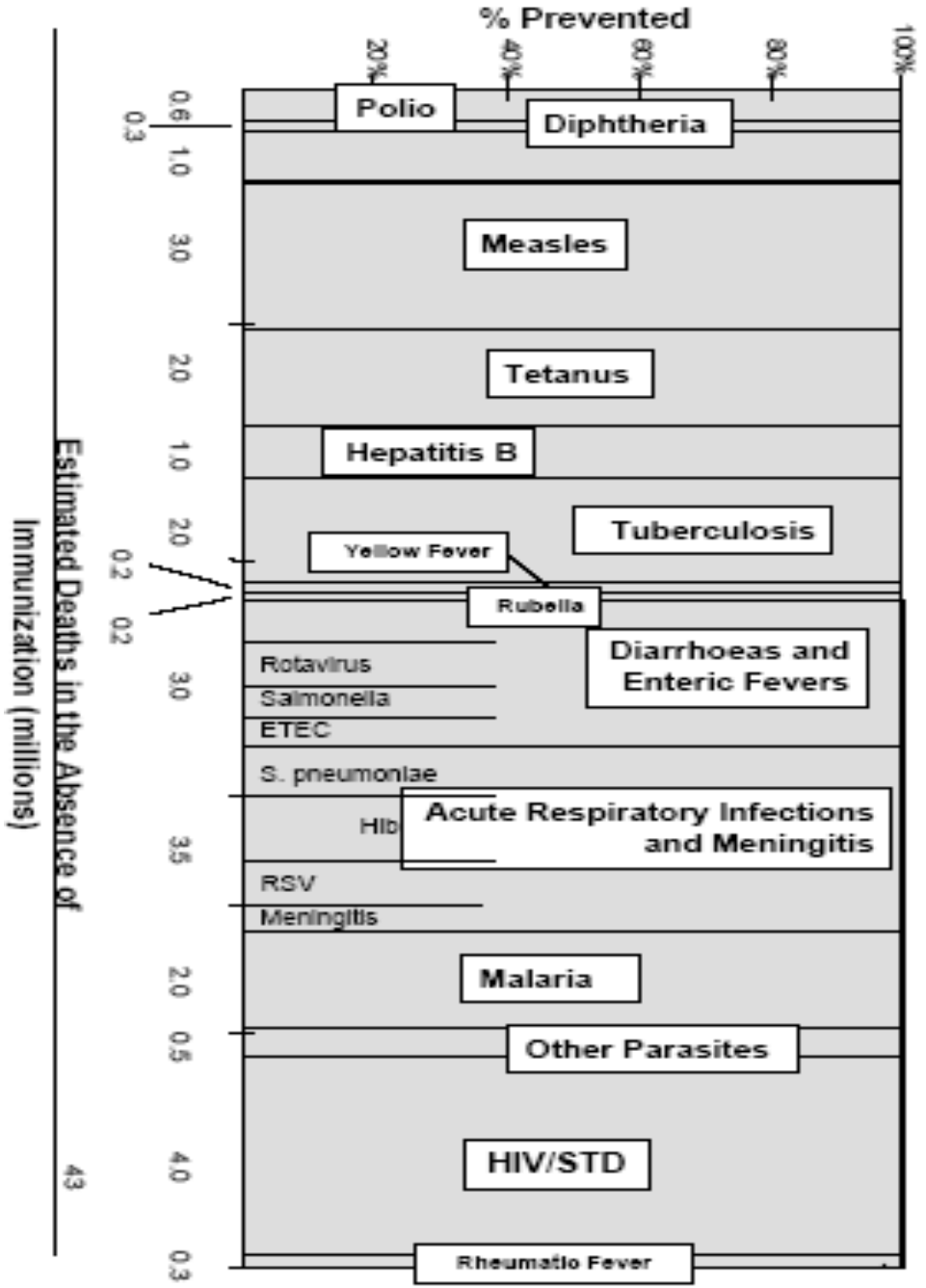
SOME BACKGROUND FIGURES

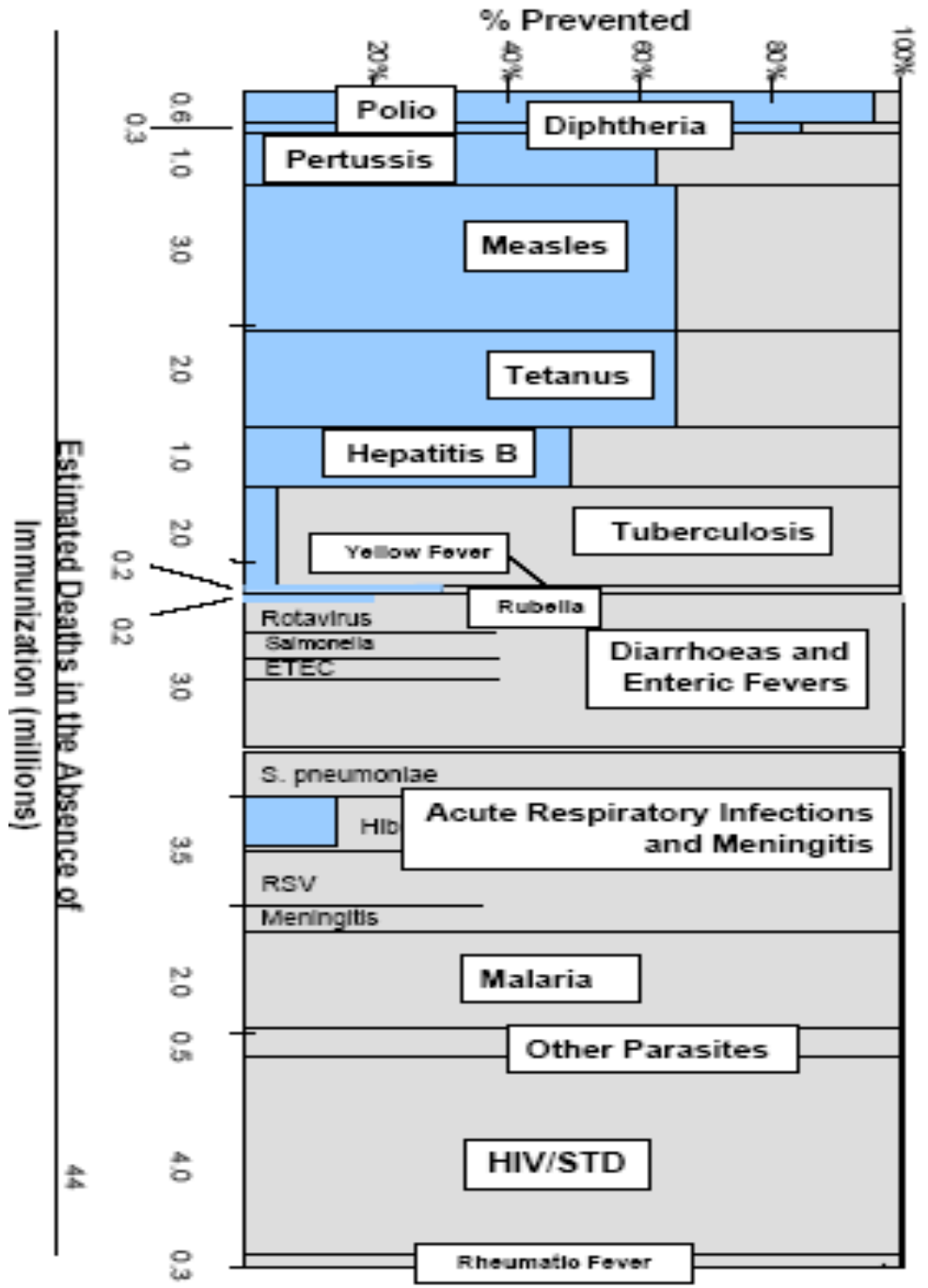
Variety of figures to get a sense for the scale of the problem, reflect changing ability to record data, etc.
The first few slides are for about 2002. The 2000s were an interesting decade for vaccines in the context of global health.
Later slides update.

