Healthy Start

WaterAid

Caught short

How a lack of toilets and clean water contributes to malnutrition

Elena, a health-trained community volunteer weighs and measures a young baby at the weekly maternal and child health clinic at the Bemanonga health clinic in Morondava, Madagascar.

Photo credit: WaterAid/Kate Holt

Introduction

Ask any parent what influences their child's physical and mental development and most will answer their genes, environment and the food they eat. But few know the impact that toilets and clean water have on children's growth and development.

In the developing world, a lack of clean water, sanitation and hygiene (WASH) is a major contributor to malnutrition. One impact of this is stunting, where severe and prolonged undernutrition makes children shorter than normal for their age, and affects their emotional, social and cognitive development.

Currently, more than 650 million people in the world do not have access to clean water and more than 2.3 billion do not have access to an adequate toilet.[1]

Diarrhoeal diseases caused by dirty water and poor sanitation are the second biggest killer of children under five after pneumonia, taking 315,000 young lives every year. Even those children who survive severe bouts of diarrhoea are at risk of having their lives, and life chances, forever changed.[2]

The World Health Organization estimates that 50% of undernutrition – a major form of malnutrition – is associated with infections caused by unsafe water, poor sanitation and unhygienic practices, including not washing hands with soap.[3]

It's an issue that has received little attention, but one that now needs to be at the forefront of international action if we're to end extreme poverty and create a fairer, more sustainable world in the next 15 years.

Last year, world leaders agreed a new set of Global Goals on sustainable development. Goal 2 is a commitment to end hunger and malnutrition by 2030. Goal 6 promises adequate, equitable access to clean water, sanitation, and hygiene for everyone everywhere by the same date. Almost one year on from the Goals being signed into effect, WASH now needs to be prioritised to improve child health and end malnutrition.

What is stunting?

Stunting is defined as children having low height for age. It indicates that children haven't developed as they should, physically or cognitively.

Stunting is a consequence of malnutrition in the first 1,000 days from conception until age two. It is largely irreversible after the age of two, making those first 1,000 days critical to a child's development.

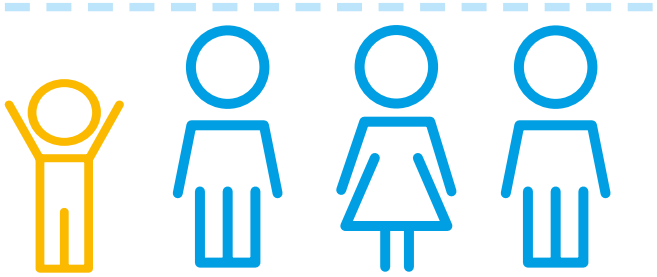
Maternal malnutrition also leads to low newborn birth weight, increasing the risk of a child dying in their first two years of life, and of them being more susceptible to life-threatening infections and diseases later in life.

Stunting has also been shown to contribute to obstructed labour for women and girls, as their bodies are not developed enough to deliver a baby safely.

And so the vicious circle goes on across generations.[4]

The numbers

Globally, **159 million** children under the age of five are stunted – **one in four** children.[5]



Half of all cases of undernutrition are estimated to be associated with repeated diarrhoea, intestinal worms and other infections as a direct result of inadequate WASH.

A quarter of all cases of stunting are estimated to be directly caused by chronic diarrhoea in the first two years of life[6] (and 88% of cases of diarrhoea are caused by inadequate WASH).[7]

A recent study suggests that **54%** of international variation in children's height can be linked to open defecation, which spreads deadly diseases and makes children more susceptible to diarrhoeal illness and infection.[8]

Crucially, *The Lancet* estimates that direct interventions to address malnutrition, such as nutrient supplements and exclusive breastfeeding, can only reduce stunting by **20%** in the worst affected countries, even if they're reaching **90%** of the population in need.[9] That means improving access to clean water, sanitation and hygiene, along with measures in other sectors, plays a crucial part in reducing the remaining 80% of stunting.

Five-month-old Teshale is given a routine weight test for malnutrition in Burie Zuria district, Amhara.

Photo credit: WaterAid/Behailu Shiferaw

The science

When we talk about malnutrition we almost always think about food, either a lack of it or the wrong types of it. The effect of WASH on malnutrition has been given relatively low priority. Only now are the connections being made to address why many are still suffering from stunting even in areas where children have enough nutritious food.

Undernutrition is defined as nutritional deficiency resulting from lack of food or from the inability of the body to absorb it.

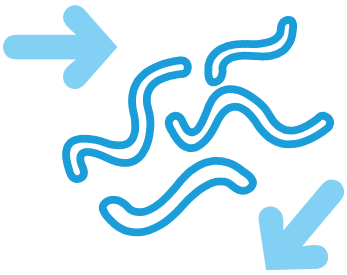
One way it manifests is through stunting.

Dirty water, poor sanitation and a lack of hygiene have been linked to undernutrition and stunting.

For more detailed definitions see endnote[10]

Even if children have plenty of food they can still suffer from malnutrition.

