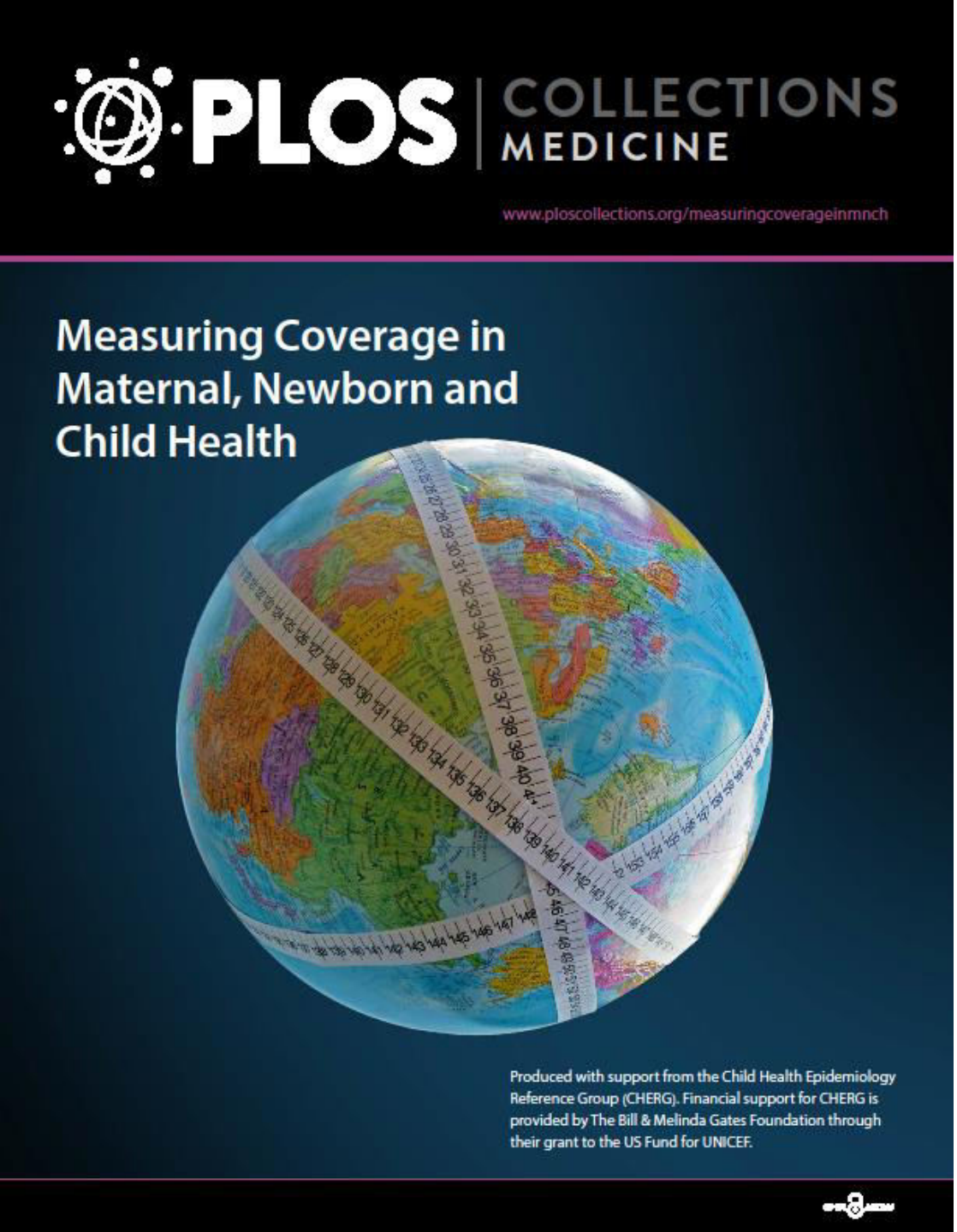

Sample Findings 1: Measuring coverage of treatment of childhood pneumonia

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