Vaccination Coverage & Impact of Vaccination on Disease Epidemiology: Focus on Africa

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10th Nov 2014

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Happy 10th Anniversary to Vaccinology Course

Date	Event and related notes
May 4, 2004	The National Institute of Allergy and Infectious Diseases (NIAID), part of the National Institute of Health (NIH), awarded a new license agreement for RotaShield, an oral rotavirus vaccine, created by NIAID scientists in the 1980s. The licensed was awarded to BIOVIRx, Inc., of Minneapolis, MN, which planned global commercialization of RotaShield.
May 2004	Contracts were awarded to Aventis Pasteur and to Chiron to develop vaccine against the H5N1 avian influenza virus.
2004	The 8th and final report of the Immunization Safety Review Committee was issued by the Institute of Medicine. The report concluded that the body of epidemiological evidence favors rejection of a causal relationship between the MMR vaccine (and thimerosal-containing vaccines) and autism.
March 24, 2004	Tetanus and diphtheria toxoids adsorbed for adult use (Decavac by Aventis Pasteur), preservative-free, was licensed.

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http://www.immunize.org/timeline/

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Global programs to increase vaccination

1) Expanded Programme on Immunization (EPI):1974

2) Universal Childhood Immunisation: 1977-1984

3) Global Alliance for Vaccines and Immunisation (GAVI): 2000

4) Millennium Development Goals (MDGs): 2000

5) Global Immunisation Vision and Strategy (GIVS): 2006

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Policy Forum

Strengthening the Expanded Programme on Immunization in Africa: Looking beyond 2015

Shingai Machingaidze[1,2]*¶, Charles S. Wiysonge[1,2]*¶, Gregory D. Hussey[1,2]

1 Vaccines for Africa Initiative, Institute of Infectious Disease and Molecular Medicine, University of Cape Town, Cape Town, South Africa, **2** Division of Medical Microbiology, Department of Clinical Laboratory Sciences, University of Cape Town, Cape Town, South Africa

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DTP3 coverage in Africa: 1980-2010

