

2017

PNEUMONIA & DIARRHEA PROGRESS REPORT

**DRIVING PROGRESS
THROUGH EQUITABLE
INVESTMENT AND ACTION**



IVAC
International Vaccine Access Center

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FOREWORD

The *2017 Pneumonia and Diarrhea Progress Report: Driving Progress through Equitable Investment and Action* is IVAC's eighth annual report, marking our ongoing commitment to monitor country progress toward child health goals.

Global investments in child health have had a transformative impact; worldwide, under-five deaths have decreased from 10 million in 2000 to 5.9 million in 2015. Investments in pneumonia and diarrhea control have contributed substantially to this impact, yet, one-in-four of all remaining child deaths are still caused by these two illnesses. With the tools we have on hand, these deaths are largely preventable.

To reduce these preventable deaths will require new ways of working, monitoring, and implementing. Reaching children who remain unreached will mean committing to ambitious new approaches, upending dogma, and being unyielding about data-driven actions. While even more resources will be needed to reach the unreached, these remaining children bear the greatest burden of disease. Thus, the benefit and impact of reaching them is also disproportionately high. The value proposition from these investments is compelling.

This report functions as a scorecard to support continued and new global investments in child health. It also functions to bring practitioners, policymakers, and researchers together around common visions and targets for the way forward. Through a lens of rigorous science, we highlight solutions that save lives, reduce the burden of childhood pneumonia and diarrhea, and exemplify productive partnerships.

With 2017 being the 7th year in the "Decade of Vaccines" (2011-2020), a special focus is on progress with vaccination. Countries and global partners have expanded vaccine access by introducing new vaccines at an unprecedented pace and by directing focus to equitable vaccine coverage. Challenges remain, especially in integrating vaccines with other proven, low-cost interventions, like oral rehydration solution (ORS), zinc supplementation, and breastfeeding. Scaling-up our ability to measure program effectiveness and impact while expanding access will help ensure that countries and their partners have the right tools to achieve ambitious health goals.

As you will read in this year's report, progress and opportunities for action align across several cross-cutting themes, including the need for:

- Better methodologies and approaches to scale up interventions that work
- Bold vision and leadership that address cross-cutting challenges and put focus on the least-advantaged
- Continued partnership of countries and donors to ensure funds and evidence to support programs that prevent disease and promote health

Join us as we deliver on our commitment to create a world with fewer pneumonia and diarrhea deaths, where children are given the greatest chance not only to survive but also to thrive.



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EXECUTIVE SUMMARY

PNEUMONIA & DIARRHEA: THE DEADLIEST CHILDHOOD DISEASES

PNEUMONIA AND DIARRHEA account for 25% of under-5 deaths globally, an estimated 1.5 million children. The 15 countries profiled in this report hold the burden for 70% of these deaths.

1 IN 4
UNDER-5 DEATHS
ARE CAUSED BY
PNEUMONIA AND DIARRHEA

MEASURING PROGRESS

The **GAPPD** (integrated Global Action Plan for the Prevention & Control of Pneumonia & Diarrhea) scoring system facilitates evaluation of progress toward 10 targets of success in the 15 highest burden countries.

PNEUMONIA & DIARRHEA IMPACT
NEARLY ALL SUSTAINABLE
DEVELOPMENT GOALS



IVAC supports the SDGs

IT'S NOT JUST A HEALTH
PROBLEM, SO CROSS-SECTOR
LINKAGES ARE CRUCIAL

INDIA	ETHIOPIA	SUDAN
NIGERIA	INDONESIA	BANGLADESH
PAKISTAN	CHAD	SOMALIA
DEMOCRATIC REPUBLIC OF THE CONGO	AFGHANISTAN	UNITED REPUBLIC OF TANZANIA
ANGOLA	NIGER	
	CHINA	

GAPPD scores are calculated as the **average** of 10 relevant indicators for which coverage data is available.

10 KEY INDICATORS OF SUCCESS

7 pneumonia-specific indicators

5 diarrhea-specific indicators

EXCLUSIVE BREASTFEEDING

MCV1 COVERAGE

DTP3 COVERAGE

RotaC COVERAGE

Hib3 COVERAGE

ORS

PCV3 COVERAGE

ZINC

APPROPRIATE CARE SEEKING

ANTIBIOTIC TREATMENT

IN THIS REPORT:
*2017 progress updates
towards 10 key
indicators of success
in the 15 countries
with the highest
pneumonia & diarrhea
child deaths.*

PROGRESS TOWARD REACHING GAPPD TARGETS

Across the 10 indicators, the 15 countries in our analysis displayed a range of performances when it came to reaching their GAPPD targets. Here is where countries stand on the 10 GAPPD indicators, with darker shading representing a higher number of countries performing in that category:

		DTP3	MCV1	Hib3	PCV3	RotaC
Met or exceeded GAPPD target	>90%	4	3	3	3	2
Close to reaching GAPPD target	70-90%	5	6	5	3	0
Far from reaching GAPPD target	45-70%	5	6	5	3	3
Did not meet half of GAPPD target	< 45%	1	0	1	6	10
No data:				1 country		

	ACCESS TO CARE	ANTIBIOTICS	ORS	ZINC	BREASTFEEDING
90% GAPPD target	0	0	0	0	>50% 5
70-90%	2	0	1	0	40-50% 3
45-70%	4	2	2	1	25-40% 2
< 45%	6	9	10	10	<25% 4
No data:	3 countries	4 countries	2 countries	4 countries	No data: 1 country

INTERPRETING RESULTS

6 OUT OF 15 COUNTRIES ARE MEETING TARGETS FOR AT LEAST 1 INTERVENTION

HIGHEST OVERALL SCORE:

TANZANIA



BIGGEST POSITIVE CHANGE:

INDIA



LOWER PERFORMANCE:

SOMALIA, CHAD, NIGERIA, AND CHINA



PROGRESS MADE:

VACCINE COVERAGE & BREASTFEEDING

GAPS IN PERFORMANCE:

TREATMENT ACCESS

CLOSING THE GAP

Accelerate the scale up of interventions that promote protection, prevention, and treatment



Prioritize investments that emphasize equity



Increase focus on treatment access



Promote cross-sector & discipline integration



INTRODUCTION

Thinking Beyond Mortality

Pneumonia and diarrhea are the leading infectious causes of death in children, accounting for 25% of under-5 deaths globally (1–3). In 2015, an estimated 1.5 million children around the world died from these two illnesses (1,2). The 15 countries profiled in this report are disproportionately responsible for global child deaths from pneumonia and diarrhea; they account for 55% of the world’s under-5 population, but they are home to approximately 70% of the world’s childhood diarrhea and pneumonia deaths.



Pneumonia and diarrhea cause 25% of under-5 child deaths

In order to grasp the true impact of these illnesses, we must think—and measure—beyond child mortality. Repeated or severe episodes of pneumonia and diarrhea can inhibit a child’s growth and mental development (4,5) and make a child more susceptible to other diseases (6). Repeated infections also can require extensive treatment costs, causing unaffordable or even catastrophic expenditures and drawing families and communities into a cycle of illness and

poverty (6,7). By preventing and controlling pneumonia and diarrhea, countries and communities become healthier, stronger, and shielded against the vicious cycle of illness and poverty.

With this report, IVAC highlights the 15 countries that carry a disproportionate burden of childhood deaths from pneumonia and diarrhea, and therefore stand to benefit the most from investments aimed at prevention and control. The integrated Global Action Plan for the Prevention and Control of Pneumonia and Diarrhea (GAPPD) provides a framework of proven interventions for diarrhea and pneumonia and sets specific coverage targets by 2025 for each intervention (8). In this report, we evaluate countries’ usage of these interventions and calculate GAPPD scores, which help track trends in country-level progress to protect child health.

1.5
MILLION

Globally, 1.5 million children die from pneumonia and diarrhea each year

The 15 countries featured in this report are:

AFGHANISTAN	INDIA
ANGOLA	INDONESIA
BANGLADESH	NIGER
CHAD	NIGERIA
CHINA	PAKISTAN
DEMOCRATIC REPUBLIC OF THE CONGO	SOMALIA
ETHIOPIA	SUDAN
	UNITED REPUBLIC OF TANZANIA



TARGET 3.2

BY 2030, END PREVENTABLE CHILD AND NEWBORN DEATHS

Reduce under-5 mortality

to at least as low as 25 per 1,000 live births

Reduce neonatal mortality

to at least as low as 12 per 1,000 live births

Achieving SDG 3 requires the world’s collective will and action, including smart investments and strong partnerships across multiple stakeholders.