Estimated deaths without vaccination

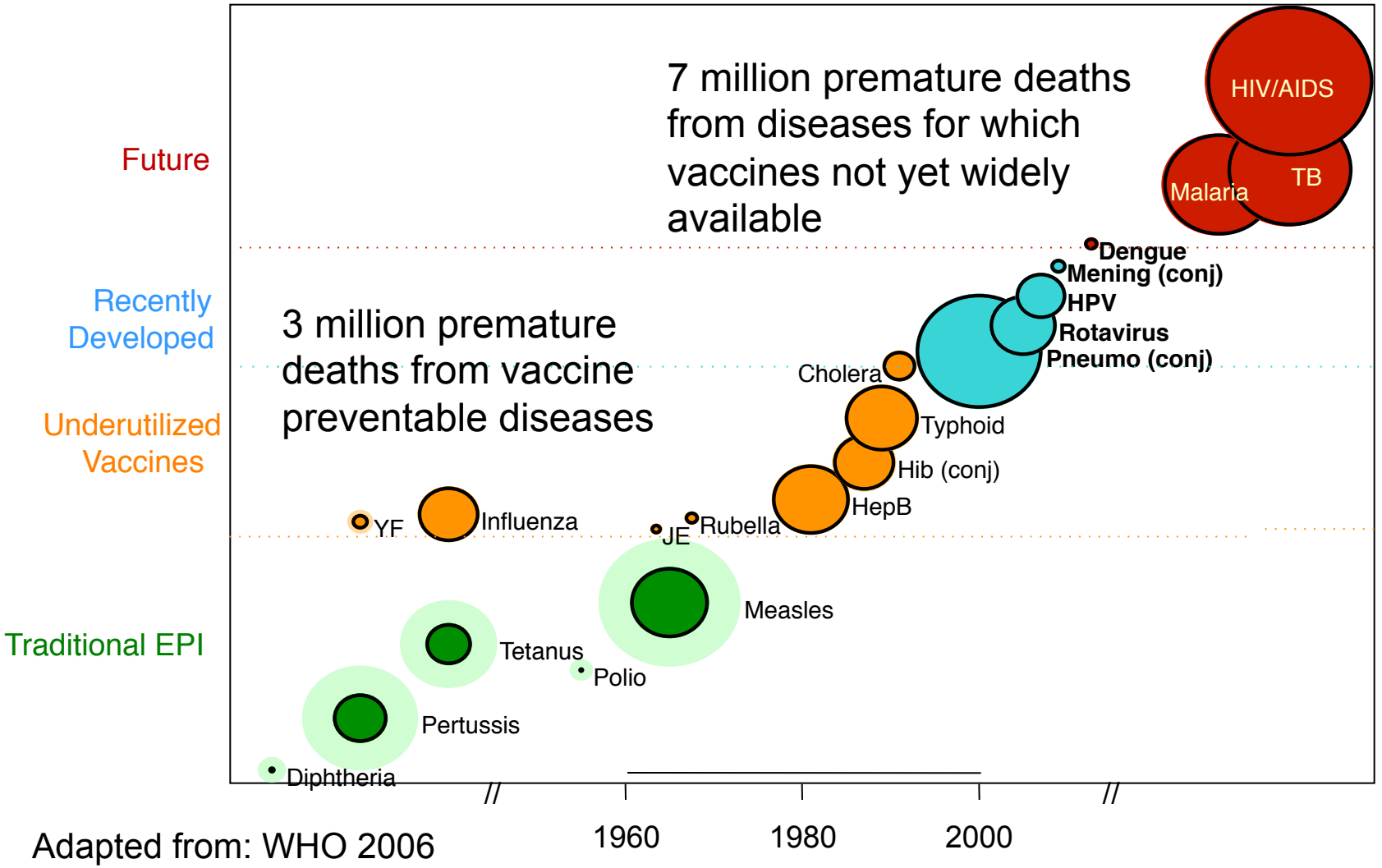


Estimated deaths without vaccination

(See discussion below re. measles, and the way this has improved. But many diseases still in need of vaccine)

