



TOWARD A HEALTHY FUTURE

WORKING TOGETHER TO END NEGLECTED
TROPICAL DISEASES AND MALNUTRITION

OCTOBER 2014

SABIN VACCINE INSTITUTE

The Sabin Vaccine Institute's mission is to reduce needless human suffering from vaccine-preventable and neglected tropical diseases by developing new vaccines, advocating for increased use of existing vaccines, and promoting expanded access to affordable medical treatments.

THE GLOBAL NETWORK FOR NEGLECTED TROPICAL DISEASES

The Global Network for Neglected Tropical Diseases is an advocacy initiative of the Sabin Vaccine Institute that works in partnership with international agencies, governments, academic institutions, corporations, non-governmental development organizations and the general public to raise the awareness, political will and funding necessary to control and eliminate the seven most common neglected tropical diseases (NTDs) by 2020.

"Toward a Healthy Future" is endorsed by:

ACTION


Partnership for Treating and Preventing Intestinal Worms
Children Without Worms

THE EARTH INSTITUTE
COLUMBIA UNIVERSITY

effect:hope
The Leprosy Mission Canada



THE **END** FUND | ENDING NEGLECTED DISEASES

Evidence
Action

 **gain**
Global Alliance for Improved Nutrition

GLOBAL HEALTH ADVOCATES




Helen Keller
INTERNATIONAL

Johnson & Johnson

 **Micronutrient Initiative**

RESULTS
the power to end poverty

SABIN
FOUNDATION EUROPE

SCI
Schistosomiasis Control Initiative

 **vitamin angels**

WASH water sanitation hygiene
ADVOCATES for everyone

 **WaterAid**

 **THE WORLD BANK**
IBRD • IDA | WORLD BANK GROUP

WFP
 **World Food Programme**
wfp.org

World Vision



TOWARD A HEALTHY FUTURE: WORKING TOGETHER TO END NEGLECTED TROPICAL DISEASES AND MALNUTRITION POLICY BRIEF



Executive Summary	6
Introduction	9
The Impact of NTDs on Nutrition	10
A High-Impact Intervention: Deworming for Better Health and Nutrition	12
Opportunities for Action	15
Linking Policy for Scale and Impact	19
Call to Action: The Path Toward a Healthy Future	22

Executive Summary

All of the 34 countries carrying the highest levels of malnutrition are endemic for neglected tropical diseases (NTDs). In fact, ten of these countries make up 90 percent of the global NTD burden. Not only do several of these diseases hinder childhood growth and development, but they also cause, aggravate and intensify the loss of key nutrients, especially Vitamin A and iron, and result in adverse pregnancy outcomes.

The international development community has the opportunity to act now to focus new energy toward eliminating the policy, program and resource gaps that hinder existing efforts to meet global goals to end both NTDs and malnutrition. Simply put, NTDs stand in the way of improved health and nutrition, making it essential for the development community to embrace a coordinated, integrated response to address both problems. Given the strong momentum behind the fight to end NTDs and the growing unified movement to end malnutrition, now is a propitious time to identify synergies in policies, leverage delivery platforms and foster greater collaboration across sectors to deliver high-impact health and nutrition solutions to those still locked in poverty.

- All of the countries with the highest levels of malnutrition are also endemic for neglected tropical diseases
- Malnutrition causes and is aggravated by NTDs
- Integrated policies and advocacy are crucial to improving outcomes for both

This brief explores the relationship between, and opportunity to address, two types of NTDs — intestinal worm infections and schistosomiasis — and malnutrition. It makes the case for international development partners to scale up deworming treatments alongside efforts to improve nutrition and other determinants of health as a way to reach more people in need and ensure lasting impact. In this brief, we call on international policymakers and development partners to:

- ✓ Recognize the joint impact of NTDs and malnutrition and the benefits of addressing them in tandem.
- ✓ Expand access to routine deworming treatments for all populations at risk.



- ✓ Include deworming in strategies that aim to improve health and nutrition outcomes for mothers and children.
- ✓ Increase resources and link policies that facilitate joint programming and partnerships.
- ✓ Ensure lasting success by simultaneously investing in water, sanitation and hygiene (WASH) and other social determinants of health
- ✓ Mobilize greater political and financial support for tackling NTDs and malnutrition during international and regional fora.

Like the nutrition movement, the NTD community is a diverse group of advocates, health experts, policymakers, industry partners and donors. Interventions that advance the 2020 NTD control and elimination targets set by the World Health Organization — including deworming for intestinal worm infections and schistosomiasis — will reduce malnutrition in children and expectant mothers. While some joint initiatives are underway and have demonstrated success, ample opportunities remain for policymakers, partners and global health and development organizations to identify opportunities to coordinate policies, programs and resources to eliminate the remaining gaps between health and nutrition.

Capitalizing on the combined resources of the NTD and nutrition communities will advance global development goals, but integrated approaches with other groups, including those in the WASH sector, will also be needed to accelerate and sustain progress towards reducing poverty and inequality.

[See page 22 for the Call to Action.](#)

Introduction

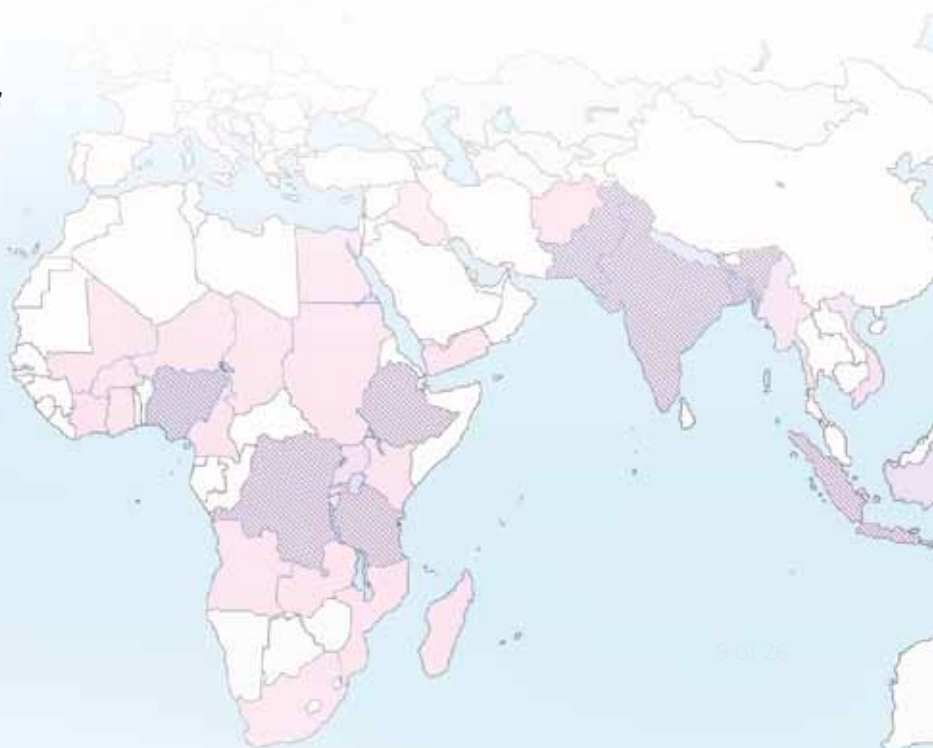
Efforts to end neglected tropical diseases (NTDs) and malnutrition should be tackled through integrated programs and policies as a way to reach more people in need and advance global health and development goals.¹