United Nations. Transforming our world: the 2030 Agenda for Sustainable Development. General Assembly 70th session, 2015. Available from: <http://sustainabledevelopment.un.org/post2015/transformingourworld/publicationtransformingourworld>

METHODS

GAPPD Intervention Scoring

Three GAPPD scores are calculated—overall score, pneumonia score, and diarrhea score. These scores, compared across years, reflect in-country progress towards achieving GAPPD coverage targets for selected pneumonia and/or diarrhea interventions. The GAPPD framework outlines key interventions to protect against, prevent, and treat pneumonia and diarrhea in children under-5, quantifying 10 indicators to help evaluate countries' progress (9). The GAPPD scores reported here are averages, based on countries' most recently available coverage data for 10 selected GAPPD indicators:

10 selected GAPPD indicators:

PREVENTION	PNEUMONIA	DIARRHEA	PROTECTION
			
5	2	2	1
INDICATORS	INDICATORS	INDICATORS	INDICATOR
DTP3, MCV1, Hib3, PCV3 and RotaC immunization coverage rates	care by an appropriate healthcare provider and antibiotic treatment	ORS treatment and zinc supplementation for children with diarrhea	exclusive breastfeeding in first 6 months

Five prevention indicators

- Diphtheria-tetanus-pertussis third dose (DTP3) coverage
- Measles-containing vaccine first dose (MCV1) coverage
- *Haemophilus influenzae* type b third dose (Hib3) coverage
- Pneumococcal conjugate vaccine third dose (PCV3) coverage
- Rotavirus vaccine final dose (RotaC) coverage

Four treatment indicators

- Care by an appropriate healthcare provider amongst children with suspected pneumonia
- Antibiotic treatment amongst children with suspected pneumonia
- ORS treatment amongst children with diarrhea
- Zinc supplementation for children with diarrhea

One protection indicator

- Exclusive breastfeeding in first 6 months

Country Selection

The countries with the largest number of pneumonia and diarrhea deaths in children under-5 were analyzed in this progress report. It is important to note that the mortality burden in each country is influenced heavily by population size, and that magnitude of burden does not necessarily reflect under-5 mortality rates. See Appendix for country-specific burden estimates and disease-specific mortality rates.

Methodology

Data Sources

Data came from publicly available sources. Vaccine coverage data were sourced from the WHO/UNICEF Estimates of National Immunization Coverage (WUENIC) (updated July 2017). Data for appropriate pneumonia care-seeking behavior and exclusive breastfeeding were sourced from UNICEF’s global database (Pneumonia Care-Seeking Interactive

Dashboard and Infant and Young Child Feeding, respectively, updated in 2016). All other coverages were sourced from the country’s latest USAID Demographic and Health Survey (DHS) or UNICEF Multiple Indicator Cluster Surveys (MICS) (reports ranged from 2011-2016).

Calculating GAPPD scores

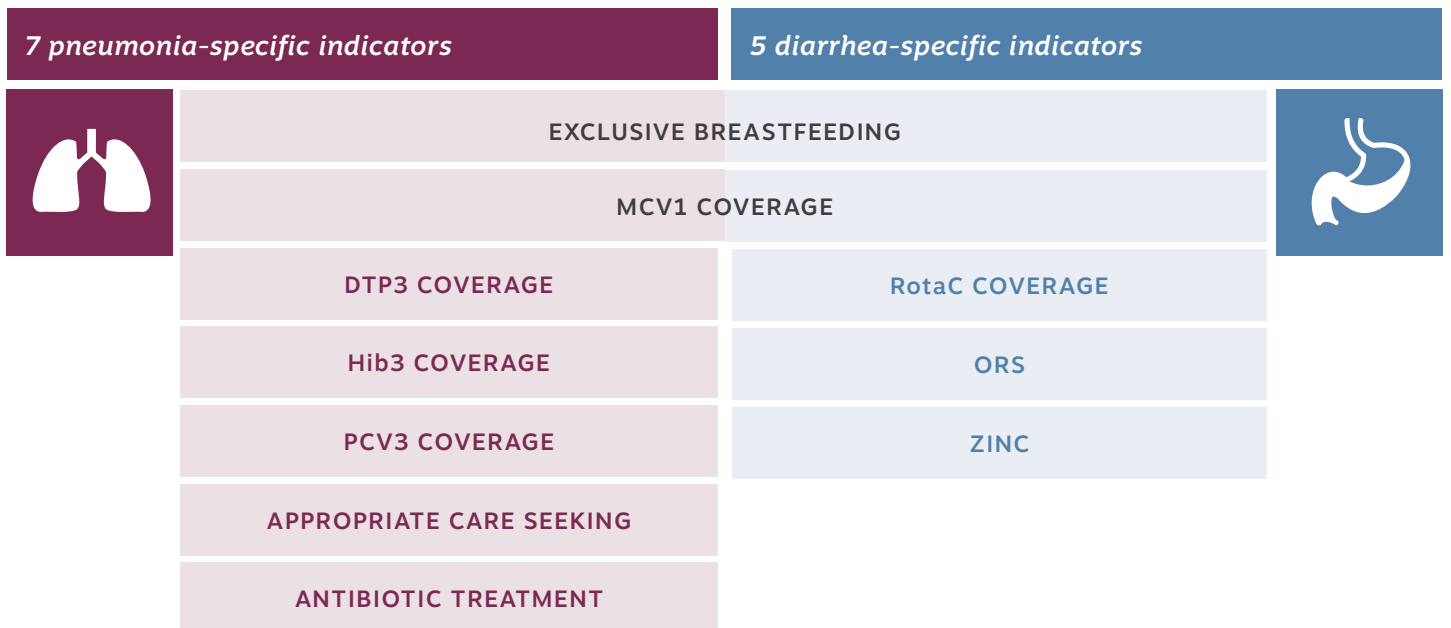
GAPPD scores are calculated as the average of 10 indicators for which coverage data is available. A country’s GAPPD-Pneumonia score reflects the **7 pneumonia-specific indicators**, and a country’s GAPPD-Diarrhea score reflects the **5 diarrhea-specific indicators**. If coverage was not reported for an indicator in a country, that data was classified either as 0% or missing. Similarly, coverage was classified as 0%


in countries that have not introduced a specific vaccine. Scores were calculated to the first decimal point, and were then rounded to the nearest whole number (in the case of a score with a decimal point of exactly 0.5, we erred on being conservative and rounded down to the nearest even whole number). See Appendix for further details on how GAPPD scores are calculated.

Interpreting GAPPD scores

Scores should be treated as estimates to assess overall trends in countries’ performances as they work towards implementing and expanding key pneumonia and diarrhea interventions, which could help inform programming and policymaking. Progress may appear

stalled in countries where coverage estimates for GAPPD indicators are not updated annually. Given a lack of new data, we treat the most recent estimate reported as remaining constant through 2017.



A woman wearing a green headwrap and a purple top is holding a baby in a yellow shirt. The baby has the number '18995' on its sleeve. The woman is looking off to the side with a serious expression. In the background, other people are visible, some wearing colorful clothing. The overall scene suggests a waiting area for health services.

RESULTS & KEY FINDINGS

2017 GAPPD ANALYSIS

*People wait for health services outside a health center in Nampula, Mozambique.
© 2017 Arturo Sanabria, Courtesy of Photoshare*

Key Findings

Overall GAPPD Scores, 2017

Overall GAPPD intervention scores for the 15 countries with the greatest number of pneumonia and diarrhea deaths amongst children under-5 ranged from 19% to 69%, with Chad having the lowest score and Tanzania having the highest (Table 1). This year's median overall GAPPD score was 46%.

None of the 15 countries reached the target GAPPD score of 86%, which is achieved when a country meets the minimal targets for each of the 10 GAPPD interventions evaluated. Eleven countries met or exceeded an overall GAPPD score of 43%, which is half of that target; four countries did not — Somalia (19%), Chad (23%), Nigeria (30%), and China (38%).

Of the 15 countries evaluated, only six countries are meeting GAPPD targets for at least one of the interventions. No countries are meeting GAPPD targets for any of the treatment indicators.

46% Median overall GAPPD score

Overall scores ranged from **19%** to **69%**

TABLE 1. Overall 2017 GAPPD Scores for the 15 countries with the greatest burden of pneumonia and diarrhea

Global Rank	Country	Overall 2017 GAPPD Intervention Score (%)
1	India	48
2	Nigeria	30
3	Pakistan	46
4	Democratic Republic of the Congo	48
5	Angola	47
6	Ethiopia	48
7	Indonesia	43
8	Chad	23
9	Afghanistan	46
10	Niger	45
11	China	38
12	Sudan	65
13	Bangladesh	64
14	Somalia	19
15	United Republic of Tanzania	69