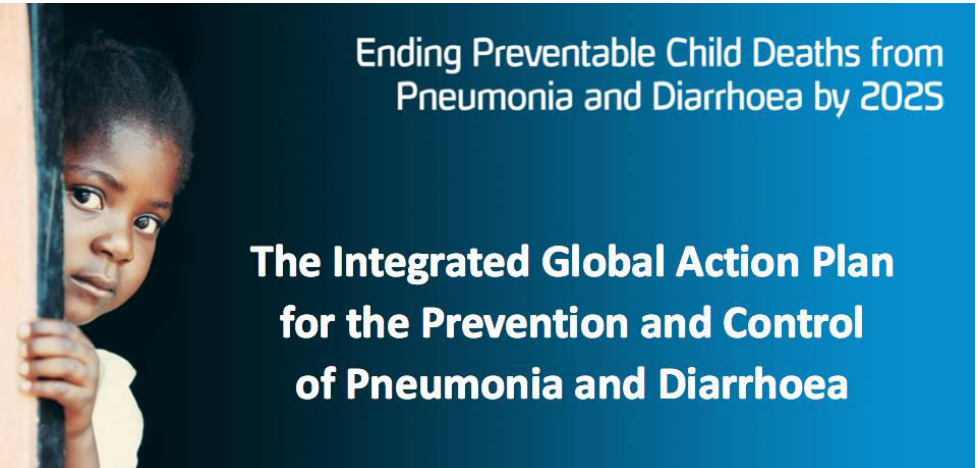
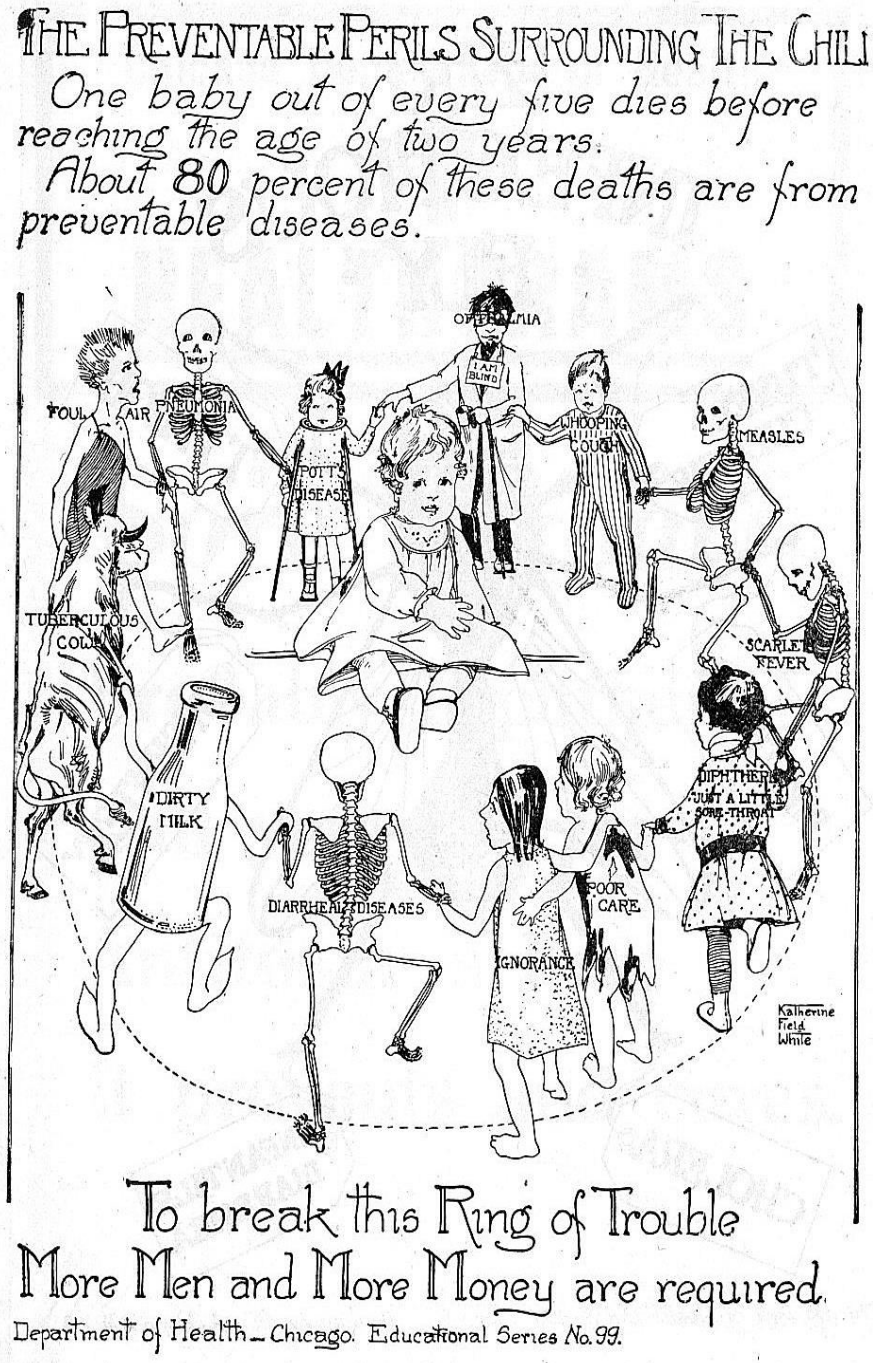
Child pneumonia death– a preventable peril

