

# Stop the Cycle of Diarrheal Disease:

A State of the Field Report



## OVERVIEW

# Diarrhea is Dangerous

Diarrheal disease is a major cause of death and illness.<sup>1,2</sup> It claims the lives of roughly half a million children under five each year and causes millions more to be hospitalized.

Persistent infections in young children result in lifelong impairments.<sup>3,4,5</sup>



**Repeated diarrheal disease infections are holding children back from reaching their full potential.**

Children living in poverty are subjected to an onslaught of environmental pathogens *every day*. These pathogens cause diarrhea and other asymptomatic infections, leading to chronic gut inflammation and putting children at risk of future infections and malnutrition.



### Who is at risk?

Diarrheal disease is particularly dangerous in poor communities and places where safe water, sanitation, and access to basic medical care may be limited or unavailable.



### What is the threat?

The state of the field is changing: death is not the only problem or biggest threat. Diarrhea can have debilitating, long-term consequences. Repeated illnesses in children contribute to a vicious cycle of malnutrition and infections, causing irreversible damage—such as physical stunting and deficiencies in cognitive development.



### What is the global burden?

Diarrhea limits potential for children, their families, and entire communities, keeping them locked in poverty.

**But it doesn't have to be this way.**



## We know how to solve the problem

**In recent years, millions of children's lives have been saved.** Deaths from diarrhea declined from more than **1 million among children under five years in 1990 to roughly 500,000 in 2015.**<sup>6,7,8</sup> This is great news, but it means that half a million children still die from diarrhea each year, and countless more are held back because of persistent, repeated infections.

Diarrhea is not a new issue and remains a chronic problem in low- and middle-income countries; it is one of many menacing health threats competing for attention and funding.

# We need to change the conversation from **surviving** to **thriving**.

- **Urge** advocates, scientists, academics, researchers, donors, multilaterals, and national government leaders...
- **To** prioritize diarrheal disease and stop the cycle...
- **By** increasing awareness, making solutions available to everyone who needs them, and establishing diarrhea's long-term consequences as an urgent priority.

Because all children deserve the chance to be happy and healthy and live up to their full potential.

*There is a risk that policymakers will shift their focus and resources away from diarrhea as deaths decline. However, the toll remains high, just more hidden, as children survive but suffer the lasting, devastating consequences of recurring infections. It is clear: persistent attention and advocacy are needed.*

— Steve Davis, CEO, PATH

## The report covers:

### PART ONE:

#### The Challenge

### PART TWO:

#### Integrated Solutions

- Vaccines
- WASH
- Breastfeeding and Nutrition
- ORS and Zinc
- Research and Development

### PART THREE:

#### What's Next?

The report that follows is a comprehensive resource with the latest research and evidence on diarrheal disease and the solutions available to prevent and control it. It will be regularly updated as new information emerges.

It is intended to be used by advocates (including scientists, academics, and researchers), donors, multilaterals, and national government leaders to take action and join the movement to defeat diarrheal disease.

## Stop the cycle of diarrhea. Give every child a healthy start.

The Defeat Diarrheal Disease (DefeatDD) Initiative is a PATH project.

*For children in poor communities, diarrhea remains a major cause of death and can have lasting consequences. Simple and proven tools can prevent and treat diarrhea, and integrating them achieves the greatest impact. By joining these tools and our voices together, we can protect children everywhere from diarrheal disease.*

**Learn more at [DefeatDD.org/state-of-the-field](https://DefeatDD.org/state-of-the-field).**

PART ONE

# The Challenge

Across all ages, diarrheal disease causes more illnesses than any other ailment and is second only to pneumonia as the largest killer of children under five.<sup>9</sup> Children who survive an episode of diarrhea, but experience recurring infections, are more likely to suffer from lifelong cognitive and physical impairments.





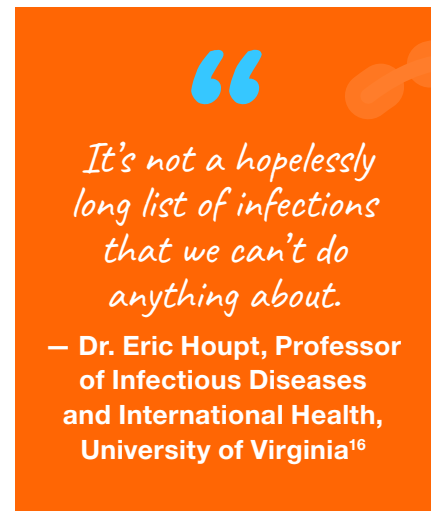
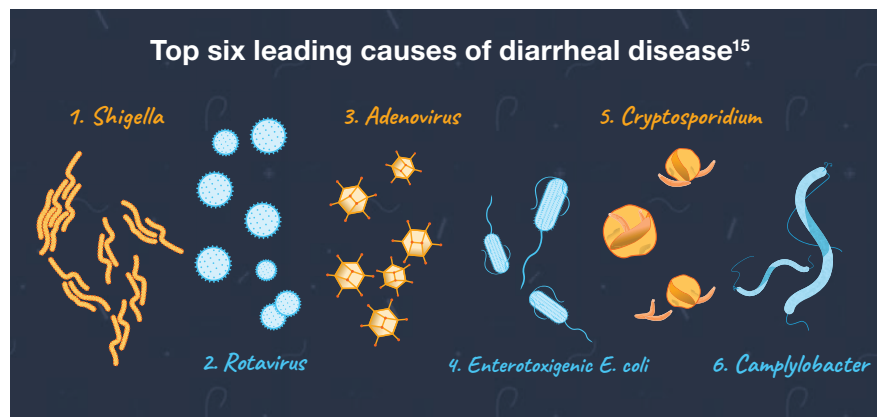
Diarrheal disease is preventable and treatable.<sup>10</sup> We can stop needless suffering—with knowledge and solutions available now. Support for research and development of new drugs and vaccines can accelerate an end to the crisis.

Global progress is encouraging. Deaths have declined in recent years—but not fast enough. Children are still getting sick and surviving, yet facing the long-term consequences of repeated infections.

To spur action and achieve sustainable impact, we must raise awareness of the threat, help improve understanding of the available solutions, and advance research on new tools and creative approaches.

## What is diarrhea and what causes it?

The World Health Organization (WHO) defines diarrhea as the passage of three or more loose or liquid stools per day.<sup>11</sup> Also known as gastroenteritis, diarrheal disease is caused by germs (both viral and bacterial) and parasites that are spread from the waste of an infected person to the mouth of another person through contaminated water, food, objects, or hands.<sup>12,13,14</sup> During a diarrhea episode, fluids are depleted. Diarrhea becomes deadly when it results in dehydration that goes untreated. Infants and young children are especially vulnerable to rapid dehydration.



# Who is at risk?

Diarrhea is a threat everywhere, but its frequency and impact are more severe in low-resource settings. Whether a child survives a diarrhea infection often depends on where he or she lives and receives treatment. In poorer countries, where access to hospitals or other forms of basic medical care—including intravenous fluids—may be limited, diarrheal disease can cause death or lasting impairments.

# Diarrhea is deadly and dangerous

Deaths from diarrhea disproportionately impact children living in poverty due to:

- Inadequate water supply/unsafe drinking water
- Lack of access to sanitation (the safe disposal of human waste)
- Limited access to soap and water and knowledge of good hygiene practices
- Limited access to vaccines
- Limited access to health care
- Limited knowledge about diarrhea prevention and treatment

Globally, unsafe water and sanitation are the leading risk factors for diarrhea. Infants who are not exclusively breastfed or are malnourished, and immunocompromised young children and adults, are also at great risk.

Despite substantial reductions in deaths among children under five years—from more than 1 million to roughly 500,000 each year over the last 15 years—diarrhea remains one of the deadliest threats young children face.<sup>17,18</sup> It is responsible for about nine percent of all worldwide deaths in young children.<sup>19</sup>

The latest estimates on diarrheal disease–related deaths are summarized below.

**Findings across sources are relatively consistent:**



	Global Burden of Disease (GBD) Study/Institute for Health Metrics and Evaluation (IHME) <sup>22</sup> Latest data: 2016, published 2017 (updated yearly)	WHO/UNICEF Maternal Child Epidemiology Estimation (MCEE) Group <sup>23</sup> Latest data: 2015, published Dec. 2016 in <i>The Lancet</i> (updated yearly)
Total number <5 deaths	~5 million	~5.9 million
Number of <5 annual diarrheal deaths	~446,000	~526,000
Percent of all <5 deaths due to diarrhea	8.9 percent	8.9 percent
Change	From 2006 to 2016, the total annual number of deaths from diarrhea among <5 children <b>decreased by 47.6 percent.</b>	From 2000 to 2015, the total annual number of deaths from diarrhea among <5 children <b>decreased by more than 50 percent.</b>

# Recent trends

**Diarrhea deaths in children are on the decline. Progress has been faster in some regions and countries than in others.** The Institute for Health Metrics and Evaluation (IHME)'s Global Burden of Disease (GBD) study found that, between 2006 and 2016:

- The fastest reductions in diarrhea deaths in children under five were in East Asia, Tropical Latin America, and Andean Latin America (>66 percent reduction).<sup>24</sup>
- The largest absolute reductions in diarrhea death rates occurred in sub-Saharan African countries, where the mortality rate was reduced by more than 100 deaths per 100,000 in western Sub-Saharan Africa (from 566 to 274 deaths per 100,000), eastern sub-Saharan Africa (from 271 to 116 deaths per 100,000), and central sub-Saharan Africa (from 347 to 146 deaths per 100,000).<sup>25</sup>
- Diarrhea deaths have decreased, but incidence has decreased at a slower rate than diarrhea-related deaths.<sup>26</sup> Infections are still a major problem. That means we need to get better at preventing—not just treating—diarrhea episodes through integrated public health approaches, including treatment, better availability of clean water and sanitation, and vaccination programs.
- Most importantly, our progress proves that success is possible. Since 2006, worldwide diarrhea deaths in children under five years have declined even faster than the overall under-five death rate. That huge drop in deaths shows what can happen when we prioritize addressing diarrhea in children.<sup>27</sup>

The top 10 countries where the most diarrhea deaths among children occur, 2016<sup>29</sup>

Rank	Country	Number of deaths of children <5
1	Nigeria	97,854
2	India	66,157
3	Pakistan	31,687
4	Democratic Republic of the Congo	18,788
5	Ethiopia	14,997
6	Niger	13,850
7	Chad	13,185
8	Madagascar	11,647
9	Mali	11,386
10	Cote d'Ivoire	9,916



## Take action

Policy decisions are made based on local needs and burden. Find out about diarrhea in your region/country with these resources.