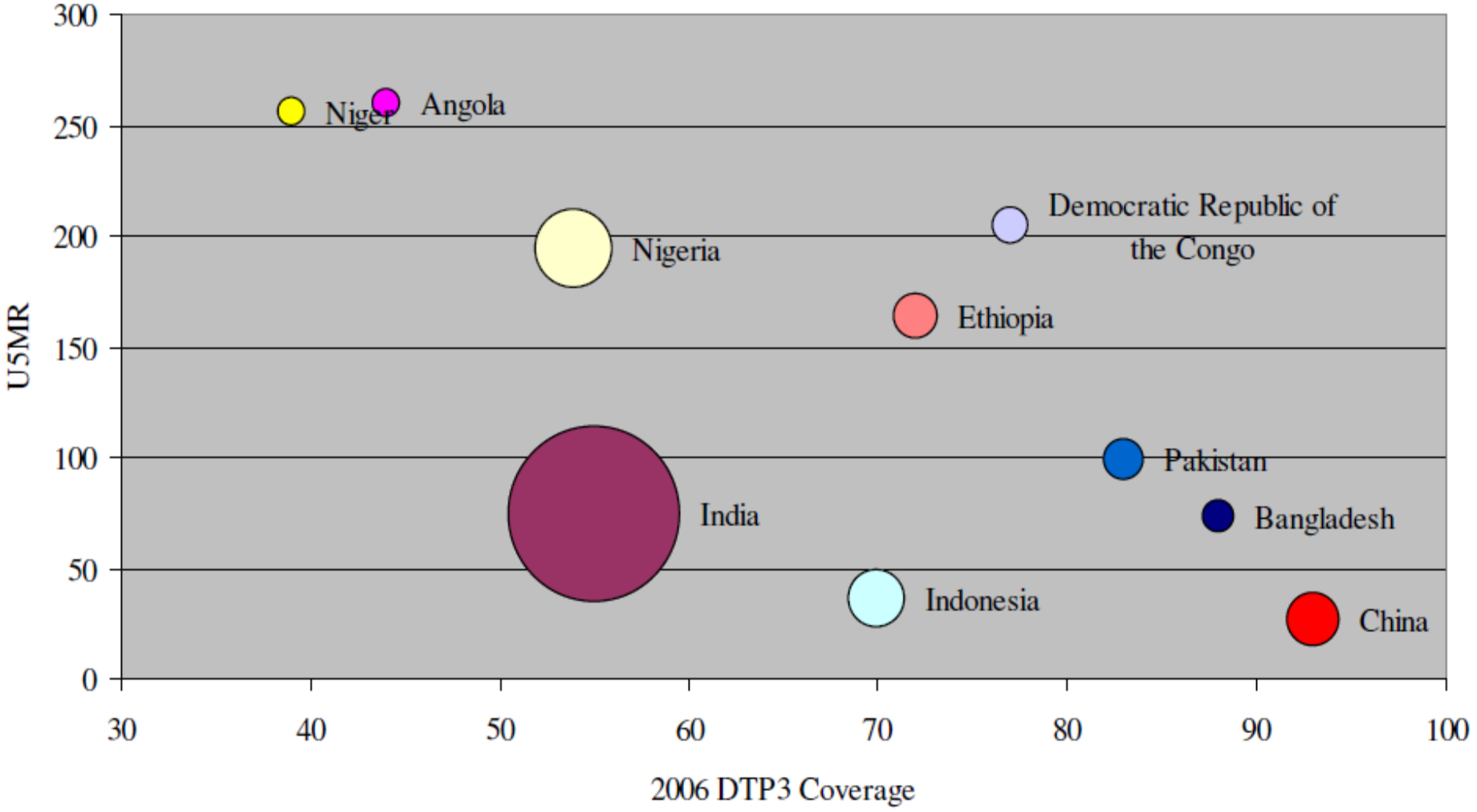


Vaccine-preventable and potentially vaccine-preventable diseases…



Adapted from: WHO 2006

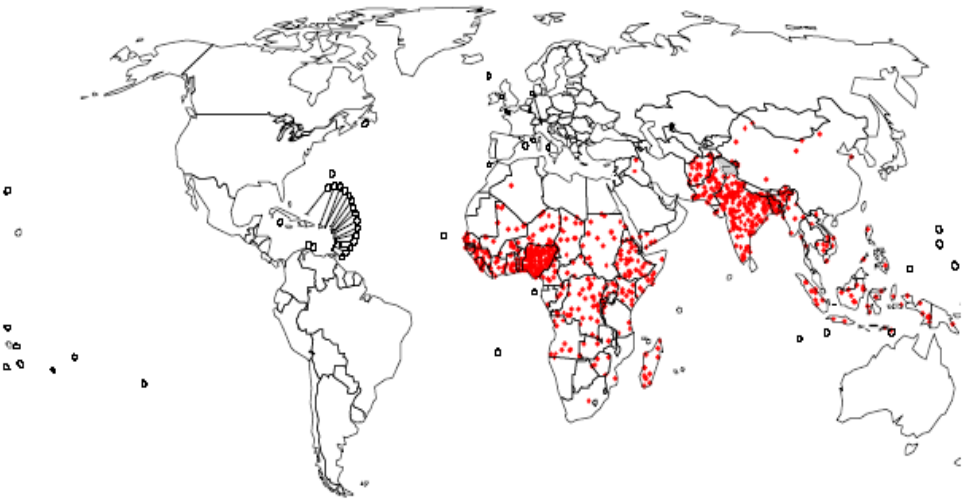
Countries with the largest numbers of unimmunized children (2006)



Source: WHO

MEASLES CASE STUDY

Deaths from measles, 2000, 2007



2000 750 000 deaths

2007 197 000 deaths

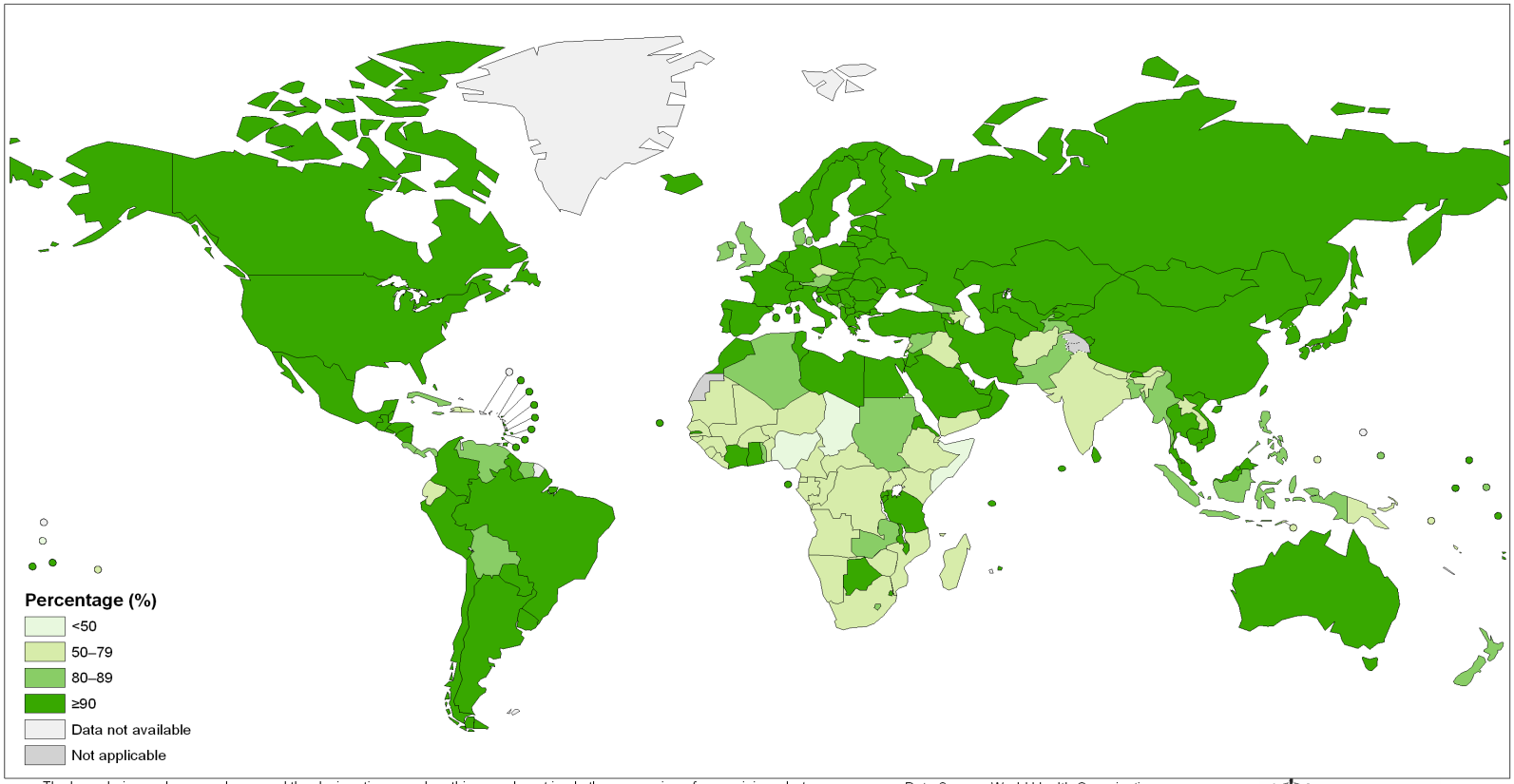
● = 1000 death

ots are randomly distributed in countries.