- Child mortality too high
- Most causes are preventable
- We need support to scale up what we know works



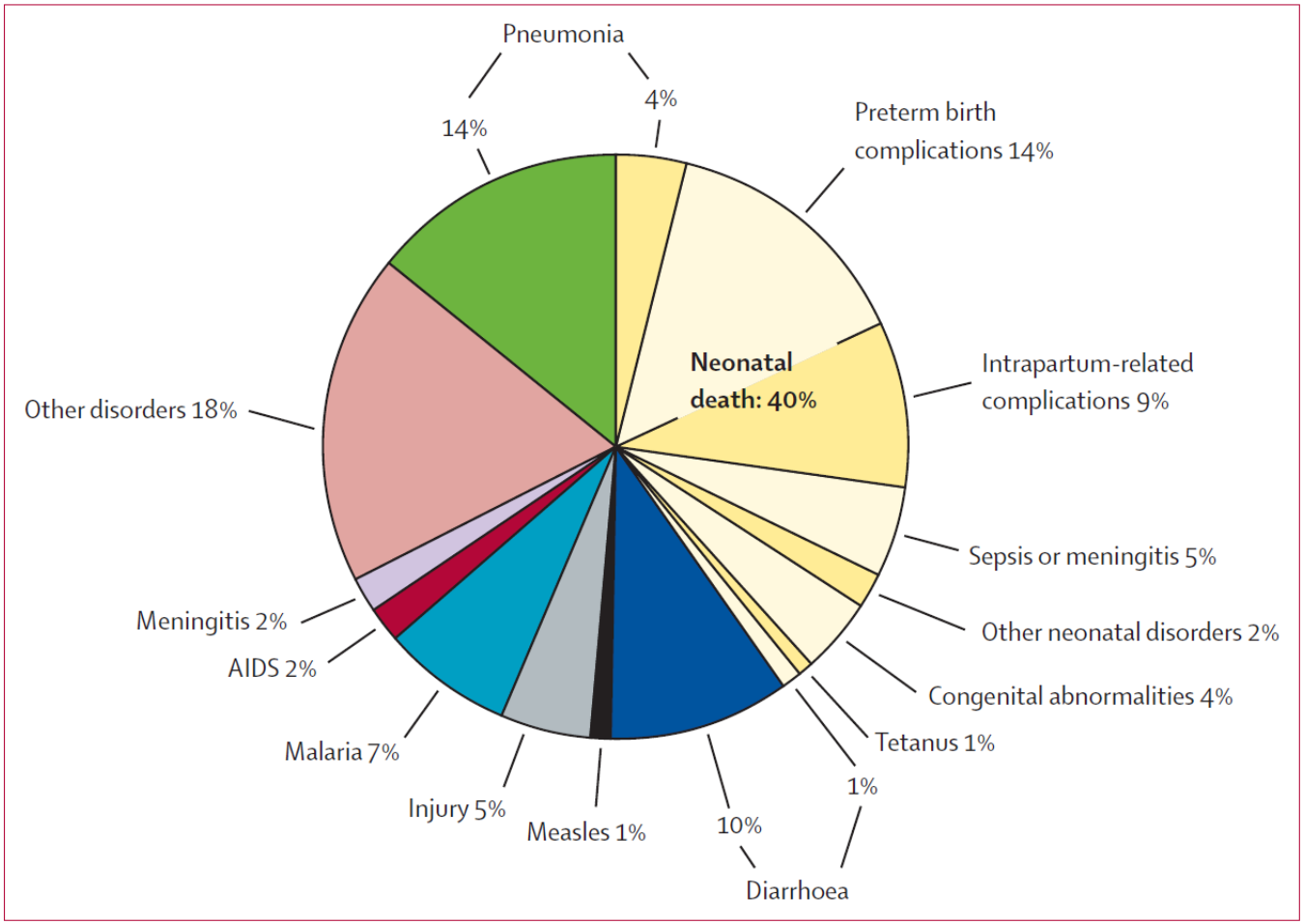


Pneumonia: the major cause of child death

Table 1: **Estimated numbers of deaths by cause in 2010**

Pneumonia was responsible for 1.3 million child deaths in 2011

Fischer-Walker C. Lancet 2013



Pneumonia case management: antibiotic treatment

Childhood Pneumonia and Diarrhoea 2

Interventions to address deaths from childhood pneumonia and diarrhoea equitably: what works and at what cost?

Zulfiqar A Bhutta, Jai K Das, Neff Walker, Arjumand Rizvi, Harry Campbell, Igor Rudan, Robert E Black, for The Lancet Diarrhoea and Pneumonia Interventions Study Group*