### Where to go to learn more about diarrhea in your country

- ✓ **WHO/Maternal Child Epidemiology Estimation (MCEE)**  
Health statistics and information systems: child causes of death, estimates for 2000–2015. WHO website. Available at [who.int/healthinfo/global\\_burden\\_disease/estimates/en/index3.html](http://who.int/healthinfo/global_burden_disease/estimates/en/index3.html).<sup>30</sup>
- ✓ **IHME GBD**  
GBD Results Tool page. Institute for Health Metrics and Evaluation website. Available at [ghdx.healthdata.org/gbd-results-tool](http://ghdx.healthdata.org/gbd-results-tool).<sup>31</sup>
- ✓ **Countdown to 2030**  
Maternal, Newborn & Child Survival website. Available at [countdown2030.org/](http://countdown2030.org/).<sup>32</sup>
- ✓ **National Demographic Health Surveys (DHS) on Child Health**  
Child health page. The Demographic and Health Surveys (DHS) website. Available at [dhsprogram.com/topics/Child-Health.cfm](http://dhsprogram.com/topics/Child-Health.cfm).<sup>33</sup>

### Learn more about the global burden of diarrheal disease

- ✓ **WHO/UNICEF**  
Liu L, Oza S, Hogan D, et al. Global, regional, and national causes of under-5 mortality in 2000–15: an updated systematic analysis with implications for the Sustainable Development Goals. *The Lancet*. 2016;388(10063): 3027–3035. Available at [sciencedirect.com/science/article/pii/S0140673616315938](http://sciencedirect.com/science/article/pii/S0140673616315938).<sup>34</sup>
- ✓ **IHME GBD**  
GHB Results Tool page. Institute for Health Metrics and Evaluation website. Available at [ghdx.healthdata.org/gbd-results-tool](http://ghdx.healthdata.org/gbd-results-tool).<sup>35</sup>
- ✓ **International Vaccine Access Center (IVAC)**  
Johns Hopkins Bloomberg School of Public Health, International Vaccine Access Center (IVAC). 2017 *Pneumonia & Diarrhea Progress Report: Driving Progress through Equitable Investment and Action*. Baltimore: IVAC; 2017. Available at [jhsph.edu/research/centers-and-institutes/ivac/resources/pneumonia-diarrhea-progress-report.html](http://jhsph.edu/research/centers-and-institutes/ivac/resources/pneumonia-diarrhea-progress-report.html).<sup>36</sup>

*We are saving more lives from diarrhea, but what is the future for kids who grow up sick much of their lives? Once a child developmentally misses an opportunity to grow, you can never fix that.*

— Dr. Roma Chilengi, Chief Scientific Officer, Centre for Infectious Disease Research in Zambia (CIDRZ)<sup>37</sup>



## Diarrhea deaths are preventable

Simple and proven solutions can prevent and treat diarrhea. Integrating them achieves the greatest impact.<sup>38</sup>

Diarrhea can be prevented by:

Vaccines	WASH (Water, sanitation, & hygiene)	Breastfeeding & Nutrition

Diarrhea can be treated by:

ORS & Zinc	Research & Development

### Deaths are not the only problem—young children are still getting sick

Diarrhea infections are not declining as fast as the rate of deaths. While diarrhea deaths declined significantly among young children between 2000 and 2015, there were only 10 percent fewer cases, according to IHME's GBD research.<sup>39</sup>

In 2016 only, there were over 1 billion episodes of diarrhea in young children worldwide.<sup>40</sup> This means children are surviving, but not necessarily thriving. The magnitude is huge, but the problem still lacks the recognition and prioritization it urgently requires.

### Diarrhea has devastating, lasting implications in children and families

Many studies demonstrate that repeated diarrhea infections, especially within the first two years of life, can cause long-term disability, diminishing a child's quality of life and potentially causing premature death.<sup>41,42</sup>

Recurring enteric infections, such as those caused by diarrheal disease, may lead to intestinal inflammation and damage in the gut. Compromised gut health inhibits nutrient absorption in the body.<sup>43</sup> This can lead to malnutrition and lasting health consequences, such as stunted physical growth, impaired cognitive development, and/or increased susceptibility to infections, including diarrheal disease and pneumonia. The better we understand these implications, the better we can make meaningful policy decisions to break the cycle of poor health.



## No child's life should be limited by diarrhea

Diarrhea imposes a devastating burden on families and entire communities.

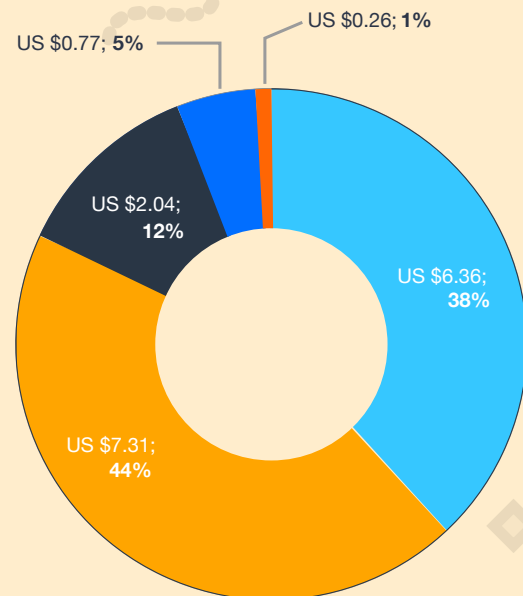
- When a young child has multiple episodes of diarrhea, he/she is left vulnerable to other infections, malnutrition, and stunting, which can take a lifelong toll on that child's ability to grow, thrive, and contribute to society.
- When a child gets sick, he/she may miss school and his/her parents must pay for care, which could amount to a significant portion of that family's income.
- Parents may also need to stay home to care for their child or take him/her to the clinic or hospital, losing wages from missed time at work.
- Especially in lower-income countries, the cost of diarrhea can push entire families into poverty, known as "medical impoverishment."<sup>44</sup>
- Often, when one child gets sick, so do other family members. The impact is bigger than one child.

**Many families are forced to make the impossible choice between treatment and family finances when their children fall sick with diarrheal disease.**<sup>45</sup>

Treatment costs can cause significant financial strain on households and health care systems alike. In Malawi, where 72.2 percent of the population lives on less than US \$1.25 per person per day, the mean household costs for patients seen in rural health centers were US \$19.16 and US \$1.81, respectively, for inpatient and outpatient treatment. Patients seen at urban hospitals had mean household costs of US \$25.36 and US \$15.48, respectively, for inpatient and outpatient treatment.

### Average household costs of one episode of diarrhea in Malawi<sup>46</sup>

- Lost income due to hospital visit
- Direct medical expenses of visit
- Direct medical expenses prior to visit
- Transportation, meals & lodging for visit
- Direct medical expenses after visit



Malawi's per capita gross income of US \$350 places it 210/216 countries and territories ranked by the World Bank.

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*We can make public health gains when we invest in the right solutions and strategies—and then motivate policymakers to accelerate progress and ‘finish the job.’ Often, the biggest obstacle is people thinking that aid doesn’t pay off. With diarrhea, it has and still can.*

”

— Eileen Quinn, Director, Advocacy and Communications,  
Center for Vaccine Innovation and Access, PATH



## Yes, we have made progress, but there is more to be done.

- ✓ Prioritization from governments and donors
- ✓ Integrated efforts, such as the Integrated Global Action Plan for the Prevention and Control of Pneumonia and Diarrhea (GAPPD)
- ✓ Continued pressure and calls for accountability by advocates

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*It’s not just one intervention. That child deserves to have access to all interventions.*

”

— Dr. Mathu Santosham, Johns Hopkins  
Bloomberg School of Public Health

PART TWO

# Integrated Solutions

Proven solutions exist to prevent and treat diarrhea when infants and young children get sick.<sup>48</sup> Since diarrhea has many causes, and infections can respond differently, successfully combating it requires an integrated approach that includes both prevention and treatment solutions.



## Diarrheal disease solutions

- **Vaccines.** In settings where medical care can be difficult to access, prevention through vaccination is the best way to protect children.
- **WASH solutions.** Using safe water, properly disposing of human waste, and handwashing with soap help prevent diarrhea.
- **Breastfeeding and proper nutrition.** Breast milk is the ideal nourishment for infants, protecting against infections and enabling them to recover more quickly from illness. Proper infant and young child nutrition fortifies the immune system against infectious diseases and promotes healthy, long-term growth and development.
- **Oral rehydration solution (ORS) and zinc supplementation.** Diarrhea can lead to dehydration, which can become life-threatening. ORS (oral rehydration solution) is a simple, lifesaving mixture of sugar, water, and salt that replenishes fluids and electrolytes. Zinc reduces the severity and duration of diarrhea infections. It can also prevent future episodes. WHO recommends using ORS and zinc together in diarrhea treatment.

