

1. Typhoid Conjugate Vaccine – Science & Technology

India, the world's largest producer of the Typhoid Conjugate Vaccine (TCV) and home to half the global typhoid burden, has paradoxically failed to include the WHO-recommended TCV in its Universal Immunisation Programme (UIP). This policy gap persists despite rising antibiotic resistance and poor sanitation, while neighboring countries like Pakistan and Bangladesh have already implemented the vaccine with GAVI's support.

The Typhoid Vaccine Paradox in India

The Core Issue – India faces a significant policy contradiction.

On one hand – India is the largest producer of typhoid vaccines globally.

On the other hand – India simultaneously accounts for half of the global burden of typhoid infections.

The Gap – Despite this, India has not yet included the Typhoid Conjugate Vaccine (TCV) in its Universal Immunisation Programme (UIP).

About Typhoid

Definition – Typhoid fever is a bacterial infection that can be life-threatening.

Causative Agent – It is caused by the bacterium *Salmonella enterica* serotype Typhi (*S. Typhi*).

Transmission

1. Spreads via the Faeco-oral route.
2. The disease is typically transmitted by ingesting contaminated food or water.
3. It is directly linked to poor sanitation and hygiene practices.

Reservoir – Humans are the only known reservoir for the bacteria. This includes asymptomatic carriers, who can spread the disease without feeling sick themselves.

Symptoms of Typhoid

1. Persistent high fever (which can reach 104°F or 40°C).
2. Weakness and severe fatigue.
3. Abdominal pain.
4. Gastrointestinal issues, which can manifest as diarrhea or constipation.
5. Loss of appetite.
6. A rash (in some cases, this appears as small, flat, rose-colored spots on the skin).
7. In severe cases, it can cause an enlarged spleen and liver.

Disproportionate Impact – The disease heavily affects children and young adults. It results in a significant loss of school and work days, impacting education and household income.

Treatment – The primary treatment for typhoid is antibiotics to kill the *S. Typhi* bacteria. Commonly used antibiotics include –

1. Ciprofloxacin (often prescribed for non-pregnant adults).
2. Azithromycin (used as an alternative, especially for cases resistant to other drugs).
3. Third-generation cephalosporins (like ceftriaxone) for more severe infections or for patients who cannot take oral medication.

The Burden of Typhoid

Global Impact (WHO Data) – An estimated 9–12 million cases occur annually worldwide. It causes over 100,000 deaths globally each year.

India's Share (SEFI Study, 2017–2020) – India alone sees an estimated 4.5 million cases annually. It contributes to an estimated 8,930 deaths annually.

Incidence Rate – The rate is extremely high, at 576–1,173 per 1,00,000 child-years. This rate is even higher in poor urban areas.

Challenges in Controlling Typhoid in India

Diagnostic Gaps – The "gold standard" test for typhoid is a blood culture, but this facility is rarely available at peripheral or primary healthcare levels. Outdated and unreliable tests, like the Widal test, are still widely used. This leads to frequent misdiagnosis and irrational antibiotic use, which in turn fuels drug resistance.

Confusion with Other Diseases – Typhoid symptoms are not unique and can mimic other common febrile illnesses such as dengue, malaria, scrub typhus, and even COVID-19.

Rising Antimicrobial Resistance (AMR) – Strains of typhoid resistant to older antibiotics (like chloramphenicol, ampicillin, and co-trimoxazole) have been prevalent since the 1950s. Worryingly, newer and more critical antibiotics like ceftriaxone and azithromycin are now showing reduced effectiveness. The emergence of XDR (Extensively Drug-Resistant) typhoid strains in neighboring Pakistan poses a serious and imminent threat to India.

Poor Water and Sanitation (WASH) Quality – Despite major campaigns like the Swachh Bharat Mission and Jal Jeevan Mission, widespread access to *verifiably safe* drinking water remains a major challenge. One study noted that only 6% of urban households across 302 districts had a safe water supply; rural coverage is even lower. Continued faecal contamination of food and water sources ensures the persistent transmission of the bacteria.

