

Study predicts that routine immunization with the first typhoid conjugate vaccine could avert 46-74% of typhoid fever

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Researchers from Yale University, University of Basel, University of Antwerp, CDDEP and other institutions recently published 'Estimating

the effect of vaccination on antimicrobial resistant typhoid fever in 73 countries supported by Gavi: a mathematical modelling study' in *The Lancet Infectious Diseases*. The study aimed to assess how vaccination against typhoid fever could help avert antimicrobial resistance both directly, by preventing transmission of resistant infections, and indirectly, by preventing cases of infection caused by antimicrobial susceptible S Typhi that would otherwise be treated with antibiotics and develop resistance.

Despite global advances in sanitation and hygiene, [typhoid fever](#), caused by the pathogen *Salmonella enterica* serovar Typhi (S Typhi), remains a major source of morbidity and mortality. Annual global case estimates of [typhoid](#) fever range from 10–20 million with 100,000 to 200,000 associated deaths, primarily in low-income and [middle-income countries](#). Typhoid fever is treated with antibiotics, and the pervasiveness of antimicrobial resistance is of growing concern.

In this study, researchers present country-specific estimates for the effect of TCV introduction on the burden of antimicrobial-resistant typhoid fever in 73 countries eligible for Gavi support. The mathematical modeling study combines three pieces of information for each country: the effect of vaccination on total burden of typhoid fever, based on estimates of typhoid incidence and forecasted [vaccine](#) coverage; the proportion of cases with fluoroquinolone non-susceptibility (FQNS) and [multidrug resistance](#); and the effect of vaccination on the proportion of cases that are drug resistant.

Overall, the key findings of the study are as follows:

- The introduction of routine immunization with TCV at age nine months with a catch-up campaign up to age 15 years was predicted to avert 46–74% of all typhoid fever cases in 73 countries eligible for Gavi support.

- Vaccination was predicted to reduce the relative prevalence of antimicrobial-resistant typhoid fever by 16%.
www.CDDEP.ORG • TCV introduction with a catch-up campaign was predicted to avert 42.5 million cases and 506,000 deaths caused by FQNS typhoid fever, and 21.2 million cases and 342,000 deaths from multidrug resistant typhoid [fever](#) over ten years following introduction.
- Vaccination with TCVs is predicted to reduce the prevalence of chronic carriage by preventing new carriers, but existing chronic carriers are likely to serve an increasingly important role in contributing to ongoing transmission in the population.
- TCV roll-out could be especially urgent in places where resistance has emerged and is rapidly spreading. The authors give Pakistan as an example, due to an outbreak of extensively drug-resistant typhoid that has been ongoing since 2016.

According to one of the study's authors, Dr. Ramanan Laxminarayan, Director, CDDEP, "this study, which is part of a larger research effort to study the effect of vaccines on averting antibiotic consumption, clearly demonstrates the tremendous value of vaccines in addressing AMR. Going forward, vaccines could be a major component of any global strategy to tackle drug resistant infections."

More information: Ruthie Birger et al, Estimating the effect of vaccination on antimicrobial-resistant typhoid fever in 73 countries supported by Gavi: a mathematical modelling study, *The Lancet Infectious Diseases* (2022). [DOI: 10.1016/S1473-3099\(21\)00627-7](https://doi.org/10.1016/S1473-3099(21)00627-7)

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