ORS and zinc are frontline treatments. Some cases of severe dehydration may require urgent medical care and intravenous (IV) fluids, which are effective.



## A comprehensive approach

**Combining both prevention and treatment solutions is the most effective way to defeat diarrhea and break the cycle of poor health and poverty for children, families, and communities.**

Proven solutions include vaccines, WASH, breastfeeding and proper nutrition, and ORS and zinc treatment. Using these solutions together makes them work better.

Diarrhea prevention and treatment solutions are complementary. For example, proper sanitation and hygiene go hand-in-hand. Safe drinking water is a necessary component of ORS and complementary feeding. Effectively implementing WASH solutions is critical to addressing the connection between malnutrition and diarrhea. And rotavirus vaccines only prevent diarrheal disease caused by rotavirus, so additional methods are necessary to prevent and treat other forms of diarrhea.

**By integrating prevention and treatment solutions, countries can maximize impact, increase efficiency, and reduce costs.**

- The use of one solution can help to mobilize the adoption of others. For example, WHO and UNICEF recommend that zinc and ORS be used together to treat diarrhea.
- Combining and implementing solutions together may be more cost-effective, as programs stand to decrease expenses and increase efficiency.
- National policies providing comprehensive options can empower communities and programs to tailor their approaches to meet local needs.

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*What all we need is to look beyond certain interventions and not work in silos, hoping that things will change by bringing more interventions in one area of the work. Instead, we need to scale the number of interventions at the national level, benefiting all.*

— Dr. Paul P. Francis,  
Technical Officer,  
WHO India<sup>49</sup>



## Fighting pneumonia and diarrhea together

Many of the solutions that we know combat diarrhea also fight pneumonia, which, along with diarrhea, accounts for one in four deaths in children under five years worldwide.<sup>50</sup> The two diseases share many of the same risk factors, and integrating policies and programs that address both can have a big impact.

*“This is a question of equity. Poor children in low-income countries are most at risk of death from pneumonia or diarrhea but much less likely to get the interventions they need... We know what to do.”*

— Dr. Mickey Chopra, Lead Service Delivery Specialist, World Bank<sup>51</sup>

## Protect, prevent, and treat

Overlapping solutions to both diarrheal disease and pneumonia include breastfeeding, handwashing with soap, and providing safe water, sanitation, good nutrition, and immunization.

## No one solution is enough

It is critical to promote an integrated approach to prevent pneumonia and diarrhea, especially for children without reliable access to care.

Treatments that are vital to the successful management of these diseases can include appropriate use of antibiotics—amoxicillin dispersible tablets (DT) for pneumonia and appropriate antibiotics after diagnosis for diarrhea—oxygen, ORS, and zinc supplements. However, too often the children most at risk—those in poor settings or hard-to-reach communities—don’t receive these interventions.

# Take action

Recognizing the urgency and potential of an integrated approach, WHO and UNICEF issued the **Global Action Plan for the Prevention and Control of Pneumonia and Diarrhea (GAPPD)** in 2013.<sup>52</sup> It's the first plan to simultaneously address pneumonia and diarrhea to protect health, prevent illness, and treat affected children.

Child health programs at every level must address diarrhea and pneumonia together for lasting impact. Both are needed to make progress toward achieving the Sustainable Development Goals (SDG), implementing the United Nations Global Strategy for Women's and Children's Health, and realizing the Promise Renewed commitment to child survival.<sup>53,54,55</sup>

Integration of diarrhea and pneumonia solutions can provide children everywhere with a healthy start and a better future for their families and communities.

# GAPPD approach



# How's it going?

Almost three-quarters (72 percent) of the global burden of pneumonia and diarrhea child deaths occur in just 15 countries.<sup>57</sup>

Rank	Country
1	India
2	Nigeria
3	Pakistan
4	Democratic Republic of the Congo
5	Angola
6	Ethiopia
7	Indonesia
8	Chad
9	Afghanistan
10	Niger
11	China
12	Sudan
13	Bangladesh
14	Somalia
15	United Republic of Tanzania

When assessed for progress, all 15 countries were found to be falling below the GAPPD 86 percent coverage target.<sup>58</sup>

*World Pneumonia Day  
is November 12*  
**stoppneumonia.org**



## Diarrheal Disease Solutions: A Closer Look

# Vaccines

Vaccines are one of the most effective tools we have to protect children from contracting a diarrheal disease. Currently, vaccines have already been developed or are in development for a number of diarrheal diseases, including: rotavirus, enterotoxigenic *E. coli* (ETEC), and *Shigella*.

## Vaccines

Vaccines produce immunity to disease. Several vaccines that provide protection against diarrheal disease pathogens are available today.

### Problem

Diarrhea can be deadly, and children who suffer repeated infections can be left with lasting disabilities. Communities with poor infrastructure or that are particularly susceptible to natural disasters are at heightened risk for outbreaks of diarrheal diseases like cholera and the spread of rotavirus, ETEC, and *Shigella*.

### Solution

Vaccines for rotavirus, the most common and deadly cause of severe diarrhea in young children, are available now and are making a significant impact in countries where they have been introduced.<sup>59</sup> Vaccines against ETEC and *Shigella*, the leading causes of bacterial diarrhea, are in development.

Vaccines are also available to prevent cholera, a diarrheal disease commonly associated with outbreaks and linked to unsafe water and sanitation-related challenges.<sup>60</sup> And vaccines are under development for other diarrheal diseases like norovirus, paratyphoid, and non-typhoidal *Salmonella*.<sup>61,62,63</sup> (Typhoid vaccines are available, but it should be noted that typhoid is not a diarrheal disease.)<sup>64</sup>

### Impact

Six pathogens (including rotavirus, ETEC, and, *Shigella*), account for nearly 80 percent of diarrheal infections. Vaccinations against these pathogens could prevent hundreds of millions of deaths and prevent the kinds of repeated diarrheal episodes that keep far too many children from reaching their full potential.<sup>65</sup>



*World Immunization  
Week is the last  
week of April*

It aims to promote the use of vaccines to protect people of all ages against disease.  
[who.int/campaigns/en/](http://who.int/campaigns/en/)

“

*The best way to protect children from deadly disease is to prevent them from getting it in the first place.*

”

— Dr. Ruth F. Bishop, led the team of researchers that discovered rotavirus<sup>66</sup>

## Rotavirus



### Problem.

Rotavirus is a highly contagious virus that can cause diarrhea.<sup>67</sup> It is often accompanied by vomiting and fever. If left untreated, it can lead to severe dehydration and death. While nearly every child in the world is at risk regardless of where he or she lives, children in poverty disproportionately die from rotavirus due to lack of access to emergency care.

Unlike the bacteria and parasites that cause other forms of diarrhea, rotavirus cannot be prevented by improvements in water, hygiene, and sanitation—vaccines provide the best protection against it.



### Solution.

In the countries where they are in use, rotavirus vaccines are saving lives and protecting child health.<sup>68</sup> To date, more than 90 countries have introduced rotavirus vaccines into their national immunization program. However, 67 percent of the world's children—over 90 million infants—still do not have access to them.<sup>69,70</sup> Uptake in Asia, in particular, remains slow. We must do more to reach these children.

## ETEC and *Shigella*



### Problem.

ETEC and *Shigella* are the leading bacterial causes of diarrhea among children under five years.<sup>71</sup> Shigellosis and illness from ETEC usually follow the ingestion of contaminated food or water. *Shigella* can also be transferred by person-to-person contact. Compounding the problem, inappropriate use of antibiotics for diarrhea is strengthening bacterial pathogens. Persistent infections, regardless of the pathogen responsible, lead to long-term consequences.



### Solution.

Vaccines against ETEC and *Shigella* are currently under development. PATH is collaborating with private- and public-sector partners to advance safe, effective, and affordable vaccines against these pathogens.<sup>72</sup>



## Global Guidance

**WHO** recommends that all countries introduce rotavirus vaccines into their national immunization programs.<sup>74</sup>

- ✓ There are currently two globally available vaccines against rotavirus.
- ✓ India, Vietnam, and China each have nationally licensed vaccines.

**Countries can learn about available vaccines here:**  
[rotacouncil.org/vaccine-evidence/available-rotavirus-vaccine-products/](http://rotacouncil.org/vaccine-evidence/available-rotavirus-vaccine-products/)

**And vaccine introduction here:** [rotacouncil.org/vaccine-introduction/how-to-introduce/](http://rotacouncil.org/vaccine-introduction/how-to-introduce/)



# WASH

Water, sanitation, and hygiene—collectively known as WASH—are essential to prevent deaths and illnesses from diarrheal disease. Exposure to enteric pathogens in the environment due to poor WASH can lead to long-term gut damage, compromising a child's physical and cognitive growth.<sup>75</sup> Good health is simply not possible without WASH.