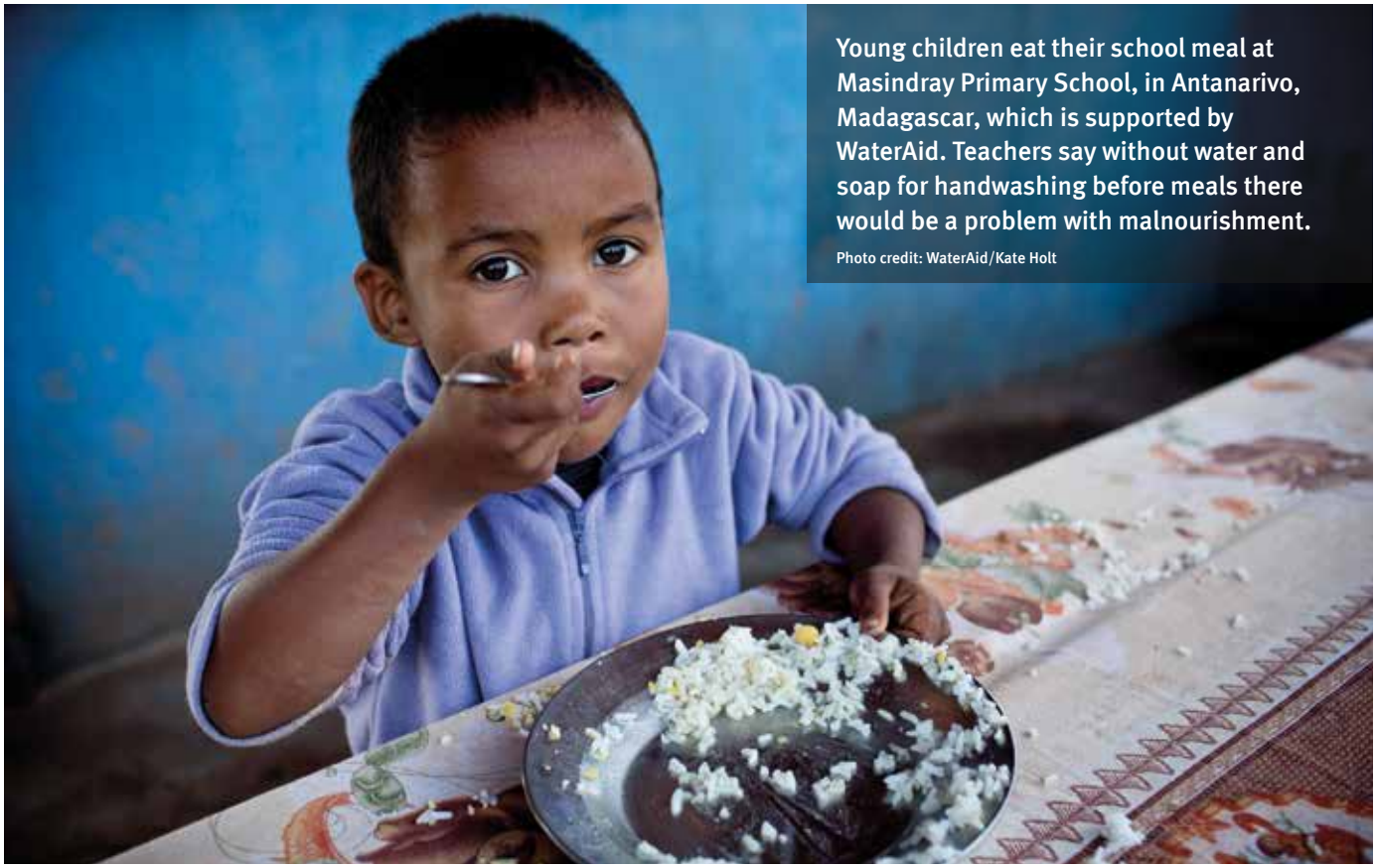
Drinking dirty water, polluted by people going to the toilet in the open and the inability to wash hands before eating can lead to diarrhoea, intestinal worms and other infections.



This in turn leads to poor performance at school and stops children from being able to reach their potential.[12]

Evidence suggests five or more cases of diarrhoea before two years of age can lead to stunting.[11]

Getting ill with diarrhoea, intestinal worms and other infections stops children from being able to absorb the nutrients they need to grow physically and mentally.



Young children eat their school meal at Masindray Primary School, in Antanarivo, Madagascar, which is supported by WaterAid. Teachers say without water and soap for handwashing before meals there would be a problem with malnourishment.