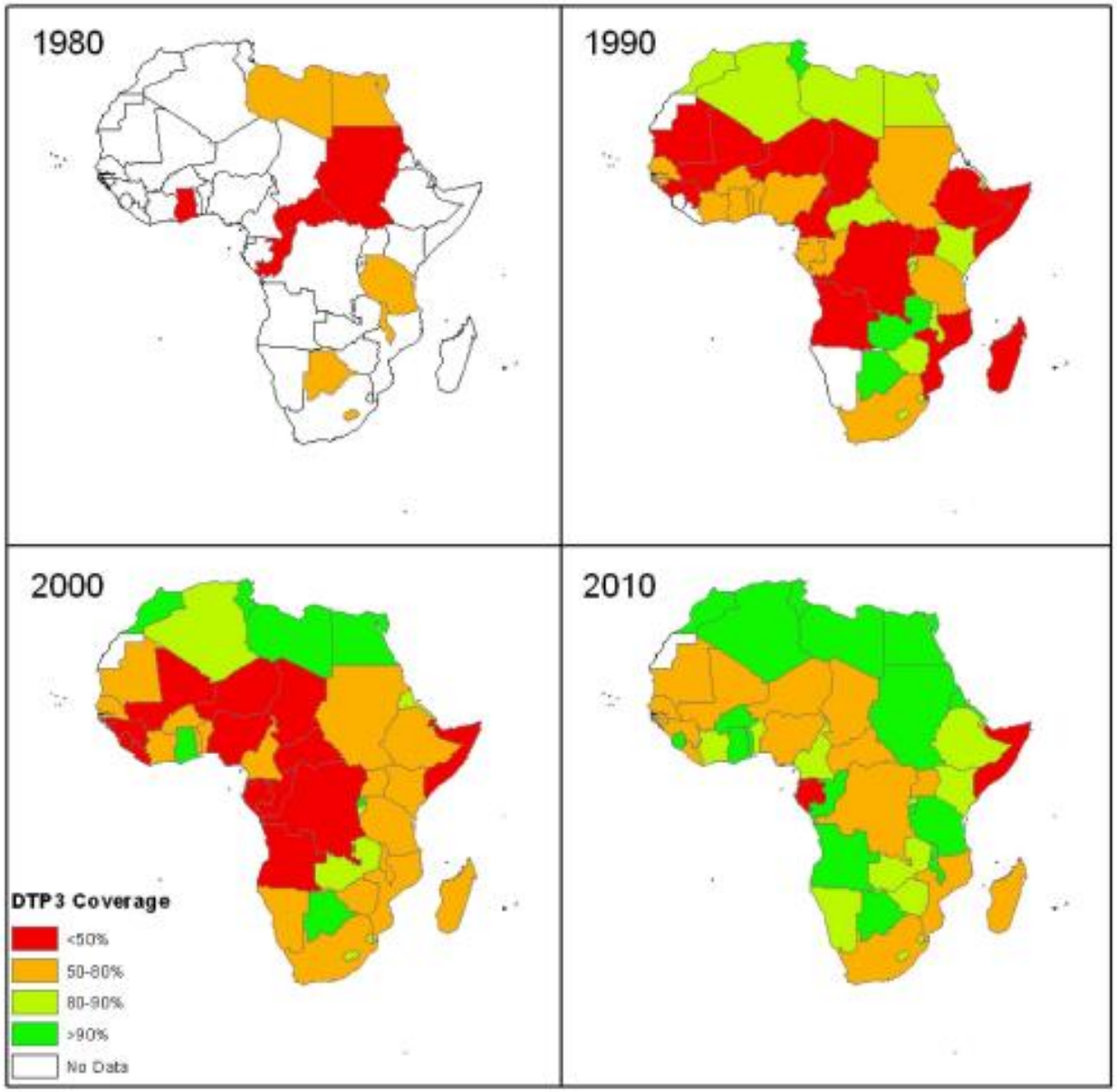

Figure 1. Colour-coded maps of Africa showing national coverage with the third dose of the diphtheria-tetanus-pertussis vaccine (DTP3) at the end of each decade since 1974. (Source of data: World Health Organization [10].)
doi:10.1371/journal.pmed.1001405.g001

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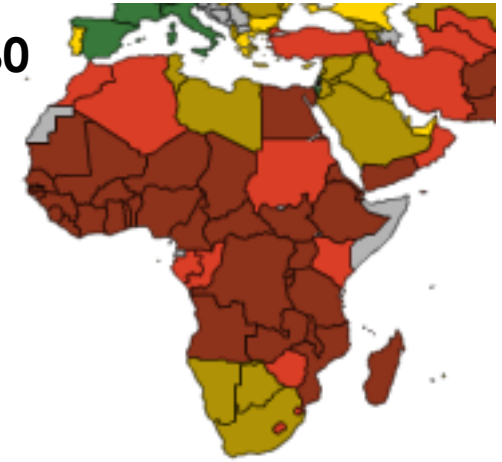
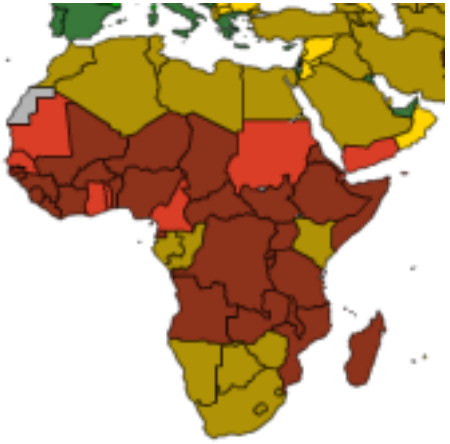
<5years old mortality rates in Africa