Source: WHO/IVB, November 2008

Percent of children immunized against measles

Proportion of one-year-old children immunized against measles (%), 2009

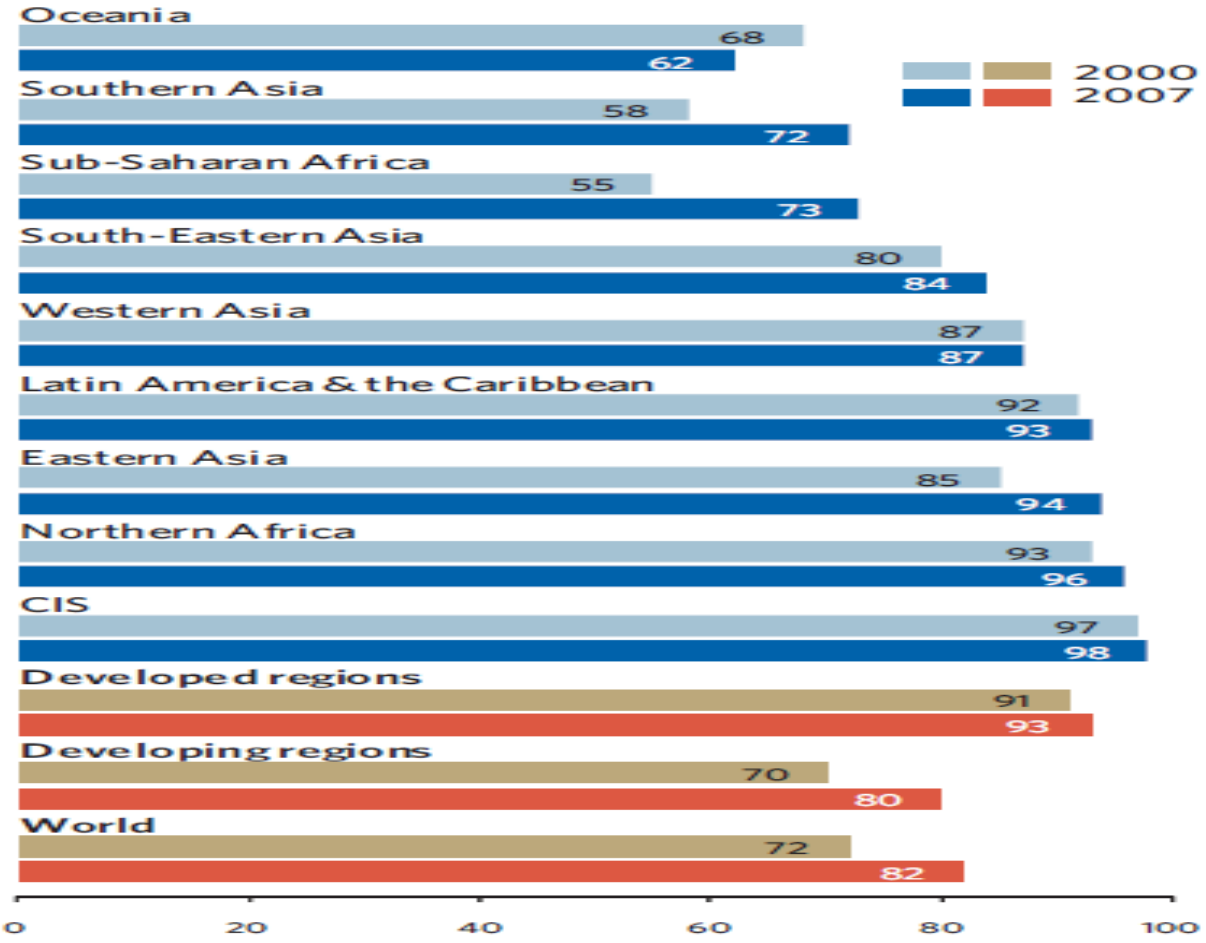


The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

Data Source: World Health Organization
Map Production: Public Health Information and Geographic Information Systems (GIS)
World Health Organization

World Health Organization

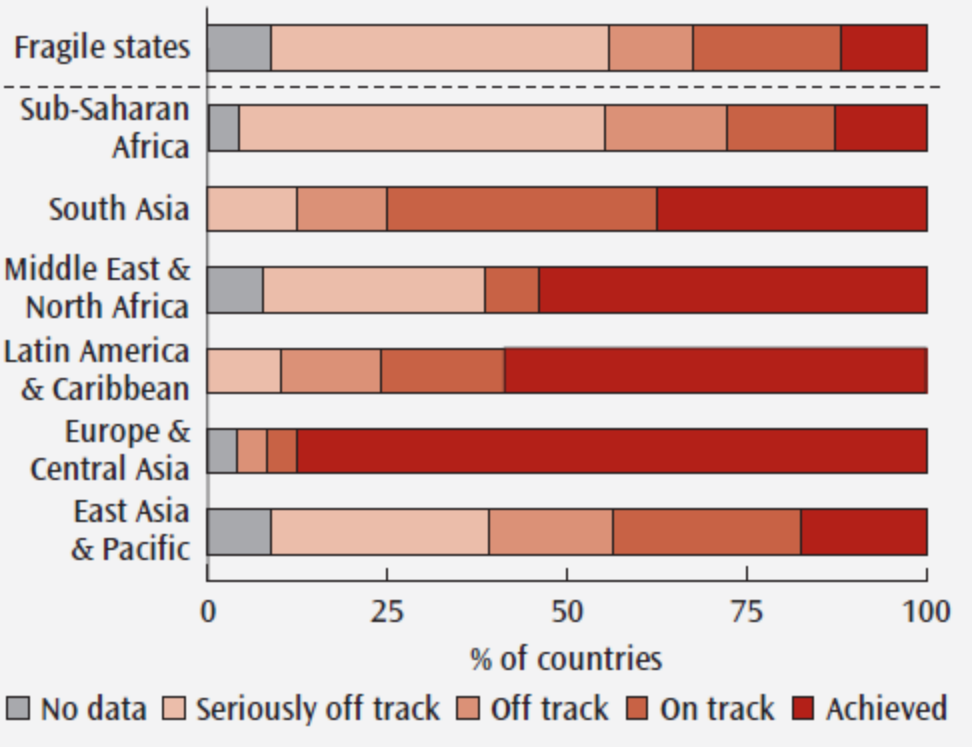
Measles. Percent of children 12-23 months who received one does of measles vaccine



Measles a success story ...but still a lot to do

- Measles vaccine costs less than $1 per child
- 2000-2007 globally measles deaths fell 74%
- 750,000 measles-related deaths in 2000
- 197,000 measles-related deaths in 2007
- Largest reduction in sub-Saharan Africa
- What caused this?
  - Improved immunization coverage
  - Second opportunity for immunization – critical for children left out the first time. Done in 46 of the 47 countries most at risk
  - 576 million second immunizations since 2000
  - Second opportunity critical for community protection
  - Measles immunization campaigns deliver other health services too, such as insecticide-treated bed nets and de-worming medicines
- Sub-Saharan Africa and fragile states lagging

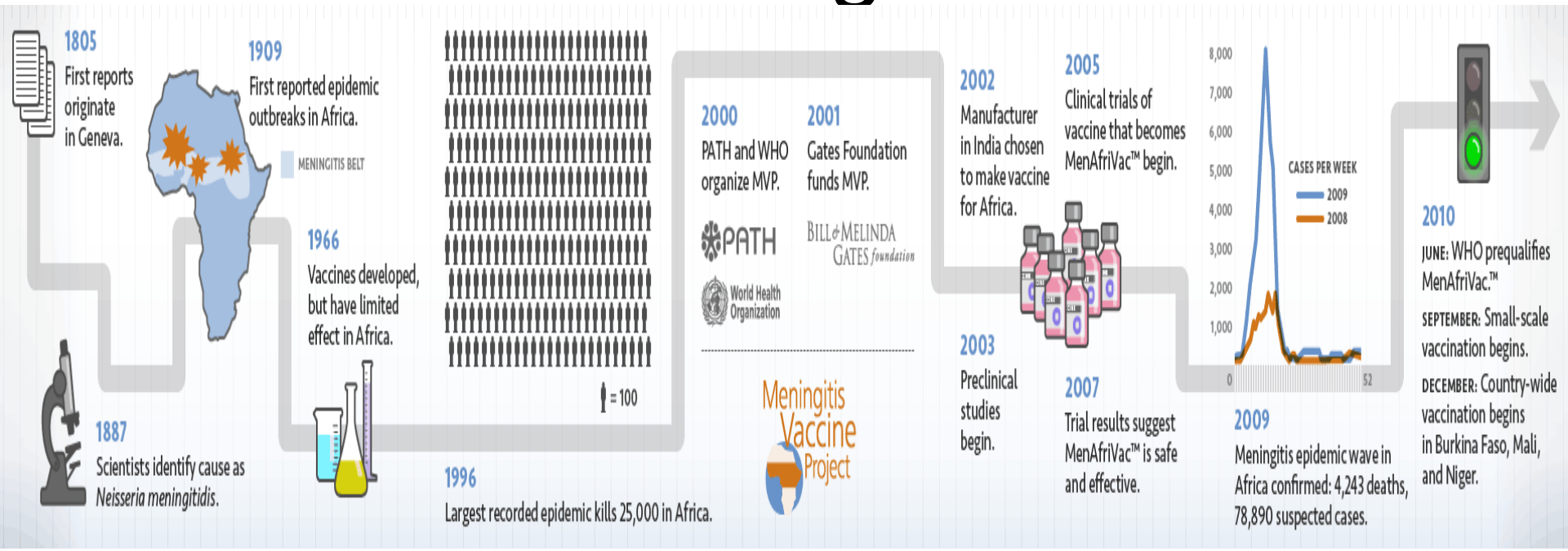
Proportion of countries on track for measles vaccination



Source: World Development Indicators.