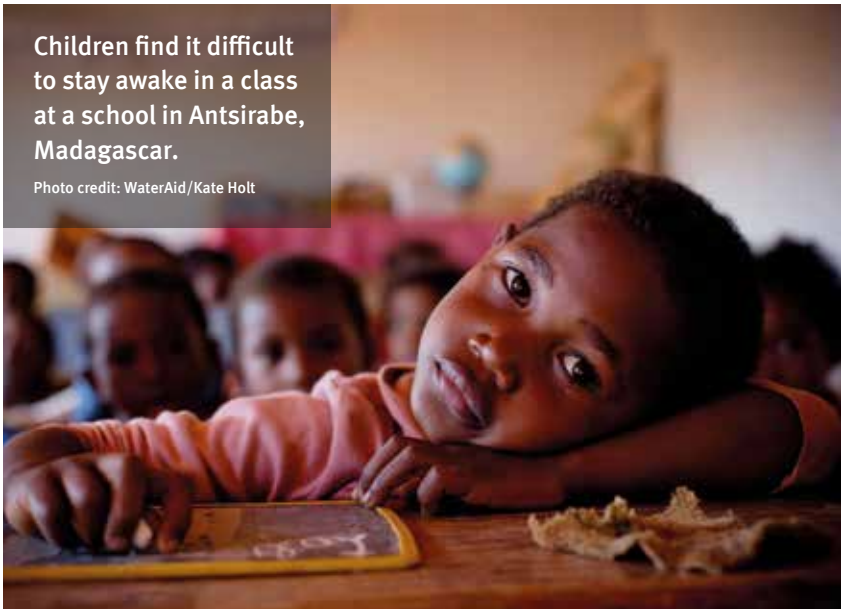
Photo credit: WaterAid/Kate Holt

The impacts beyond health

Education

The time wasted from being sick with water-borne diseases or collecting water has a huge impact on education. Children who regularly have diarrhoea or other infections caused by poor WASH are more likely to fall behind in school or even drop out altogether.

Regular bouts of diarrhoea not only mean children struggle to keep up at school because they are often absent, it can also cause stunting which affects the make-up of the brain and prevents children from reaching their potential. Reducing malnutrition increases cognitive development and contributes to learning and school completion rates.[13]



Children find it difficult to stay awake in a class at a school in Antsirabe, Madagascar.

Photo credit: WaterAid/Kate Holt

Baby Anna and her 18-year-old mother Marnema await news from doctors after being admitted to Morondava's main referral hospital in Madagascar. Anna is suffering from acute diarrhoea.

Photo credit: WaterAid/Kate Holt

Economics

Malnutrition not only has a huge human cost in terms of lives lost, it also inflicts a big economic burden. This year's *Global Nutrition Report* has found that the impact of malnutrition costs 11% of GDP annually across Africa and Asia.

The impact, and costs, of low weight, poor child growth and deficiencies in vitamins and minerals add to the burden on health systems and affect development.

Making sure communities are healthy can increase productivity and lead to more economic opportunities. Investing in water and sanitation can bring significant economic rewards.

For every **£1** invested in water and sanitation...

an average of at least **£4**[14] is returned in increased productivity, primarily based on improved health and more time to work.

Stunting – the ten worst places in the world[15]

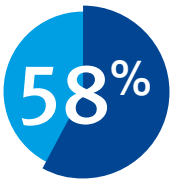
Rank	Country	% of children stunted	% of population without access to sanitation	% of population without access to water[16]
1	Timor-Leste	58	59	28
2	Burundi	58	52	24
3	Eritrea	50	84	42
4	Papua New Guinea	50	81	60
5	Madagascar	49	88	49
6	Guatemala	48	36	7
7	Yemen	47	–	–
8	Pakistan	45	37	9
9	Lao People's Democratic Republic	44	29	24
10	Mozambique	43	80	49

Timor-Leste

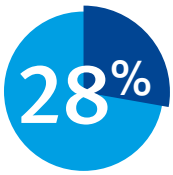
Population: **1.17 million**

The highest proportion of children under five who are stunted

Percentage of children who are stunted



Percentage of population without safe water



Percentage of population without adequate sanitation

100

Reported child deaths from diarrhoea every year[17]

Timor-Leste is one of the world's newest nations, yet it has the unenviable title of having the highest proportion of children under-five who are stunted – over 50%.

Many children like five-year-old Fidelia live without access to clean water and a safe, private toilet. Last year, her three-year-old sister, Mercia, died after suffering from a severe bout of diarrhoea and stomach pains.

Fidelia's mother, Filomena, has no choice but to collect dirty water from a stream about an hour away from their village. In the dry season, Filomena has to walk even further to collect the unsafe water that her children drink and bathe in.

Development in this South-East Asian nation has been hindered by a decades-long struggle for independence from Indonesia, which damaged the country's infrastructure. 14 years on from independence, nearly a third of the population doesn't have safe water, and 700,000 people don't have adequate sanitation.

23-year-old Filomena and her five-year-old daughter Fidelia on their way to collect water from an unsafe stream in Laubrema village, Manufahi district, Timor-Leste.