Overall GAPPD Intervention Score Target 86%

Key Findings

Pneumonia and Diarrhea GAPPD Scores, 2017

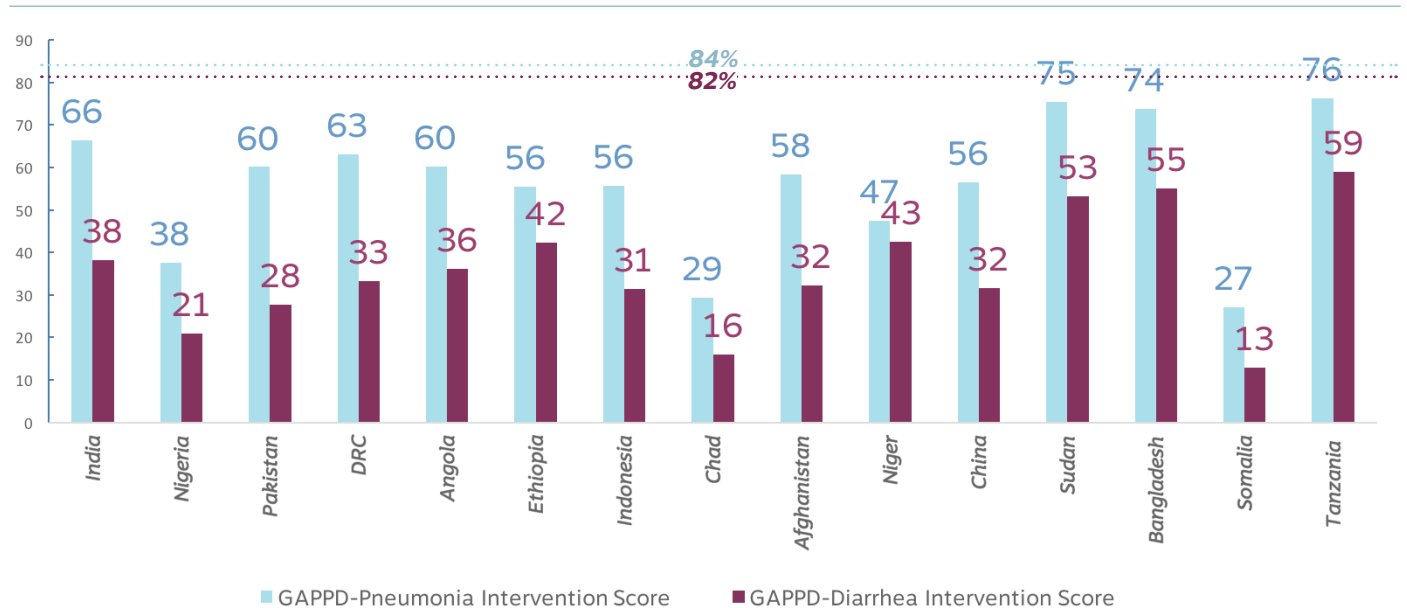
Of the 15 countries in this report, none met the GAPPD-Pneumonia (84%) or GAPPD-Diarrhea (82%) target scores. Interestingly, the countries with the highest scores per category were the same for both pneumonia and diarrhea scores (Bangladesh, Sudan, and Tanzania). Similarly, the low scoring countries were the same for both Pneumonia and Diarrhea scores (Somalia, Chad, Nigeria).

GAPPD-Pneumonia scores ranged from 27% in Somalia to 76% in Tanzania. Three countries exceeded a threshold of 70% for GAPPD-Pneumonia scores (Bangladesh, 74%; Sudan, 75%; and Tanzania, 76%), and three countries did not meet 42%, or half of the target score (Somalia, 27%; Chad, 29%; and Nigeria, 38%).

GAPPD-Diarrhea scores ranged from 13% in Somalia to 59% in Tanzania. Five countries met or exceeded 41%, which is half the target (Ethiopia, 42%; Niger, 43%; Sudan, 53%; Bangladesh, 55%, and Tanzania, 59%). The remaining 10 countries were low-performing in diarrhea interventions, with scores below 41%.

Across all 15 greatest burden countries, GAPPD-Pneumonia Scores were higher than GAPPD-Diarrhea Scores (Figure 1). GAPPD-Diarrhea scores are based on three intervention indicators—whereas the GAPPD-Pneumonia scores are based on six indicators—and are therefore more heavily impacted by missing or zero data. Other explanations for this trend include low use of zinc supplementation in the 15 greatest burden countries (12 countries had $\leq 10\%$ coverage) and limited use of rotavirus vaccine (RVV) (only six countries had introduced RVV and reported coverage in 2016).

FIGURE 1. GAPPD-Pneumonia and Diarrhea intervention scores for the 15 greatest burden countries, 2017



Key Findings

Immunization Coverage

Overall, vaccine coverage was higher than coverage among many of the other indicators (Figures 2 and 3). For each vaccine, at least two countries met the GAPPD target of 90%. Four countries (Bangladesh, China, Tanzania, and Sudan) met the target for at least two vaccines. No country had MCV1 coverage lower than half the target (45%), and only Somalia had DTP3 and Hib3 coverage below 45%. PCV3 and RotaC coverage were lower across the countries compared to DTP3, MCV1, and Hib3 coverage. All countries evaluated had introduced DTP, MCV, and Hib/pentavalent vaccines by 2016. Five countries had not yet introduced PCV and nine countries had not yet introduced RVV in 2016 (Table 2).

FIGURE 2. Progress toward reaching vaccine targets

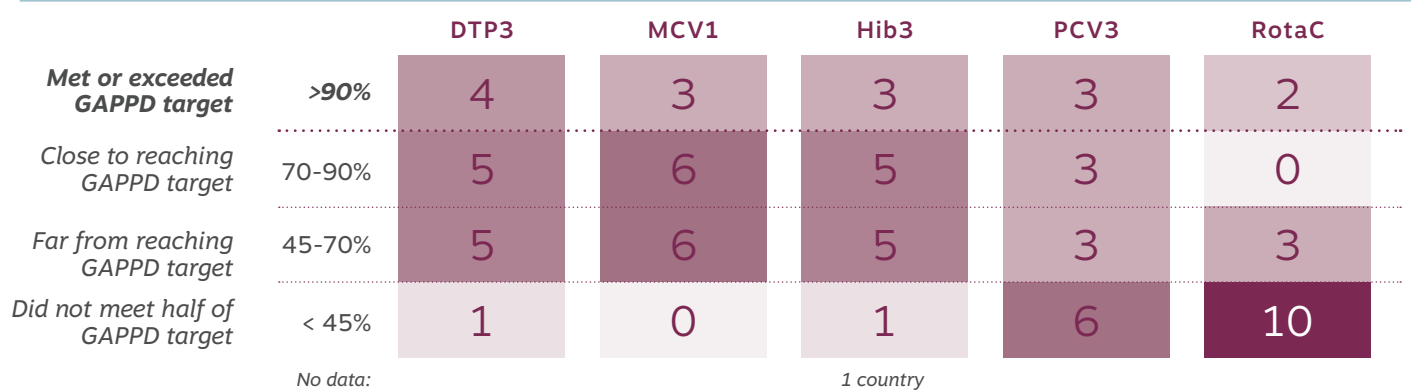
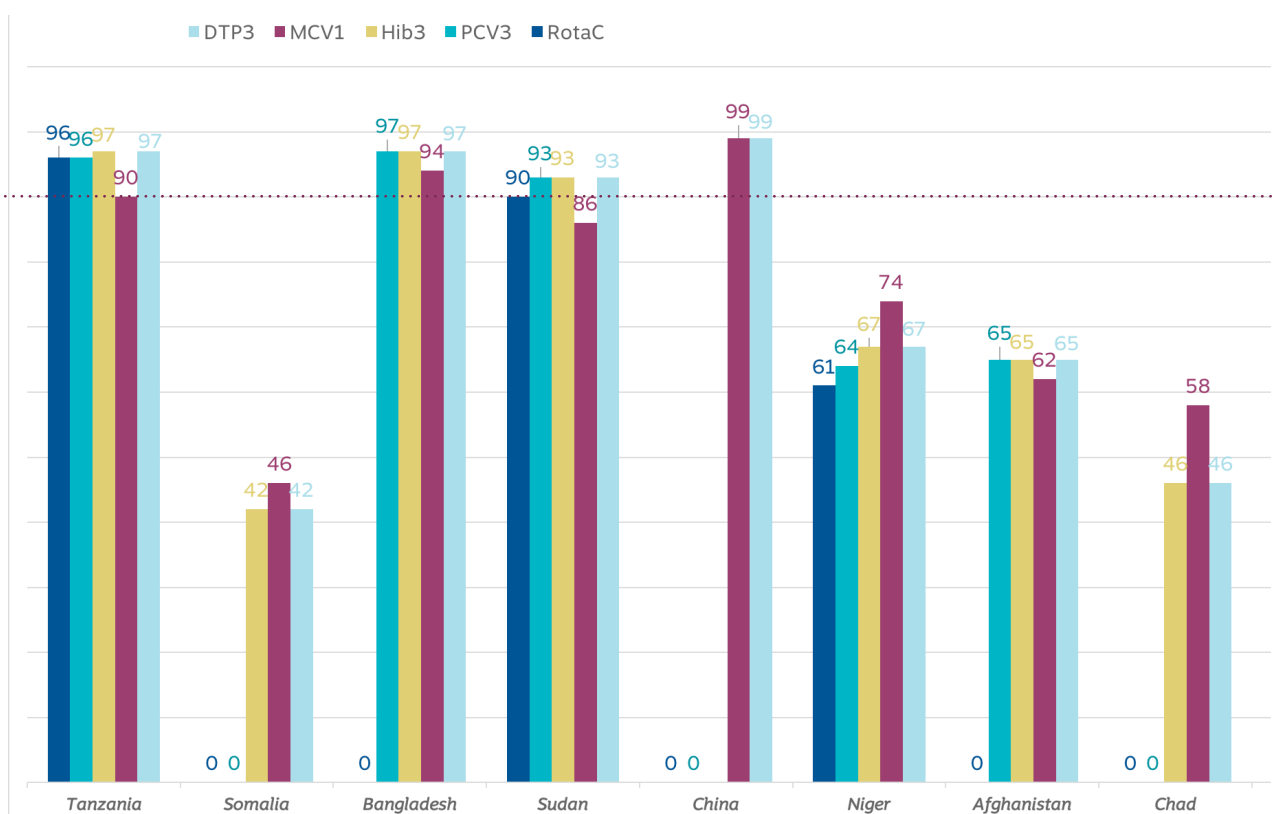