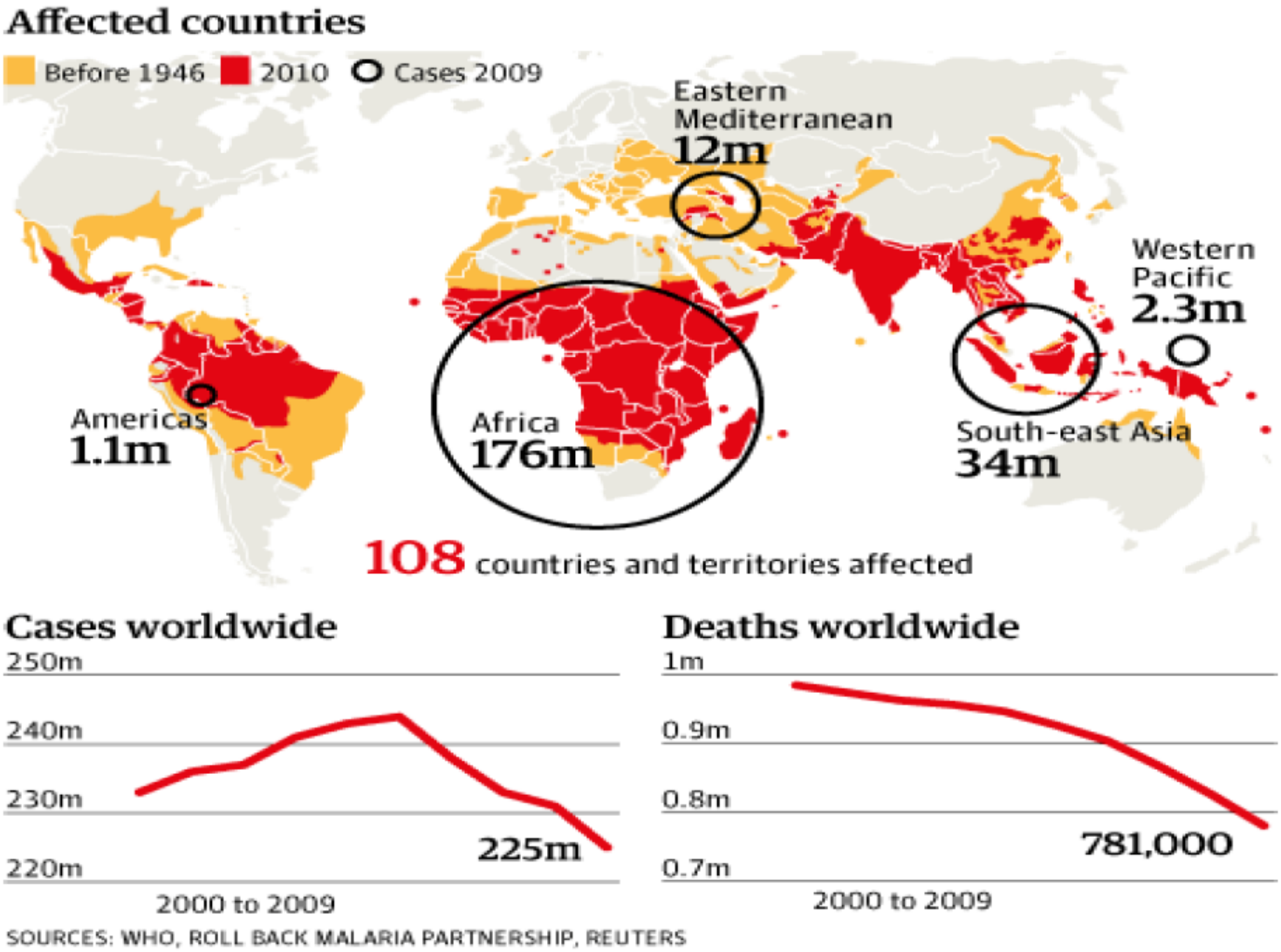
THREE MORE SUCCESSES

Group A meningococcal meningitis

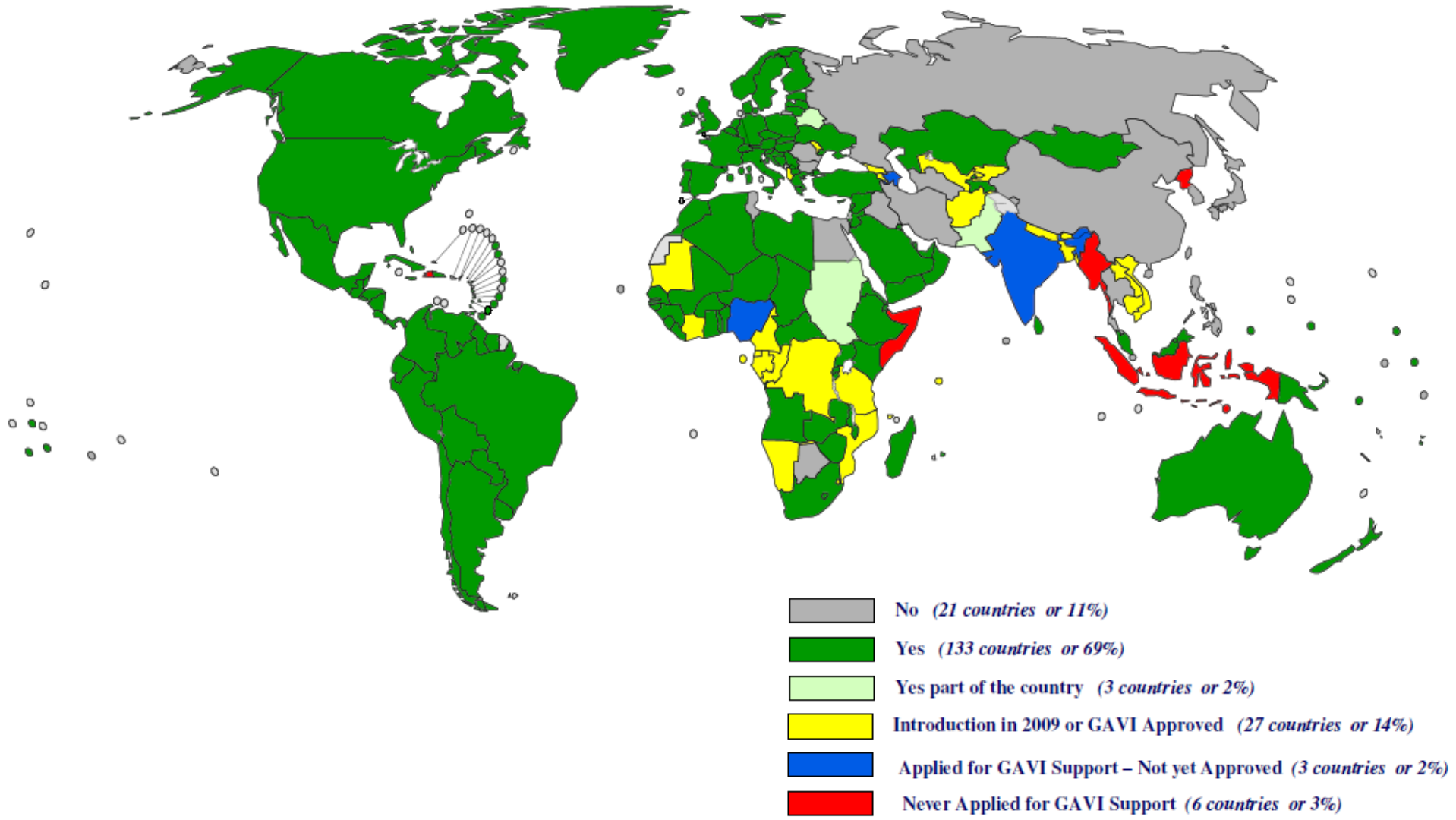


- Logistically-difficult polysaccharide vaccine replaced with MenAfriVac™, a low-cost conjugate vaccine to tackle group A meningococcal meningitis
- IP for conjugation technology valuable and highly protected
- Scientists at Center for Biologics Evaluation and Research at the US Food and Drug Administration in Bethesda, Maryland had developed a new conjugation method. With help from the NIH, technology transferred within months to the Serum Institute of India at very low cost.
- 50 cents a dose