WASH in institutional settings, such as health centers and schools, is critically important and is generally agreed to be one of the key integrated interventions for tackling stunting. However, an expansive study of 54 countries and 66,101 facilities revealed that 38 percent of health care facilities do not have a clean water source, 19 percent do not have improved sanitation, and 35 percent do not have water and soap for handwashing.<sup>76</sup>

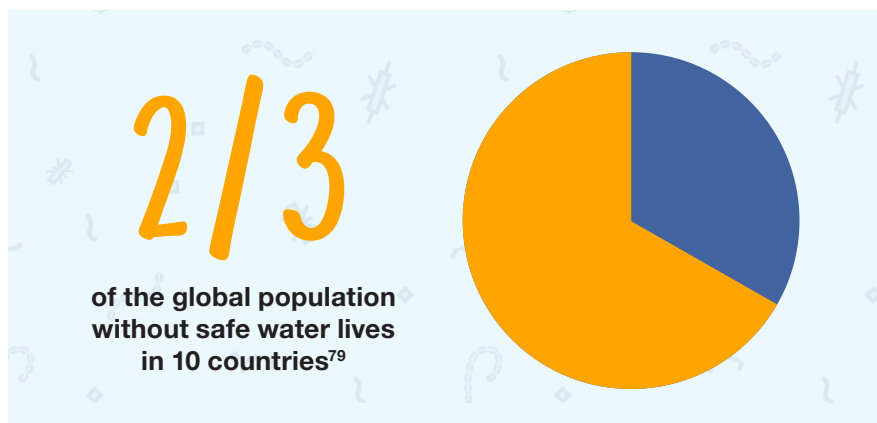
## Water

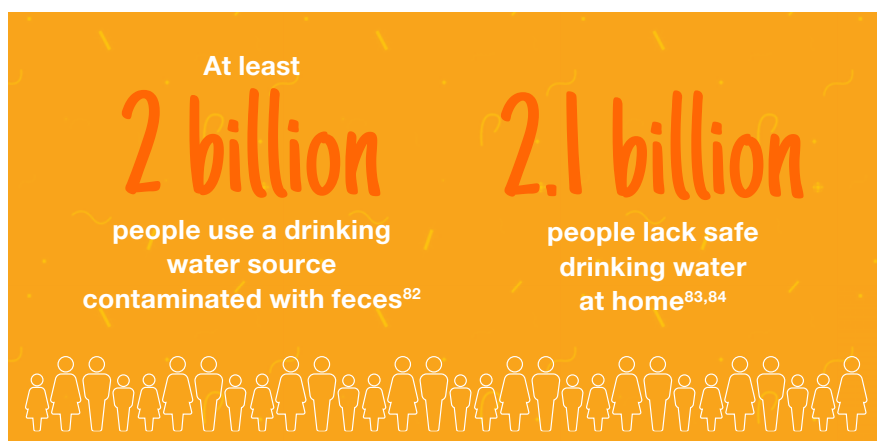
Everyone needs water to survive. But it must first be safe to drink and use.

### Problem

Water can be contaminated at its source, during transportation, or at the point of consumption. Drinking or using unsafe water for washing, cooking, cleaning, or farming can lead to illnesses. This burden, and the constant search for a water supply, even when unsafe, falls most heavily on girls and women.

This problem is critical in sub-Saharan Africa and Southeast Asia, where rural and poor communities lack infrastructure that ensures safe drinking water.<sup>77,78</sup> Rapid urbanization is putting new pressures on flawed water systems. People are more likely to be exposed to contaminated water in countries where infrastructure may be lacking or failing. Climate change is also an exacerbating factor. Droughts can dry up sources, leading people to use any water they can find, even if highly contaminated. Additionally, floods are more likely to lead to contamination as water sources overflow or surge and stress infrastructure.





## Solution

Solutions that make water safe must be tailored to meet local needs.<sup>85</sup> Education and behavior-change tactics are also important to sustainability. Point-of-use and household water treatment and storage involve disinfecting water before it is used or consumed.<sup>86</sup> There are a range of proven low-cost methods including disinfection by sun, UV lamps, boiling, filtration, and absorption, as well as chemical disinfection with chlorine, bleach, and flocculants.<sup>87</sup> Innovation to address unsafe water may be as specific as an adapter ring in a water filter that accommodates several sizes of ceramic pots, or a design upgrade that encourages use.<sup>88,89</sup> Once water is treated, it must be stored safely to prevent subsequent contamination.

## Impact

If everyone had access to safe water, almost 90 percent of diarrheal deaths could be prevented.<sup>90</sup>

## Engagement with the private sector can help, too.

Everything from direct sales of water filters to automated water kiosks and ATMs may change the landscape of water providers. **Learn more:**

### Water filters:

[hydrologichealth.com/  
path.org/publications/files/DT\\_hhi\\_wash\\_fs.pdf](http://hydrologichealth.com/path.org/publications/files/DT_hhi_wash_fs.pdf)

### Kiosks:

[sarvajal.com/index.php](http://sarvajal.com/index.php)  
[waterhealth.com/index.php/impact/campaign](http://waterhealth.com/index.php/impact/campaign)  
[coca-colacompany.com/stories/ekocenter-empowering-community-well-being-through-social-enterprise](http://coca-colacompany.com/stories/ekocenter-empowering-community-well-being-through-social-enterprise)  
[aquanetto.ch/wasserversorgung/mobile-water-kiosk-175.html](http://aquanetto.ch/wasserversorgung/mobile-water-kiosk-175.html)  
[ecosoft.com/catalog/water-kiosk/ecosoft-water-production-kiosk/](http://ecosoft.com/catalog/water-kiosk/ecosoft-water-production-kiosk/)

## Global Guidance

The SDGs, launched in 2015, include a target to ensure everyone has access to safe water by 2030.<sup>91</sup>

**Target 6.1:** Achieve universal and equitable access to safe and affordable drinking water.<sup>92</sup>

**Indicator 6.1.1:** Proportion of population using safely managed drinking water services.

### Learn more:

[sustainabledevelopment.un.org/sdg6](http://sustainabledevelopment.un.org/sdg6)

**WHO's guidelines on drinking water quality** provide the basis for national regulations and standards for water safety in support of public health.

**The latest guidelines for drinking water quality can be found at:** [who.int/water\\_sanitation\\_health/publications/drinking-water-quality-guidelines-4-including-1st-addendum/en/](http://who.int/water_sanitation_health/publications/drinking-water-quality-guidelines-4-including-1st-addendum/en/)



*World Water Day is  
March 22*

A day of action focused on the global water crisis.  
**[worldwaterday.org](http://worldwaterday.org)**



## Sanitation

Safely collecting, treating, and disposing of human waste reduces exposure to the causes of enteric disease.

### Problem

Billions of people do not have basic sanitation facilities, such as toilets or latrines, and defecate in the open in fields, streets, gutters, or open bodies of water.<sup>93</sup>

Lack of basic sanitation (e.g., open defecation) creates serious health risks, including endemic diarrhea and the spread of diseases like cholera, diarrhea, and dysentery.<sup>94,95</sup> It is also linked to transmission of hepatitis A, typhoid, and polio.<sup>96</sup>

Evidence shows a total community approach to sanitation coverage is needed in order to have a meaningful impact. Estimations show that 60 to 65 percent coverage in a community is required before any impact can be seen. A study in India showed that 25 percent of the effect of diarrheal disease reduction was due to a child's access to his/her own sanitation facility; by contrast, 75 percent of the effect came from having a high level of sanitation in the village.<sup>97</sup>

The lack of access to basic sanitation facilities can also have serious safety implications, especially for women at night, and undermine feelings of self-dignity.

The vast majority of people without access to proper sanitation live in sub-Saharan Africa, East Asia, and South Asia.<sup>98</sup> Unless addressed, the problem will only continue, with rapid urbanization and climate change presenting growing threats.<sup>99</sup>

“

*The fact that so many of the world's population still have to exist without access to the essentials of life—clean water and a decent toilet—is shameful.*

— Tim Wainwright,  
Chief Executive of  
WaterAid UK<sup>100</sup>

2.3 billion people

still **do not** have basic sanitation facilities such as toilets or latrines<sup>101</sup>

## Solution

Sanitation can be improved by addressing user-, product-, and market-related challenges that inhibit uptake and use of sanitation technologies. Leading sanitation solutions engage and create incentives for all actors across the sanitation value chain.<sup>102</sup>



Everyone needs a safe place to go. Proper sanitation means that people are separated from and do not come into contact with human waste.<sup>104</sup> Squat pan or seated pour-flush toilets, onsite biodigesters, or public latrine blocks are all appropriate for varying contexts. However, it is important to recognize there is no “one size fits all” solution to sanitation. The right intervention depends on the community’s needs, culture, and environment. And a critical element of an intervention is ensuring that facilities are used and maintained. This can sometimes mean taking on cultural norms.

## Impact

Sanitation could substantially reduce diarrheal disease frequency and malnutrition indicators.<sup>105,106</sup> Safely disposing human waste impacts not only health, but also social and economic development.



“

*Giving people access to toilets isn't enough. You also have to persuade them to use the toilets.*

— Bill Gates, Co-Chair,  
Bill & Melinda Gates  
Foundation<sup>107</sup>

*World Toilet Day is  
November 19*

A day of action focused on raising awareness and inspiring action to tackle the global sanitation crisis — a topic often neglected and shrouded in taboos.  
**worldtoiletday.info**

## Durability, privacy, and security

These were among the key user requirements for a Population Services International (PSI) and PATH sanitation project in rural India. The collaboration helped build a market for the sale of 150,000 toilets that are designed to be cost-effective and user-friendly. Addressing supply chain challenges, creating user-centered designs, and providing financing options for families to purchase their own toilets have been core components in the program’s success in Bihar.<sup>108</sup>



## Global Guidance

The SDGs include a target to ensure everyone has access to toilets by 2030. This makes sanitation a global development priority.

**SDG target 6.2:** Achieve access to adequate and equitable sanitation and hygiene, and end open defecation, paying special attention to the needs of women, girls, and those in vulnerable situations.

**Indicator 6.2.1:** Proportion of population using safely managed sanitation services, including a handwashing facility with soap and water.