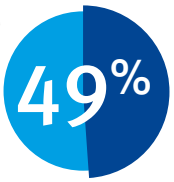
Photo credit: WaterAid/Tom Greenwood

Madagascar

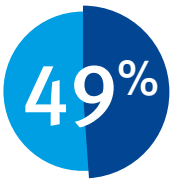
Population: 22 million

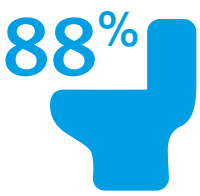
Fifth highest proportion of children under five who are stunted

Percentage of children who are stunted



Percentage of population without safe water

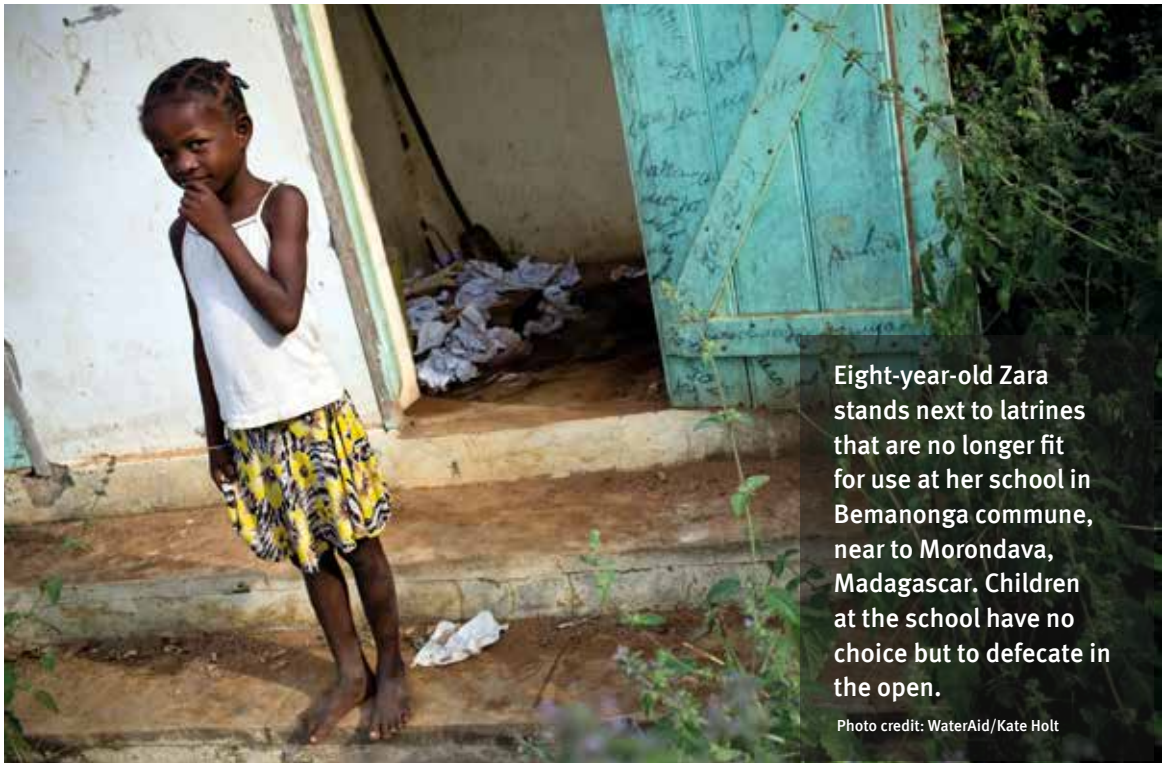




Percentage of population without adequate sanitation

3,000

Reported child deaths from diarrhoea every year[18]



Eight-year-old Zara stands next to latrines that are no longer fit for use at her school in Bemanonga commune, near to Morondava, Madagascar. Children at the school have no choice but to defecate in the open.

Photo credit: WaterAid/Kate Holt

At eight years old, Zara measures just 107cm, nearly 20cm under the global average height for her age, calculated by the World Health Organization's growth standards.[19] While genetics play a big part, the lack of clean water and sanitation in her village has also affected her growth and development.

"I eat rice three times a day, with fish," she explains. "But the water I drink is cloudy and muddy." Zara lives in Morondava, eastern Madagascar. Much like the rest of the country, open defecation is widely practised in her village, and the school she attends does not have clean water or toilets.

"I last had belly ache a few days ago," she says. "My brothers and sisters get belly ache a lot too. I have a baby sister that is two months old. She has already been sick with diarrhoea."

Zara, like nearly half of Madagascar's children, has stunted growth. She often complains of headaches and stomach aches and constantly feels tired. Her teacher says Zara finds it very hard to concentrate in class and has often missed lessons because of diarrhoea.

"It's a big problem in this school. 70-80% of children here are malnourished," says Florine Rabaomirary, one of Zara's teachers.

"Sometimes children miss school for a week or even a month. The children often fall asleep in class and they lack concentration. In this school we lack clean water; the lack of water is contributing to malnutrition here."

Zambia

Population: 16 million

17th highest proportion of children under five who are stunted

Percentage of children who are stunted: 40%

Percentage of population without safe water: 35%

56% Percentage of population without adequate sanitation

1,000 Reported child deaths from diarrhoea every year[20]

Eight-year-old Milambo lives in Monze district, southern Zambia. It's an area which, according to health workers, suffers from high rates of malnutrition. She, along with many children in her village, suffers from frequent bouts of diarrhoea and often misses school.

"Stunting is common here in Monze," says Saul Maamb, a health worker who deals specifically with monitoring children's growth and development.

"Malnourished children tend to get exposed to sickness like diarrhoea. This puts a toll on them and compromises their growth rates," he adds.