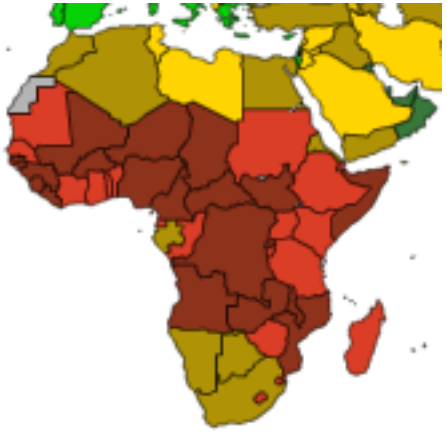
1980



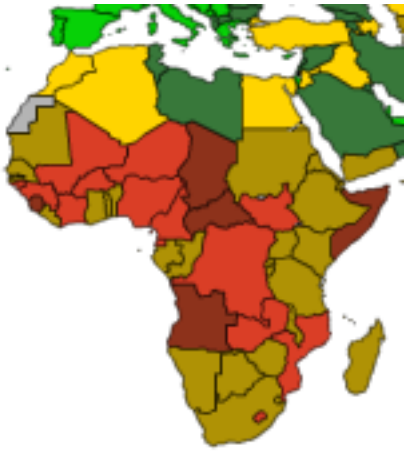
1990



2000



2010



0	-	9	
10	-	19	
20	-	39	
40	-	99	
100	-	149	
150	and above		
No Data			

http://www.childmortality.org/index.php?r=site/map

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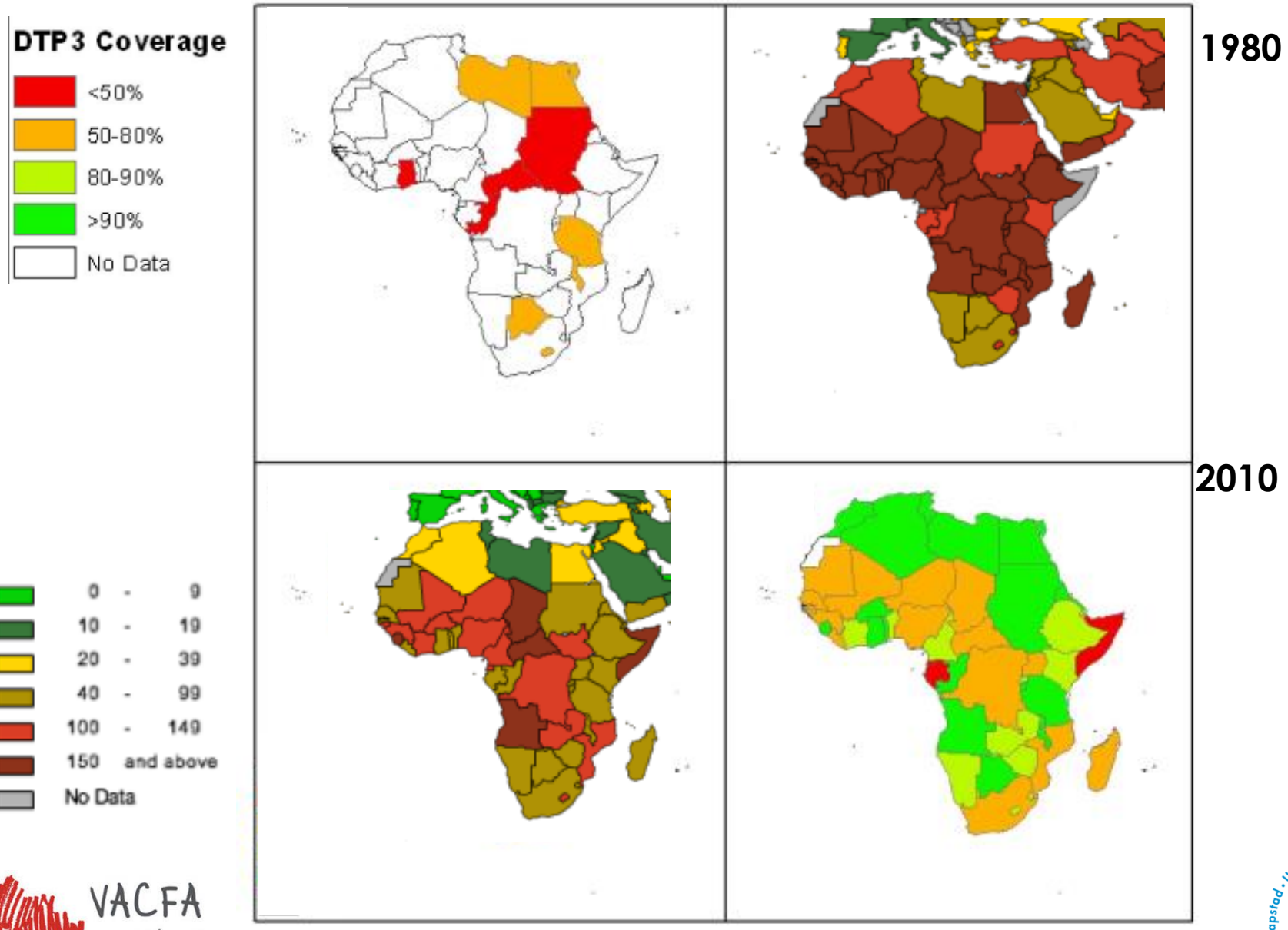
DTP3 coverage Vs <5yrs mortality: 1980 & 2010