[Pneumonia case management with antibiotics] is a key strategy to reduce pneumonia mortality

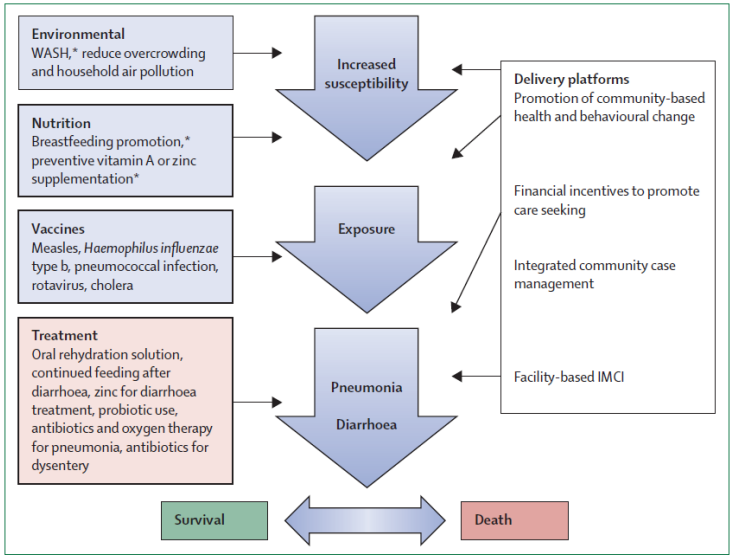


Figure 1: Conceptual framework of the effect of interventions for diarrhoea and pneumonia
WASH=water, sanitation, and hygiene. IMCI=Integrated Management of Childhood Illness. *Interventions common to both diarrhoea and pneumonia.

2013 Annual Letter from Bill Gates: measurement, measurement, measurement

"in the past year I have been struck again and again by how important measurement is to improving the human condition. You can achieve amazing progress if you set a clear goal and find a measure that will drive progress toward that goal-in a feedback loop. This may seem pretty basic, but it is amazing to me how often it is not done and how hard it is to get right".

