

Typhoid + Climate Change



Key Messages

- **Increases in typhoid transmission are a possible consequence of climate change** and the resulting increase in extreme weather events, including floods and droughts.
- **TCVs provide protection to those living in typhoid-endemic communities**, particularly those prone to extreme floods and droughts.
- **TCVs offer vulnerable populations a cost-effective option** to defend against the potentially devastating health consequences caused by typhoid.

Changes in infectious disease transmission patterns already underway are likely a consequence of climate change, and the World Health Organization anticipates many health impacts due to a changing climate.

According to the COP24 Special Report on Health and Climate Change, an increase in severe weather events has led to more frequent and more severe flooding and surface water contamination. This provides a perfect environment for *Salmonella Typhi* (S. Typhi) and the spread of other waterborne pathogens. Typhoid conjugate vaccines (TCVs) offer protection to take on typhoid in high-risk endemic areas and after extreme weather events.

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Typhoid

Typhoid is a serious and potentially life-threatening enteric fever spread through contaminated food and water.

While largely eliminated in industrialized countries, it remains a substantial public health issue that disproportionately affects children and adolescents in low- and middle-income countries. The Global Burden of Disease study estimates that in 2019 there were **more than 9 million cases and more than 110,000 deaths due to typhoid worldwide**. However, the burden is likely underestimated due to difficulties with surveillance and diagnostics.

Research shows that the burden of typhoid goes beyond physical illness and mortality. Even with prompt treatment with antibiotics, **typhoid infections can force children to miss school for weeks**, impacting attendance and performance. **A child's illness has broader economic impacts on the family** due to medical and transport expenses, and time lost from work to care for a sick child.

Improved water quality, sanitation, and hygiene are the major ways to break the typhoid transmission cycle in the long term. However, until these investments can be made in all countries, vaccination with TCV is an important and effective way to prevent typhoid.

Expanded use of TCVs through routine immunization will allow children to remain healthy, stay in school, and for families to continue to work and prosper, preventing the socioeconomic burden from typhoid. It also has the potential to reduce the need for antibiotics and slow further emergence of drug-resistant typhoid.



Climate Change

Climate change—or changes in the Earth's weather patterns—includes global warming and other effects of greenhouse gases such as rising temperatures, increased evaporation, extreme weather events, and accelerated sea level rise.

Human activities—including the burning of fossil fuels and clearing land for agriculture—have increased greenhouse gases, which trap heat closer to the Earth's surface and contribute to global warming trends and **will have damaging effects for decades into the future.**

The spike in frequency, severity, and magnitude of recent extreme weather events has led to hotter heat waves, drier and longer droughts, heavier rainfall, bigger storm surges, and more intense flooding, which can put additional burden on already vulnerable populations.



Climate warming increases flooding and the risk of untreated waste—which carries diseases such as typhoid—spreading through the environment.

The potential for typhoid transmission increases with flooding and drought caused by extreme weather events.

Heavy rains and flooding can overwhelm, stress, and damage water, sanitation, and hygiene (WASH) infrastructure by clogging storm drains, releasing waste or wastewater, and contaminating clean water supplies with fecal material—all of which potentially expose a greater number of people to typhoid. During droughts, when water is scarce, people resort to shallow water sources that are more likely to harbor bacteria such as typhoid.

Contaminated water sources and inadequate sewage systems exacerbate typhoid transmission. In low- and middle-income countries with insufficient, inadequate, or lack of WASH infrastructure, **climate change has an even greater potential to impact typhoid transmission because extreme weather events can tax already weak systems.** The spread of typhoid is further escalated in densely populated, overcrowded areas such as urban slums and refugee camps where a high number of people are exposed to a single contaminated source.

Natural disasters can have devastating effects on communities' health. Families often end up displaced from their homes, and **in the most extreme cases, morbidity and mortality rise from the toll of the disaster and increased disease transmission.** When a monsoon hits or an earthquake, hurricane, or fire ravages a village or town, contaminated water, close living quarters, and unsanitary conditions are inevitable.

As people are forced to flee, nearby communities, emergency settlements, or camps can become densely populated and create a breeding ground for typhoid. These conditions increase the potential for disease transmission due to a lack of access to improved sanitation facilities or sufficient drinking water to support a growing population.

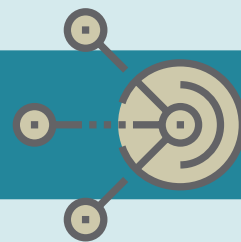


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Photo: PATH/Aaron Joel Santos

Take Action Now!



- **Create the policy and requisite budget for quickly procuring and administering TCVs** to protect impacted communities when extreme weather events do occur.
- **Introduce TCVs to help protect populations most at risk** from severe weather events.

- **Educate decision-makers, national and sub-national leaders, and other health champions about the detrimental impact of climate change** and the importance of protecting vulnerable communities against increases in typhoid transmission.



Additional Resources

- **NASA's website on climate change**
- **Intergovernmental Panel on Climate Change**
- **Environmental Protection Agency's website on climate change**
- **United Nations website on climate change**

TyVAC Typhoid Vaccine Acceleration Consortium
CENTER FOR VACCINE DEVELOPMENT • OXFORD VACCINE GROUP • PATH



a program of the
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- Climate Change
- Drug Resistance
- Forced Migration
- Universal health coverage (UHC) and the Sustainable Development Goals (SDGs)
- Urbanization
- Water, Sanitation, and Hygiene



August 2021