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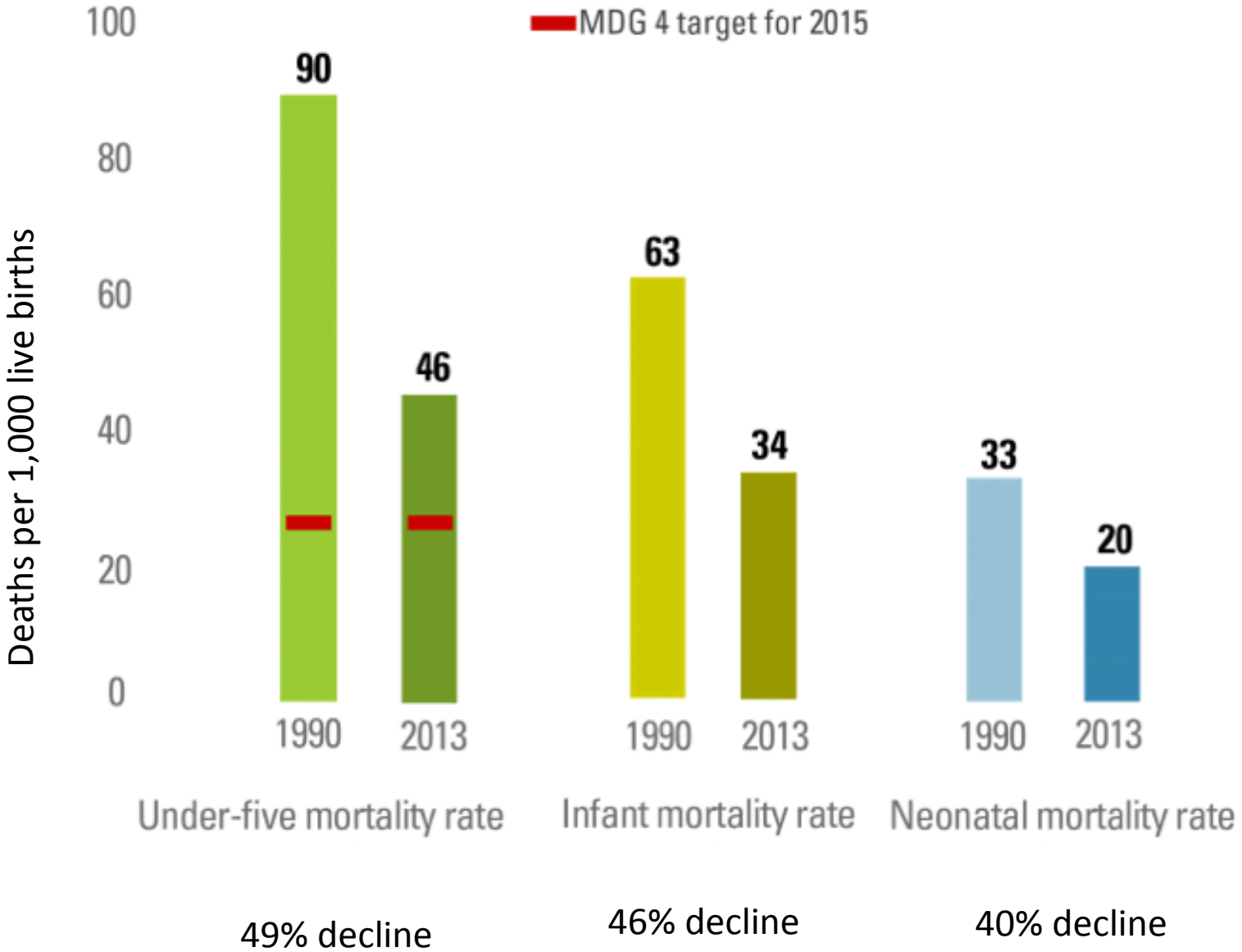


