

## How to talk about typhoid: menu of messages



The more we talk about typhoid, the better we'll be able to prioritize it. These messages were developed for use by anyone interested in communicating the impact of typhoid on the health and development of children and families around the world and the value of an integrated package of solutions for typhoid control and prevention. Divided by issue area, these messages are intended to provide options for communicating to a variety of audiences—including more general audiences (marked with a bullet) and more technical audiences (marked by an arrow)—and about a variety of typhoid-related topics.

### Main messages

- Typhoid is a serious and sometimes fatal disease with an underestimated but significant burden among children in Asia and sub-Saharan Africa.
- The best way to take on typhoid is through an integrated prevention and treatment approach including vaccines; improvements in safe water, sanitation, and hygiene (WASH); availability of dependable typhoid diagnostics; and appropriate antibiotics.
- By raising awareness about integrated typhoid prevention and treatment solutions, mobilizing resources, and accelerating uptake of new solutions such as typhoid conjugate vaccines (TCVs), we can take on typhoid together.
  - » Newly licensed TCVs are recommended by the World Health Organization (WHO) and have the advantages of longer-lasting protection, require fewer doses, and are suitable for children less than two years of age, allowing for delivery through routine childhood immunization programs.

# Disease burden

Typhoid is a serious and sometimes fatal disease that causes fever, fatigue, headache, abdominal pain, and diarrhea or constipation. It places a significant and underestimated burden on children in Asia and sub-Saharan Africa, with poor communities often being most susceptible.

- Although typhoid has largely been eliminated in industrialized countries, it continues to be a substantial public health issue in many low- and middle-income countries.
  - » *An estimated 90 percent of typhoid deaths occur in Asia, though recent data from sub-Saharan Africa suggests the typhoid burden may be greater than previously known.*
  - » *Typhoid can be transmitted in either epidemic or endemic fashion.*
- Recent estimates suggest that there are nearly 11 million cases and more than 116,000 deaths due to typhoid worldwide each year. However, the burden is likely underestimated due to difficulties in surveillance and diagnostic challenges.
  - » *Typhoid symptoms, such as fever and fatigue, are common to many illnesses and are often mistaken for other diseases such as malaria, pneumonia, dengue, or influenza.*
  - » *Blood and bone marrow are the current gold standard tests for typhoid diagnosis. These tests are expensive, and require equipment that is not routinely available in many low- and middle- income settings with a high burden of typhoid.*
  - » *The above estimates come from the 2017 Global Burden of Disease study, which uses models to estimate global disease burden numbers. Varying burden estimates from different sources, using different modeling methods, range from 11 to 21 million cases and 116,000 to 223,000 deaths per year.*
- Typhoid is caused by a bacteria called *Salmonella enterica* serovar Typhi.
  - » *Typhoid is an “enteric fever” and cannot be clinically distinguished from another enteric fever caused by *Salmonella enterica* serovar Paratyphi. Together, the Typhi and Paratyphi serovars are referred to as “typhoidal *Salmonella*.”*
  - » *Non-typhoidal *Salmonella* serovars can cause a serious bloodborne disease (known as invasive nontyphoidal *Salmonella* [iNTS]) and diarrheal disease. It may be difficult to clinically distinguish iNTS from the enteric fevers.*
- Children and adolescents younger than 15 years of age are disproportionately impacted by typhoid.
  - » *Current trends of drug resistance, urbanization, and climate change heighten the risk for typhoid outbreaks worldwide. Because of increased travel and transient populations, even countries that currently have little or no typhoid burden may become susceptible.*
  - » *Typhoid is spread by the fecal-oral route through contaminated food and water, usually due to unsafe water, inadequate sanitation, and poor hygiene habits. This places poor communities in low- and middle- income countries at the highest risk for typhoid.*
  - » *If left untreated, typhoid can cause a variety of severe short- and long-term complications.*

## Urbanization

- The global trend of rapid urbanization, which is leading to overcrowded populations in cities across Asia and sub-Saharan Africa that often have outdated, inadequate, or unsafe water and sanitation systems, is increasing the risk of typhoid in these communities.
- The disproportionate impact of typhoid on children and populations in resource-poor areas is likely to grow with increasing urbanization, which can exacerbate disparities in access to safe water and sanitation.