Challenge: measure % children with pneumonia who receive antibiotic treatment

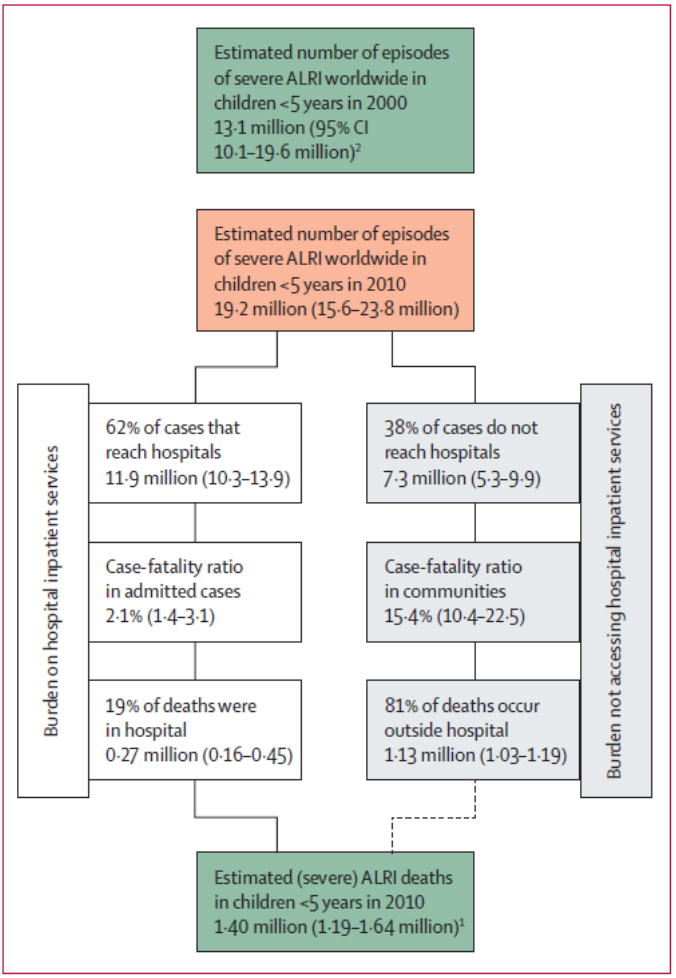


Figure 4: Global burden of severe acute lower respiratory infection, including burden on hospital services

Understanding how these estimates fit with previously reported estimates of the

35% of severe pneumonia cases do not reach hospitals

81% of pneumonia deaths occur outside of hospitals [Nair H. Lancet 2013]

Cannot assess this indicator with hospital studies – need a community survey

Pneumonia treatment rate : community survey

Expressing a treatment rate of 50% with a precision of +/- 5% would require a study of 385 children with pneumonia

True pneumonia incidence - 0.3 episodes / child / yr

Survey asking about cases in last 2 weeks *

- Survey of 10,000 children will detect 120 cases
- Survey of 32,000 children will detect 385 cases

So need large scale surveys to measure this indicator

DHS and MICS are the only surveys that are currently widely conducted at this scale

DHS and MICS approach: uses a proxy measure of pneumonia

Caregiver report of children with signs consistent with pneumonia - ask whether these children received antibiotic treatment

Is this approach valid? Study addressed this question

Study Design:
field studies in Pakistan and Bangladesh

- 950 children with confirmed pneumonia and 980 children with cough (but who did not have pneumonia) were recruited by medical officers

- They were all followed up at home at 2 or 4 weeks by field workers with DHS / MICS survey questions on pneumonia

- We tested alternative methods including a video showing children with pneumonia and with "cough or cold" and a drug chart illustrating locally available antibiotics

Key Findings

1) DHS / MICS question sensitivity (detection rate) for pneumonia was 50 – 70%
2) DHS / MICS question specificity for pneumonia was about 70% (false positive rate 30%)
3) No difference between 2 and 4 week recall
4) Correct recall of antibiotic treatment 67%
5) Performances were a little better with newer methods [video and drug charts] eg correct treatment recall increased from 67% to 72%

Context for interpretation of study results:

DHS / MICS survey of 10,000 children

1. A survey population of 10,000 children can be expected to include 120 children who have had pneumonia in past 2 weeks
2. there are at least 10 cases of cough for every case pneumonia

Das Bild kann zurzeit nicht angezeigt werden.