FIGURE 3. Vaccine coverage in 2016



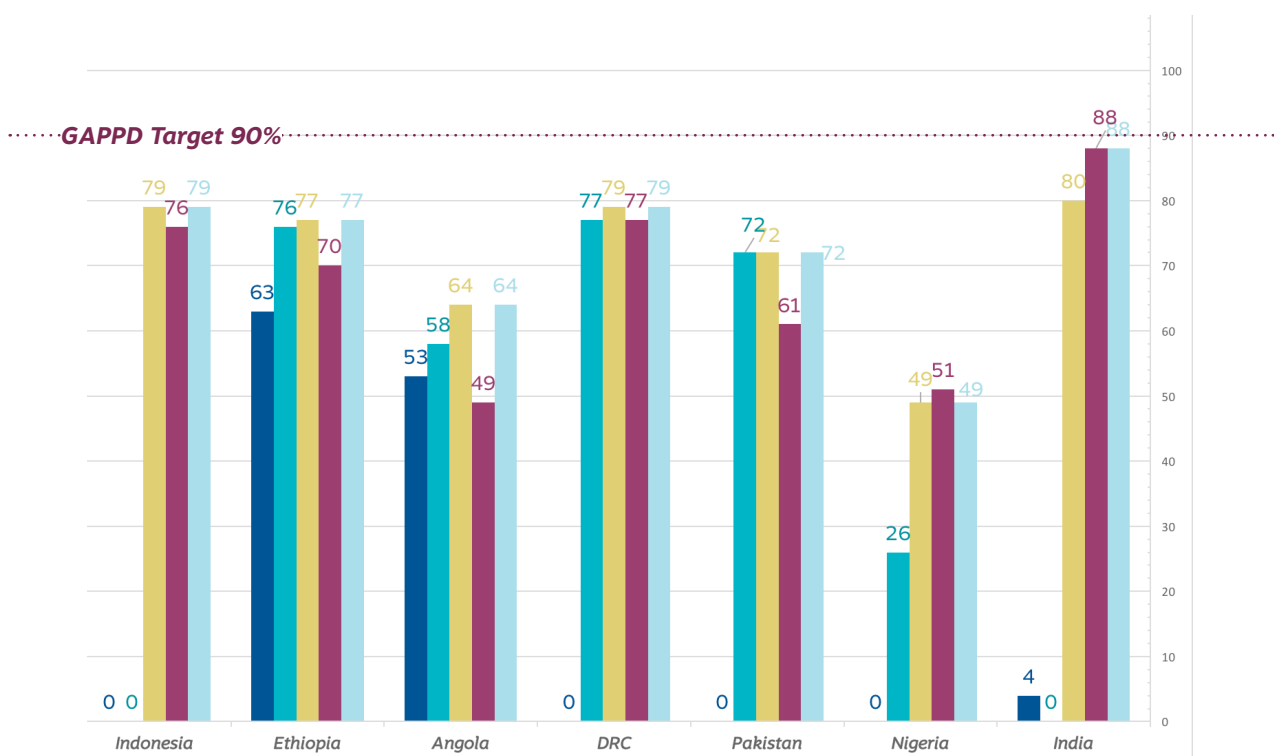
DTP3 Coverage: The lowest coverage was 42% (Somalia) and the highest was 99% (China). Four countries achieved or exceeded the 90% target (Sudan, Bangladesh, Tanzania, and China).

MCV1 Coverage: The lowest coverage was 46% (Somalia) and the highest was 99% (China). Three countries achieved or exceeded the 90% target (Tanzania, Bangladesh, and China).

Hib3 Coverage: The lowest coverage was 42% (Somalia) and the highest was 97% (Bangladesh and Tanzania). Three countries achieved or exceeded the 90% target (Sudan, Bangladesh, and Tanzania).

PCV3 Coverage: The lowest coverage was 0% (several countries) and the highest was 97% (Bangladesh). Three countries achieved or exceeded the 90% target (Sudan, Tanzania, and Bangladesh). Six countries failed to meet a threshold of 45%: Nigeria and five countries that had not yet introduced PCV in 2016 (Chad, China, India, Indonesia, and Somalia).

RotaC Coverage: The lowest coverage was 0% (several countries) and the highest was 96% (Tanzania). Two countries achieved or exceeded the 90% target (Sudan and Tanzania). Ten countries failed to meet a threshold of 45%, including nine countries who had not yet introduced RVV and one country (India) who began a phased introduction in 2016.



Key Findings

Access to Care, Antibiotic Use, ORS, and Zinc

All 15 countries had coverage levels below the 90% GAPPD target for treatment coverage (Figures 4 and 5). In general, care by an appropriate healthcare provider was more common than antibiotic treatment for children with suspected pneumonia. For children with diarrhea, ORS treatment was more common than zinc supplementation.

Nearly all countries were low-performing, meaning that <70% of children received the appropriate intervention. Exceptions were India and Indonesia, where >70% of children with suspected pneumonia were taken to an appropriate healthcare provider, and Bangladesh, where >70% of children with diarrhea received ORS. Treatment data was missing for Angola, China, Ethiopia, India, and Somalia.

Appropriate Healthcare (Suspected Pneumonia): In the 12 countries with available data, access to an appropriate healthcare provider ranged from 26% (Niger) to 77% (India). Six countries exceeded 45%, half the target.

Antibiotic Treatment (Suspected Pneumonia): In the 11 countries with available data, antibiotic treatment ranged from 7% (Ethiopia) to 59% (Sudan). Two countries met or exceeded half the target.

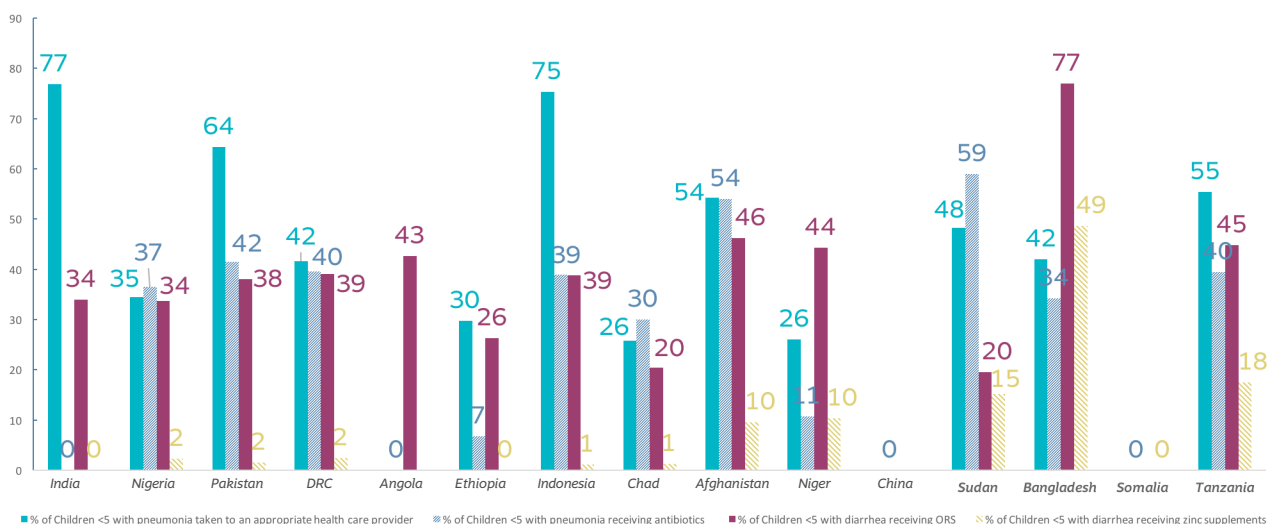
ORS Treatment (Diarrhea): In the 13 countries with available data, ORS treatment ranged from 20% (Chad and Sudan) to 77% (Bangladesh). Four countries met or exceeded half the target.

Zinc Supplementation (Diarrhea): In the 11 countries with available data, zinc supplementation among children with diarrhea ranged from 0% to 49% (Bangladesh).

FIGURE 4. Progress toward reaching treatment targets

	ACCESS TO CARE	ANTIBIOTICS	ORS	ZINC
90% GAPPD target	0	0	0	0
70-90%	2	0	1	0
45-70%	4	2	2	1
< 45%	6	9	10	10
No data:	3 countries	4 countries	2 countries	4 countries

FIGURE 5. Percent of children under 5 with pneumonia or diarrhea who receive appropriate treatment



Key Findings

Breastfeeding

The GAPPD target for exclusive breastfeeding within the first six months of a child's life is 50% coverage. Five countries met or exceeded the target (Bangladesh, Ethiopia, India, Sudan, and Tanzania). Data on these indicators were taken from a single source, providing data for a country in a single year within a five-year range (2010-2015), and thus do not allow us to assess rate changes from year to year. No changes were observed across the 15 countries reported from last year, as there were no updates to the data set since the previous report. For the countries evaluated in this report, exclusive breastfeeding rates ranged from 0% (Chad) to 65% (India) (Figures 6 and 7). Nine countries did not meet the target; of these, five countries met a threshold of 25%, half the target (Afghanistan, China, DRC, Indonesia, and Pakistan) and three did not (Chad, Niger, and Nigeria). Data was not available for Angola.