## Drug resistance

- While typhoid can be treated with antibiotics, the rate of cases resistant to available antibiotics is increasing globally. Resistance to even the newer antibiotics is becoming more prevalent, particularly in low- and middle-income countries where accurate diagnosis and treatment are difficult.
  - » *Since first appearing in the 1970s, multidrug-resistant typhoid—specifically defined as resistance to chloramphenicol, ampicillin, and co-trimoxazole—has since spread globally.*
  - » *During the past 30 years, a multidrug-resistant typhoid strain called H58 has emerged and spread in many parts of Asia and sub-Saharan Africa, displacing other typhoid strains and significantly changing typhoid epidemiology. In addition to multidrug resistance, this strain has also shown reduced fluoroquinolone susceptibility.*
  - » *Resistance to fluoroquinolones, the drug of choice to treat multidrug-resistant typhoid since the 1990s, and to some third-generation cephalosporins is increasingly frequent, making them less suitable for use in low- and middle-income countries.*
- Multidrug-resistant typhoid strains force the use of more expensive, less available and harder-to-use antibiotics, placing great pressure on public health systems in low- and middle-income countries. When these antibiotics are no longer effective, multidrug-resistant typhoid will be untreatable.
- Typhoid's increasing drug resistance raises the urgency for preventive measures such as vaccines and improved water, sanitation, and hygiene (WASH).

## Climate change, disasters, and refugees

- Climate change poses an increased risk for typhoid due to the higher likelihood for natural disasters to occur and the additional stress placed on WASH services.
- Natural disasters, such as droughts and floods, can increase the risk of typhoid outbreaks. During droughts, people are forced to search for any water they can find, and shallow water sources are more likely to be contaminated with typhoid or other bacteria. Flooding can overwhelm inadequate sewage systems or sanitation facilities, allowing human waste to contaminate water sources.
- Emergency situations such as natural disasters or wars that result in many people living in refugee camps or shelters put people at high risk for contracting typhoid due to the close living quarters. Camps and shelters often lack access to improved sanitation facilities or connections to treated water systems, increasing the risks for the spread of typhoid.

## Hidden burdens of typhoid

- While typhoid kills about 1 percent of people who contract the disease, an estimated one third of cases result in complications, many of which can be serious or life-threatening.
  - » *Typhoid complications include a life-threatening tear of the small intestines, hepatitis, neuropsychiatric dysfunction, and secondary infections of the lungs and heart.*
- Because typhoid disproportionately impacts school-age children and adolescents, the disease can greatly disrupt a child's education, causing rippling effects on families' and communities' economic development and potential.

# Integrated solutions

The best way to take on typhoid is through an integrated prevention and treatment approach including vaccines; improvements in safe water, sanitation, and hygiene; availability of dependable typhoid diagnostics; and appropriate antibiotics.

- By integrating typhoid prevention and control interventions in comprehensive policies, we can maximize impact, reduce costs, and increase efficiency of resources and programming to take on typhoid.
- Typhoid prevention and control solutions can also be integrated into policies that tackle other important childhood diseases, such as diarrhea, pneumonia, and neglected tropical diseases when prevention and treatment interventions overlap.

## Water, sanitation, and hygiene

- Safe water, sanitation, and hygiene (WASH) precautions are key to preventing typhoid.
  - » *Because typhoid is spread via the fecal-oral route, the bacteria can pass to humans through food and water that have been contaminated with fecal matter.*
- By safely separating waste from water sources used for drinking, cooking, washing, or swimming and ensuring that water is treated and free of contamination, we can help prevent the spread of typhoid and many other diseases.
- Proper food handling and hygiene practices—including handwashing with soap and water, using safe water sources, and boiling or treating food and beverages—play a large role in the prevention of typhoid, which is often spread by contaminated food or beverages.
  - » *Contaminated water and passion fruit juice sold in public markets in Uganda caused a large typhoid outbreak in 2015. Water treatment products and education about avoiding untreated beverages were an important part of outbreak control.*
- Given the significant burden of typhoid among hard-to-reach populations where WASH progress may be slow, the role of preventive vaccines alongside WASH interventions becomes even more critical in high-risk areas.

## Typhoid conjugate vaccines

- Two typhoid vaccines have been recommended by WHO since 2008, but because they do not give lasting immunity and do not work well in children less than two years old, they are not widely used in routine immunization programs.
  - » *The older WHO-recommended typhoid vaccines are an oral live attenuated vaccine, Ty21a, and an injectable Vi capsular polysaccharide (ViCPS) vaccine. Ty21a is approved for use in children six years of age and older and requires three to four doses. The ViCPS vaccine is licensed for children two years of age and older with a booster dose required every two to three years. Studies show these two vaccines to be safe and to protect 50 to 80 percent of recipients.*
  - » *Neither of these vaccines is routinely used in endemic areas, and uptake is low. The Ty21a vaccine requires numerous doses, and the ViCPS vaccine has short-lived protection. Additionally, neither vaccine is approved for use in children less than two years of age, which limits potential health benefits and prevents inclusion in routine childhood vaccination programs.*
- New typhoid conjugate vaccines (TCVs), which were newly recommended by WHO in 2018, overcome many shortfalls of the two currently available vaccines.
  - » *Compared to the currently available vaccines, TCVs have longer-lasting protection, require fewer doses, and are suitable for children less than two years of age, allowing delivery through routine childhood immunization programs.*
- Two TCVs are already licensed and used in India and Nepal. Several other TCVs are in development.
- Expanding coverage of typhoid vaccines through routine immunization can reduce the need for antibiotics, slow further emergence of drug-resistant typhoid strains, and save lives.