Some 40% of children in Zambia are stunted, putting it among the 20 countries globally with the highest rates of stunting and the tenth worst in Africa.

Malnutrition in this part of Zambia is caused by several factors, including a lack of nutritious food and little access to safe water and good sanitation.

"The overall situation is bad," says Saul. "People don't have a safe and reliable source of water. Most homes do not have toilets and hygiene education is low."

Milambo is forced to collect her water from a nearby stream. "It's brownish and sometimes has things in it," she says. "Most of the time I use the bush to go to the toilet."

Milambo hopes one day to become a teacher, but says she misses school a lot because of belly ache.

Eight-year-old Milambo, who is poorly nourished, stands near her home in Monze district, Zambia.

Photo credit: WaterAid/Chileshe Chanda

The ten countries with the greatest number of stunted children

Rank	Country	Number of children stunted[21]	% of population without access to sanitation	% of population without access to water[22]
1	India	48,000,000	60	6
2	Nigeria	10,321,000	71	32
3	Pakistan	9,898,000	39	9
4	Indonesia	8,728,000	39	13
5	China	8,044,000	24	5
6	Ethiopia	5,822,000	72	43
7	Bangladesh	5,484,000	39	13
8	DR Congo	5,072,000	71	48
9	Philippines	3,434,000	26	8
10	UR Tanzania	3,061,000	84	44

India

Population: 1.25 billion

Country with greatest number of stunted children

Number of stunted children **48m**

76m Number of people without safe water

774m Number of people without adequate sanitation

140,000 Reported child deaths from diarrhoea every year[23]

Sisters Manjula, 9, and Gouramma, 13, stand underneath a chalk mark showing the global average height for an eight-year-old at a primary school in Ooti Village, Karnataka State, India.

Photo credit: WaterAid/Ronny Sen

Prevalance of under-five stunting in India

48% of children were stunted in **2006**

39% of children were stunted in **2014**

At nine years old, Manjula is well below WHO growth standards for her age, as is her sister Gouramma, who is 13, but also suffers from a condition called hypothyroidism. Their school headmaster says most families in the area do not have access to toilets, and absence rates are high – as many as 30% of students are away from school and ill at any given time.

Manjula's 65-year-old grandmother Yellamma says they would like a toilet at home, but the family has no choice now but to relieve themselves in the open – usually in a field behind a large rock, across from their home, at daybreak or dusk. There is also no soap at home for handwashing. "My granddaughters have not grown according to their age. God knows why they are so short," she said. "They keep on complaining of stomach ache. Sometimes their hands and legs ache."

India has made progress on reducing child stunting, from 48% of all children in 2006 to 39% in 2014. However, alongside the high numbers of people without access to adequate toilets, India also has the highest concentration in the world of people practising open defecation.[24]

Research shows that high rates of open defecation have a strong correlation with increased rates of stunting,[25] as faeces in the environment contaminate hands and surroundings, and spread disease and infection.

Ethiopia

Population: 99 million

Sixth in the world for greatest number of stunted children

Number of stunted children **5.8m**

42m Number of people without safe water

71m Number of people without adequate sanitation

9,000 Reported child deaths from diarrhoea every year[26]

Mantegbosh Ensa has been a health worker in the Burie Zuria district of Amarah, Ethiopia, for five years. Almost every other child that she sees is stunted. "Even I am stunted. Can you see how small I am?" she asks. But she knows stunting is different from simply being genetically short.

"Most of the children here are either diagnosed with diarrhoea or an eye infection from playing in the dust and not washing afterwards. If the children can't keep the food they eat in, it's as if they never ate it at all," she explains. "They often come here weak and very thin, their eyes looking sunken."

Diarrhoea – sometimes bloody – is in the top three most common illnesses reported in this part of Ethiopia. It's one of the key drivers of malnutrition among very young children.

"Some of the malnourished children come from families we know can feed their children well," says Mantegbosh. "But every other week, the child is vomiting and suffering from diarrhoea, which means they don't have enough time to absorb the nutrients into their system."

Eight-year-old Habtamu became sick when he was younger from a bout of diarrhoea. His father said, "He gets sick from anything and everything. So his growth slowed down and he never recovered." He now stands well below the average height for his age outlined by WHO.

Like Habtamu, nearly three-quarters of the population in Ethiopia don't have adequate sanitation. The toilet he uses is overflowing, worn out and very unsanitary.

"The health workers have warned us about our sanitation situation," explains Habtamu's father. The importance of having access to clean water and a safe private toilet will make all the difference to children like Habtamu, allowing them to grow and reach their potential.

Eight-year-old Habtamu stands next to a stick marked red to show the global average height for his age – 126cm.