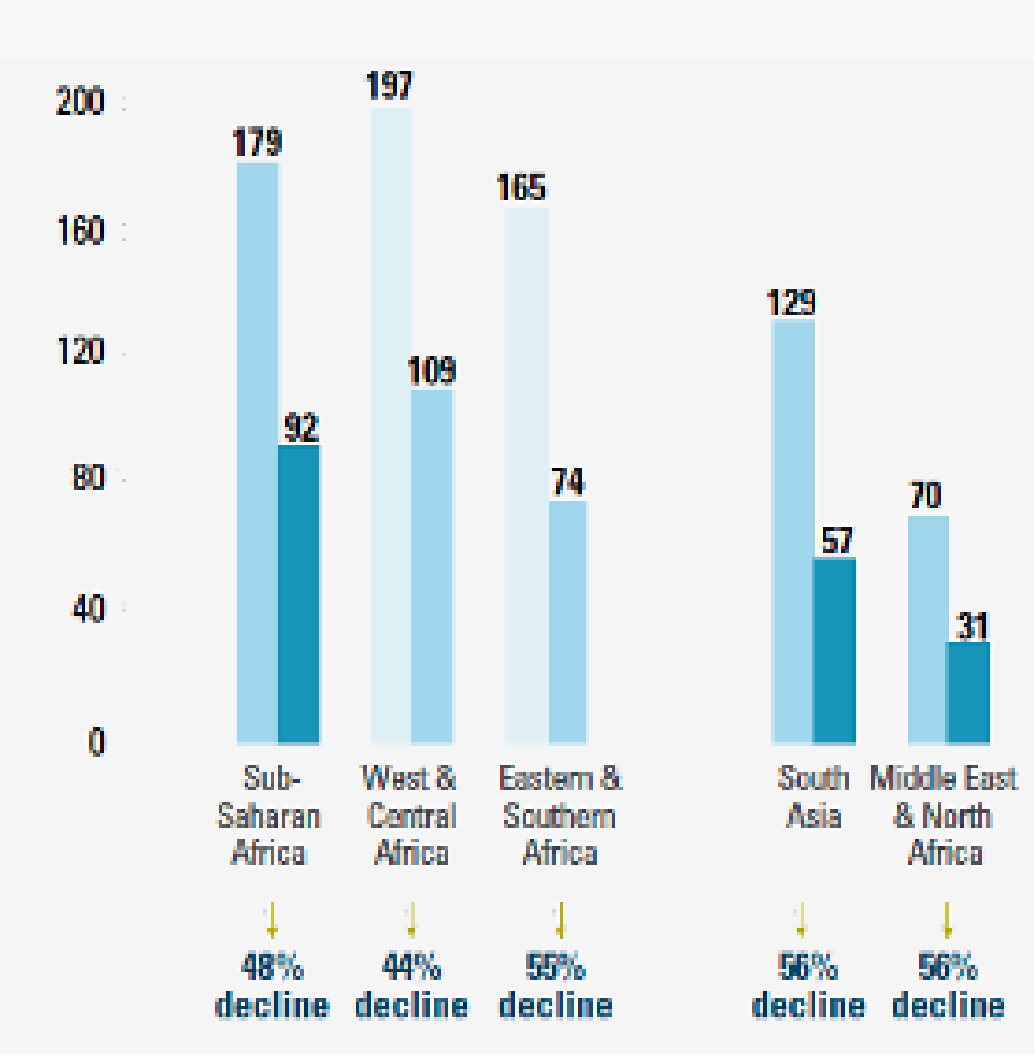
49% decline

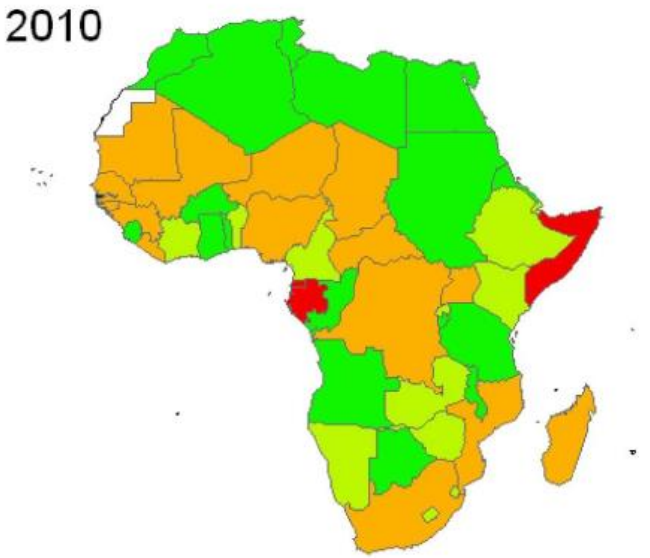
46% decline

40% decline

http://data.unicef.org/child-mortality/under-five#sthash.aOv0db0g.dpuf

<5 mortality rates by region, 1990 Vs 2013, and % declines





http://data.unicef.org/child-mortality/under-five#sthash.aOv0db0g.dpufer-five#sthash.aOv0db0g.dpuf

There appears to be an association: Increase in vaccination coverage with decreased <5yrs old mortality rates!!!!!

Makes sense because……..

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According to WHO…..

- Globally, it is estimated that 7.6millions children <5yrs old die each year

- 50% of global under <5yrs old deaths occur in Africa

- 30-40% of deaths among 1-59 months old children are vaccine preventable

Mmmmhhhhh….now makes more sense because……..