## Improving diagnostics

- Currently, diagnosing typhoid requires specialized equipment and personnel. Because of the technical requirements and costs, typhoid diagnosis may not be feasible for many low-resource health facilities.
  - » *The two types of laboratory tests that are used to diagnose typhoid are blood culture and bone marrow culture. Both have limitations.*
  - » *Blood cultures correctly identify people with typhoid in only 40 to 60 percent of cases and are greatly influenced by the volume of blood collected, prior administration of antibiotics, and the timing of collection.*
  - » *Although bone marrow cultures are more sensitive to typhoid, they are also more complicated and invasive procedures and are rarely used in clinical settings.*
- In low- and middle-income countries where laboratory testing may be limited, typhoid diagnosis is typically made based upon clinical symptoms. Because typhoid symptoms are common to many other illnesses such as malaria and dengue, patients are frequently misdiagnosed.
  - » *Difficulties with accurate typhoid diagnosis and appropriate treatment can lead to more serious complications and contribute to drug resistance.*
- The development of a more cost-effective rapid diagnostic test is needed to better characterize the typhoid disease burden and avoid over- and under-diagnosis.
- While improved diagnostics and surveillance can help the global and scientific community understand the full burden of typhoid, we already know that typhoid is a significant public health issue and that proven prevention and treatment solutions are available. By accelerating access to WASH interventions and typhoid vaccines now, we can start to save lives and improve health without waiting for improved typhoid diagnostics.

## Results

- During the past century, integrated prevention of typhoid (improved hygiene, better sanitation, clean water, and vaccines), and treatment of typhoid (appropriate antibiotic use and supportive care) have saved millions of lives. However, the interventions are not reaching those most at-risk, and new challenges are emerging.
- We have new cost-effective prevention and treatment interventions at hand to stop this ongoing threat to children's health. The availability of new TCVs and WASH improvements offers new opportunities to take on typhoid today.

## Taking on typhoid

By raising awareness about integrated typhoid prevention and treatment solutions, mobilizing resources, and accelerating uptake of new solutions such as typhoid conjugate vaccines, we can take on typhoid together.

- With renewed commitment to taking on typhoid across the water, sanitation, and hygiene (WASH), immunization, diagnostics, and treatment sectors, investments by global donors, and action plans by country governments, we can continue to reduce death and illness caused by typhoid.
- The Typhoid Vaccine Acceleration Consortium (TyVAC) and the Coalition against Typhoid are already working with countries and other partners to take on typhoid with the best available tools. Join us to expand our impact!

## Raising awareness

- Raising awareness about the public health burden of typhoid can help donors and decision-makers prioritize existing typhoid prevention and treatment interventions as well as accelerate the development and uptake of new interventions.
- By sharing data, policy information, and real-life experiences about the impact of typhoid and the potential for interventions with decision-makers and advocates, we can help raise the profile of typhoid on policy agendas.

## Mobilizing resources

- We can save lives and improve health by mobilizing policies and financial support to protect children and at-risk populations from typhoid.
- Mobilizing country resources to fight typhoid through country-led policies and programs is the most sustainable way to take on typhoid. By raising awareness of typhoid disease and proven solutions among decision-makers, we can help garner interest in and funding for country-led typhoid prevention and control projects.

## Accelerating access to typhoid conjugate vaccines

- Typhoid conjugate vaccines (TCVs) show great potential to provide longer-lasting protection to young children before they are exposed to typhoid. By building demand for and awareness of TCVs now, we can accelerate access in the countries that need them most.
  - » *In 2008, the World Health Organization (WHO) recommended the use of the Ty21a and ViCPS vaccines for controlling endemic disease but highlighted the need for improved vaccines, including TCVs.*
  - » *In 2017, TCVs were evaluated and recommended by WHO's Strategic Advisory Group of Experts on Immunization, approved for funding support by Gavi, the Vaccine Alliance, and prequalified by WHO.*
  - » *In 2018, the World Health Organization formally recommended the use of TCVs in the national immunization programs of typhoid-endemic countries.*
- By working across sectors to raise awareness of the potential of TCVs, to improve WASH, and to closely monitor the use of and resistance to antibiotics, advocates and champions can build the case for an integrated approach for typhoid control.
- By continuing to generate and share evidence of the vaccines' safety, efficacy, and cost-effectiveness in the countries that need them most, the research community can help decision-makers determine the best strategies for introduction and build country demand for TCVs.

Learn more and join the effort at [www.takeontyphoid.org](http://www.takeontyphoid.org).

**#TakeOnTyphoid**