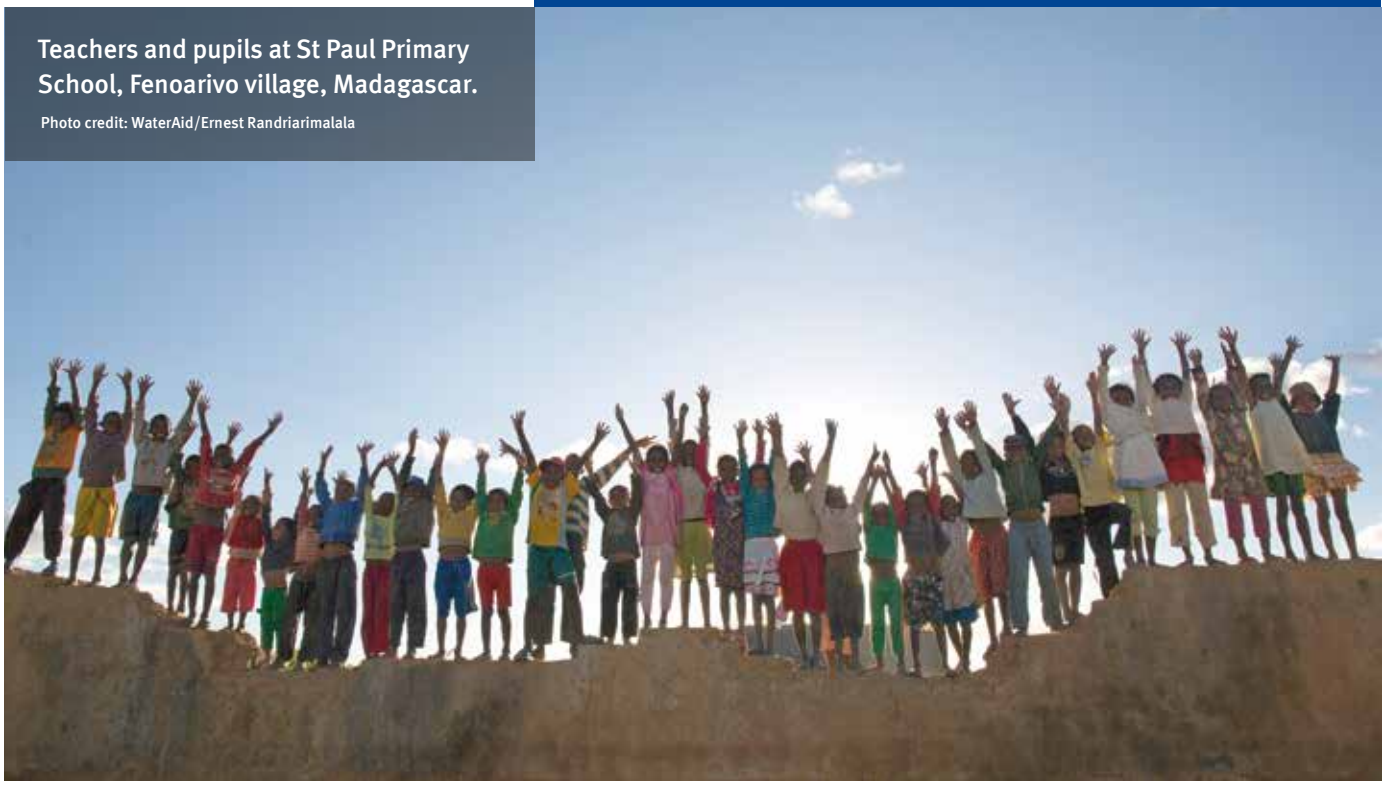
Photo credit: WaterAid/Behailu Shiferaw

What should be done

As world leaders turn their attention to the urgent action needed to achieve the UN Global Goals for Sustainable Development, the coming months will see several crucial opportunities to accelerate progress towards ending malnutrition by 2030. The Nutrition for Growth event at the Rio 2016 Olympic Games, the World Bank's summit on Stunting and Early Childhood Development in October 2016, and the G7 in Italy in 2017 are all key moments for governments, donors and international agencies to invest in solutions that will improve the lives of millions of the world's most vulnerable children. Improving access to clean water, adequate sanitation and good hygiene must be central to their nutrition action plans.

Good food will only get us part of the way to the finishing line. We need clean water, clean toilets and clean hands to finish this race and end undernutrition altogether.

1. Governments and donors must make ambitious investments in water, sanitation and hygiene for all, as a critical part of their efforts to improve nutrition.
2. Governments must ensure that WASH interventions are embedded in their policies, plans and programmes, to reduce undernutrition, childhood diseases and newborn deaths.
3. Ministries of Health, Water, Sanitation, Agriculture and Education must all coordinate their efforts to tackle the underlying causes, as well as the effects, of malnutrition.
4. Donors must improve their measurement and transparency of WASH investments that address the underlying causes of malnutrition, to ensure they are more effective and accountable.
5. International institutions, researchers and civil society organisations must collaborate to strengthen the evidence-base and understanding of how WASH and nutrition are connected, and which approaches are most effective.



Teachers and pupils at St Paul Primary School, Fenoarivo village, Madagascar.