Today, more than 1.4 billion people living in Africa, the Americas and Asia are affected by at least one of the 17 NTDs listed by the World Health Organization (WHO).² These infections can cause impaired childhood growth and development, poor pregnancy outcomes, blindness and crippling physical disfigurements, and they increase the likelihood of contracting HIV, thwarting opportunities for social progress and economic growth. NTDs persist in communities that do not have access to clean water, proper sanitation and adequate healthcare. And, they overlap geographically with populations who are at the greatest risk for malnutrition.

It is no coincidence that all 34 countries carrying the highest levels of malnutrition are endemic for NTDs. These nations not only display alarming levels of malnutrition and are home to 90 percent of the world's stunted children, but ten of them account for 90 percent of the global NTD burden. A prime example of this overlap exists in India, which has more people suffering from NTDs than in any other country in the world as well as the highest number of stunted and wasted children under the age of five.^{3,4,5}

10 of the 34 countries with the highest levels of malnutrition account for 90% of the world's NTD burden.

Afghanistan	Guatemala	Nigeria
Angola	Kenya	Pakistan
Bangladesh	India	Philippines
Burkina Faso	Indonesia	Rwanda
Cameroon	Iraq	South Africa
Côte d'Ivoire	Madagascar	Sudan
Chad	Malawi	Tanzania
Democratic Republic of Congo	Mali	Uganda
Egypt	Mozambique	Vietnam
Ethiopia	Myanmar	Yemen
Ghana	Nepal	Zambia
	Niger	



The Impact of NTDs on Nutrition

Approximately 805 million people worldwide suffer from undernutrition — a consequence of poor nutrient intake due to lack of food or the body’s inability to absorb nutrients.⁶ There is a growing body of evidence showing that poor nutrient intake may increase susceptibility to parasitic diseases and together, this combination exacerbates stunting (chronic malnutrition), wasting (acute malnutrition) and the loss of nutrients. Additionally, concurrent parasitic infections have detrimental effects on health and development, further fueling a destructive cycle of malnutrition and infection.⁷

Two types of NTDs cause and perpetuate malnutrition: intestinal worm infections — also known as soil-transmitted helminths (STH) — and schistosomiasis, a waterborne parasitic disease. These diseases contribute to stunting and wasting as well as the loss of Vitamin A and iron — two of the three most detrimental micronutrient deficiencies that represent a major threat for maternal, newborn and child health.

A Diminished Future: Delayed Childhood Growth and Development

Intestinal worms — specifically hookworm, whipworm and roundworm — and schistosomiasis are among the underlying causes of stunting.^{8, 9, 10} A study in Peru demonstrated that 7–14 months-old children burdened by intestinal worms were 84 percent more likely to be stunted. Infections appeared in children as young as 8 months of age, a time when infants start to become more active and mobile.¹¹ Infants and young children are often exposed to NTD-contaminated soil and water during everyday activities like eating, playing and bathing, highlighting the importance of improving water, sanitation and hygiene (WASH) alongside treatment efforts.

Another study revealed substantially greater odds of stunting, wasting and anemia among Kenyan children (between the ages of 5 and 18) who were often coinfecting with a combination of schistosomiasis, hookworm, or malaria.¹² Children suffering from these infections face significant growth deficits, cognitive delays and impaired learning ability. For instance, it has been shown that children infected with whipworm are approximately 4.5 times more likely to perform poorly in tests of verbal fluency.¹³

TWO TYPES OF NTDs THAT CAUSE AND PERPETUATE MALNUTRITION:

Intestinal worm infections Schistosomiasis

WHAT MAKES THEM SO HARMFUL:

They lead to stunting and wasting, as well as the loss of Vitamin A and iron — two of the three most detrimental micronutrient deficiencies that represent a major threat for maternal, newborn and child health.

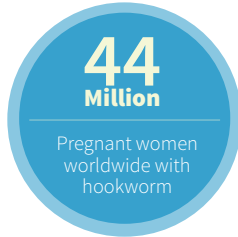
A Competition for Nutrients: Vitamin A

Roundworm, one of the most prevalent intestinal worm infections, has serious health and developmental consequences for growing children. Roundworms live in the intestinal tracks of children and rob them of Vitamin A, a micronutrient that is critical for immune function and proper growth.¹⁴ Vitamin A deficiency is a leading cause of child mortality and can have devastating impacts, especially for children under the age of 5, and may result in permanent blindness.¹⁵ Roundworms compete with children for Vitamin A and, as a result, children living with worms absorb less Vitamin A even after receiving oral supplementation.¹⁶ A study in Nepal, where Vitamin A deficiency and intestinal worms are both prevalent, showed that a serious eye disease leading to blindness, xerophthalmia, was found more commonly in children with roundworm.^{17,18}

Iron Loss and Anemia

Considering the role that hookworm infections and schistosomiasis play in contributing to blood and iron loss, it is no surprise that they are among the leading causes of anemia worldwide. Prevalence of anemia, including iron-deficiency anemia, is consistently higher among populations with low socioeconomic status, especially in young children and women.¹⁹