The Fight against malaria



Hib Vaccine, 2008



Source: WHO/IVB database, 193 WHO member States, Data as of June 2009

SOME VACCINE NEEDS FROM A GLOBAL PUBLIC HEALTH PERSPECTIVE

Need to Develop New Vaccines that…

- Where possible avoid the need for storage in a cold chain and can be administered without needles and in fewer doses (please discuss the possibilities and limitations of this. Recent WHO activity in case of measles technology)
- Work in the most impoverished populations, target types/subtypes and age ranges most relevant
- Are able to contain epidemics following complex emergencies
- Are safe and effective in HIV infected individuals
- Can confer long-term protection
- Are able to confer herd protection

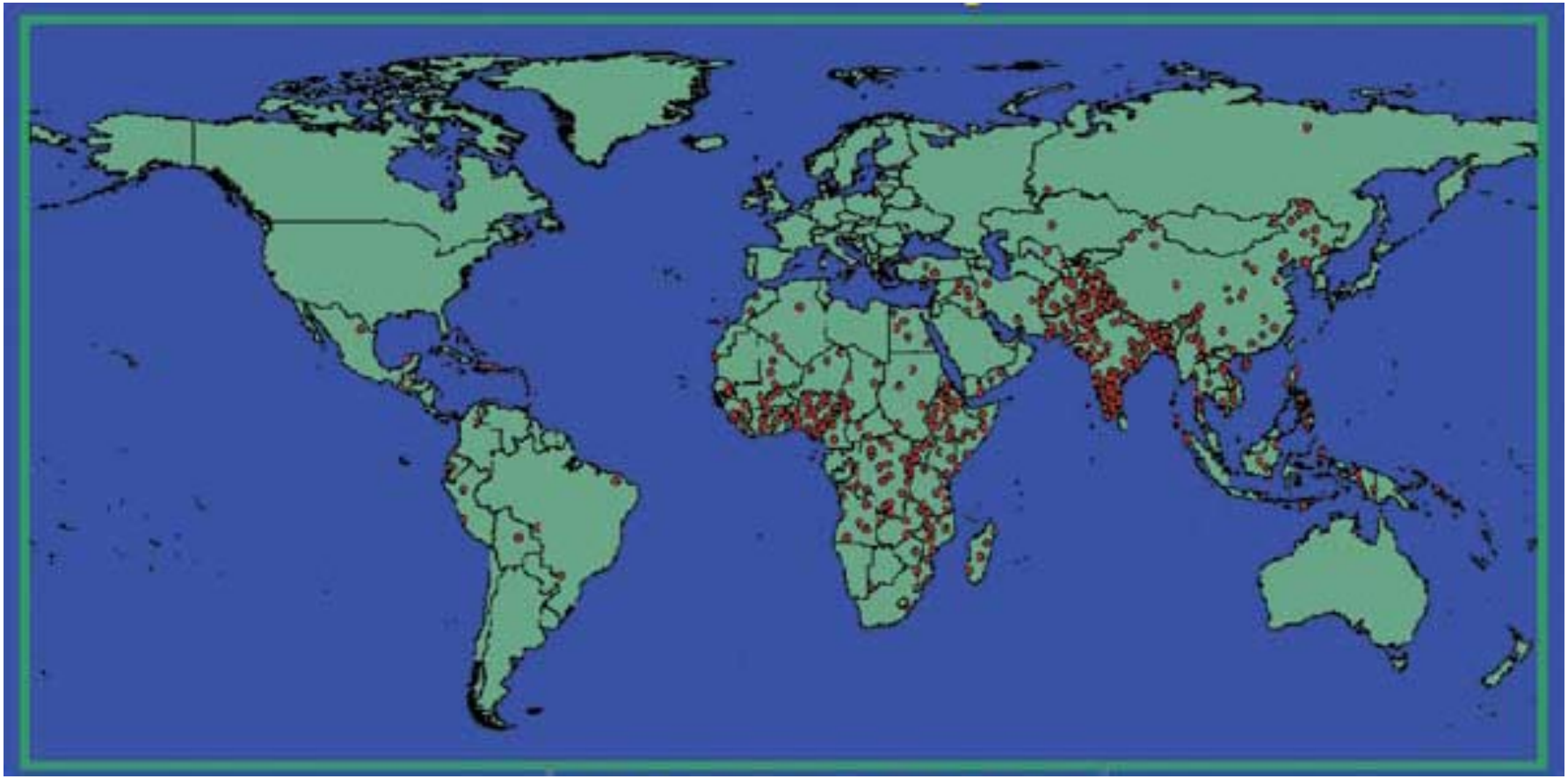
ROTAVIRUS VACCINE CASE STUDY: THE POVERTY ISSUE

Impoverished setting: Placebo-controlled, randomized field trials, RIT 4237 vaccine against rotavirus diarrhea

Site(yr)	Doses	No. of immunized Children	PE vs. all severe RV Diarrhea	PE vs. RV Diarrhea
Finland (1984)	1	86	47% (-10%,75%)	88% ** (63%,96%)
Rwanda (1986)	1	122	0% (304%,67%)	NR
Gambia (1987)	3	170	33%* (4%,53%)	7% (-37%,37%)
Peru (1998)	1	ca.100	15% (-41%,48%)	63% (-9%,88%)
	2	ca.100	10% (-47%,45%)	28% (-76%,70%)
	3	ca.100	25% (-24%,55%)	58% (-15%,85%)