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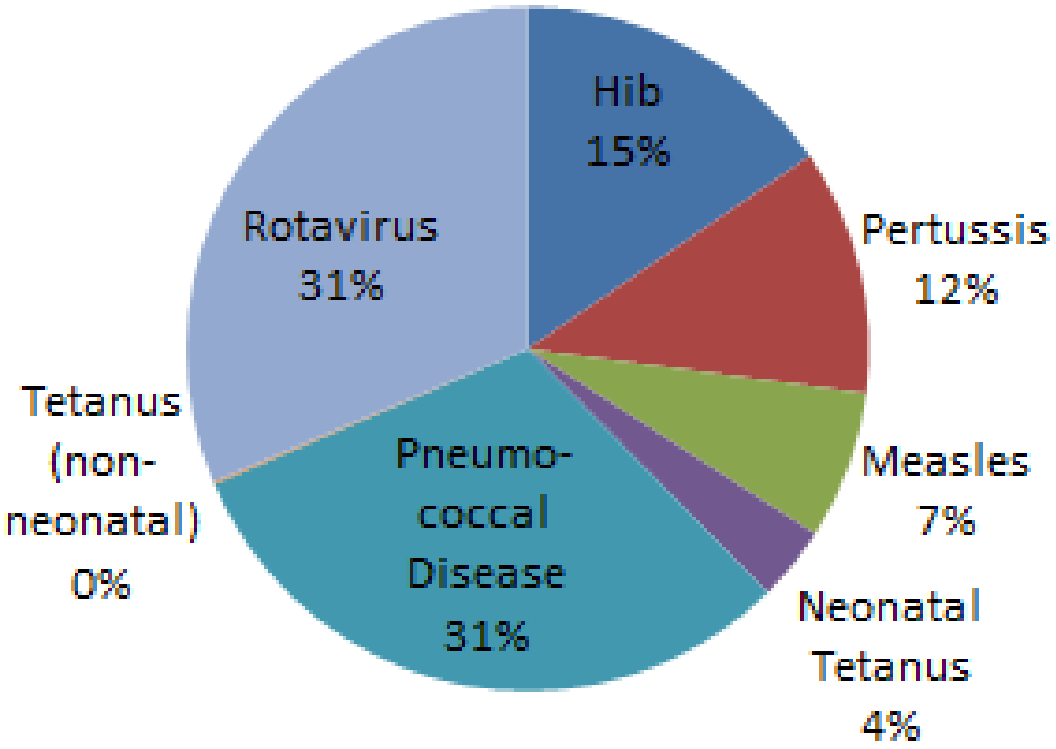
Vaccine Preventable Deaths in <5 years: 2008



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http://www.action.org/resources/item/vaccine-preventable-deaths

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Objective 1 of the vaccinology course