FIGURE 6.
Progress toward
breastfeeding targets

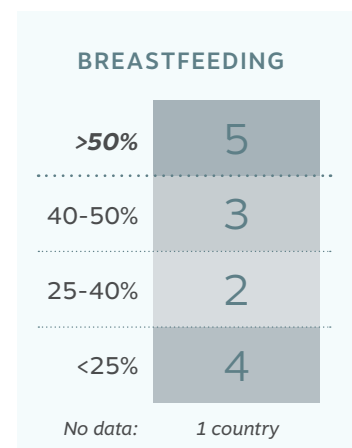


FIGURE 7. Reported rates of children less than 6 months of age receiving exclusive breastfeeding in the 15 greatest burden countries

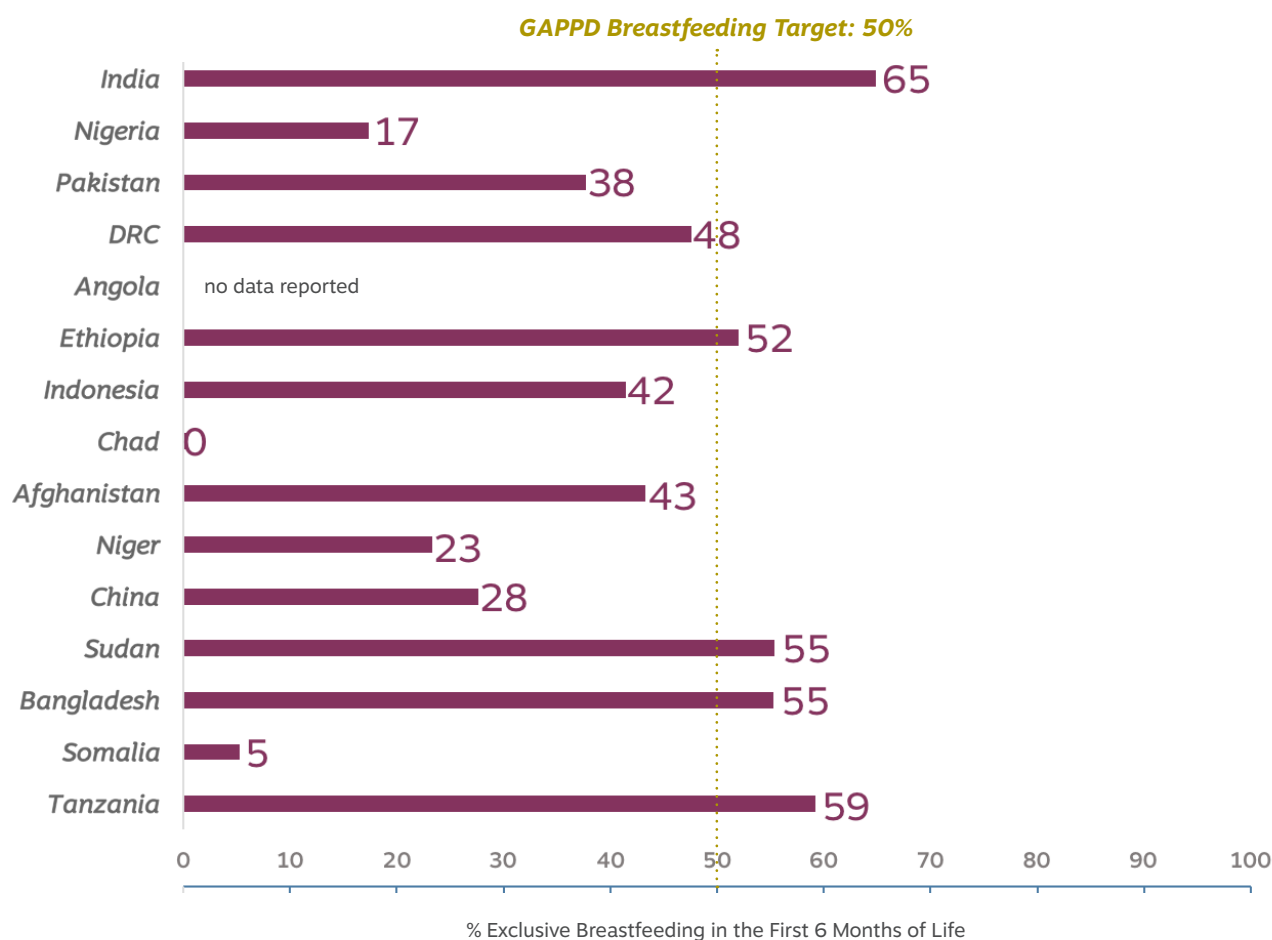


Table 2. Full dataset on GAPPD score indicators

Global Mortality Rank by Pneumonia & Diarrhea Deaths in Children Under 5	Country	Vaccine Coverage (%), WUENIC Estimate, 2016				
		DTP3	MCV1	Hib3	PCV3	RotaC
1	India	88	88	80	0	4
2	Nigeria	49	51	49	26	0
3	Pakistan	72	61	72	72	0
4	DRC	79	77	79	77	0
5	Angola	64	49	64	58	53
6	Ethiopia	77	70	77	76	63
7	Indonesia	79	76	79	0	0
8	Chad	46	58	46	0	0
9	Afghanistan	65	62	65	65	0
10	Niger	67	74	67	64	61
11	China	99	99	Not Reported; Private Market Coverage Only	0	0
12	Sudan	93	86	93	93	90
13	Bangladesh	97	94	97	97	0
14	Somalia	42	46	42	0	0
15	Tanzania	97	90	97	96	96

% of Children Under 5 with Suspected Pneumonia		% of Children Under 5 with Diarrhea <i>Estimates Range from 2007-2017</i>		% Exclusive Breastfeeding in First 6 Months <i>Estimates Range from 2010-2015</i>	2017 Overall GAPPD Intervention Score (%)	2017 GAPPD-Pneumonia Intervention Score (%)	2017 GAPPD-Diarrhea Intervention Score (%)
Taken to an appropriate health care provider	Receiving antibiotics	Receiving ORS	Receiving zinc supplements				
77	Not Reported	34	0	65	48	66	38
35	37	34	2	17	30	38	21
64	42	38	2	38	46	60	28
42	40	39	2	48	48	63	33
Not Reported	Not Reported	43	Not Reported	Not Reported	47	59	36
30	7	26	Not Reported	52	48	56	42
75	39	39	1	42	43	56	31
26	30	20	1	0	23	29	16
54	54	46	10	43	46	58	32
26	11	44	10	23	45	47	43
Not Reported	Not Reported	Not Reported	Not Reported	28	38	56	32
48	59	20	15	55	65	75	53
42	34	77	49	55	64	74	55
Not Reported	Not Reported	Not Reported	Not Reported	5	19	27	13
55	40	45	18	59	69	76	59

Progress in Overall GAPPD Scores

This year, overall GAPPD scores changed from last year in almost half of the countries evaluated (Table 3). Of the eight countries whose scores changed, four countries experienced improvements from their 2016 scores. Two experienced large increases (≥ 5 percentage points) and two experienced minor increases (≤ 1 percentage point). The two countries who experienced the largest increases were India (+7) and Bangladesh (+5). The two countries who experienced minor increases were Nigeria (+1) and Niger (+1). On the other hand, three countries experienced declines from their 2016 scores. One experienced a large decline (Tanzania, -5), and two a minor decline (Afghanistan, -2), (Angola, -1). Finally, eight countries' overall GAPPD scores were unchanged from 2016 (Chad, China, DRC, Ethiopia, Indonesia, Pakistan, Somalia, and Sudan)¹. Table 3 further explores what drove the changes in countries' overall GAPPD scores.

TABLE 3. Drivers of Change in Overall GAPPD Score, from 2016 to 2017

COUNTRY	2016 OVERALL GAPPD SCORE	DIFFERENCE FROM 2016-2017	2017 OVERALL GAPPD SCORE	DRIVER(S) OF CHANGE
India	41	+7	48	<ul style="list-style-type: none"> → DTP3 coverage increased from 87% to 88% (+1 percentage point from 2016 to 2017) → MCV1 coverage increased from 87% to 88% (+1) → Hib3 coverage increased from 45% to 80% (+35)—completed national phased introduction in late 2015 → RotaC coverage increased from 0% to 4%—new phased introduction → Excluded antibiotic treatment indicator this year—data was >10 years old
Nigeria	29	+1	30	<ul style="list-style-type: none"> → PCV3 coverage increased from 13% to 26% (+13)—completed national phased introduction in 2016 (some of this data was captured in the WUENIC 2016 estimate)
Angola	48	-1	47	<ul style="list-style-type: none"> → MCV1 coverage dropped from 55% to 49% (-6) → RotaC coverage increased from 49% to 53% (+4)
Afghanistan	48	-2	46	<ul style="list-style-type: none"> → Appropriate provider care for suspected pneumonia dropped from 62% to 54% (-8) → Antibiotic treatment for suspected pneumonia dropped from 64% to 54% (-10)—data from a new source (DHS 2015)
Niger	44	+1	45	<ul style="list-style-type: none"> → DTP3 coverage increased from 65% to 67% (+2) → MCV1 coverage increased from 73% to 74% (+1) → Hib3 coverage increased from 65% to 67% (+2) → PCV3 coverage increased from 49% to 64% (+15) → RotaC coverage increased from 47% to 61% (+14) → Appropriate provider care for suspected pneumonia dropped from 53% to 26% (-27)
Bangladesh	59	+5	64	<ul style="list-style-type: none"> → PCV3 coverage increased from 48% to 97% (+49)—new vaccine introduction in 2015
Tanzania	74	-5	69	<ul style="list-style-type: none"> → DTP3 coverage dropped from 98% to 97% (-1) → MCV1 coverage dropped from 99% to 90% (-9) → Hib3 coverage dropped from 98% to 97% (-1) → PCV3 coverage increased from 95% to 96% (+1) → RotaC coverage dropped from 98% to 96% (-2) → Appropriate provider care for suspected pneumonia dropped from 71% to 55% (-16) → Antibiotic treatment for suspected pneumonia (+40)—data from new source (DHS 2015-16) → Zinc coverage increased from 5% to 18% (+13)

¹ Three countries (Pakistan, China and Somalia) experienced exactly no change (0.0) in overall GAPPD score from 2016 to 2017. The five remaining countries experienced changes between -0.2 to 0.5, which were rounded to no change.