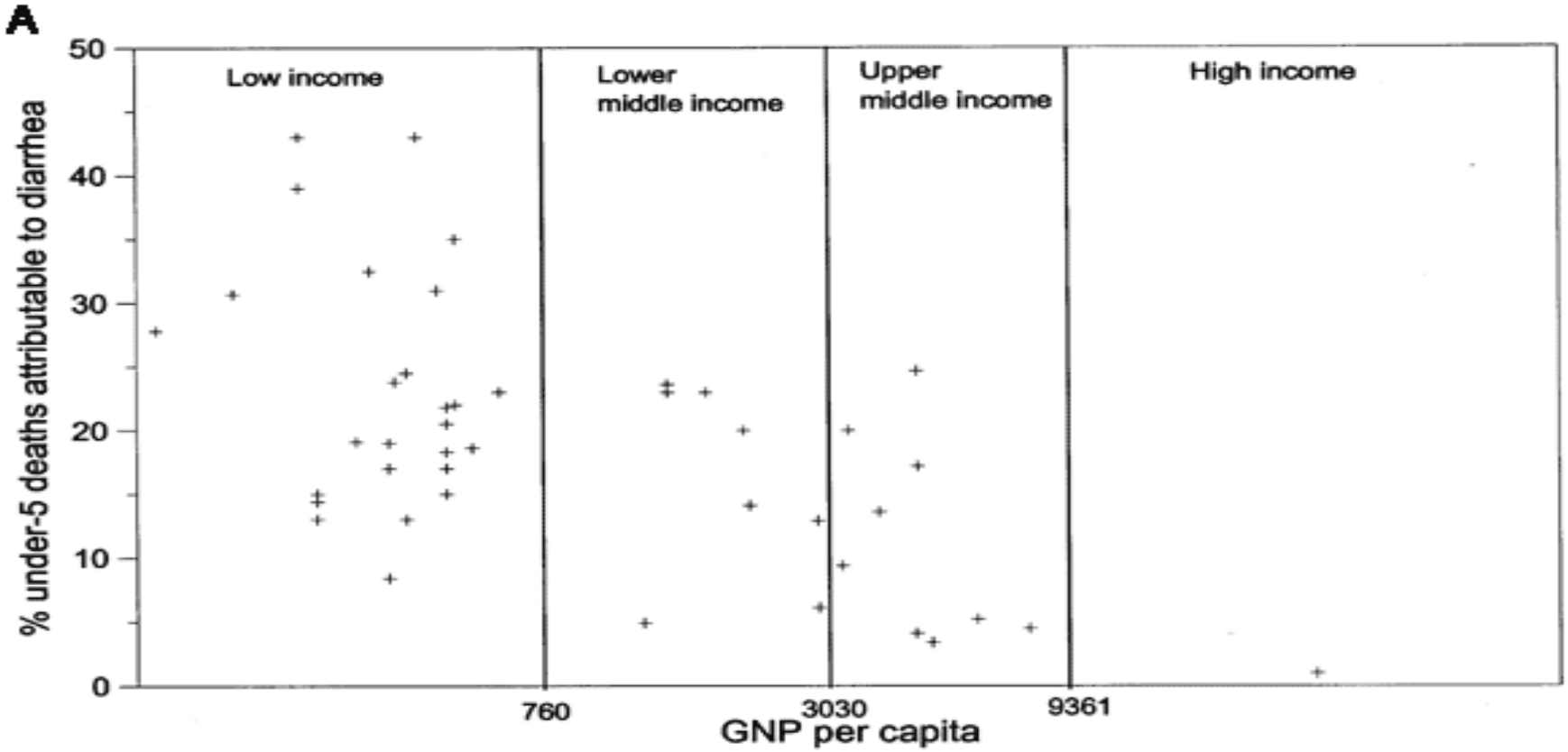
* P<.05; **P<.01

Poverty: Rotavirus diarrhea est. distr. 440,000 annual deaths in children



Source: Parashar UD, Hummelman EG, Bresee JS, Miller MA, Glass RI. Global illness and deaths caused by rotavirus disease in children. Emerg Infect Dis 2003 May. http://www.cdc.gov/ncidod/EID/vol9no5/02-0562.htm

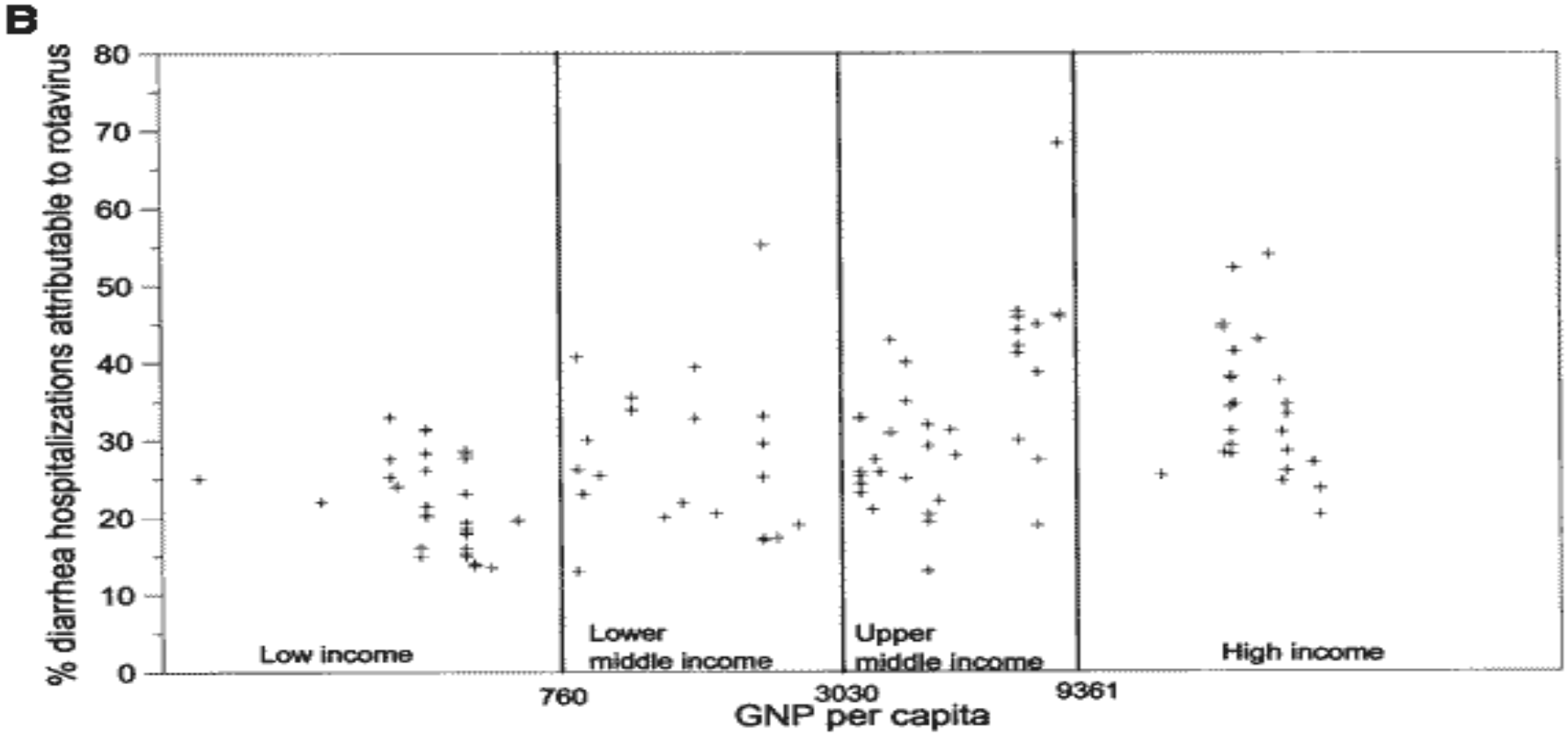
Poverty: rotavirus diarrhea under-5 death



Median	21	17	9	1
IQR	17-30	11-23	5-17	NA

Source: Parashar UD, Hummelman EG, Bresee JS, Miller MA, Glass RI. Global illness and deaths caused by rotavirus disease in children. Emerg Infect Dis 2003 May. http://www.cdc.gov/ncidod/EID/vol9no5/02-0562.htm