Photo credit: WaterAid/Ernest Randriarimalala

Appendix:
Countries ranked by prevalence of stunting, highest to lowest

Rank	Country	% of children stunted	% of population without access to water	% of population without access to a toilet
1	Timor-Leste	57.7	28.1	59.4
2	Burundi	57.5	24.1	52
3	Eritrea	50.3	42.2	84.3
4	Papua New Guinea	49.5	60	81.1
5	Madagascar	49.2	48.5	88
6	Guatemala	48	7.2	36.1
7	Yemen	46.5	no data	no data
8	Pakistan	45	8.6	36.5
9	Lao People's Democratic Republic	43.8	24.3	29.1
10	Mozambique	43.1	48.9	79.5
11	Niger	43	41.8	89.1
12	Democratic Republic of the Congo	42.6	47.6	71.3
13	Malawi	42.4	9.8	59
14	Afghanistan	40.9	44.7	68.1
15	Central African Republic	40.7	31.5	78.2
16	Ethiopia	40.4	42.7	72
17	Zambia	40	34.6	56.1
18	Chad	38.7	49.2	87.9
19	India	38.7	5.9	60.4
20	Mali	38.5	23	75.3
21	Sudan	38.2	no data	no data
22	Rwanda	37.9	23.9	38.4
23	Sierra Leone	37.9	37.4	86.7
24	Nepal	37.4	8.4	54.2
25	Indonesia	36.4	12.6	39.2
26	Bangladesh	36.1	13.1	39.4
27	Myanmar	35.1	19.4	20.4
28	United Republic of Tanzania	34.7	44.4	84.4
29	Uganda	34.2	21	80.9
30	Benin	34	22.1	80.3
31	Bhutan	33.6	0	49.6
32	Djibouti	33.5	10	52.6
33	Lesotho	33.2	18.2	69.7
34	Burkina Faso	32.9	17.7	80.3
35	Nigeria	32.9	31.5	71
36	Solomon Islands	32.8	19.2	70.2
37	Cameroon	32.6	24.4	54.2
38	Cambodia	32.4	24.5	57.6
39	Comoros	32.1	9.9	64.2
40	Liberia	32.1	24.4	83.1
41	Sao Tome and Principe	31.6	2.9	65.3
42	Botswana	31.4	3.8	36.6

Rank	Country	% of children stunted	% of population without access to water	% of population without access to a toilet
43	Guinea	31.3	23.2	79.9
44	South Sudan	31.1	41.3	93.3
45	Philippines	30.3	8.2	26.1
46	Cote d'Ivoire	29.6	18.1	77.5
47	Angola	29.2	51	48.4
48	Vanuatu	28.5	5.5	42.1
49	Democratic People's Republic of Korea	27.9	0.3	18.1
50	Guinea-Bissau	27.6	20.7	79.2
51	Zimbabwe	27.6	23.1	63.2
52	Syrian Arab Republic	27.5	9.9	4.3
53	Togo	27.5	36.9	88.4
54	Tajikistan	26.8	26.2	5
55	Equatorial Guinea	26.2	52.1	25.5
56	Kenya	26	36.8	69.9
57	Somalia	25.9	no data	no data
58	Swaziland	25.5	25.9	42.5
59	Ecuador	25.2	13.1	15.3
60	Congo	25	23.5	85
61	Gambia	24.5	9.8	41.1
62	Nauru	24	3.5	34.4
63	South Africa	23.9	6.8	33.6
64	Albania	23.1	4.9	6.8
65	Namibia	23.1	9	65.6
66	Nicaragua	23	13	32.1
67	Honduras	22.7	8.8	17.4
68	Iraq	22.6	13.4	14.4
69	Egypt	22.3	0.6	5.3
70	Mauritania	22	42.1	60
71	Haiti	21.9	42.3	72.4
72	Libya	21	no data	3.4
73	Armenia	20.8	0	10.5
74	Maldives	20.3	1.4	2
75	Brunei Darussalam	19.7	no data	no data
76	Uzbekistan	19.6		0
77	Senegal	19.4	21.5	52.4
78	Viet Nam	19.4	2.4	22
79	Belize	19.3	0.5	9.5
80	Panama	19.1	5.3	25
81	Ghana	18.8	11.3	85.1
82	Bolivia (Plurinational State of)	18.1	10	49.7
83	Azerbaijan	18	13	10.7
84	Gabon	17.5	6.8	58.1
85	Peru	17.5	13.3	23.8
86	Malaysia	17.2	1.8	4
87	Thailand	16.3	2.2	7