**Learn more:** [sustainabledevelopment.un.org/sdg6](https://sustainabledevelopment.un.org/sdg6)

### UN-Water Global Analysis and Assessment of Sanitation and Drinking-Water (GLAAS) 2017-2020 Strategy

The UN-Water GLAAS strategy responds to the new demands of the SDGs and sets a course for GLAAS actions at the country level.

**Learn more:** [who.int/water\\_sanitation\\_health/publications/glaas-strategy-2017/en/](https://who.int/water_sanitation_health/publications/glaas-strategy-2017/en/)

### WHO Joint Monitoring Programme (JMP) Report: Progress on Drinking Water, Sanitation and Hygiene: 2017 Update and Sustainable Development Goal Baselines

Many countries lack data on the quality of water and sanitation services. This report includes estimates for 96 countries on safely managed drinking water and for 84 countries on safely managed sanitation.

**Learn more:** [who.int/water\\_sanitation\\_health/publications/jmp-2017/en/](https://who.int/water_sanitation_health/publications/jmp-2017/en/)



## Hygiene

Handwashing with soap is a simple and effective way to prevent diarrhea. Hygienic practices like handwashing maintain health and prevent the transmission of diseases.

### Problem

Contaminated hands are one of the main ways diarrhea is spread.

### Solution

Since diarrheal diseases are transmitted through the fecal-oral route, routine handwashing with soap can prevent the transmission of the bacteria and viruses that cause diarrhea, particularly when regularly practiced after using the toilet or changing a baby's diaper and before preparing food.

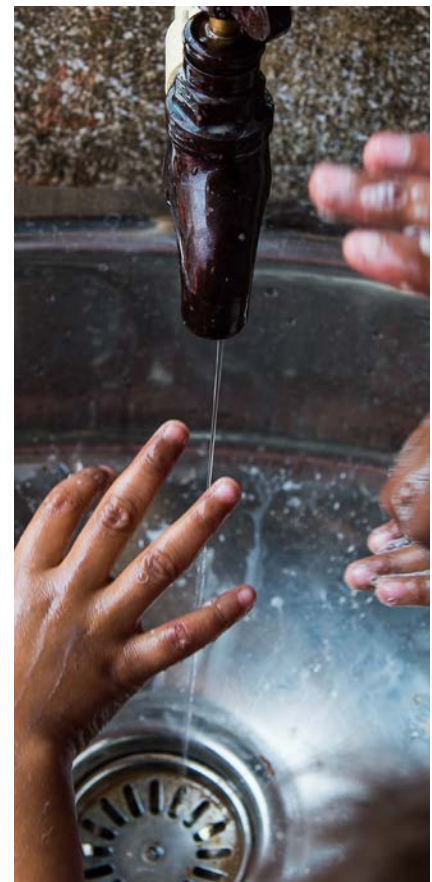
Handwashing with soap is one of the most cost-effective investments in public health.<sup>110</sup> Handwashing prevents diarrhea and a host of other infections that can be extremely costly to individuals, health care systems, and countries.

Washing hands in schools and health care facilities can have a significant impact.

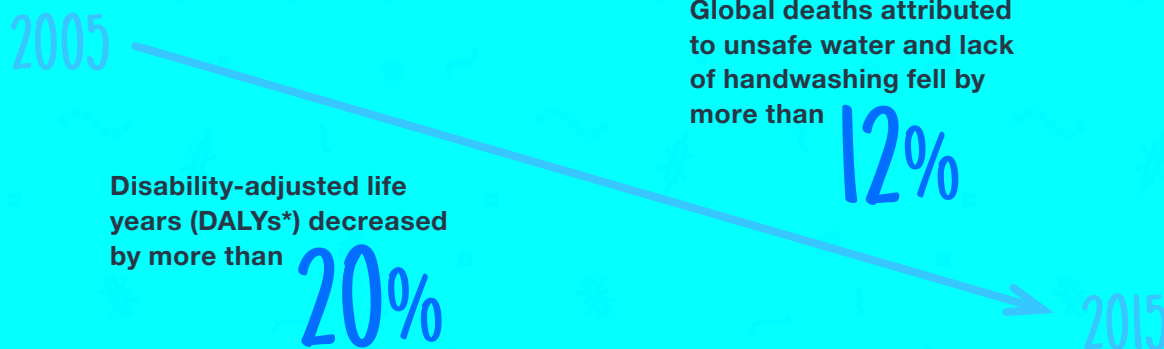
It is critical to educate both parents and caregivers on the importance of correctly washing hands. For children, schools provide ample opportunities for promoting healthy habits.<sup>111</sup>

Since improving handwashing requires behavior change, it works best as part of a broader package of solutions.

**Billions  
per year =**  
net costs for  
diarrhea and  
acute respiratory  
infections,  
whereas a national  
handwashing program  
could result in the  
equivalent savings  
for an economy.<sup>113</sup>



## Making progress<sup>114,115</sup>

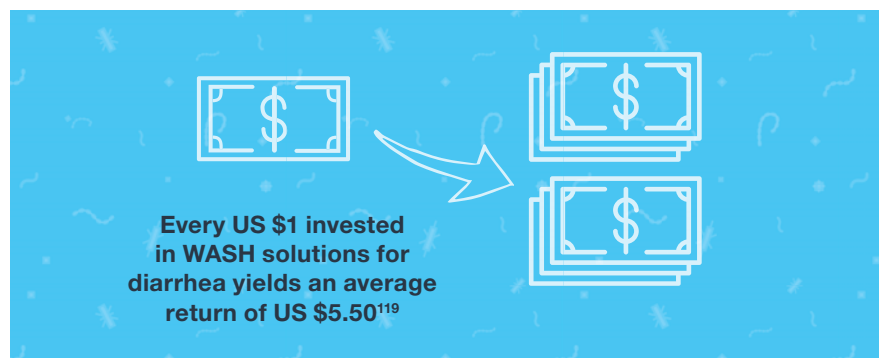


\*DALYs account for lost years of productive life due not only to early death but also to illness, stunting, and other long-term impacts

### Impact

Handwashing with soap could eliminate nearly half of all diarrhea infections.<sup>116</sup>

Without good hygiene practices like handwashing with soap, efforts to improve drinking water and sanitation will be undermined and unsustainable.<sup>117</sup> The SDGs are monitoring the percentage of people with facilities in their homes to wash their hands with soap and water. Access varies immensely, from 15 percent of the population in sub-Saharan Africa to 76 percent in West Asia and North Africa.<sup>118</sup>



### Global Handwashing Day is October 15

A day of action focused on increasing awareness and understanding about the importance of handwashing with soap.  
[globalhandwashing.org](http://globalhandwashing.org)

“

*Safe water, sanitation, and hygiene at home should not be a privilege... These are some of the most basic requirements for human health, and all countries have a responsibility to ensure that everyone can access them.*

”

— Dr. Tedros Adhanom Ghebreyesus, Director-General, WHO<sup>120</sup>



# Breastfeeding and Nutrition

Breastfeeding and good nutrition help ensure that every child can properly develop. Between them, these two critical solutions help protect children from and reduce their exposure to diarrheal disease.

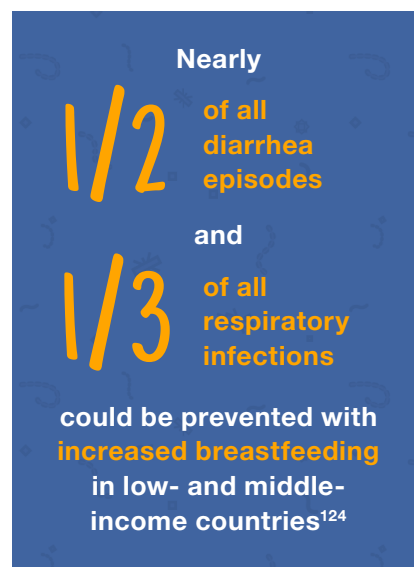
## Breastfeeding

Breastfeeding provides all the essential nutrition infants need for growth and development.<sup>121,122</sup>

### Problem

Infants are at greatest risk of diarrheal disease when they are given foods other than breast milk.<sup>123</sup> This is because they are more likely to be exposed to food- and water-borne pathogens and lose the protection of breast milk's anti-infective properties. Many women face obstacles that keep them from breastfeeding. Instead, they turn to alternatives to breast milk that carry risks, particularly in areas where water may be unsafe and in areas prone to high levels of infectious disease and with the potential for improper food preparation and storage practices. For women who are unable to breastfeed, it's important that healthy solutions—made with safe water—are available. (Again, the access and availability problem!)

Additionally, some mothers don't produce enough milk or have trouble accessing breast milk. Both issues are critical to ensure a child receives good nutrition.



## Solution

Exclusive breastfeeding has many health benefits for infants, including the prevention and treatment of infections like diarrhea. It provides immediate immune protection to the infant from the mother, stimulates the development of an infant's immune system, and contains many health and growth-enhancing properties like enzymes, proteins, and hormones, all of which are unique to breast milk.<sup>125</sup> Breastfeeding benefits mothers, too, by reducing the risk of breast and ovarian cancer, among other health benefits.<sup>126</sup> Key feeding practices recommended by WHO for infants and young children include:

- Initiating breastfeeding within the first hour of life
- Exclusive breastfeeding for the first six months
- Timely and adequate complementary feeding
- Continued breastfeeding for two years
- Good nutrition and restorative feeding for toddlers over age two<sup>127</sup>

Breastfeeding prevents diarrheal disease in two ways:

1. It eliminates the risk of a child consuming contaminated food and water at a point in his/her life when his/her digestive system is not fully developed.
2. Breast milk contains secretory antibodies and other immune factors that protect against gastrointestinal pathogens. Breast milk has also demonstrated anti-inflammatory and immunomodulatory effects.