A photograph of a man with glasses and a cap, smiling while holding a young child. The man is wearing a light blue polo shirt. The child is wearing a light blue and pink patterned wrap and blue sandals. The background shows an outdoor setting with a building and trees.

CASE STUDIES & COMMENTARY

*A man holds a child outside a health center in Nampula, Mozambique.
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The Protective Power of What We Eat

A New Take on an Old Adage for Diarrhea Control

The old British adage “You are what you eat” traces its roots to a French nutritionist-philosopher, making its way through German philosophic writing before taking root in the English language, where it continues to ring true through the famines of the early-mid-twentieth century (10) to the global obesity epidemic of our day and age (11). It emerges again in the important role that nutrition plays in two syndromes that impact millions of children – pneumonia and diarrhea (12,13).



NUTRITION

plays an important role in two syndromes that impact millions of children – pneumonia & diarrhea

Every year we learn a little more about how infants grow and develop into children, youth, and then adults. The breastfeeding, zinc, and ORS components of the IVAC GAPPD score allow us to comment on access to nutrition-based interventions that can stop severe diarrhea, and in turn have a synergistic effect on pneumonia.

Children with poor nutrition are apt to have lower IQs and mental function, and even decreased earning potential once they become adults (14–16). Multiple studies identify under-nutrition as a risk factor for diarrhea and pneumonia throughout the world, and episodes of diarrhea may further predispose malnourished children to infections like pneumonia (6). The relationship is complex, but we know that infectious, recurrent, severe diarrhea and poor diet due to poverty play off of each other in an infectious disease cycle that contributes to malnutrition and stunting (17), and pneumonia plays out in a similar cycle to predispose children to recurrent pneumonia infections. Children with diarrhea have poorer weight gain and growth (e.g. length or height) and are more susceptible to stunting (18). Although childhood stunting has been on the global decline, it is associated with developmental delays, childhood illness,



*A health provider feeds a group of children on the day of Pulse Polio Immunization, a government-sponsored program held at an Integrated Child Development Services (ICDS) Centre in Bagnan, India.
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and early death due to infection (18,19). In addition, treatment of childhood diarrheal disease can impose significant financial burdens on health systems and households, putting families at risk of poverty with repeated diarrheal episodes (20).

Tanzania leads the other 14 countries in terms of total score and diarrhea intervention score. A striking example of a life-saving investment with impact on this nutrition-infection cycle is the catalytic donor support that Save the Children in Tanzania received from Irish Aid and UNICEF. This funding facilitated the formation of a consortium of civil society groups, PANITA, which has worked successfully to build economic empowerment in communities across the country. PANITA has catalogued wins from representation on national steering committees to working with elected officials to prioritize funding for nutrition in government budgets (21). This year Tanzania improved its zinc coverage indicator, with government sector services distributing the micronutrient supplement to 18% of children with diarrhea (+13 percentage points). Giving zinc to children with diarrhea can reduce the length and severity of illness, particularly for children over 6 months of age who are already malnourished (22,23). The low baseline, while an improvement, is much below the target of 90% of children, which presents an important opportunity for life-saving investment.

Despite such success stories, malnutrition and stunting are key public health concerns for governments around the world. With targeted, thoughtful investments in basics such as good nutrition, governments can set up the next generations of children for fewer and less severe diseases. Investment in new technologies is important, but sometimes placing a priority on simple, inexpensive interventions makes a difference big enough to allow a country's children to tell a tale of progress for the future.

TOP COUNTRY

Tanzania leads the way in terms of total score and diarrhea intervention score

A Canary in the Coalmine

How Increasing the Momentum for Measles Vaccine Can Help Reduce Pneumonia & Diarrhea

The decreasing number of deaths due to measles marks progress in our ability to prevent child mortality, of which the leading causes are pneumonia and diarrhea. There is a relationship between pneumonia, diarrhea, and measles – pneumonia and diarrhea are frequent causes of measles complications and mortality, just as measles is a frequent cause of pneumonia and diarrhea deaths (24). Over the past 15 years, we have seen the number of children who die each day from measles drop from 2,000 to 400 (25). This achievement is due to the increasingly widespread use of measles vaccines.



Measles vaccine coverage is the “canary in a coal mine,” indicating weaknesses in a country’s immunization system

Unfortunately, progress has stagnated, leaving the most vulnerable, hard-to-reach children unvaccinated and unprotected. A significant number of countries failed to reach more than one third of young children with MCV1, including Somalia (46%), Angola (49%), Nigeria (51%), and Pakistan (61%). Measles vaccine coverage is the “canary in a coal mine,” indicating weaknesses in a country’s immunization system and, more broadly, its primary health care system. If these children are not receiving measles vaccine, they may not be receiving other critical public health interventions, putting them at risk not only for measles but also for other preventable diseases. Many issues have led to diminished immunization coverage, and the routine immunization systems need to be strengthened in much of Africa and parts of Asia. In some countries in the Middle East, conflict and displacement have interrupted vaccine delivery. In Europe and the US, doubts and myths about vaccines have resulted in measles outbreaks. Facing this challenge requires that stakeholders proactively address community concerns and communicate the risk of measles outbreaks. This will require political will, effort, and funding.



A grandmother cares for her diarrhea-stricken grandson in Cooch Behar, India.
© 2013 Sujan Sarkar, Courtesy of Photoshare

The Lion's Club International Foundation is one organization of note looking to turn this tide; they provide support for measles vaccination efforts around the world. In 2010, the Lions provided advocacy, community mobilization and financial support to vaccinate 41 million vulnerable children in several countries, including some highlighted in this report. Additional funding from the Gates Foundation was matched by the Lions and helped to vaccinate more than 150 million children, including measles vaccination campaigns in Cameroon, Haiti, Kenya, Nepal, Kenya, Uganda, and Zambia. For the 100-year anniversary of Lions Clubs International, the Lions are committed to raise US\$30 million by the end of 2017 for measles vaccination, a goal that will be matched by the United Kingdom's Department for International Development and the Bill & Melinda Gates Foundation.

These efforts to fight measles will not only reduce the number of measles deaths but will strengthen the capacity to reach vulnerable children, create stronger vaccine delivery systems, and in turn, significantly reduce the number of deaths from pneumonia and diarrhea.

The Vaccine Confidence Project

Based at the London School of Hygiene & Tropical Medicine, The Vaccine Confidence Project is an academic research group that monitors public confidence in immunizations. Amidst doubts and myths about vaccines around the world, the project monitors and listens for public concerns and questions about vaccines, in order to better understand the motivations that lead to potential program disruptions, vaccine refusals, and disease outbreaks.

The group is funded by the Gates Foundation and WHO. To learn more about The Vaccine Confidence Project, their publications, and resources, visit www.vaccineconfidence.org.

Shaping Success

How India is Rewriting its Vaccine Story

As the country that shoulders about one-fifth of the world's burden of under-5 deaths (26), India is an important partner in global efforts towards achieving SDG-3 targets and ending preventable child deaths. Pneumonia and diarrhea together are India's leading infectious causes of death for children under 5 years, resulting in the death of one child every two minutes (27). This stark reality has increasingly struck a chord with Indian policymakers, who have taken action to improve equitable vaccine access and coverage in the country.

Mission Indradhanush, leaving no child behind

In 2009, India's full immunization coverage stood around 61% (28). By 2013, it had risen to just 65% (29), meaning that approximately one-in-three Indian children were not fully immunized. The Government of India decided that millions of child deaths from vaccine-preventable disease were simply unacceptable. Thus, Mission Indradhanush (MI) was launched in 2014 to expand the breadth and reach of India's Universal Immunization Program (UIP).

MI seeks to rapidly and systematically expand India's routine immunization program, starting in the areas where it lags most. The program uses rigorous surveillance methods and proactive strategies to achieve ambitious coverage targets in selected high-priority districts. The original aim of MI was to immunize all children under the age of 2 years against seven vaccine preventable diseases, a number that has expanded as new vaccines are added to the UIP. With MI, India actualizes its vision towards equitable immunization and demonstrates its commitment to the nation's health. Over its first four phases, MI has vaccinated about 25 million children in over 500 districts (30).

Along with the introduction and scale-up of new and underutilized vaccines in the UIP, MI has helped drive the increases in immunization coverage captured in India's 2017 GAPPD Score. India's 7-point increase in GAPPD score is the largest positive change amongst the 15 countries evaluated in this year's report, and is largely due to changes in MCV1 (+1%), Hib (+35%), DTP3 (+1%), and RVV (+4%). In a country so populous, these percentages translate to a significant increase in the number of vaccinated children.



For an immunization campaign day in Bangladesh, this volunteer loads his bike with coolers full of measles and polio vaccines and delivers them to each community.
© 2011 Kyla Hayford, Courtesy of Photoshare

RVV and PCV introductions, rollouts in progress

In 2016, India became the first South/Southeast Asian country to introduce RVV into its national immunization program (the UIP). The phased rollout began with four states in 2016, effectively driving up national RVV coverage by 4%. In 2017, five more states rolled out RVV, with more expected in the coming years as India scales up to national coverage. Notably, India is introducing an indigenous RVV product. This introduction was supported by Gavi funding, and is part of Gavi's investment into the UIP, which will span from 2016 to 2021 (31).