- Importance of immunisation on human health and development

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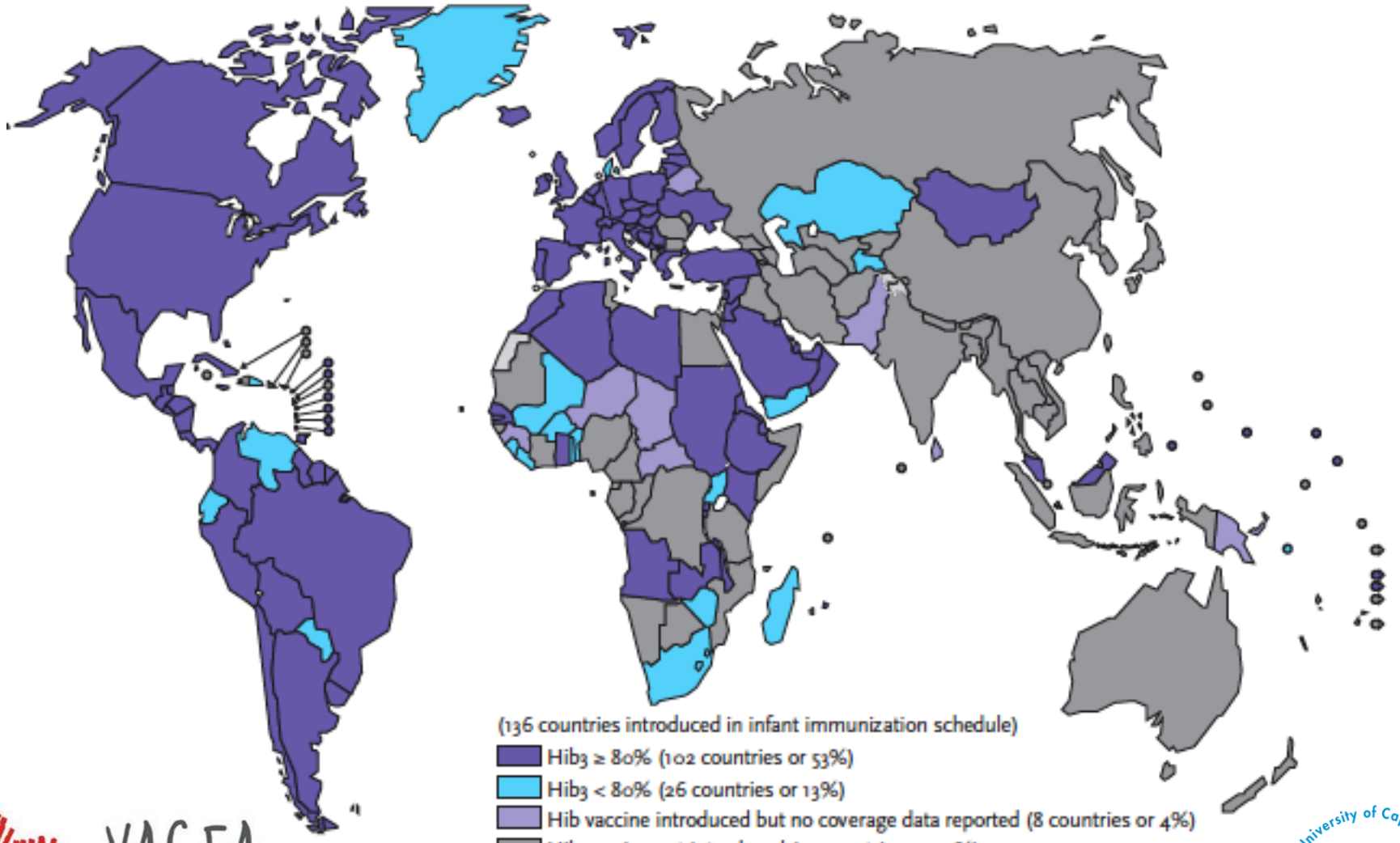
Hib epidemiology

Hib introduction and coverage in infants, 2008



Source: WHO/IVB database, 193 WHO Member States, July 2009

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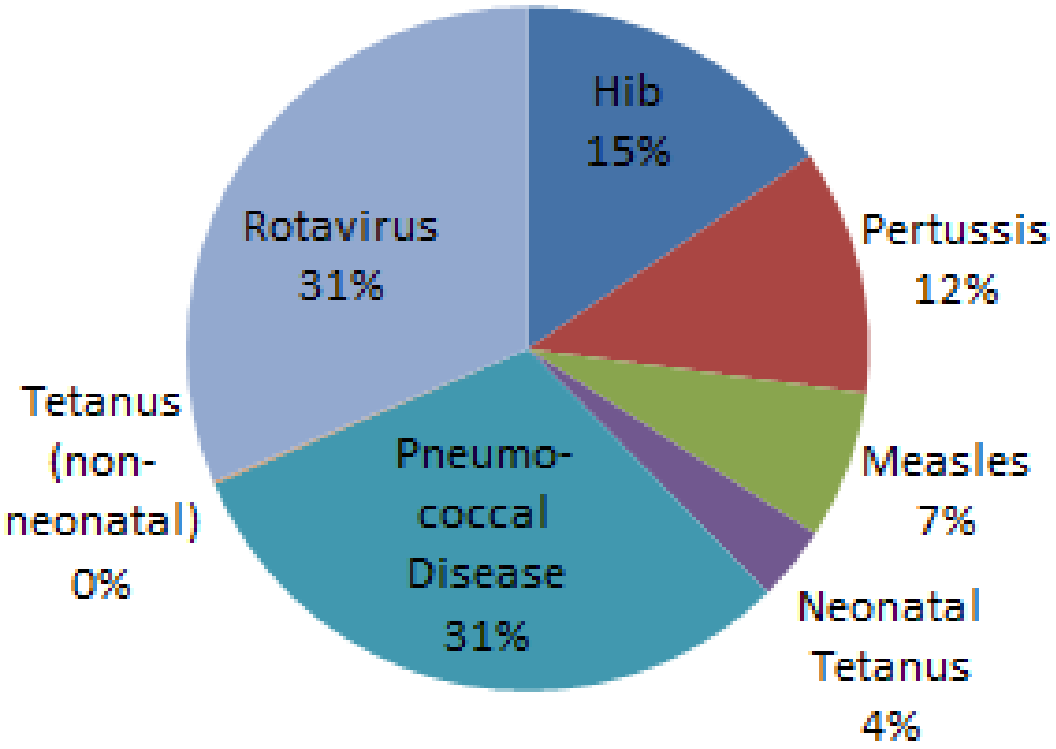
Vaccine Preventable Deaths in <5 years: 2008