Context for interpretation of study results:

apply 70% sensitivity and 70% specificity

Das Bild kann zurzeit nicht angezeigt werden.

1. 444 with reported symptoms / signs versus 120 with pneumonia
2. Only 84/444 (19%) with symptoms / signs have true pneumonia

Problems with use of these data as an indicator of pneumonia treatment

CONSIDER "ideal" programme in which

- 100% of 120 pneumonia cases treated with antibiotics
- 0% of 1200 children with cough (but who do not have pneumonia) treated with antibiotics

If perfect recall of treatment by caregivers the treatment rate among children with reported signs consistent with pneumonia would be 84 / 444 = 19%

If a programme interpreted this as a poor coverage of antibiotic treatment it may take inappropriate action leading to antibiotic overuse

The bottom line – avoid calling this indicator "pneumonia treatment rate"

FIGURE 11
CHILDREN UNDER FIVE WITH PNEUMONIA WHO RECEIVED ANTIBIOTICS

(DATA FROM 27 COUNTRIES, MAINLY FROM THE EARLY 1990s)

Total	19%
Urban	24%
Rural	17%
Male	19%
Female	18%
No formal education	15%
Primary education	20%
Secondary education	27%

See statistical table 5.

* Currently, only DHS mainly from the early 1990s are available for a sample of 27 countries, and these surveys are subject to under- and over-reporting as a result of caregivers' lack of knowledge regarding drug treatments. They also do not record dosage and timing of treatment. It is likely that antibiotic coverage has increased since these data were collected.

Problems in use of these data as an indicator of pneumonia treatment

Among children in whom the caregiver reports signs consistent with pneumonia, a treatment rate of 19% is consistent with:

1. 100% of the 120 pneumonia cases treated with antibiotics and 0% of the 1200 children with cough (who do not have pneumonia) treated with antibiotics

2. 10% of 120 pneumonia cases treated with antibiotics and 21% of 1200 children with cough (who do not have pneumonia) treated with antibiotics

The bottom line – take care in interpreting this indicator as "pneumonia treatment rate"

Global Mortality Rank in Pneumonia Deaths in Children under 5[1]	Country	Annual Child Pneumonia Deaths (000s) 2010[1]	Vaccine Coverage				% of Children with suspected pneumonia		% Exclusive breast-feeding in first 6 months[4]	GAPP Intervention Score
			Pertussis (DTP3) 2011[2]	Measles 2011[2]	Hib 2011[2] or (Year Introduced) [3]	PCV Introduction Status[3] or 2011 (Year Introduced)[3]	Taken to an appropriate health-care provider[4]	Receiving antibiotics[4]		
1	India	396.7	72	74	Coverage in some states (2012)[5]	Non-GAVI introduction planned	69	13	46	55
2	Nigeria	143.6	47	71	Coverage in some states (2012)[6]	GAVI introduction planned (2013)	45	23	13	40
3	Democratic Republic of the Congo	87.0	70	71	70 (2009)	9 (2011)	40	42	37	55
4	Pakistan	79.8	80	80	80	Introduced (2012)	69	50	37	66
5	Ethiopia	57.8	51	57	51	Introduced (2012)	19	5	49	39
6	China	54.7	99	99	Private market coverage	No decision	-	-	28	75