These infections can have serious consequences for women of child-bearing age, who need iron and other nutrients before and during pregnancy to ensure that their babies have proper nutrition from the start. In pregnant women, hookworm and schistosomiasis exacerbate the loss of iron during pregnancy, increasing the likelihood



of delivering low birthweight newborns that face a higher risk of mortality. Furthermore, they multiply blood loss during birth, contributing to hemorrhage,^{20, 21, 22} a leading cause of maternal death.²³ An estimated 44 million pregnant women worldwide are infected with hookworm at any given time, including up to one-third of all pregnant women in sub-Saharan Africa. Schistosomiasis alone affects 10 million pregnant women in Africa, which carries about 90 percent of the global schistosomiasis burden.²⁴

It is equally important to recognize the geographic overlap of these NTDs and malaria in sub-Saharan Africa.^{25, 26} Results from a study in Kenya show that severely anemic boys were more likely to be infected by both hookworm and malaria, indicating the need for, and potential benefit from, an integrated approach to malaria and deworming interventions.²⁷ Such integrated approaches could help prevent and mitigate the potential damage of people harboring more than one parasite.

A High-Impact Intervention

Deworming for Better Health and Nutrition

The evidence linking intestinal worms and schistosomiasis to malnutrition underscores the importance of expanding access to interventions that simultaneously address these development challenges.

The WHO recognizes that in addition to ridding people of parasites, deworming can help affect positive health and nutrition outcomes among populations at risk including during pregnancy, childhood and adulthood.^{28, 29} The world's top economists emphasized this point in the 2008 Copenhagen Consensus and again in 2012, ranking deworming for preschool-aged and school-aged children as one of the most cost-

effective investments for policymakers. They highlighted how deworming, especially when bundled with micronutrient supplementations, can help achieve greater educational and economic outcomes, in addition to improved health and nutrition. In their analysis, these experts also recognized the benefits of treating other populations at risk, including pregnant women.^{30,31}

Additionally, *The Lancet's* research on maternal and child nutrition in 2008 and 2013 has called attention to the importance of delivering nutrition-specific interventions, including deworming, during critical times in life. For instance, *The Lancet* points to the evidence demonstrating how deworming children can lead to reduced anemia and increased weight gain.³²

The Profound Impact of NTD Treatment on Nutritional Status

Because NTDs can impact nutritional status at any point of life — including during pregnancy, childhood and adulthood — it is essential that populations living in endemic areas receive routine deworming treatment, the results of which are compelling.



EARLY LIFE

Studies confirm that deworming can support optimal growth early in life, ages 1-4:

- ✓ Grow taller
- ✓ Gain more weight
- ✓ Better appetite
- ✓ Improved motor and language development
- ✓ Reduced anemia, malnutrition, and stunting



SCHOOL AGE

The advantages of deworming for the health of school-aged children are meaningful as well:

- ✓ Increased educational outcomes
- ✓ Improved cognitive development
- ✓ Better appetite
- ✓ Improved physical fitness
- ✓ Reduced malnutrition



ADULTHOOD

In adults, including women of child-bearing age and pregnant women, deworming treatment has led to positive health benefits:

- ✓ Improved worker productivity and potential for greater wage earnings
- ✓ Reduced maternal anemia
- ✓ Reduced malnutrition
- ✓ Improved infant birth-weight
- ✓ Higher child survival rates

The first 1,000 days of life represent a critical time between the start of a woman's pregnancy and a child's second birthday when proper nutrition can have the greatest impact on physical growth and cognitive development. Deworming is proven to be most impactful to children over the age of 24 months, however this intervention can still help bolster efforts to ensure optimal growth early in life.

Because NTDs can impact nutritional status at any point of life — including during pregnancy, childhood and adulthood — it is essential that populations living in endemic areas receive routine deworming treatment. And, the results of deworming are compelling:

- In adults, including women of child-bearing age and pregnant women, deworming treatment has shown reduced malnutrition and maternal anemia, improved worker productivity and potential for greater wage earnings. Treatment also helps improve infant birthweight and higher child survival rates.³³
- While deworming has a limited impact on linear growth during the first 1,000 days, some studies show that children who were dewormed between the ages of 1 and 4 (preschool-aged children) gained more weight, grew taller, displayed improved appetite and in some cases, reduced prevalence of stunting.^{34,35} Additionally, treating preschool-aged children is associated with improved motor and language development, reduced anemia and malnutrition.
- The advantages for school-aged children include improved educational outcomes, cognitive development, physical fitness and appetite, and reduced malnutrition.^{36,37} A study in Kenya demonstrated that treating children for intestinal worms reduced school absenteeism by at least 25 percent.³⁸

In short, the consequence of leaving NTDs untreated stifles opportunities for people to grow into their full potential, highlighting the advantages of integrated approaches and potential for greater impact.

Opportunities for Action

Key findings from the 2013 *Lancet* series emphasized the importance of identifying a range of channels and delivery strategies to reach more people in need, including community-based platforms that could lead to the potential integration of nutrition with maternal, newborn and child health interventions to reduce health inequality.

Expanding Access to Treatments is Critical

Linking delivery of NTD treatments with schools and other community-based platforms offers an obvious, cost-effective way to expand coverage to those in need. The NTD community already promotes the use of existing solutions like mass drug administration (MDA). Through this integrated approach, a bundled packet of NTD treatments can be delivered through schools and by community health workers. MDA leverages treatment donations from pharmaceutical companies, limiting annual costs to distribution, training, education and monitoring, reducing the cost of treatment to approximately 50 cents per person each year.

Despite the fact that pharmaceutical companies donate many NTD treatments, there is a US \$220 million annual funding gap that stands in the way of controlling and eliminating the most common NTDs by 2020, which includes extremely large coverage gaps for intestinal worms and schistosomiasis.³⁹ Globally, regular deworming treatments are needed by more than 870 million children⁴⁰ at risk for intestinal worm infections⁴¹ and another 240 million people, including pregnant women,⁴² who are afflicted by schistosomiasis.⁴³

Why Integration Makes Sense

The links between these NTDs and growth deficits, Vitamin A depletion, iron loss and anemia make a clear case for bundling deworming, wherever needed, alongside nutrition interventions like micronutrient supplementation. More needs to be done to document the benefits of joint delivery of these treatments and because NTDs both cause and worsen malnutrition,⁴⁴ it is clear that joint programming has the potential to accelerate impact. A number of studies show the success in combining deworming and nutrition efforts and highlight opportunities to replicate this approach in the future.