Most recently, in response to insufficient treatment for pneumococcal disease and antimicrobial resistance, the country introduced PCV into the UIP. PCV was previously available only through the private market, keeping it out of reach for millions of children. Including PCV in the UIP will help ensure access to the vaccine for the children who need it most. In addition to reducing disease burden, this decision will help low-income families avoid potentially catastrophic treatment-related costs (32) and will alleviate the number of patients in overburdened hospitals (33,34).

The next chapter for India's story is the upcoming Intensified Mission Indradhanush (IMI). IMI will include more cross-cutting strategies with municipal and state governments and implement a rewards incentive for districts to reach 90% full immunization coverage for all Indian children under 2 years of age. Additionally, the Government recently recalibrated the target deadline to December of 2018, rather than 2020 (30). IMI is a robust, country-led program that partners with Gavi, WHO, UNICEF, UNDP, John Snow, Inc. (JSI), Global Health Strategies, Rotary International, and others for technical support. It aims to unpack why children are being missed by the UIP and directly address these issues at an unprecedented scale. Eventually, India will be able to take full ownership of this process as it aims to ensure child health.

RVV ROLLOUT

In 2016, India became the first South/South East Asian country to introduce RVV into its national program

REACHING THE UNREACHED

Healthcare workers travel to the most remote corners of India by any means necessary to ensure all of India's children receive the vaccines to which they are entitled.

Preparing for the Inevitable

Tackling Child Health in the Face of Climate Change

Climate change is more than just higher average temperatures, rising sea levels, and changing weather patterns. It has broad, extensive implications for the health and well-being of children and their families around the world. A critical but sometimes overlooked consequence of climate change is the impact it can have on the fragile progress made to date in reducing childhood disease burden and deaths.



160+

**COUNTRIES
SIGNED
THE PARIS
AGREEMENT**
*committing
to tackle
climate
change*

The countries where overall child and diarrhea-related mortality are greatest are also those most vulnerable to the effects of climate change (36,37). Over the next several decades, climate scientists predict rising sea levels leading to flooding of low-lying coastal areas, along with increased average temperatures and different patterns of rain, snow, and storms. Extreme weather will likely become more common and more severe under most scenarios, impacting millions of people. People in low-income, underserved communities are particularly vulnerable to the physical impacts of climate change—including the resulting disruptions in community systems and resources and the impact of masses of people moving inland to flee affected areas. We already see these effects at play around the world, and they can only be expected to worsen over time.

Changes in average air temperature and rainfall result in floods and droughts. In particularly vulnerable areas, this may lead to an increase in children being infected with bacteria and viruses that cause diarrhea. More severe and more

It's not just diarrhea—climate change is expected to impact child pneumonia illnesses and deaths as well. Efforts to mitigate climate change impacts can play a role in preventing pneumonia.

Investing in renewable energy can reduce outdoor air pollution, which is strongly linked to pneumonia and disproportionately affects children in poorer, urban communities (35). Mosquito-borne diseases like malaria and dengue, as well as other vector-borne diseases, will also be impacted by the shifting rainfall and temperature patterns expected—and already being seen—under climate change scenarios.



A mother navigates flood waters with her baby in Islampur, Jamalpur, Bangladesh.
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frequent extreme weather events can trigger diarrhea outbreaks—for example, as the systems that deliver clean water and take away sewage and dirty water reach capacity, they may become damaged, exposing more people to water and food contaminated with disease-causing pathogens. Shifts in the typical rainfall and temperature usually seen in a given season can change the normal rhythms of some causes of enteric diseases, like cholera and *Escherichia coli* (38–42). Recent catastrophic flooding in Bangladesh and India, as well as Nepal and Myanmar, has highlighted this issue, with reports of diarrheal disease outbreaks in these areas, along with increases in malaria and dengue (43–45).

Addressing the root causes of climate change and the associated risk of diarrheal disease, especially amongst children, will require immense global effort. One recent turning point marks our collective commitment to adapt to climate change and to work together to reduce the risk and danger it poses to people—adopted in December 2015, the Paris Agreement entered into force in November 2016 and has since been signed by more than 160 countries (46). Yet, this landmark turning point is the first step of a long journey. To deal effectively with the growing health threats as extreme weather, droughts, and flooding continue to increase, the world needs scientists to better understand how to predict and prevent worsening diarrheal disease (42).

Child health advocates and climate change activists can work together to highlight the interdependency of health and climate. An equity-focused approach can help ensure that populations in areas prone to the effects of climate change receive the resources they need. Vulnerable countries must scale up their comprehensive package of interventions to help reduce the risk of childhood diarrhea in the face of a changing climate. Expanding access to rotavirus and measles vaccines, as well as others like oral cholera vaccine where needed; improving WASH and addressing malnutrition; and delivering ORS and zinc may create extra layers of protection against disease in countries threatened by climate change. Climate change readiness must account for potential health impacts, including strategies to prevent WASH failures in flood settings and plan for climate refugees who will stress overburdened health systems. Understanding the links between diarrheal disease and the environment—and shifting our work to address drivers of both climate change and diarrheal disease—will require long-lasting country ownership, global commitment, and donor support.

EQUITY- FOCUSED APPROACH

ensures that populations in areas prone to the effects of climate change receive the resources they need

The Costs We Don't Account For: Why Pneumonia and Diarrhea Result in Catastrophic Consequences

Few diseases have as much power to cause wide-ranging impact amongst the population as pneumonia and diarrhea. This is primarily because of their potential to cause long-term disability and economic consequences.

One of the most severe consequences of infection is the sudden, catastrophic out-of-pocket expenditures households have to make when a child is hospitalized for pneumonia or diarrhea. These consequences are often seen the most in the highest burden countries. For example, a study in Ethiopia estimated 11% of pneumonia and diarrhea cases were considered catastrophic relative to a household's annual capacity to pay (47). These estimates increased to 96% of households when the health expenditure was compared to monthly household capacity to pay (47). In Bangladesh, pneumonia out-of-pocket expenditures exceeded half the household monthly income in 75% of households (48). Unfortunately, not all governments are investing equitably in healthcare costs. In nine of the 15 highest burden countries, the government contribution to healthcare costs equates to less than 50% (see Appendix) (49).

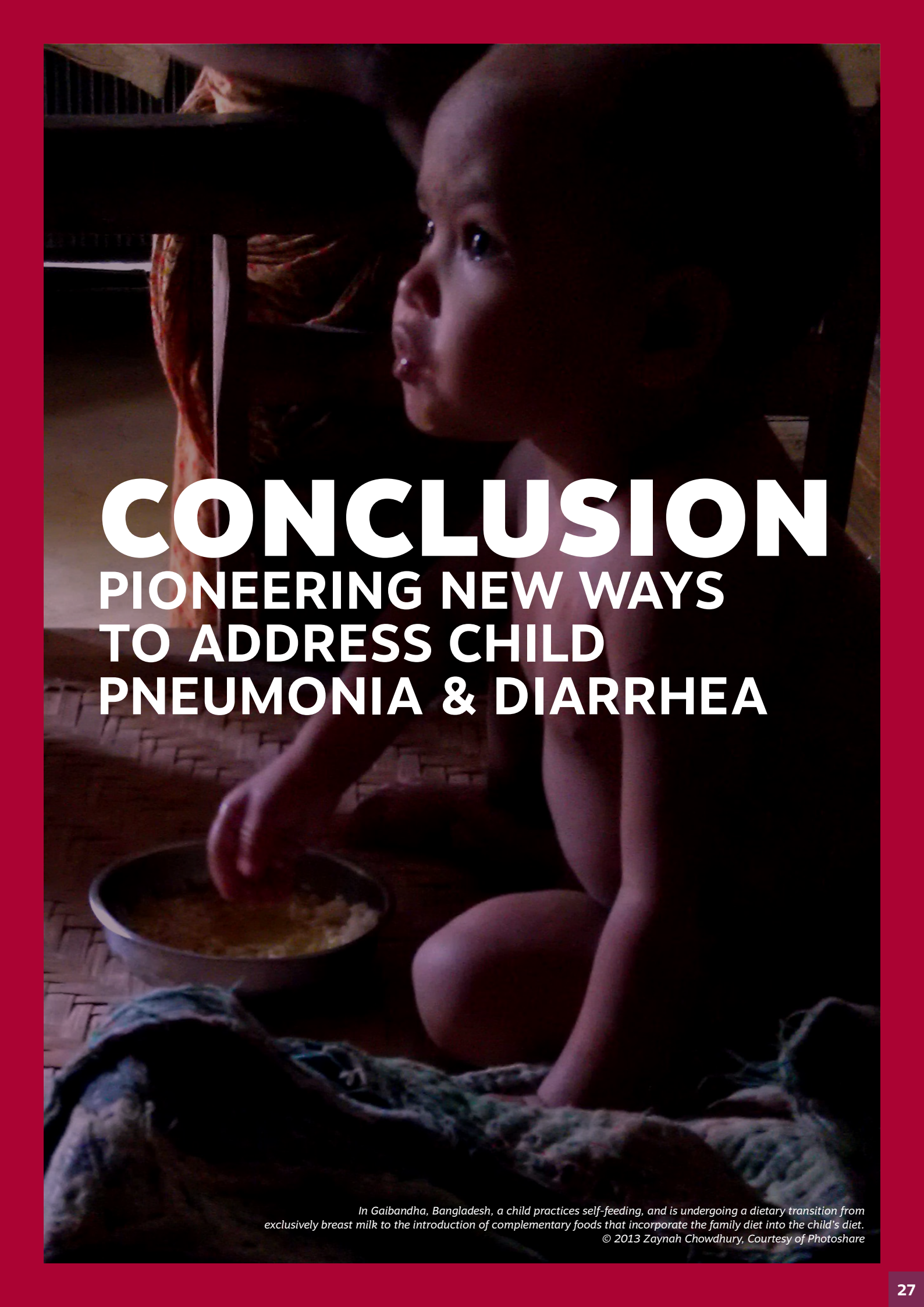
This out-of-pocket burden disproportionately impacts the most vulnerable and poorest households, especially since these same households often lack savings and are forced to reduce other expenses in the short term, sell assets, or borrow money to pay for health expenditures. In Bangladesh, 42% of households borrowed money, and 11% mortgaged or sold household assets to pay for hospitalized pneumonia in children under-5 (48). In order to repay debts, households often reduce

consumption of essential items like food and work extra hours (48,50). This can increase the risk for further illness and forces households to make difficult decisions when illness arises.