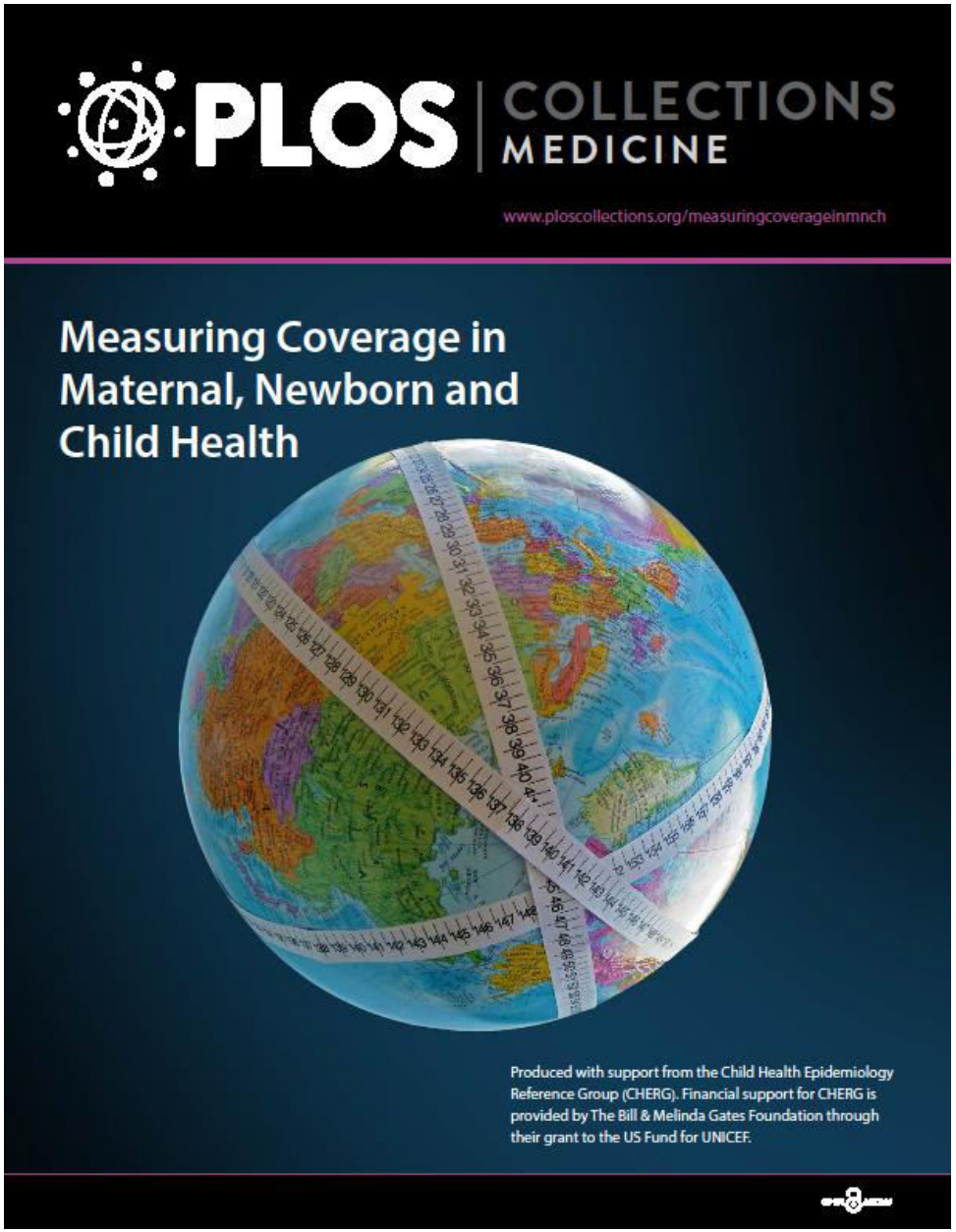
Future Work

- CHECK THESE FINDINGS: We plan two further studies in Africa to check that the findings are replicated in different epidemiological settings

- WORK TO EXPLORE OTHER MEASURES: We plan work to continue to try to develop improved or alternative indicators