A Snapshot of Success

A number of multilateral organizations, governments, NGOs and endemic countries are implementing programs that deliver treatments for intestinal worms and schistosomiasis alongside other nutrition and health interventions, effectively leveraging policies and delivery strategies. The following examples offer a snapshot of how this has worked in practice.

UNICEF and the World Food Programme (WFP) implement large-scale programs that integrate a package of health interventions, such as nutritional supplements, Vitamin A, deworming and vaccinations.

Schools and communities are cornerstones for NTD treatment. Through **the National Healthy Schools program, Honduras** treated more than one million school-aged children in 2012 for intestinal worms, reaching more than 60 percent of the children who were at risk.⁴⁵ Through the Focusing Resources on Effective School Health (FRESH) framework, the World Bank and other partners have made deworming and iron and other micronutrient supplementation an integral component of school health programs.⁴⁶ Save the Children, for example, uses the FRESH framework as a model for its School Health and Nutrition programs that expand access to treatments for both intestinal worms and schistosomiasis; support micronutrient supplementation and malaria control; and increase access to WASH in schools.⁴⁷



Vietnam

A study in Vietnam revealed that regular pre-pregnancy deworming and weekly iron-folic acid supplementation reduced the prevalence of low birthweight infants by 40 percent.⁴⁸



India

Preschool-aged children in India who received deworming treatments and vitamin A supplements exhibited a 35 percent greater weight gain, equivalent to an extra two pounds over two years.⁵⁰



Nepal

Infant mortality rates fell by 41 percent after pregnant women in Nepal who received micronutrient supplements and deworming treatments (after the first trimester).⁴⁹



Uganda

A review of a child health program in Uganda that delivered deworming treatments alongside nutrition interventions revealed increased weight gain by approximately five percent and ten percent above the expected amounts, when treatment was given annually and biannually, respectively, among children 1 to 7 years old.⁵¹

Similarly, NGOs like **Helen Keller International** have supported deworming in preschool-aged children, school-aged children and pregnant women through large Vitamin A supplementation campaigns, school health and nutrition programs, and anemia control initiatives.⁵²

The **Micronutrient Initiative**, through support to Ministries of Health and their partners, ensures that wherever Vitamin A supplementation is being provided to preschool children, deworming is also included as part of an essential package of interventions, especially during Child Health Days and other public health campaigns.⁵³

To advance its commitment to maternal and child health, **the Canadian government** has supported expanded health and nutrition programs, which incorporates micronutrient supplementation, deworming and screening for acute malnutrition. In Ethiopia, their support provided 1.5 million children under the age of 5 with Vitamin A supplementation and deworming treatments during Community Health Days.⁵⁴

Vaccination Week in the Americas (VWA), a platform that delivers critical interventions such as deworming, Vitamin A supplementation and health education, has been institutionalized by many countries in the **Latin America and Caribbean region**.

Additionally, **Guatemala's** national NTD plan is directly linked to the country's Zero Hunger Plan, which strengthens policies and expands the benefits of these programs to more children in need.

India has adopted a comprehensive approach in its **National Iron+ Initiative**, which delivers deworming alongside iron supplementation as part of its broader effort to address anemia across all key age groups.⁵⁵

Amplifying the Impact: Cross-Sectoral Interventions

In addition to scaling up deworming through MDA and leveraging successful delivery platforms, international development partners can make an even greater difference in the long-term by supplementing these efforts with investments in WASH.

There are clear connections between NTDs, malnutrition and lack of access to clean water, adequate sanitation and proper hygiene. This complex relationship puts a spotlight on the need to simultaneously make improvements in these areas. Poor WASH conditions are well-known contributing factors to the spread of NTDs and other diseases like diarrhea, which is one of the leading causes of acute malnutrition and child mortality.



Key WASH interventions can complement and support the sustainability of progress made in disease control and reduction of malnutrition. Infants and young children who consume liquid and food supplements mixed with water contaminated by roundworm are at risk. It has been shown that children living in urban slums with poor sanitation facilities in India have significantly lower levels of roundworm when breastfed exclusively, because of limited exposure to contaminated water.⁵⁶

A comprehensive program to improve WASH conditions in schools in Kenya, for example, resulted in a nearly 50 percent reduction in diarrheal illness.⁵⁷ In the same way, increased use of latrines, regular hand-washing and adequate water supply infrastructure — all interventions that address underlying causes of disease and malnutrition — are associated with reduced risk of intestinal worm and schistosomiasis infections. In a review of 144 studies, researchers found that on average, following the installation of improved water and/or sanitation facilities, the prevalence of roundworm in that community decreased by 29 percent and the prevalence of schistosomiasis decreased by as much as 77 percent.⁵⁸ Looking ahead, there is a clear opportunity to build on these linkages by identifying best practices to set the stage for more collaborative, comprehensive programming.

Linking Policy for Scale and Impact

Linking policies, strategies and resources will enable greater opportunity for partnership and joint programming to reach more people in need of both NTD treatment and nutrition interventions.

The United Nations High-Level Panel report on the post-2015 development agenda stresses the importance of partnerships between health, nutrition and other sectors to ensure that development initiatives are inclusive and reach all populations in need. Currently, both NTDs and malnutrition are included as targets in the framework that will be used to guide the final phase of the discussions on the post-2015 agenda. Endorsed by the international community, roadmaps like the London Declaration on NTDs (London Declaration) and the Global Nutrition for Growth Compact lay out the critical steps needed to reach global NTD and nutrition goals. In order to achieve success, policymakers and partners should intensify efforts to work together to strengthen sustained coordination and collaboration.

The 2012 London Declaration triggered the growing momentum to control, eliminate or eradicate the ten most common NTDs by 2020 – the goal set by the WHO. Public and private partners from across the globe including 13 pharmaceutical companies, the United States, United Kingdom and United Arab Emirates, the Bill & Melinda Gates Foundation and the World Bank, among others, pledged to provide more than US \$785 million to support research and development and strengthen drug distribution and implementation programs to accelerate progress towards the 2020 goal.⁵⁹

A newly formed partnership by new and longstanding London Declaration partners highlights the increased momentum for integrated approaches and a model for future collaboration. Announced in April 2014, the STH Coalition aims to scale up deworming programs and facilitate efforts to prevent reinfection by coordinating with the WASH and nutrition communities. Vitamin Angels, for example, will help increase coordinated deworming treatments and Vitamin A supplements for preschool-aged children.⁶⁰ Building on its longstanding commitment to scientific and philanthropic collaboration, Johnson & Johnson (J&J) has pledged to donate 200 million doses Vermox® (mebendazole) per year through 2020. J&J is working together with London Declaration and STH Coalition partners to harness collective resources and expertise to chart a new course toward health and sustainability among the world's poorest communities.