Inadequate Surveillance – India's national typhoid surveillance system remains patchy and inconsistent. This lack of reliable, long-term data hinders and delays crucial decision-making regarding a national vaccine rollout.

About Typhoid Conjugate Vaccine (TCV)

Vaccine Technology – It is a conjugate vaccine, which is a highly effective type of vaccine. It works by attaching the Vi polysaccharide antigen (a sugar molecule from the bacteria's outer coat) to a carrier protein. This "conjugation" process enhances the immune response significantly, making it effective even in young children (under 2 years old), whose immune systems don't respond well to polysaccharide-only vaccines.

WHO Recommendation – The World Health Organization (WHO) strongly endorsed the use of TCV in 2018 for all endemic countries.

Benefits of TCV

1. It is administered as a single-dose injection.
2. It provides enhanced protection for young children, and can be given to those aged 6 months and older.
3. It provides long-lasting immunity.
4. It is effective in preventing severe cases and life-threatening complications like intestinal perforation and sepsis.
5. It is effective in both children and adults living in high-risk areas.

Cost-Effectiveness – A field trial conducted in Navi Mumbai (2018) found the cost to be \$1.87 per dose, which is significantly lower than the costs associated with treating the illness (hospitalization, antibiotics, lost wages).

Major Indian Producers – India is a manufacturing powerhouse for TCV. Key producers include –

1. Bharat Biotech (Typbar TCV)
2. Serum Institute of India
3. Zydus Lifesciences

Why India Should Include TCV in the Universal Immunisation Programme (UIP)?

Massive Disease Burden – India bears half of the global typhoid load. Including TCV in the UIP would dramatically reduce cases, hospitalisations, and deaths, offering the most protection to children and the urban poor.

To Curb Drug Resistance (AMR) – Vaccination directly reduces the number of infections. Fewer infections lead to less antibiotic consumption and misuse. This is a critical, non-negotiable strategy to contain the spread of AMR.

To Promote Health Equity – Currently, TCV is only available in the private sector at a high cost, making it unaffordable for the most vulnerable families. Including it in the UIP would provide free access for all, aligning with the National Health Policy (2017)'s focus on equity.

Leverage India's Vaccine Strength – It is a significant policy paradox that India serves as a global vaccine manufacturing hub and is the main supplier of TCV to other countries. Yet, India lags in its own domestic utilisation, undermining its own public health goals and capabilities.

Global and Regional Precedents – Several of India's neighbors, including Pakistan, Nepal, and Bangladesh, have already successfully integrated TCV into their national immunisation schedules. These countries received support from GAVI, The Vaccine Alliance, for their rollouts.

GAVI Partnership – India's current partnership with GAVI (2023–2026), worth \$250 million, explicitly supports the introduction of TCV. Despite this available funding and support, action from India has been delayed.

About GAVI, The Vaccine Support

Established – In the year 2000.

Type – It is a public-private global health partnership.

Key Partners – Involves the WHO, UNICEF, the World Bank, and the Bill & Melinda Gates Foundation, among others.

Objective – To improve access to life-saving vaccines for children in the world's low- and middle-income countries.

About Universal Immunisation Programme (UIP)

Origin – It was first launched as the Expanded Programme on Immunization (EPI) in 1978. It was renamed the Universal Immunization Programme (UIP) in 1985.

Aim – To provide free vaccination against a dozen preventable diseases to all children and pregnant women in India.

Access Points – Vaccines are provided at government and private health facilities. They are also delivered at immunization session sites, such as Anganwadi centres or other community locations, on fixed days.

Administered by – Ministry of Health & Family Welfare, Government of India.

Coverage – It currently provides 12 vaccines (including Measles, Polio, Pentavalent, and HPV in selected states).

Mission Indradhanush (MI)

Launched by – Ministry of Health and Family Welfare (MoHFW) in 2014.

Objective – This is a special, intensified drive operating under the UIP. Its goal is to reach and ensure full immunization for all unvaccinated and partially vaccinated children who were missed during routine immunization rounds.

Source – <https://www.thehindu.com/sci-tech/health/why-india-needs-to-include-the-typhoid-conjugate-vaccine-in-its-universal-immunisation-programme/article70180224.ece>