

# The Economic Benefits of Scaling up Vaccines against Pneumonia and Meningitis in 14 Middle Income Countries

Meghan L Stack<sup>1</sup>, Sachiko Ozawa<sup>1</sup>, Yvonne Tam<sup>1</sup>, Damian G Walker<sup>2</sup>, Orin S Levine<sup>1</sup>

<sup>1</sup> International Vaccine Access Center, Department of International Health, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD USA

<sup>2</sup>The Bill and Melinda Gates Foundation, Seattle, Washington, USA

## INTRODUCTION

Much of child health research and funding support focuses on the world's poorest countries, leaving middle-income countries with less evidence to assess the benefits of interventions. Vaccines remain one of the most cost-effective health interventions and may result in considerable economic benefits in middle-income countries despite limited international support. This study projects the potential economic benefits of scaling up *Haemophilus influenzae* type b (Hib) vaccine and pneumococcal conjugate vaccine (PCV) over the Decade of Vaccines (2011-2020) in 14 non-GAVI eligible middle-income countries.

## METHODS

### Coverage Assumptions

PCV and Hib vaccine coverage was raised from 2010 levels to current DTP3 coverage over 1-3 years (depending on the size of the country).

### Health Impact

We used the Lives Saved Tool (LiST)<sup>1</sup> to estimate the impact of scaling up PCV and Hib vaccine coverage on child mortality. Country- and disease-specific case fatality ratios were used to project the number of cases that would be averted.

### Cost of Illness<sup>3</sup>

#### Treatment costs

Using existing evidence and WHO-CHOICE<sup>2</sup>, direct and indirect costs of vaccine-preventable pneumonia and meningitis cases were estimated for each country and applied to the projected number of averted cases that would have sought care as measured by Demographic Health Surveys (DHS).

### Reduced caretaker output

We estimated caretakers' improved output from vaccination by assuming 50% of daily wages were saved for every outpatient visit that was averted and 100% of daily wages were saved for every hospital bed day averted.

### Lost productivity due to premature death and long-term disability

Projected GDP/capita was applied to the number of productive life years lost from death or major meningitis sequelae (age 15+) that could be averted with vaccine scale up and discounted 3% annually.

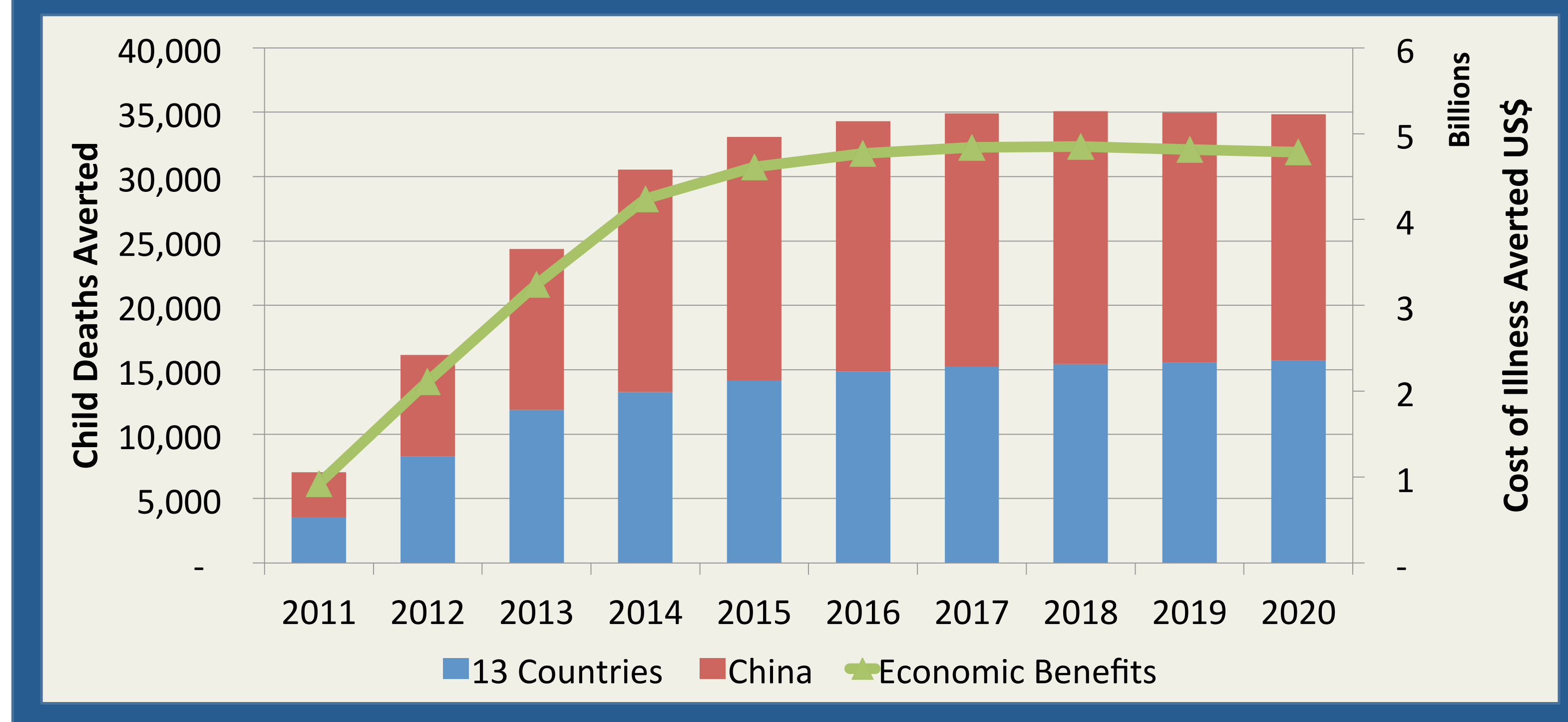
**Sensitivity analysis** was performed to obtain a 95% uncertainty range.