Parallel to the fight against NTDs is a strong coalition of partners dedicated to ending malnutrition in accordance with the 2025 goals set by the World Health Assembly. Through the 2013 Global Nutrition for Growth Compact, businesses, NGOs, country governments and donor governments agreed to work towards reaching the following targets:

- Prevent at least 20 million children from being stunted
- Save at least 1.7 million lives
- Ensure that at least 500 million pregnant women and children under 2 receive nutrition interventions

Many public and private sector partners have signed onto both of these key frameworks. GlaxoSmithKline (GSK), for example, pledged to donate up to 400 million albendazole treatments per year to treat school-aged children for intestinal worms. GSK called attention to this commitment in the 2013 Global Nutrition for Growth Compact, noting that worm infections contribute to malnutrition and hamper child development. As part of the STH Coalition partnership, the WFP will ensure that deworming is provided to millions of children as part of its school feeding programs, and the Children's

Investment Fund Foundation will fund technical assistance to country-led deworming programs.

Several G7/8, G20 and other global policymakers have also made commitments to address NTDs and malnutrition, including senior government officials from Australia, France, Germany, Japan, the United States and United Kingdom. Likewise, endemic countries have started to prioritize efforts against NTDs and malnutrition among their health development needs. More than 70 NTD-endemic countries have established national plans to control and eliminate NTDs, with strong technical support

World Health Assembly 2025 Global Nutrition Targets

- Reduce by 40 per cent the number of children under 5 who are stunted
- Achieve a 50 per cent reduction in the rate of anemia in women of reproductive age
- Achieve a 30 per cent reduction in the rate of infants born with low birth weight
- Ensure that there is no increase in the rate of children who are overweight
- Increase to at least 50 per cent the rate of exclusive breastfeeding in the first six months
- Reduce and maintain childhood wasting to less than 5 per cent

from the WHO. A number of these countries also signed onto the Scaling Up Nutrition movement and signed onto the Global Nutrition for Growth Compact, including Burkina Faso, Democratic Republic of the Congo, Guatemala, Indonesia and Nigeria, among others.

While many development partners are leveraging policies to advance global NTD and malnutrition goals, more needs to be done to collaborate across sectors and strengthen these efforts. A new report from the NTD community highlights a US \$220 million annual funding gap that stands in the way of reaching the WHO 2020 goals. While these estimates include needs for multiple NTDs, there are extremely large coverage gaps that remain for intestinal worms and schistosomiasis.⁶¹

CALL TO ACTION

The Path Toward a Healthy Future

WORKING TOGETHER TO END NEGLECTED TROPICAL DISEASES AND MALNUTRITION

The international development community has the opportunity to act now to focus new energy toward eliminating the policy, program and resource gaps that hinder existing efforts to meet global goals to end both NTDs and malnutrition. To accelerate these efforts, the following actions are recommended:

Recognize the joint impact of NTDs and malnutrition and the benefits of addressing them in tandem.

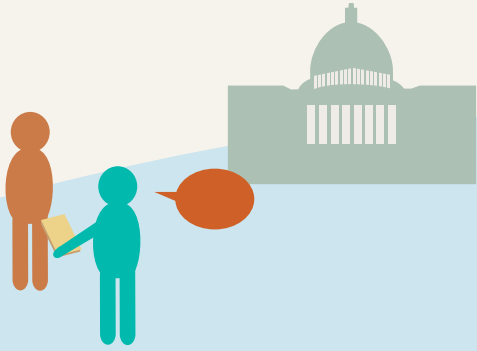
Intestinal worm infections and schistosomiasis are underlying causes of stunting, wasting and the loss of nutrients. Poor nutrient intake can increase susceptibility to parasitic diseases and taken together, the combined effects of NTDs and malnutrition further intensify the cycle of disease, malnutrition, poverty and inequality. These linkages underscore the importance of including NTDs in strategies that aim to improve nutrition.

Expand access to routine deworming treatments for all at-risk populations.

This includes deworming for preschool-aged and school-aged children, women of childbearing age and pregnant women. NTDs result in long-term health consequences and represent a major obstacle to improved educational outcomes, social progress and economic growth. It is critical to scale up access to deworming treatments by expanding existing programs; leveraging infrastructure such as schools and community-based platforms; and utilizing proven, cost-effective approaches such as mass drug administration.

Include deworming in strategies that aim to improve health and nutrition outcomes for mothers and children.

Not only do treatments for intestinal worm infections and schistosomiasis rid people of parasites, they also strengthen efforts to address child and maternal malnutrition and other problems that undercut development. Scaling up deworming alongside nutrition interventions, such as Vitamin A and iron supplementation, has shown promising results including reduced anemia, lower child mortality, improved child growth and development, and overall improved nutrition.



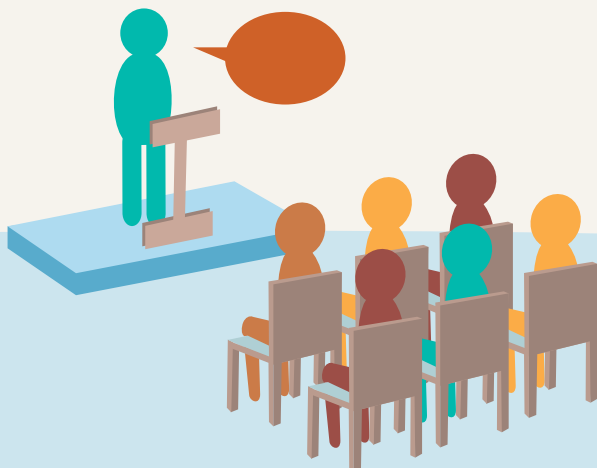
Increase resources and link policies that facilitate joint programming and partnerships.