For an infant or toddler, continued breastfeeding during and following an episode of diarrhea significantly reduces the risk of dehydration and prevents weight loss and malnutrition. Breastfeeding may also help speed up recovery and reduce the severity and duration of an episode.

After six months, when breast milk needs to be complemented with other foods, caregivers should be educated about safe and hygienic food preparation and feeding. Infants and toddlers are particularly vulnerable to malnutrition between six months and two years due to inadequate feeding practices during and after illness.<sup>128</sup>

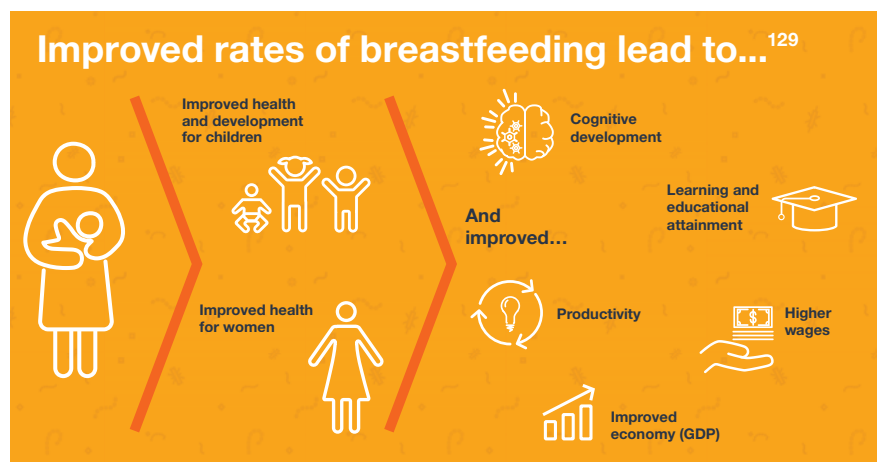
Successful breastfeeding is a collective, community effort. Mothers need support from families, communities, and their governments.



## What are safe alternatives? Donor milk and special cups.

When a mother is unable to breastfeed her child, human milk banks are critical.<sup>130</sup> In 2008, WHO called for member nations to promote the use of donor breast milk from human milk banks for vulnerable babies. To date, there has been progress in human milk banks opening around the world, with the first human milk bank in Asia opening in India in 2016, followed by Vietnam in 2017.<sup>131,132</sup>

Several million babies born each year in Africa and South Asia cannot breastfeed due to prematurity or craniofacial anomalies like cleft lip or palate; however, new inventions like the NIFTY Cup help these babies get the nutrients they need. The cup creates a reservoir and flow channel that allows an infant to lap breastmilk, instead of it being poured down their throats using a traditional cup.<sup>133</sup>



## Impact

Breastfeeding could save an estimated 800,000 infants each year by preventing death and stunting from malnutrition, helping to support immune system development, and preventing infections like pneumonia and diarrhea.<sup>134</sup>

## Global Guidance

WHO and UNICEF recommend exclusive breastfeeding—where the infant only receives breast milk without additional food or drink—for the first six months of life. This is followed by continued breastfeeding with appropriate complementary foods for up to two years or beyond.

**Learn more:** [who.int/maternal\\_child\\_adolescent/topics/child/nutrition/breastfeeding/en/](http://who.int/maternal_child_adolescent/topics/child/nutrition/breastfeeding/en/)

The **World Health Assembly** hopes to achieve at least a 50 percent rate of exclusive breastfeeding during the first six months of life by 2025. (The 2012 baseline is 37 percent.) By investing US \$570 million a year for the next 10 years, governments, donors, and partners can help increase the rate of exclusive breastfeeding.

**Learn more:** [who.int/nutrition/publications/infantfeeding/global-bf-collective-investmentcase/en/](http://who.int/nutrition/publications/infantfeeding/global-bf-collective-investmentcase/en/)

The **Global Breastfeeding Collective** (GBC) developed a scorecard to track progress on seven policy actions and on the state of breastfeeding practices within countries.

By the GBC's estimates, every dollar invested in increasing breastfeeding generates US \$35 in future returns across low- and middle-income countries, resulting in healthier families with higher productivity.<sup>135</sup>

**Learn more:** [unicef.org/nutrition/index\\_100585.html](http://unicef.org/nutrition/index_100585.html)

“

*What if governments had a proven, cost-effective way to save babies' lives, reduce rates of malnutrition, support children's health, increase educational attainment, and grow productivity? They do: it's called breastfeeding.*

— Anthony Lake,  
Executive Director,  
UNICEF<sup>136</sup>

**World Breastfeeding Week is August 1–7**

A week to promote and support breastfeeding.

[worldbreastfeedingweek.org](http://worldbreastfeedingweek.org)



## Nutrition

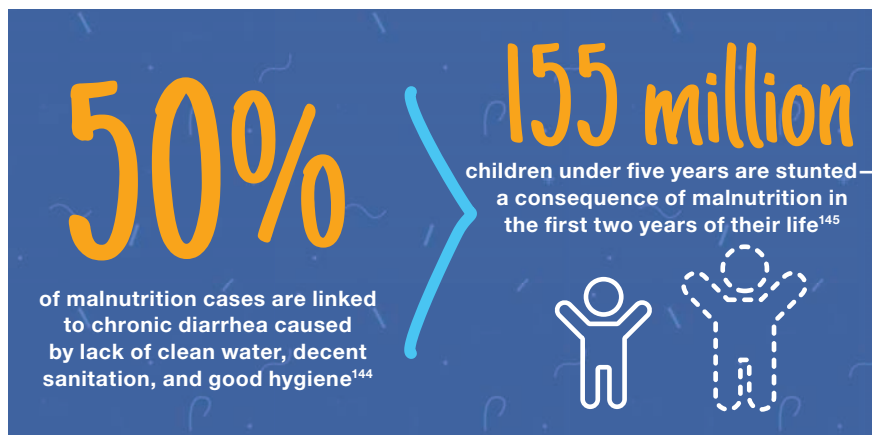
Good health begins with good nutrition. Proper infant and young child nutrition fortifies the immune system against infectious diseases, including diarrhea, and promotes healthy growth and development.

### Problem

Diarrhea and malnutrition are inextricably linked.<sup>137,138</sup> When a child experiences persistent diarrhea infections, he/she is less likely to be able to absorb the necessary nutrients needed to survive and develop. Five or more cases of diarrhea before the age of two can lead to stunting—the effects of which are largely irreversible.<sup>139</sup>

Diarrhea is a leading cause of malnutrition in children under five years, and children who are malnourished are more susceptible to it. Diarrhea and malnutrition feed off each other in a relentless loop—keeping children sick and vulnerable to infection.<sup>140,141</sup>

Long-term gut damage caused by repeated enteric infections is called environmental enteric dysfunction (EED).<sup>142,143</sup> It prevents nutrient absorption and immune system function, even when children eat healthy foods.



Poor-quality diets contribute to and exacerbate this cycle. Children without adequate nutrients in their diets suffer even more when the minimal nutrients aren't able to be absorbed due to diarrhea. Those whose diets consist of maize (such as nsima or ugali) or rice—foods with little nutritional content—aren't necessarily hungry, but they suffer greater consequences from diarrhea because the few vitamins, minerals, and nutrients they have become quickly depleted.

Pathogens from unsafe drinking water, poor sanitation, and lack of hygiene cause changes to the gut structure that prevent nutrient absorption. When this happens during a child's first years of life, the long-term impact can be devastating.

“

*Alongside the ‘double burden’ of diarrhea and malnutrition, data now suggest that children with stunted growth and repeated gut infections are also at increased risk of developing obesity and its associated comorbidities, resulting in a ‘triple burden’ of the impoverished gut.*

— Richard Guerrant, Mark DeBoer, Sean Moore, Rebecca Scharf and Aldo Lima, “The Impoverished Gut”<sup>146</sup>



Mounting evidence links diarrhea-associated malnutrition and its adverse consequences with impaired physical and cognitive development.<sup>147</sup> This can perpetuate the cycle of poverty by curtailing a child's educational achievements and limiting future employment opportunities.

While increased availability of treatments such as ORS has greatly reduced diarrhea deaths, the overall number of enteric infections persists and continues to trap communities in a cycle of poor health, malnutrition, and poverty.

## Stunting limits potential<sup>148</sup>

- India has the highest number of children suffering from stunting in the world—48 million, or two in every five.
- Nigeria and Pakistan rank second and third with 10.3 and 9.8 million children suffering from stunting, respectively.
- Timor-Leste has the highest percentage of children who are stunted, at 58 percent.

## Solution

The 1,000 days between when a mother's pregnancy begins and her child's second birthday is a critical window during which good nutrition is essential for a child's healthy development.<sup>149</sup> An integrated approach to prevent and treat diarrheal disease, with particular emphasis on the 1,000-day period, is vital to comprehensively address the vicious cycle of diarrhea and malnutrition.

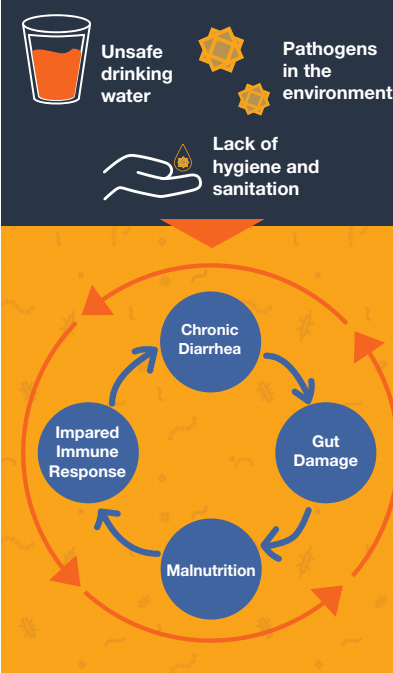
The mother's health during the 1,000 days is also imperative. Mothers must ensure they do not get diarrhea and malnutrition themselves in order to avoid passing along these conditions. Malnourished mothers are much more likely to give birth to low birth weight babies who are more susceptible to diarrhea and often less able to breastfeed. These children are, therefore, prone to malnourishment and stunting.