Rank	Country	% of children stunted	% of population without access to water	% of population without access to a toilet
88	Morocco	14.9	14.6	23.3
89	Sri Lanka	14.7	4.4	4.9
90	El Salvador	14	6.2	25
91	Mexico	13.6	3.9	14.8
92	Venezuela (Bolivarian Republic of)	13.4	6.9	5.6
93	Kazakhstan	13.1	7.1	2.5
94	Kyrgyzstan	12.9	10	6.7
95	Colombia	12.7	8.6	18.9
96	Guyana	12	1.7	16.3
97	Algeria	11.7	16.4	12.4
98	Georgia	11.3	0	13.7
99	Paraguay	10.9	2	11.4
100	Mongolia	10.8	35.6	40.3
101	Uruguay	10.7	0.3	3.6
102	Tunisia	10.1	2.3	8.4
103	Tuvalu	10	2.3	no data
104	Oman	9.8	6.6	3.3
105	Turkey	9.5	0	5.1
106	China	9.4	4.5	23.5
107	Montenegro	9.4	0.3	4.1
108	Saudi Arabia	9.3	3	0
109	Bosnia and Herzegovina	8.9	0.1	5.2
110	Suriname	8.8	5.2	20.8
111	Argentina	8.2	0.9	3.6
112	Tonga	8.1	0.4	9
113	Seychelles	7.9	4.3	1.6
114	Jordan	7.8	3.1	1.4
115	Barbados	7.7	0.3	3.8
116	Brazil	7.1	1.9	17.2
117	Dominican Republic	7.1	15.3	16
118	Japan	7.1	0	0
119	Iran (Islamic Republic of)	6.8	3.8	10
120	Republic of Moldova	6.4	11.6	23.6
121	Serbia	6	0.8	3.6
122	Kuwait	5.8	1	0
123	Jamaica	5.7	6.2	18.2
124	Costa Rica	5.6	2.2	5.5
125	Macedonia (former Yugoslav Republic of)	4.9	0.6	9.1
126	Belarus	4.5	0.3	5.7
127	Republic of Korea	2.5	no data	0
128	Saint Lucia	2.5	3.7	9.5
129	United States of America	2.1	0.8	0
130	Australia	2	0	0
131	Chile	1.8	1	1
132	Germany	1.3	0	0.8

References

1 World Health Organization/UNICEF Joint Monitoring Programme for Water Supply and Sanitation www.wssinfo.org

2 www.unicef.org/publications/files/APR_2015_9_Sep_15.pdf

3 http://apps.who.int/iris/bitstream/10665/43840/1/9789241596435_eng.pdf

4 See for example Petri WA Jr et al (2008) Enteric infections, diarrhea, and their impact on function and development. *J Clin Invest* 118(4): 1277-90; Prüss A and Corvalan C (2006) *Preventing disease through health environments*. Geneva: World Health Organization; and World Bank (2006) Repositioning nutrition as central to development. Washington DC: World Bank.

5 http://ebrary.ifpri.org/utils/getfile/collection/p15738coll2/id/130354/filename/130565.pdf

6 Fischer Walker C L et al (2013) Global burden of childhood pneumonia and diarrhoea. *The Lancet*. Apr 20;381(9875):1405-16. doi: 10.1016/S0140-6736(13)60222-6. Epub 2013 Apr 12. Childhood pneumonia and diarrhoea series.

7 http://apps.who.int/iris/bitstream/10665/43840/1/9789241596435_eng.pdf

8 http://sanitationdrive2015.org/wp-content/uploads/2013/09/sanitation-height.pdf

9 www.ncbi.nlm.nih.gov/pubmed/23746776

10 Malnutrition: Malnutrition refers to all forms of nutrition disorders caused by a complex array of factors, including dietary inadequacy (deficiencies, excesses or imbalances in macronutrients or micronutrients), and includes both undernutrition and over-nutrition and diet-related non-communicable diseases.

Undernutrition: Undernutrition occurs when the body's requirements for nutrients are unmet as a result of under-consumption or impaired absorption and use of nutrients. Undernutrition commonly refers to a deficit in energy intake from macronutrients (fats, carbohydrates and proteins) and/or to deficiencies in specific micronutrients (vitamins and minerals). It can be either acute or chronic http://apps.who.int/iris/bitstream/10665/193991/1/9789241565103_eng.pdf

11 www.thelancet.com/series/childhood-pneumonia-and-diarrhoea

12 For more detail on the links between WASH and nutrition see www.youtube.com/watch?v=8cOlDDpf1lY or read WaterAid's policy brief www.wateraid.org/~/media/Publications/undernutrition_and_water_sanitation_and_hygiene.pdf?la=en

13 www.unicef.org.uk/Documents/Publication-pdfs/UNICEFUK_ChildNutritionReport2013w.pdf

14 www.who.int/water_sanitation_health/publications/2012/globalcosts.pdf

15 Most recent data available from *2016 Global Nutrition Report*, p120, available at: http://ebrary.ifpri.org/utils/getfile/collection/p15738coll2/id/130354/filename/130565.pdf

16 www.wssinfo.org/data-estimates/

17 www.washwatch.org/en/countries/timor-leste/summary/statistics/

18 www.washwatch.org/en/countries/madagascar/summary/statistics/

19 www.who.int/growthref/who2007_height_for_age/en/

20 www.washwatch.org/en/countries/zambia/summary/statistics/

21 Data from *2015 Global Nutrition Report*. Available at: https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/MUOX19

22 www.wssinfo.org/data-estimates/

23 www.washwatch.org/en/

24 www.wateraid.org/what-we-do/our-approach/research-and-publications/view-publication?id=c8e9d0b5-3384-4483-beff-a8efef8f342a

25 http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0073784

26 www.washwatch.org/en/countries/ethiopia/summary/statistics/

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Cover image: A group of eight-year-old children at Bemamonga Primary School in Morondava, Madagascar, line-up underneath a chalk mark that indicates the global average height for their age. The school has no clean water or toilets and the teachers say up to 80% of the pupils there are malnourished.

Photo credit: WaterAid/Kate Holt

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