Endorsed by the international community, roadmaps like the London Declaration on NTDs and the Global Nutrition for Growth Compact lay out the critical steps needed to reach global objectives to counter NTDs and malnutrition. In order to achieve success, policymakers and partners need to rapidly work together to strengthen sustained coordination and collaboration. Equally important, endemic countries must also prioritize NTDs and identify opportunities for integrated approaches to maximize the reach and impact of their national health plans.



Ensure lasting success by simultaneously investing in water, sanitation and hygiene (WASH) and other social determinants of health.

Investments in WASH must go hand-in-hand with efforts to prevent and control NTDs and malnutrition, and vice versa. While it is critical to expand access to NTD treatments, key WASH interventions complement and help support the sustainability of progress made in disease control and reduction of malnutrition.



Mobilize greater political and financial support for tackling NTDs and malnutrition during international and regional fora.

Global nutrition conferences such as the 2nd International Conference on Nutrition, as well as G7/8 and G20 Summits and the post-2015 development dialogue present occasions to include NTDs and malnutrition in discussions, public communiques, declarations and accountability reports.

ENDNOTES

1. "Malnutrition" refers only to undernutrition in this brief, not overnutrition.
2. *Delivering on Promises and Driving Progress*. (2014). United to combat NTDs. Retrieved from <http://unitingtocombatntds.org/>
3. The Lancet. (2013). Maternal and child nutrition, executive summary of the lancet maternal and child nutrition services. *The Lancet*. Retrieved from <http://download.thelancet.com/flatcontentassets/pdfs/nutrition-eng.pdf>
4. The World Health Organization lists 10 countries that make up 90 percent of the global NTD burden: Bangladesh, Democratic Republic of the Congo, Ethiopia, India, Indonesia, Pakistan, Myanmar, Nigeria, Philippines and Tanzania. Preventive chemotherapy: planning, requesting medicines, and reporting. (2014). *Weekly Epidemiological Record*, 8, 61–72. Retrieved from <http://www.who.int/wer/2014/wer8908.pdf?ua=1>
5. World Health Organization. *Global database on childhood growth and malnutrition*. Retrieved from <http://www.who.int/nutgrowthdb/database/en/>
6. The latest FAO estimates indicate that global hunger reduction continues: About 805 million people are estimated to be chronically undernourished in 2012–14, down more than 100 million over the last decade, and 209 million lower than in 1990–92. *The State of Food Insecurity in the World 2014: Strengthening the enabling environment to improve food security and nutrition*. (2014) Retrieved from <http://www.fao.org/3/a-i4030e.pdf>.
7. Papier, K., Williams, G.M., Luceres-Catubiq, R., Ahmed, F., Olveda, R.M., McManus, D.P., . . . Chy, D. (2014). Childhood malnutrition and parasitic helminth interactions. *Clinical Infectious Diseases*, 59(2), 234-43. doi:10.1093/cid/ciu211
8. Gyorkos, T. W., Maheu-Giroux, M., Casapia, M., Joseph, S. A., & Creed-Kanashiro, H. (2011). Stunting and helminth infection in early preschool-age children in a resource-poor community in the Amazon lowlands of Peru. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 105(4), 204-8. doi:10.1016/j.trstmh.2010.12.003
9. Sanches, A.L., Gabrie, J.A., Usuanlele, M.T., Rueda, M.M., Canales, M., & Gyorkos, T.W. (2013). Soil-transmitted helminth infections and nutritional status in school-age children from rural communities in Honduras. *PLoS Neglected Tropical Diseases*, 7(8). doi:10.1371/journal.pntd.0002378
10. Papier, K, et al. (2014). Childhood malnutrition and parasitic helminth interactions.
11. Gyorkos, T.W., Maheu-Giroux, M., Casapia, M., Joseph, S.A., & Creed-Kanashiro, H. (2011). Stunting and helminth infection in early preschool-age children in a resource-poor community in the Amazon lowlands of Peru.
12. Bustinduy, A.L., Parraga, I.M., Thomas, C.L., Mungai, P.L., Mutuku, F., Muchiri, E.M., . . . U.K. (2013). Impact of polyparasitic infections on anemia and undernutrition among Kenyan children living in a *Schistosoma haematobium*-endemic area. *American Journal of Tropical Medicine and Hygiene*, 88(3), 433-40. doi:10.4269/ajtmh.12-0552
13. Ezeamama, A.E., Friedman, J.F., Acosta, L.P., Bellinger, D.C., Langdon, G.C., Manalo, D.L., . . . Olveda, R.M. (2005). Helminth infection and cognitive impairment among Filipino children. *American Journal of Tropical Medicine and Hygiene*, 72(5), 540-8.
14. Rajagopal S, Hotez P.J., Bundy D.A.P. (2014). Micronutrient supplementation and deworming in children with geohelminth infections. *PLoS Neglected Tropical Diseases*, 8(8), e2920. Retrieved from [http://www.plosntds.org/article/ fetchObject.action?uri=info%3Adoi%2F10.1371%2Fjournal.pntd.0002920&representation=PDF](http://www.plosntds.org/article/fetchObject.action?uri=info%3Adoi%2F10.1371%2Fjournal.pntd.0002920&representation=PDF)



15. *Investing in the future: A united call to action on vitamin and mineral deficiencies*. (2009). Retrieved from http://www.unitedcalltoaction.org/documents/Investing_in_the_future.pdf
16. Mahalanabis, D., Jalan, K.N., Maitra, T.K., & Agarwal, S.K. (1976). Vitamin A absorption in ascariasis. *American Journal of Clinical Nutrition*, 29, 1372-1375. Retrieved from <http://ajcn.nutrition.org/content/29/12/1372.full.pdf>
17. Curtale F, Pokhrel R.P., Tilden R.L., Higashi G. (1995). Intestinal helminths and xerophthalmia in Nepal. A case-control study. *Journal of Tropical Pediatrics*, 41(6), 334-337. doi:10.1093/tropej/41.6.334
18. World Health Organization & Unicef. (2004). *How to add deworming to vitamin a distribution*. Retrieved from http://whqlibdoc.who.int/hq/2004/WHO_CDS_CPE_PVC_2004.11.pdf

19. Kassebaum, N.J., Jasrasaria, R., Naghavi, M., Wulf, S.K., Johns, N., Lozano, R., . . . Regan, M. (2014). A systematic analysis of global anemia burden from 1990 to 2010. *Blood*, 123(5), 615-24. doi:10.1182/blood-2013-06-508325
20. Hotez, P.J. (2009). Empowering women and improving female reproductive health through control of neglected tropical diseases. *PLoS Neglected Tropical Diseases*, 3(11), e559. Retrieved from <http://www.plosntds.org/article/fetchObject.action?uri=info%3Adoi%2F10.1371%2Fjournal.pntd.0000559&representation=PDF>
21. Friedman, J.F., Mital, P., Kanzaria, H.K., Olds, G.R., & Kurtis, J.D. (2007). Schistosomiasis and pregnancy. *Trends Parasitology*, 23(4), 159-64.



