute for Innovation in Developing Economies, the researchers recently launched the Program for Disease Ecology, Health and Environment at Stanford in collaboration with the Woods Institute and the Center for Innovation in Global Health. The new program focuses on finding sustainable ecological solutions to a range of diseases.

"In the bigger picture, for other diseases that have environmental phases, who knows what creative solutions might exist like we have seen for schistosomiasis?" Sokolow said. "Let's bring our creativity back to these important problems and think beyond the pills."

De Leo and Sokolow are both senior fellows at Stanford's Center for Innovation in Global Health.

Other co-authors of "Global Assessment of Schistosomiasis Control over the Past Century Shows Targeting the Snail Intermediate Host Works Best," include Chelsea Wood of the University of Michigan; Isabel Jones, Scott Swartz and Melina Lopez of Stanford's Hopkins Marine Station; Michael Hsieh of George Washington University; Kevin Lafferty and Armand Kuris of the University of California, Santa Barbara; and Chloe Rickards of Stanford.

More information: Susanne H. Sokolow et al. Global Assessment of Schistosomiasis Control Over the Past Century Shows Targeting the Snail Intermediate Host Works Best, *PLOS Neglected Tropical Diseases* (2016). [DOI: 10.1371/journal.pntd.0004794](https://doi.org/10.1371/journal.pntd.0004794)

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