## RESULTS

Results from LiST show that scaling up PCV and Hib vaccine to current DTP3 coverage could save 285,000 child lives over the next 10 years. See Figure 1 for country distribution.

### FIGURE 2

Annual Lives Saved and Cost of Illness Averted 2011-2020



We found that scale-up of PCV and Hib vaccine to current DTP3 coverage over 2011-2020 would result in:

- **Economic benefit of \$39 billion** (uncertainty range: \$32.8 billion - \$46.3 billion) using the cost of illness methodology
- **Averted treatment costs equaling \$878 million** (uncertainty range: \$582 million - \$1.4 billion)
- **Long-term productivity gains of \$38 billion** (uncertainty range: \$31.8 billion - \$44.7 billion). [considered disability + death productivity]

### TABLE 2

Cost of Illness Averted (millions 2009 US\$) with uncertainty ranges

Disease	Treatment costs	Caretaker productivity	Disability productivity	Death productivity	Total costs averted
Pneumonia	839	431	-	31,680	32,950
Meningitis	39	18	1,227	4,967	6,250
Total (less China)	161	58	169	9,031	9,419
<b>Total</b>	<b>878</b>	<b>449</b>	<b>1,227</b>	<b>36,647</b>	<b>39,200</b>
Uncertainty	(582-1,439)	(212-624)	(570-2,526)	(30,713-42,987)	(32,806-46,302)

## CONCLUSION

While a majority of interventions and research focuses on the world's poorest countries, it is important for stakeholders to realize the large impact that improving immunization access in middle-income countries can have on health and economic outcomes. The results of this analysis can be used by both country-level and international stakeholders to assess returns on investment in immunization through both treatment savings and productivity gains.

## REFERENCES

- 1 Lives Saved Tool (LiST), Johns Hopkins Bloomberg School of Public Health. January, 2012. Available at: <http://www.jhsph.edu/dept/ih/IIP/list/index.html>
- 2 WHO. WHO-CHOICE unit cost estimates for service delivery [internet]. Geneva:WHO; July, 2011. Available from: [http://www.who.int/choice/country/country\\_specific/en/index.html](http://www.who.int/choice/country/country_specific/en/index.html).
- 3 Stack, M., Ozawa, S., Bishai, D., et al. Estimated Economic Benefits During the 'Decade of Vaccines' Include Treatment Savings, Gains in Labor Productivity. Health Affairs. 6;2011.

TABLE 1

14 non-GAVI eligible middle-income countries used in analysis

Country	Reg.	Group	2010 WB DTP3 Surviving Cover	Infants age ('000s)
Botswana	AFR	UMIC	96	45
Brazil	AMR	UMIC	98	2,959
China	WPR	UMIC	99	16,143
Egypt	EMR	LMIC	97	1,836
Gabon	AFR	UMIC	45	39
Guatemala	AMR	LMIC	94	454
Iraq	EMR	LMIC	65	1,087
Mexico	AMR	UMIC	95	2,183
Morocco	EMR	LMIC	99	604
Peru	AMR	UMIC	93	583
Philippines	WPR	LMIC	87	2,293
South Africa	AFR	UMIC	63	1,006
Swaziland	AFR	LMIC	89	32
Turkmenistan	EUR	LMIC	96	104

FIGURE 1

Distribution of 285,000 Deaths Averted