22. World Health Organization. (2013). *Sustaining the drive to overcome the global impact of neglected tropical diseases*. Retrieved from http://www.who.int/iris/bitstream/10665/77950/1/9789241564540_eng.pdf?ua=1
23. World Health Organization. (2014). Maternal mortality, fact-sheet 348. Retrieved from <http://www.who.int/mediacentre/factsheets/fs348/en/>
24. World Health Organization. (2013). *Sustaining the drive to overcome the global impact of neglected tropical diseases*.
25. Kinung'hi S., Magnussen P., Kaatano G., Kishamawe C., & Vennervald B. (2014). Malaria and helminth co-infections in school and preschool children: A cross-sectional study in Magu district, north-western Tanzania. *PLoS ONE*, 9(1), e86510. Retrieved from <http://www.plosone.org/article/fetchObject.action?uri=info%3Adoi%2F10.1371%2Fjournal.pone.0086510&representation=PDF>
26. Brooker S, Akhwale W, Pullan R, Estambale B, Clarke S.E., Snow R.W., Hotez P.J. (2007). Epidemiology of plasmodium-helminth co-infection in Africa: Populations at risk, potential impact on anemia, and prospects for combining control. *American Journal of Tropical Medicine and Hygiene*, 77(6), 88-98. Retrieved from http://www.ajtmh.org/content/77/6_Suppl/88.full.pdf+html
27. Bustinduy, A.L., Parraga, I.M., Thomas, C.L., Mungai, P.L., Mutuku, F., Muchiri, E.M., . . . U.K. (2013). Impact of polyparasitic infections on anemia and undernutrition among Kenyan children living in a *Schistosoma haematobium*-endemic area.
28. World Health Organization. (2006). Preventive chemotherapy in human helminthiasis. Coordinated use of anthelmintic drugs in control interventions: A manual for health professionals and program managers. Retrieved from http://whqlibdoc.who.int/publications/2006/9241547103_eng.pdf?ua=1
29. World Health Organization. E-Library of Evidence for Nutrition Actions. (2014). *Deworming to combat the health and nutritional impact of helminth infections*. Retrieved from <http://www.who.int/elena/titles/deworming/en/>.
30. Horton, S., Alderman, H., & Rivera, J.A. (2008). *Copenhagen Consensus 2008 Challenge Paper: Hunger and malnutrition*. Retrieved from http://www.copenhagenconsensus.com/sites/default/files/CP_Malnutrition_and_Hunger_-_Horton.pdf
31. Kydland F.E., Mundell R., Schelling T., Smith V., Stokey, N. (2012). *Copenhagen Consensus: Expert Panel Findings*. Retrieved from http://www.copenhagenconsensus.com/sites/default/files/outcome_document_updated_1105.pdf
32. Bhutta Z.A., Das J.K., Rizvi A., Gaffey M.F., Walker N., Horton S., Webb P. (2013) Evidence-based interventions for improvement of maternal and child nutrition: What can be done and at what cost? *Lancet* 382, 452-477. Retrieved from http://thousanddays.org/wp-content/uploads/2013/06/Nutrition2_p40_65.pdf.
33. Horton, S., Alderman, H., & Rivera, J.A. (2008). *Copenhagen Consensus 2008 Challenge Paper: Hunger and Malnutrition*.
34. Crompton, D.W.T., & Nesheim, M.C. (2002). Nutritional impact of intestinal helminthiasis during the human life cycle. *Annual Review of Nutrition*, 22, 35-59. doi:10.1146/annurev.nutr.22.120501.134539
35. Albonico M., Allen H., Chitsulo L., Engels D., Gabrielli A-F, Savoli, L. (2008). Controlling soil-transmitted helminthiasis in pre-school-age children through preventive chemotherapy. *PLoS Neglected Tropical Diseases*, 2(3), e126. Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2274864/>
36. Horton, S., Alderman, H., & Rivera, J.A. (2008). *Copenhagen Consensus 2008 Challenge Paper: Hunger and Malnutrition*.
37. Hoddinott, J., Rosegrant M., Torero, M. (2012). Copenhagen Consensus Center. *Copenhagen Consensus 2012 Challenge Paper: Hunger and Malnutrition: Investments to reduce hun-*