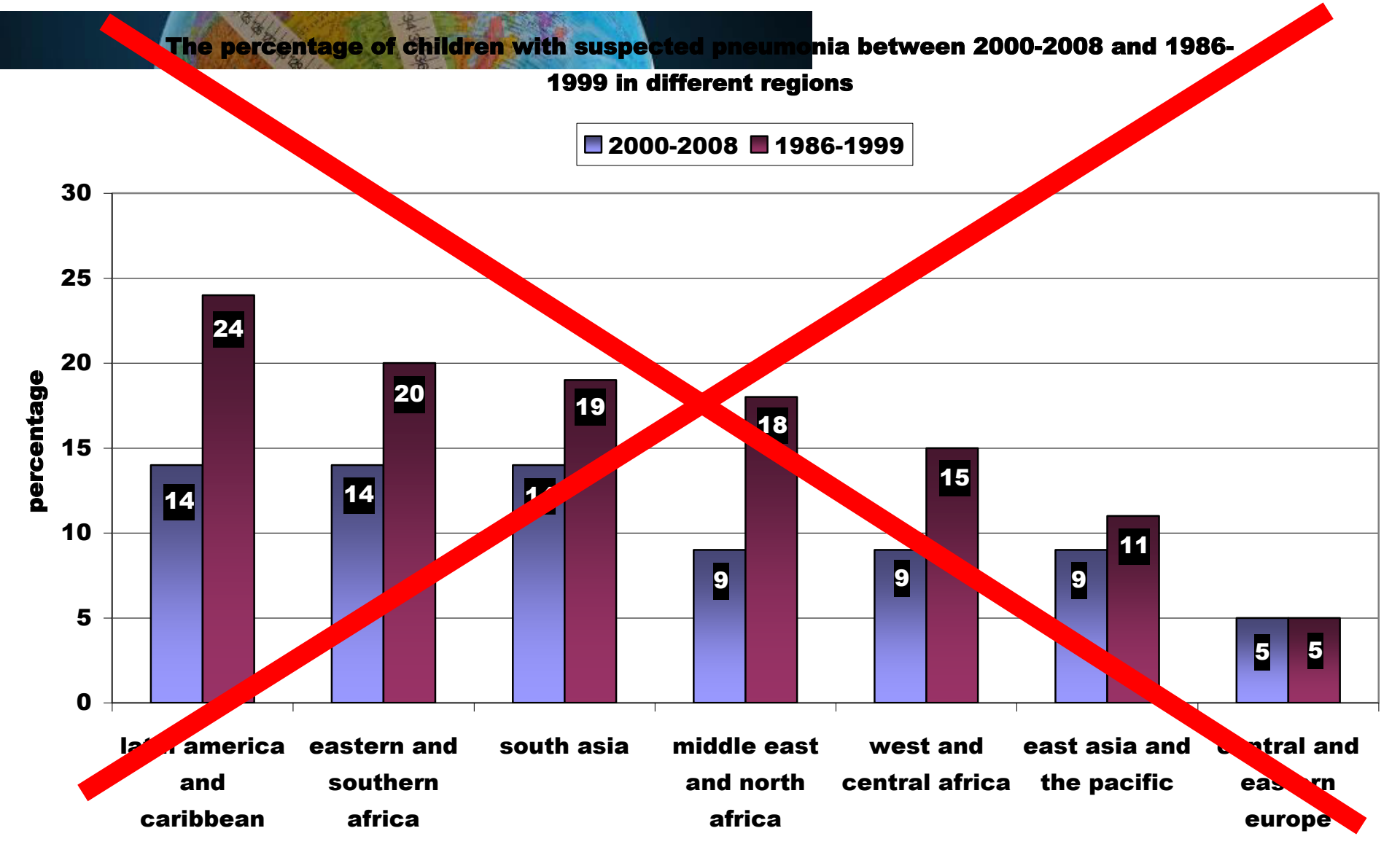
Thanks to Contributors

- Authors and their institutions
  - Tabish HAZIR, Amira KHAN, Salim Abbassi
  - Shams EL ARIFEEN, Khadija BEGUM, Hamidul HUQUE
- CHERG scientists - Shamim QAZI, Jennifer Bryce
- PLOS Med Collections team, Technical Editor, and peer reviewers
- Bill & Melinda Gates Foundation
- JHSPH support team



http://www.ploscollections.org/measuringcoverageinmnch

The Bottom Line: don't be tempted to use DHS/MICS data to estimate prevalence of pneumonia (median 12% not expected 1.2%)



Interpretation of study results: what is the context for these results?

- a summary estimate of pneumonia incidence is about 0.3 episodes per child per year
  - systematic review of population-based cohort studies using case definitions consistent with WHO IMCI pneumonia

- a summary estimate of the incidence of "cough and cold" is about 5 episodes per child per year
  - based on a series of well designed (BOSTID) studies using standard case definitions

So about 10-15 cases of "cough and cold" for every case of pneumonia