The economic burden of disease impacts all sectors and disciplines, not just health. This multi-sectorial burden can be improved by investment into universal health coverage, including primary health care and immunization programs, shielding the most vulnerable from catastrophic out-of-pocket expenses. For example, in Ethiopia, continued investment in diarrhea treatment and rotavirus vaccination was estimated to avert US\$ 44.1 million in out-of-pocket expenditures (51). In India, by introducing and scaling up coverage of vaccination programs targeting pneumonia and diarrhea, India could save over US\$ 1 billion each year in economic benefits and avert more than 90,000 needless child deaths each year (52).

Investment in programs to prevent and control pneumonia and diarrhea are smart investments, and as countries transition away from external funding and subsidies, new strategies to increase or sustain funding are needed. (Please refer to the Appendix for more information and insight on financing strategies). Country-owned financing strategies are a critical step on the path to sustainability and are needed to ensure programs have sufficient, long-term funding to reach all children.

In 9 of the 15 highest burden countries, governments contribute <50% of healthcare costs



CONCLUSION

PIONEERING NEW WAYS TO ADDRESS CHILD PNEUMONIA & DIARRHEA

*In Gaibandha, Bangladesh, a child practices self-feeding, and is undergoing a dietary transition from exclusively breast milk to the introduction of complementary foods that incorporate the family diet into the child's diet.
© 2013 Zaynah Chowdhury, Courtesy of Photoshare*

In this report, IVAC analyzes the latest progress of the 15 countries with the highest absolute numbers of child pneumonia and diarrhea deaths. The analysis of GAPPD indicators enables us to form a snapshot of the progress countries are making in addressing these two leading childhood killers. The effects of preventing pneumonia and diarrhea go well beyond saving lives. Although we often focus on the number of lives lost to these illnesses, country commitments to equitable protection, prevention and treatment for pneumonia and diarrhea can also strengthen the provision of primary care, and address issues such as poverty, equity and education.

Overall, while the 15 countries featured in this report are making marked progress towards vaccine coverage and breastfeeding targets, they are lagging behind in meeting treatment goals. Recognizing the many complex challenges involved, it must be noted that nine countries have yet to meet any of the GAPPD targets. While the data doesn't clearly reflect all of the steps taken to tackle the problem – or as in the case of China, is not fully reported – it is still concerning that more progress hasn't been made.

This analysis also highlights some important forward progress. Countries such as India are not only improving performance, but also focusing on equity in a concerted manner. Tanzania, Sudan and Bangladesh have also performed above average and will need to sustain and build upon this progress.

Other countries, such as Somalia, Nigeria, and Chad had significant challenges within, and outside of, the health sector. While Nigeria, which has experienced financial decline and political strife, has met success with their expansive, polio-focused immunization program, coverage of routine childhood vaccines remains low, resulting in sluggish progress on child mortality rates. In order to maintain and gain ground, these countries must ensure continuous delivery of

routine services, especially to the most vulnerable. Investments into improving vaccine coverage for the most vulnerable populations have had the greatest impact on child mortality rates in other countries.

While the price paid in lives lost remains significant, the cost of pneumonia and diarrhea is greater than the sum of health care expenditures, especially for households with the lowest incomes. The indirect economic consequences include missed schooling for children and lost wages for parents when they provide care. In addition, there are longer term effects of repeated or severe illness, which can leave children with life-long disabilities.

Upon reflection of the limited progress made to date, we conclude that the need to move beyond conventional thinking in how we address child health is more urgent than ever before. Around the world, companies, governments, and non-governmental organizations are pioneering new ways to address contemporary challenges, and these insights must be taken up by public health actors and child health advocates alike. By highlighting the importance of catalytic investments, innovative partnerships, and political will, this report hopes to shed light on opportunities to fill the gaps that still exist in tackling

Limitations

As with any effort to accurately track country progress year to year, this report has limitations. These limitations include missing data, old data, and a finite number of indicators, which may not represent all nuances of country progress. While the available data and indicators may be imperfect, their analysis is, nevertheless, informative and useful. A further description of limitations is provided in the appendix.

childhood pneumonia and diarrhea. It is critical to recognize that this is not just a health problem, and smart investments in child health allow countries and communities to reap an array of benefits, including greater educational attainment and breaking the vicious cycle of poverty. Because pneumonia and diarrhea impact all SDGs, global goals can only be attained through new collaborations across all sectors and disciplines.

By continuing to critically and regularly examine the measurable movement towards achieving GAPPD goals in the highest burden countries, it is our intent that these findings will spark a renewed commitment to child health with a global call for investment, innovation, and leadership. This is a time for boldness, not complacency. We must work harder and smarter than ever before to create a world where children are given the chance not only to survive but to thrive.

RECOMMENDATIONS

Accelerate the scale-up of interventions that promote protection, prevention and treatment

Introducing an intervention is only part of the solution. Particularly in large or fragile countries, systems are often weak where need is highest. Scale-up should be hastened to ensure greatest impact and deliver sustainable platforms from which future benefit can be seen.

Prioritize investments that emphasize equity

Although reaching marginalized populations may be more expensive, the broader benefits of helping avert catastrophic expenditures or out-of-pocket costs that hinder the development of strong families and communities must be considered.

Increase focus on treatment access while maintaining momentum and expansion of preventive and protective strategies

Access to treatment is unacceptably low and must be addressed alongside efforts to increase equitable vaccine coverage, promote breastfeeding, and ensure adequate nutrition.

Integrate across sectors and disciplines to address disease burden holistically

Addressing childhood pneumonia and diarrhea will benefit nearly all SDGs. Building relationships with other sectors will strengthen political will to act. We can also leverage work in other sectors to implement strategies with cross-reaching impact.

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MORE RESOURCES

VIEW-HUB (VACCINE INFORMATION AND EPIDEMIOLOGY WINDOW) is a publicly accessible interactive platform to visualize real-time information on vaccine use, product type, coverage levels, as well as impact assessments. It can be utilized to track progress and strategize ways to accelerate and optimize vaccine implementation. This tool is designed for global, regional, and national stakeholders from the global health community, including partners, civil society organizations, academia, industry, governments, and donor institutions. VIEW-hub compiles data from a variety of official and unofficial vetted partner sources in a central platform where data visualizations (e.g., maps, graphics) and summaries can be generated and customized to the user's needs. Data are systematically gathered and are triangulated across official sources as needed to ensure validity. Visit view-hub.org.

VOICE (THE VALUE OF IMMUNIZATION COMPENDIUM OF EVIDENCE) is a browsable, queryable database of information about the broad benefits of immunization and costs of vaccine-preventable disease. The tool is designed to capture the many ways in which immunization can be valued, and to present the evidence supporting a broader valuation of vaccines by linking the broader ripple effects of immunization and of vaccine-preventable disease on the health, economic status, societal wellbeing and equity of individuals, communities and nations. The information contained in VoICE has been drawn from peer-reviewed literature and other sources and synthesized with policy-focused immunization, child health and global health advocacy organizations in mind. Each linkage (called “key ideas”) is supported by one or more sources, with a summary of the key results for each source. Visit view-hub.org/voice.



For additional partner features, please see Appendix in the online report, found at <https://www.jhsph.edu/research/centers-and-institutes/ivac/resources/IVAC-2017-Pneumonia-Diarrhea-Progress-Report.pdf>

ACKNOWLEDGEMENTS

The Pneumonia and Diarrhea Progress Report is prepared and published annually by the International Vaccine Access Center (IVAC) at Johns Hopkins Bloomberg School of Public Health to mark World Pneumonia Day. This is the eighth edition of the progress report and the ninth year of World Pneumonia Day.

We gratefully recognize the following organizations and individuals for their valuable contributions to the 2017 edition of the Pneumonia and Diarrhea Progress Report (in alphabetical order): Bill & Melinda Gates Foundation, Clinton Health Access Initiative, Global Health Strategies, Lions Club International Federation, Results for Development, UNICEF, and the World Health Organization.

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Cover Photo

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Suggested Citation

International Vaccine Access Center (IVAC), Johns Hopkins Bloomberg School of Public Health. (2017). Pneumonia and Diarrhea Progress Report 2017: Pushing Progress through Investment & Action. Retrieved from: <https://www.jhsph.edu/research/centers-and-institutes/ivac/resources/IVAC-2017-Pneumonia-Diarrhea-Progress-Report.pdf>

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