For children, nutrition-based solutions for diarrhea incorporate optimal infant and young child feeding—exclusive breastfeeding in the first six months, plus continued breastfeeding and nutritious, hygienically prepared, complementary foods through the child's first two years of life. These programs should also account for WASH solutions.

When a child has diarrhea, feeding should continue. After the episode, feeding should increase to help counteract weight loss and malnutrition.

WASH solutions, breastfeeding, proper nutrition, and vaccines are crucial to preventing infections that contribute to chronic diarrheal disease, EED, the malabsorption of nutrients, and compromised immune function in young children, all of which limit children's potential.

## Diarrhea and Malnutrition: A Relentless Loop<sup>150</sup>



“

*The link between malnutrition and cognitive development is powerful and far-reaching... Malnourished children often become malnourished parents and the vicious cycle is repeated.*

— Dr. Cyril Engmann,  
Director of Maternal,  
Newborn, and Child Health  
and Nutrition, PATH<sup>151</sup>

## Integrating WASH through Global Partnerships: Scaling Up Nutrition (SUN) and Sanitation and Water for All (SWA)

Recognizing the close relationship between WASH conditions and undernutrition, government actors working on WASH and nutrition policies and programs have increasingly begun to collaborate. To reinforce and accelerate these efforts, the SUN Movement and SWA Partnership began to work together in 2015 on high-level advocacy, including joint participation at the 2015 Bonn WASH Nutrition Forum, joint seminars at the European Development Days and Stockholm World Water Week in 2016, and the United Nations General Assembly (UNGA) in 2015 and 2016.

SUN and SWA have now agreed to a joint workplan focused on advocacy for integration; identifying, documenting, and sharing good practices in integrated national policies and programming; and research and learning to enhance and communicate the benefits of more integrated approaches.



### *World Food Day is October 16*

A day to promote worldwide awareness and action for those who suffer from hunger and for the need to ensure food security and nutritious diets for all.

World Food Day is a chance to show our commitment to SDG 2—to achieve zero hunger by 2030.

**[fao.org/world-food-day/2017/about/en/](http://fao.org/world-food-day/2017/about/en/)**

## Global Guidance

### **SDG 2 addresses hunger and calls for progress by 2030.<sup>152</sup>**

**Goal 2:** End hunger, achieve food security and improved nutrition, and promote sustainable agriculture.

**Target 2.1:** End hunger and ensure access by all people, in particular the poor and people in vulnerable situations (such as infants), to safe, nutritious, and sufficient food all year round.

**Indicator 2.1.1:** Prevalence of undernourishment

**Target 2.2:** End all forms of malnutrition, including achieving by 2025 the internationally agreed targets on stunting and wasting in children under five years, and address the nutritional needs of adolescent girls, pregnant and lactating women, and older persons.

**Indicator 2.2.1:** Prevalence of stunting (height for age  $<-2$  standard deviations from the median of WHO Child Growth Standards) among children under five years

**WHO's** complementary feeding guidelines provide guidance for infants and toddlers six months and older.

**Learn more:** [who.int/maternal\\_child\\_adolescent/topics/child/nutrition/comp\\_feeding/en/](http://who.int/maternal_child_adolescent/topics/child/nutrition/comp_feeding/en/)

### **SDG 6 addresses WASH and calls for progress by 2030.<sup>153</sup>**

**Goal 6:** Ensure availability and sustainable management of water and sanitation for all.

**Target 6.1:** By 2030, achieve universal and equitable access to safe and affordable drinking water for all.

**Target 6.2:** By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations.

**Learn more:** [sustainabledevelopment.un.org/sdgs](http://sustainabledevelopment.un.org/sdgs)



# ORS and Zinc

Diarrhea causes dehydration and a loss of nutrients, so it's important to address both. Oral rehydration solution (ORS) replenish fluids and electrolytes, and zinc supplements help restore levels of the micronutrient (and subsequently limit the severity of diarrheal episodes and prevent future ones). Together, they address the immediate dangers posed by diarrhea episodes and help to restore good health.

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## ORS

ORS is a simple, lifesaving mixture of sugar and salt added to clean water that caregivers can give to children at home.<sup>154</sup>

### Problem

Diarrhea becomes fatal when it leads to severe dehydration. Children in developing countries suffer from dehydrating diarrhea an average of four times per year. But many caregivers do not turn to appropriate solutions to rehydrate their child when he/she experiences diarrhea.<sup>155</sup> It is not about choice; often, they don't know about or can't access ORS and zinc, or they are given an antibiotic by a private seller who wants a higher profit.

## Global Guidance

WHO and UNICEF recommend the use of ORS and zinc for the treatment of acute diarrhea.<sup>156</sup>

**Learn more:** [unicef.org/nutrition/files/ENAcute\\_Diarrhoea\\_reprint.pdf](https://unicef.org/nutrition/files/ENAcute_Diarrhoea_reprint.pdf)

### Solution

ORS rehydrates by replacing fluids and electrolytes lost through diarrhea.

ORS should always be given as a first line of defense to prevent and address diarrhea-related dehydration. The success of ORS critically depends on caregivers.<sup>157</sup> A key component includes educating and reducing skepticism among caregivers.<sup>158</sup> If and when an episode becomes severe, IV fluids and urgent medical care may be needed.

As of 2001, a new ORS with reduced sodium and glucose (sugar) content is available. The updated formula, low-osmolality ORS, is packaged as a powder to be mixed with safe water. It's easy to use and can be administered by a health





care provider or at home. The new formula improves efficacy and reduces the need for unscheduled intravenous (IV) fluid interventions. WHO and UNICEF both recommend the use of low-osmolarity ORS.

### Impact

ORS has made and continues to make a big impact in reducing deaths related to diarrheal disease. More needs to be done to increase ORS coverage globally.

**ORS Day is July 29**

It aims to promote the message that  
ORS saves lives.

[nhp.gov.in/ors-day\\_pg](http://nhp.gov.in/ors-day_pg)



## Zinc

Zinc is an important micronutrient needed for overall health and development.

### Problem

Zinc and other micronutrients can become depleted through diarrhea.

### Solution

Zinc is a safe and effective treatment option that can reduce the duration and severity of diarrhea episodes and prevent future episodes.

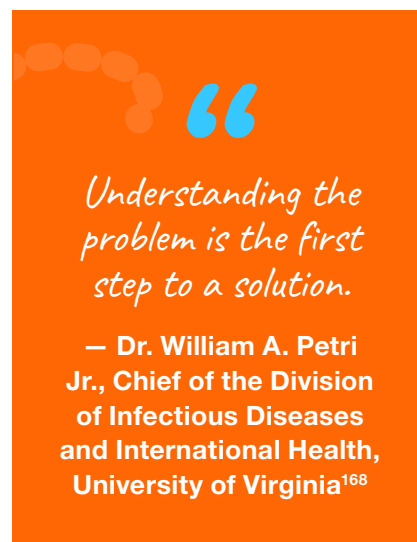
Zinc can be given as a syrup or as a tablet that is dissolved in clean water or breast milk. When using zinc to treat diarrhea, it is important that caregivers are educated about the importance of giving the full course of zinc treatment in conjunction with ORS.<sup>161</sup>

### Impact

Zinc can reduce the duration of illness by 25 percent and prevent recurrence of disease for up to three months. This combined treatment is cost-effective and easily administered by caregivers in the home.

The UN Commission on Life-Saving Commodities for Women and Children named zinc and ORS two of thirteen essential commodities that could contribute to saving more than 6 million lives.<sup>162,163,164</sup> The GAPPD includes ORS and zinc.<sup>165</sup> The Zinc Task Force, among others, has come together to address barriers to access.<sup>166</sup>

Just **two in five children** with diarrhea receive ORS, and the median coverage of zinc is **only 1 percent** in 49 countries with available data<sup>167</sup>





# Research and Development

Although diarrhea can be prevented and treated with solutions available today, researchers are studying and developing new prevention approaches and treatments to ease diarrhea symptoms, prevent dehydration, and protect children from long-term harm. There are still things we do not understand, such as the long-term impact of diarrhea, that research could help illuminate, thereby helping us discover the most effective interventions. This research is particularly important for children living in low-resource settings who lack access to drug treatments for specific diarrheal pathogens.

## Research and Development

Though we already have a lot of the tools to defeat diarrheal disease, new research and innovations could help save even more lives and prevent lifelong harm.

### Problem

There are very few drug treatments for specific diarrheal pathogens. In low-resource settings, diarrhea is often inappropriately treated with antibiotics that are ineffective against anything not caused by bacteria (i.e., anything viral or parasitic). Compounding the problem, indiscriminate antibiotic use can lead to bacterial resistance and deadlier pathogens.

### Solution

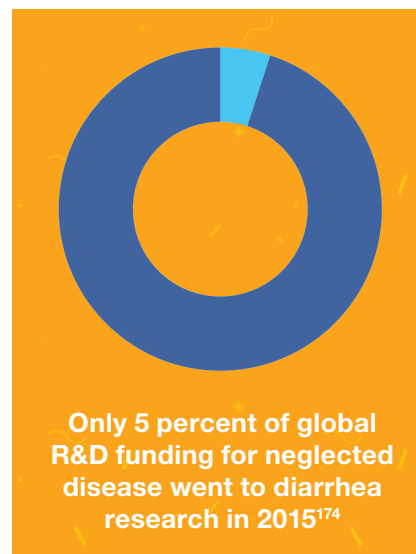
New drug treatments to complement existing solutions—like ORS and zinc—are urgently needed.