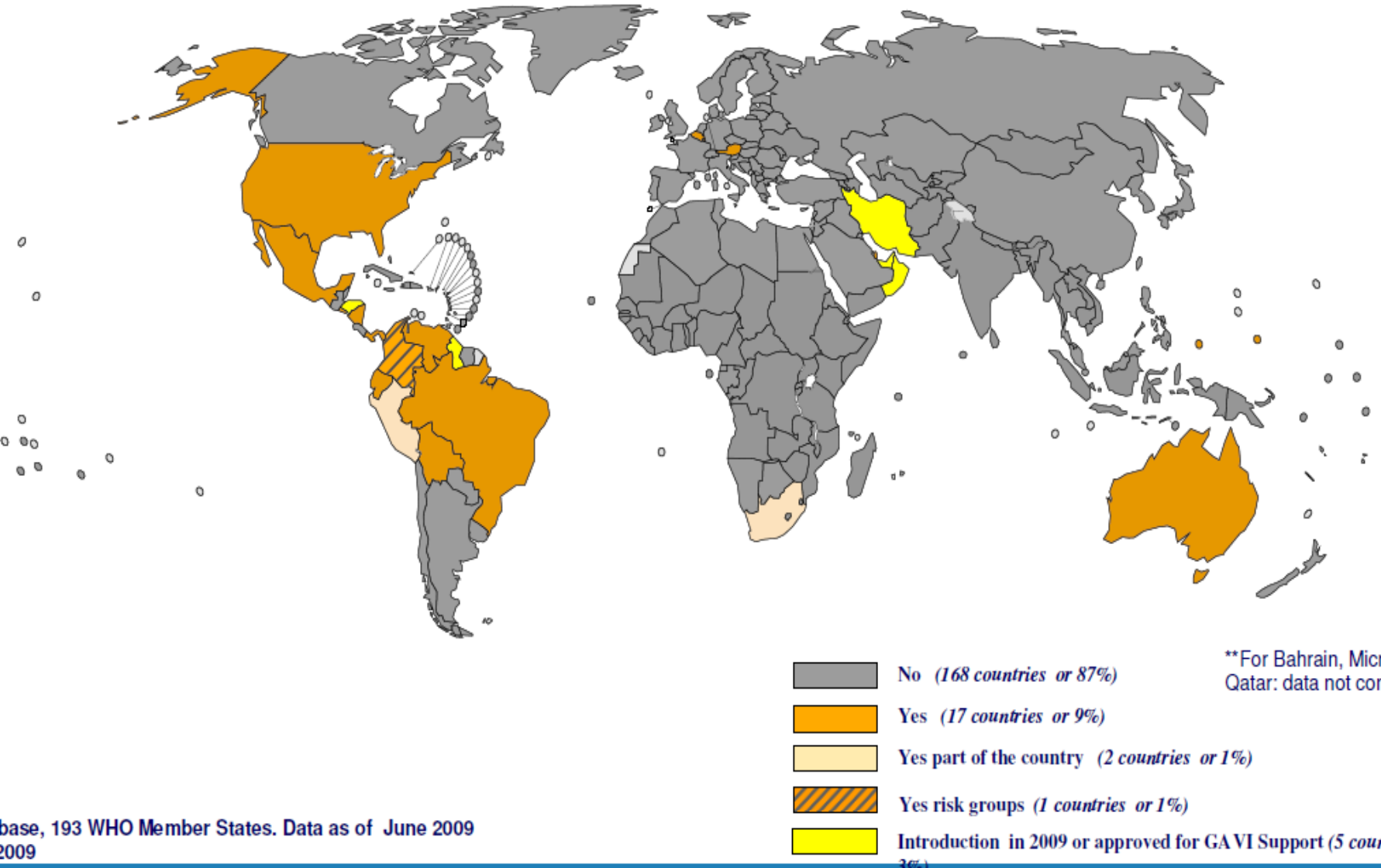
Poverty: rotavirus and hospitalizations



Median	20	25	31	34
IQR	16-27	20-33	25-42	28-38

Source: Parashar UD, Hummelman EG, Bresee JS, Miller MA, Glass RI. Global illness and deaths caused by rotavirus disease in children. Emerg Infect Dis 2003 May. http://www.cdc.gov/ncidod/EID/vol9no5/02-0562.htm

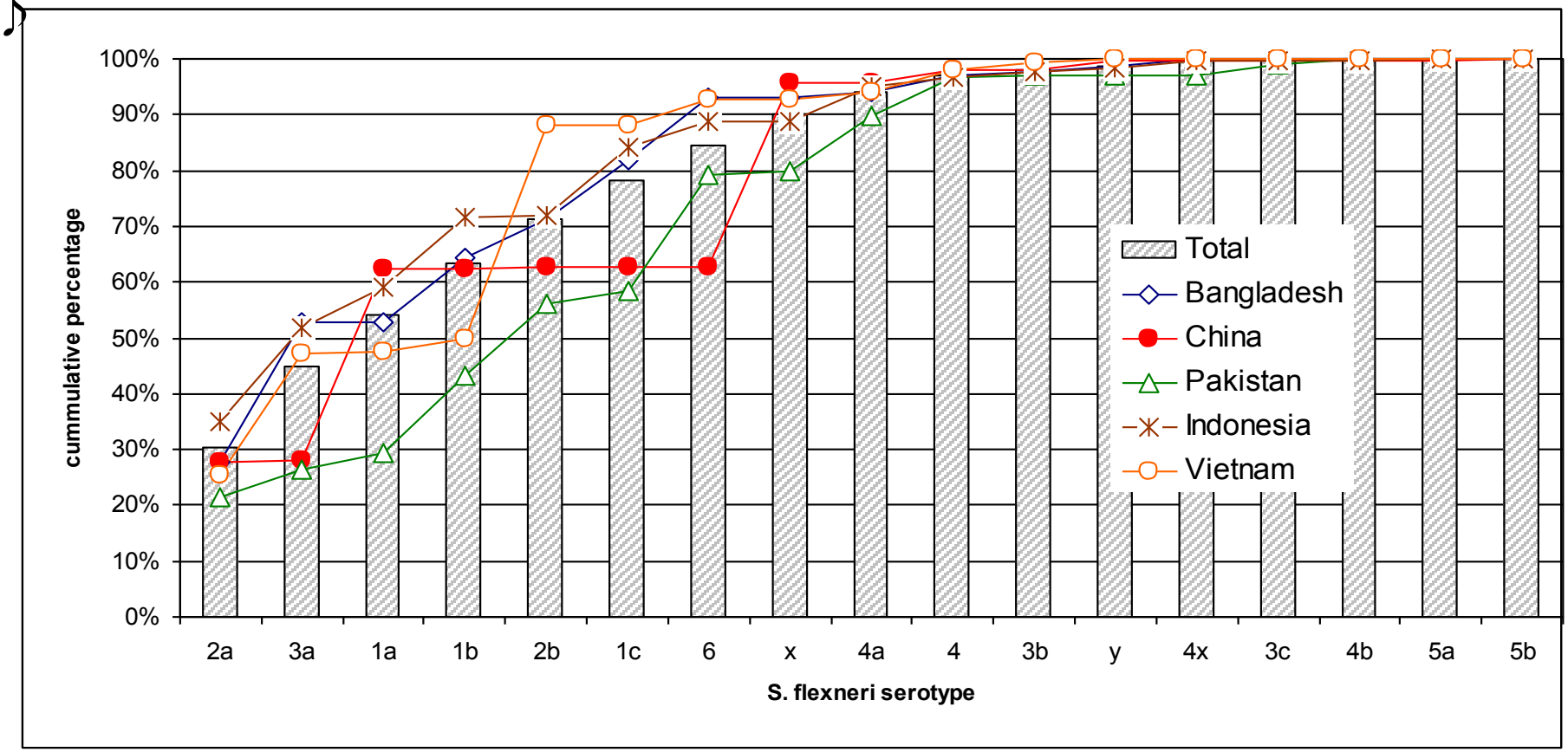
Rotavirus Vaccine, 2008



Source: WHO/IVB database, 193 WHO member States, Data as of June 2009

Vaccines that cope with antigenic diversity and variation

Cumulative distribution of types and subtypes in 1,927 *S.flexneri* episodes in 5 IVI sites in Asian countries



Vaccines that target most relevant age ranges

Annual incidence (per 1,000) of blood culture-confirmed typhoid fever in 5 IVI sites

Age Group	Karachi, Pakistan (N=41,845)	Kolkata, India (N=56,946)	N. Jakarta, Indonesia (N=160,261)	Hue, Vietnam (N=84,488)	Hechi, China (N=98,103)
0-1 years	na	0.9	0.0	na	na
2-4 years	5.5	3.1	1.6	na	na
5-15 years	4.1	4.5	1.8	0.2	0.3
16- years	na	1.1	0.5	0.1	0.1

na : not available

Epidemics following complex emergencies

Cholera Outbreak in Zaire in 1994

Target Product Profile in epidemic v endemic settings

	Settings	
	Epidemic	Endemic
Single-dose regimen	More Important	Less Important
Early onset of protective immunity	More Important♪	Less Important♪
Long duration of protective immunity	Less Important	More Important
Needle-free	More Important♪	Less Important♪
Able to be rapidly administered in mass immunization	More Important♪	Less Important♪
Low storage volume	More Important♪	Less Important♪
Cold chain independent	More Important♪	Less Important♪

Herd protection

Cholera Risk by the Level of Killed, Oral Cholera Vaccine Coverage, Matlab, Bangladesh 1985-1986 (Ali, 2005)

Level of vaccine coverage	Target population		Vaccinated group			Placebo group		
	N	%	N	Cases	Risk/ 1000 persons*	N	Cases	Risk/1000 persons** ♪
<28%	24,954	20.6	5,627	15	2.66	2,852	20	7.01
28-35%	25,059	20.7	8,883	22	2.47	4,429	26	5.87
36-40%	24,583	20.3	10,772	17	1.57	5,503	26	4.72
41-50%	24,159	19.9	11,513	26	2.25	5,801	27	4.65
51%+	22,394	18.5	12,541	16	1.27	6,082	9	1.47
Total	**121,149**	**100**	**49,336**	**96**	**1.94**	**24,667**	**108**	**4.37**

P=.05 for trend

** P<.0001 for trend