- ger and undernutrition. Retrieved from <http://www.copenhagen-consensus.com/sites/default/files/hungerandmalnutrition.pdf>
38. Miguel E, Kremer M (2004) Worms: Identifying impacts on education and health in the presence of treatment externalities. *Econometrica* 72: 159–217. Retrieved from http://cega.berkeley.edu/assets/cega_research_projects/1/Identifying-Impacts-on-Education-and-Health-in-the-Presence-of-Treatment-Externalities.pdf
 39. United to Combat NTDs. *Delivering on promises and driving progress*. (2014). Retrieved from <http://unitingtocombatntds.org/>
 40. This figure includes preschool age children (years 1-4) and school age children (years 5-14). Soil-transmitted helminthiasis: number of children treated in 2011. (2013). *Weekly Epidemiological Record*, 14, 145-152. Retrieved from <http://www.who.int/wer/2013/wer8814.pdf>
 41. World Health Organization. (2013). Soil-transmitted helminthiasis: Number of children treated in 2011. *Weekly epidemiological record*, 88, 145-152.
 42. Friedman, J.F., Mital, P., Kanzaria, H.K., Olds, G.R., & Kurtis, J.D. (2007). Schistosomiasis and pregnancy.
 43. The Second WHO Report on NTDs indicates least 237 million people at risk for schistosomiasis.
 44. Hall, A., Zhang, Y., MacArthur, C., & Baker, S. (2012). The role of nutrition in integrated programs to control neglected tropical diseases. *BMC Medicine*, 10(41). Retrieved from <http://www.biomedcentral.com/content/pdf/1741-7015-10-41.pdf>
 45. Global Network for Neglected Tropical Diseases. (2014). *Honduras: Leading the way in the Americas through integrated efforts to treat neglected tropical diseases*. Retrieved from: <http://www.globalnetwork.org/sites/default/files/Honduras%20Case%20Study%20ENG%20Final.pdf>
 46. World Health Organization. (2003). *School deworming: At a glance*. Retrieved from http://www.who.int/intestinal_worms/resources/en/at_a_glance.pdf?ua=1
 47. Save the Children. (2013). School health and nutrition in developing countries. Retrieved from: http://www.savethechildren.org/site/c.8rKLIXMGIpl4E/b.6196515/k.F65F/School_Health_and_Nutrition_in_Developing_Countries.htm
 48. Casey, G.J., Biggs, B.A., Cong, D.T., Phu, L.B., Phuc, T.Q., Carone, M., . . . Montresor, A. (2012). Increased birth weight associated with regular pre-pregnancy deworming and weekly iron-folic acid supplementation for Vietnamese women. *PLoS Neglected Tropical Diseases*, 6(4), e1608. Retrieved from <http://www.plosntds.org/article/fetchObject.action?uri=info%3Adoi%2F10.1371%2Fjournal.pntd.0001608&representation=PDF>
 49. Christian, P., Khatry, S.K., West, K.P. (2004). Antenatal anthelmintic treatment, birthweight, and infant survival in rural Nepal. *The Lancet*, 364(9438), 981-983. doi:10.1016/S0140-6736(04)17023-2
 50. Awasthi S., Peto R., Pande V.K., Fletcher R.H., Read S., Bundy D.A.P. (2008). Effects of de-worming on malnourished Pre-School Children in India: An Open-Labelled, Cluster-Randomized Trial. *PLoS Neglected Tropical Diseases*, 2(4), e223. Retrieved from <http://www.plosntds.org/article/fetchObject.action?uri=info%3Adoi%2F10.1371%2Fjournal.pntd.0000223&representation=PDF>
 51. Alderman, H., Konde-Lule, J., Sebuliba, I., Bundy, D., & Hall, A. (2006). Effect on weight gain of routinely giving albendazole to preschool children during child health days in Uganda: cluster randomised controlled trial. *British Medical Journal*, 333. Retrieved from <http://www.bmj.com/content/333/7559/122.full.pdf+html>
 52. Zhang, Y., Macarthur, C. (2010). *Helen Keller International Position Paper Control of Neglected Tropical Diseases*. Retrieved from http://www.hki.org/research/HKI_NTD_External_Position_Paper.pdf
 53. Micronutrient Initiative. (2014). Retrieved from <http://www.micronutrient.org/english/view.asp?x=1>
 54. Foreign Affairs, Trade and Development Canada. (2013). *Nutrition – Essential to improving and saving lives*. Retrieved from <http://www.acdi-cida.gc.ca/acdi-cida/acdi-cida.nsf/en/fra-4422402-563>
 55. National Rural Health Mission, Adolescent Division, Ministry of Health and Family Welfare, Government of India. *Guidelines for control of iron deficiency anaemia: National iron plus initiative*. (n.d.). Retrieved from http://www.unicef.org/india/10_National_Iron_Plus_Initiative_Guidelines_for_Control_of_IDA.pdf
 56. Khan, M.U., Shahidullah, M.M., & Begum, T. (1983). Role of breast feeding in preventing acquisition of roundworm and hookworm in Dhaka slum children. *The Indian Journal of Pediatrics*, 50(5), 493-495. doi: 10.1007/BF02753286
 57. *Raising even more clean hands: Advancing health, learning and equity through WASH in schools*. (2012). Retrieved from [http://www.unicef.org/wash/schools/files/Raising_Even_More_Clean_Hands_Web_17_October_2012\(1\).pdf](http://www.unicef.org/wash/schools/files/Raising_Even_More_Clean_Hands_Web_17_October_2012(1).pdf)
 58. Esrrey, S.A., Potash, J.B., Roberts, L., Schiff, C. (1991). Effects of improved water supply and sanitation on ascariasis, diarrhoea, dracunculiasis, hookworm infection, schistosomiasis, and trachoma. *Bulletin of the World Health Organization*, 69(5), 609-621. Retrieved from http://apps.who.int/iris/bitstream/10665/48164/1/bulletin_1991_69%285%29_609-621.pdf?ua=1
 59. Bill and Melinda Gates Foundation. Private and public partners unite to combat 10 neglected tropical diseases by 2020. (n.d.). Retrieved from <http://www.gatesfoundation.org/media-center/press-releases/2012/01/private-and-public-partners-unite-to-combat-10-neglected-tropical-diseases-by-2020>
 60. These nine organizations initially formed the STH Coalition in April 2014: Children’s Investment Fund Foundation, Dubai Cares, the Bill & Melinda Gates Foundation, Mundo Sano, the Global Partnership for Education, Vitamin Angels, WaterAid, the World Bank and the World Food Programme.
 61. United to Combat NTDs. *Delivering on promises and driving progress*. (2014).

Photo Credits

Cover: Olivier Asselin

Page 4: Mo Scarpelli

Page 7: Esther Havens

Page 8: Esther Havens

Page 13: Olivier Asselin;
Esther Havens; Mo Scarpelli

Page 18: Join the Lights

Page 24-25: Esther Havens

Art and Design:

Scott Melamed

Sabin Vaccine Institute

The Sabin Vaccine Institute's mission is to reduce needless human suffering from vaccine-preventable and neglected tropical diseases by developing new vaccines, advocating for increased use of existing vaccines, and promoting expanded access to affordable medical treatments.


The Global Network for Neglected Tropical Diseases

The Global Network for Neglected Tropical Diseases is an advocacy initiative of the Sabin Vaccine Institute that works in partnership with international agencies, governments, academic institutions, corporations, non-governmental development organizations and the general public to raise the awareness, political will and funding necessary to control and eliminate the seven most common neglected tropical diseases (NTDs) by 2020.

Sabin Vaccine Institute

2000 Pennsylvania Avenue, NW
Suite 7100
Washington, D.C. 20006
Phone : +1 202 842 5025
Web : www.sabin.org

 : www.facebook.com/sabinvaccine

 : [@sabinvaccine](https://twitter.com/sabinvaccine)