The work underway is promising. For example, iOWH032 is an investigational new drug for secretory diarrhea with potential to treat cholera and ETEC.<sup>168</sup> This new drug could be the first synthetic drug of its kind designed to reduce fluid loss.<sup>170</sup> Additionally, research is underway to develop a drug to combat the *Cryptosporidium* parasite, a significant problem in low-resource settings.<sup>171,172</sup> Scientists are at work to improve diagnostics and develop new prevention and treatment tools.<sup>173</sup>

### Impact

New drug treatments could have a profound impact in saving lives and alleviating the burden of diarrhea's long-term effects. Research and development of new tools to stop diarrhea will play a crucial role in accelerating an end to the global crisis.

Researchers are also studying the potential for new prevention methods, such as vaccines for ETEC and *Shigella*.



## Creative approaches

New approaches focused on innovating delivery and improving access to existing interventions are important, too.

### Learn more:

[defeatdd.org/blog/diarrhea-solutions-20](https://defeatdd.org/blog/diarrhea-solutions-20)

### Diarrhea Innovations

**Group:** [defeatdd.org/other/diarrhea-innovations-group](https://defeatdd.org/other/diarrhea-innovations-group)



Advances in epidemiological data and research methods are opening new doors to develop treatments against top causes of moderate-to-severe diarrhea, such as *Cryptosporidium* and cholera. Additionally, research on the gut microbiome, immune system, and gut dysfunction barrier present promising opportunities to test and develop new interventions to prevent and/or reverse stunting.

PART THREE

# What's Next?

No child should die from diarrhea or suffer its lasting consequences. We can stop the cycle of poor health and poverty for children, their families, and entire communities by taking on diarrhea with an integrated approach.





## It's time for you to join the movement.

Solutions to address diarrhea exist. We know what it takes. Some countries are already taking action, but even greater progress can be made by putting solutions together in an integrated approach.

## We've made progress. But we can't stop now.

The hard work of advocates, health workers, scientists, donors, and policymakers means that deaths from diarrhea are decreasing. Still, too many children get sick and face the long-term consequences of diarrhea.

Governments, donor countries, and global health agencies are juggling competing priorities. But if complacency takes over and we continue to ignore the physical and mental impacts of persistent diarrhea, millions of children will fail to reach their full potential.

## Current levels of awareness and attention do not match the scope of the problem.

By increasing awareness, making proven solutions widely available to everyone who needs them, and working to re-establish diarrheal disease and its long-term impacts as priorities, we can save and improve the lives of children around the world.

## The movement has already begun.

Globally, advocates—including donors and policymakers—are already taking clear and bold actions to move the issue of diarrheal disease up on global and national health agendas.

“

*We are not settling for lower mortality. We must hold policymakers accountable for protecting children from illness too—especially in the poorest and most remote communities. Equity is essential.*

— Helga Fogstad,  
Executive Director, The  
Partnership for Maternal,  
Newborn & Child Health  
(PMNCH)



## Let's talk about it.

In many places, people don't want to talk about diarrhea—it's a taboo topic. If people do not want to talk about it, how can we get them to act on it? DefeatDD is trying to change the dialogue by turning taboo into action.<sup>175</sup>

# Who is a diarrheal disease advocate?

YOU are. Whether you're a nongovernmental (NGO) or civil society organization (CSO) staffer, a health care worker, a doctor, a parent, a researcher, or an academic, you can help bring more attention and urgency to diarrheal disease. Below are some examples of how advocates are already shining a spotlight on the issue. No matter who you are, you can take action.



## If you are an advocate, you can:

- **Inform policies related to diarrhea and child health, and hold policymakers accountable for implementing them.** If you know what works to defeat diarrhea in your community, contribute to development, revision, and passage of national and subnational policies to include global best practices for diarrhea prevention and control. Once policies and plans are in place, you can hold leaders and policymakers accountable by ensuring that solutions reach communities and that budgets are allocated and correctly spent.
- **Call for increased budgets for diarrheal disease solutions and programs.** Solutions for diarrhea are simple and cost-effective, but they require resources, which are often ignored or under-funded when health budgets are developed. You can call for funding for an integrated set of solutions to address diarrhea.
- **Bring the issue of diarrhea to greater public awareness.** Greater visibility for diarrhea can lead to more widespread delivery of solutions. Bringing attention to the consequences of and solutions for diarrhea can help get prevention and treatment interventions to families and children who need them. Advocates around the world are using radio, social media, and their own voices to spread the word.
- **Use and generate data to inform research and funding decisions.** The data supporting a need for diarrhea solutions are strong—so if you're talking about diarrhea, facts and figures should be part of your messaging. If you're an academic, scientist, or researcher, you have a special role to play in conducting and championing research on both the long-term consequences of diarrhea and innovative solutions to address it.
- **Collaborate with partners to encourage an integrated approach.** If you're a health professional or a civil society representative, you can join with others in a partnership or coalition effort to support and implement proven, integrated solutions against diarrhea.



## Here are some successes already underway:

- In the US, advocates and policymakers have worked to pass legislation that provides momentum for solutions to address diarrhea.<sup>176</sup>
- In Malawi, a policy analysis recommended steps to re-prioritize diarrheal disease control and increase funding.<sup>177</sup>
- In Zambia, a coalition succeeded in including diarrheal disease interventions in newborn health policy.<sup>178</sup>

## If you are a donor, you can:

- **Increase financial support for adaptable, integrated diarrheal disease programs and research.** Your financial support to innovative funding mechanisms that support diarrhea control—such as the Global Financing Facility—can save countless children's lives and ensure their futures. More technical and funding support for countries that are developing national plans, adopting the GAPPD and Integrated Management of Childhood Illnesses (IMCI) as part of their national child survival commitment, and/or addressing diarrhea through integrated solutions is critical for continued progress.
- **Provide resources for programs and research that feature innovative ways to deliver integrated approaches in cost-effective ways.** As a donor, you can ensure more solutions reach larger populations by incentivizing, funding, and measuring flexible approaches that combine and deliver the most-needed solutions. Specifically, include requirements in your calls/requests for proposals that prioritize programs implementing the GAPPD approach.



### Here are some successes already underway:

- The Global Financing Facility, which supports the Every Woman Every Child initiative, is a new funding mechanism that prioritizes country plans for addressing a range of child health issues, including diarrhea and pneumonia.<sup>179,180</sup>

## If you are a multilateral leader (especially WHO and UNICEF), you can:

- **Champion best practices and global guidance for an integrated approach to diarrhea, especially the GAPPD.** You provide technical assistance to donors and national governments to implement the plans and guidance that already exists, including the integrated approach outlined in the GAPPD. Harness the strength of regional and national program staff to work with member countries on effective implementation of global and national strategies for diarrhea control.
- **Work with donors to allocate and track funding that promotes global best practices and recommendations.** Improve the tracking of cross-sectoral investments to better understand return on investment and enable stronger accountability.
- **Provide guidance to national and subnational governments to ensure interventions focus on high-impact solutions.** Serve as an advocate for regular policy updates that incorporate global best practices and recommendations.
- **Procure high-quality commodities and tools to improve access and accountability to proven treatment solutions and vaccines.** Ensure efficient prequalification of relevant, high-quality, effective interventions—especially those locally manufactured—to lower costs and ensure that WHO-approved commodities are available to all children.



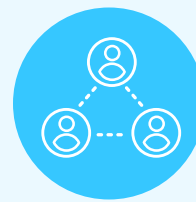
### Here are some successes already underway:

- WHO and UNICEF set the gold standard and roadmap for integration by launching the GAPPD.<sup>181</sup>



## If you are a national or subnational government decision-maker, you can:

- **Adapt global standards on diarrheal disease and integration to your local policy and programmatic needs.** Global guidance exists, so adapting those best practices to your local context can help to increase the effectiveness of programs and policies. Use the GAPPD and IMCI to determine what specific plans, investments, and partners are needed at the national and subnational level to achieve the greatest health impact.
- **Prioritize the fight against diarrhea through integrated policies and increased domestic and partner resource mobilization.** Prioritizing more domestic funding demonstrates greater commitment to improving child health. Ensure that integrated diarrheal disease solutions are included in Global Financing Facility Country Investment Case frameworks as well as other funding mechanisms.
- **Encourage and incentivize cross-sectoral action and collaboration to bring integrated solutions to all communities.** All too often, WASH, health programs, and departments are segmented into silos—creating barriers to reaching a common goal of addressing diarrheal disease. Creating linkages can help to promote an integrated approach.



### Here are some successes already underway:

- In Vietnam, health officials worked with policy advocates and program experts to revise national guidelines that could impact diarrheal disease programs on the ground.<sup>182</sup>
- India used the GAPPD framework to establish the India Integrated Action Plan for Prevention and Control of Pneumonia and Diarrhoea (IAPPD) and targeted implementation in 184 districts in 29 states with high childhood mortality rates.<sup>183</sup>
- The Kenyan government made zinc available to more parents and caregivers by reclassifying it as an over-the-counter treatment for diarrhea.<sup>184</sup>

## No matter who you are, you can be an advocate. Join the movement.

Learn more and help us tell policymakers and influencers that, together, we can defeat diarrheal disease.

Follow DefeatDD on Twitter (@DefeatDD) (join the conversation using the hashtag #DefeatDD) and Facebook (facebook.com/DefeatDD/).

Together we can **Stop the Cycle.**

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