Typhoid Fever
(or Enteric Fever)

A *food & water borne disease* mostly transmitted through *contaminated food or water*[1]

Caused by highly virulent and invasive *enteric bacterium Salmonella Typhi* (S. Typhi)[1]

An estimated *7 million infections* and *93,000 deaths* occurred in 2022 wordlwide[3]

Transmission risk increased when *lacking access to safe water, adequate sanitation,* or *poor hygiene among food handlers*[2]

Incubation period from 7 to 14 days[2]

From exposure to outcomes:

10-15% of hospitalized patients *develop complications*[2]

Complications include intestinal hemorrhage, intestinal perforation, and encephalopathy[2]

Fatality rates range from:

- *1-4 %* if *adequate therapy* is undertaken[2]
- *10-20%* if *untreated or treated with inappropriate antibiotics*[2]

2-5% of cases develop into *chronic carriers*[2]

Typhoid fever treatment

The treatment of typhoid fever consists of antibiotics[2,4]

Only 1-4%
of suspected typhoid cases are confirmed[4]

Antibiotics administered before diagnosis confirmation *≥ emergence of drug-resistant S. Typhi strains*[5]

MDR

XDR

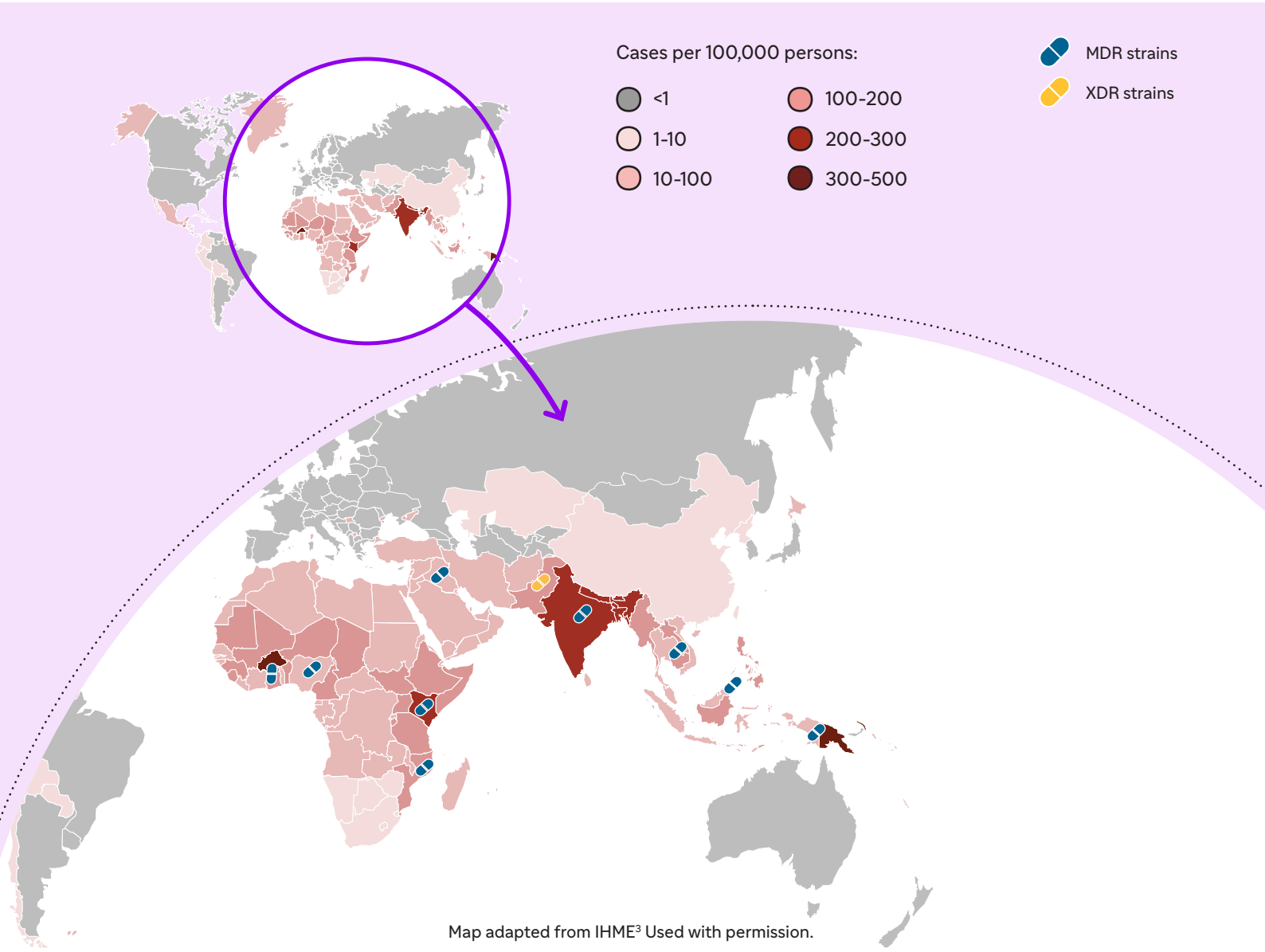
In recent decades, resistant S. Typhi strains have emerged:

- *MDR**, resistant to *first-line antibiotics* and spread into South Asia and Africa[4]
- *XDR***, MDR + resistance to *fluoroquinolones + ceftriaxone*, have emerged to Pakistan[4]

* MDR: multi-drug resistant; ** XDR: extensively-drug resistant

sanofi

Typhoid fever incidence and drug-resistant strains (2022)[3-4, 6-7]



Map adapted from IHME[3] Used with permission.

Risk of typhoid fever associated with travel

- *70-85% of reported cases in Europe and North America* are *travel related* [1,8]
- Travel-risk of being infected (per month of stay):
  - 20 cases /100,000 travelers to South Asia[9]
  - <1 cases /100,000 travelers to Africa or Latin America[9]
- Travelers visiting friends and relatives in their country of origin are more at risk[10]

Hygienic measures, safe eating, and drinking habits remain essential when traveling to areas where the risk of typhoid fever is high[11]

Injectable vaccines

Oral vaccines

Due to increased drug-resistance, *typhoid fever vaccination* should be considered as preventive measure in addition to behavioral precautions[10]

References

1. Muresu N, et al. Travel-Related Typhoid Fever: Narrative Review of the Scientific Literature. Int. J. Env. Res. & Pub. Health, 2020. 17 (615): 1-12. **2.** World Health Organization. Typhoid vaccines: WHO position paper – March 2018. 13/93):153–72. **3.** Institute for Health Metrics and Evaluation – IHME-at the University of Washington. Accessed February 2025. Used with permission. **4.** Masuet-Aumatell C, et al. Typhoid fever infection – Antibiotic resistance and vaccination strategies: A narrative review. Trav Med and Infect Dis 2021. 40: 101946. **5.** Andrews JR, et al. Typhoid conjugate vaccines: a new tool in the fight against antimicrobial resistance. Lancet Infect Dis 2019. 19(1):e26-e30. **6.** Together We Can Take on Typhoid. Drug-Resistant Typhoid. Available at: https://www.coalitionagainsttyphoid.org/the-issues/drug-resistant-typhoid/. Accessed February 2025. **7.** Kim CL, et al. The Burden of Typhoid Fever in Sub-Saharan Africa: A Perspective. Res Rep Trop Med., 2022. 131–9. **8.** US- Centers for Disease Control and Prevention. National Typhoid and Paratyphoid Fever Surveillance Annual Summary, Aug 2023 at: https://www.cdc.gov/typhoid-fever/reports/annual-summary-2020.html Accessed January 2024 **9.** Steffen R et al. Travel vaccines—priorities determined by incidence and impact. J travel Med, 2023. 1–14. **10.** US- Centers for Disease Control and Prevention. Typhoid Fever Sept 2020. available at: https://wwwnc.cdc.gov/travel/diseases/typhoid. Accessed January 2024. **11.** US- Centers for Disease Control and Prevention. Prevention Tips for Travelers. May 2020. Available at: https://www.cdc.gov/typhoid-fever/prevention.html. Accessed January 2024.

MAT-US-2503058 - EXP 3/25/2026
Photo credit: Unsplash / Arte m Beliaikin