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Pertussis epidemiology

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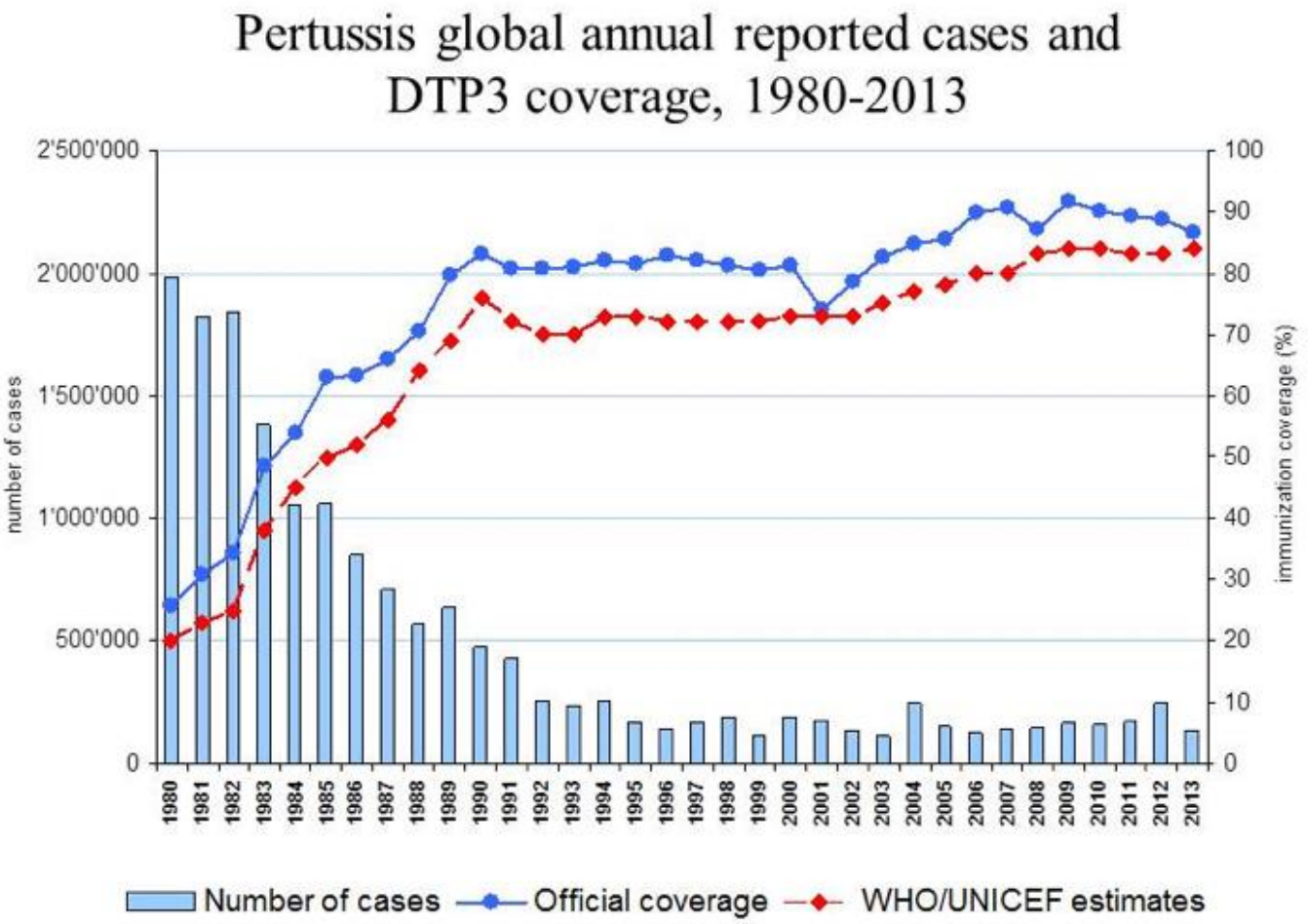
WHO estimate of global burden of pertussis



Source: WHO/IVB database, 2014
194 WHO Member States.
Data as of July 2014

Date of slide: 15 July 2014

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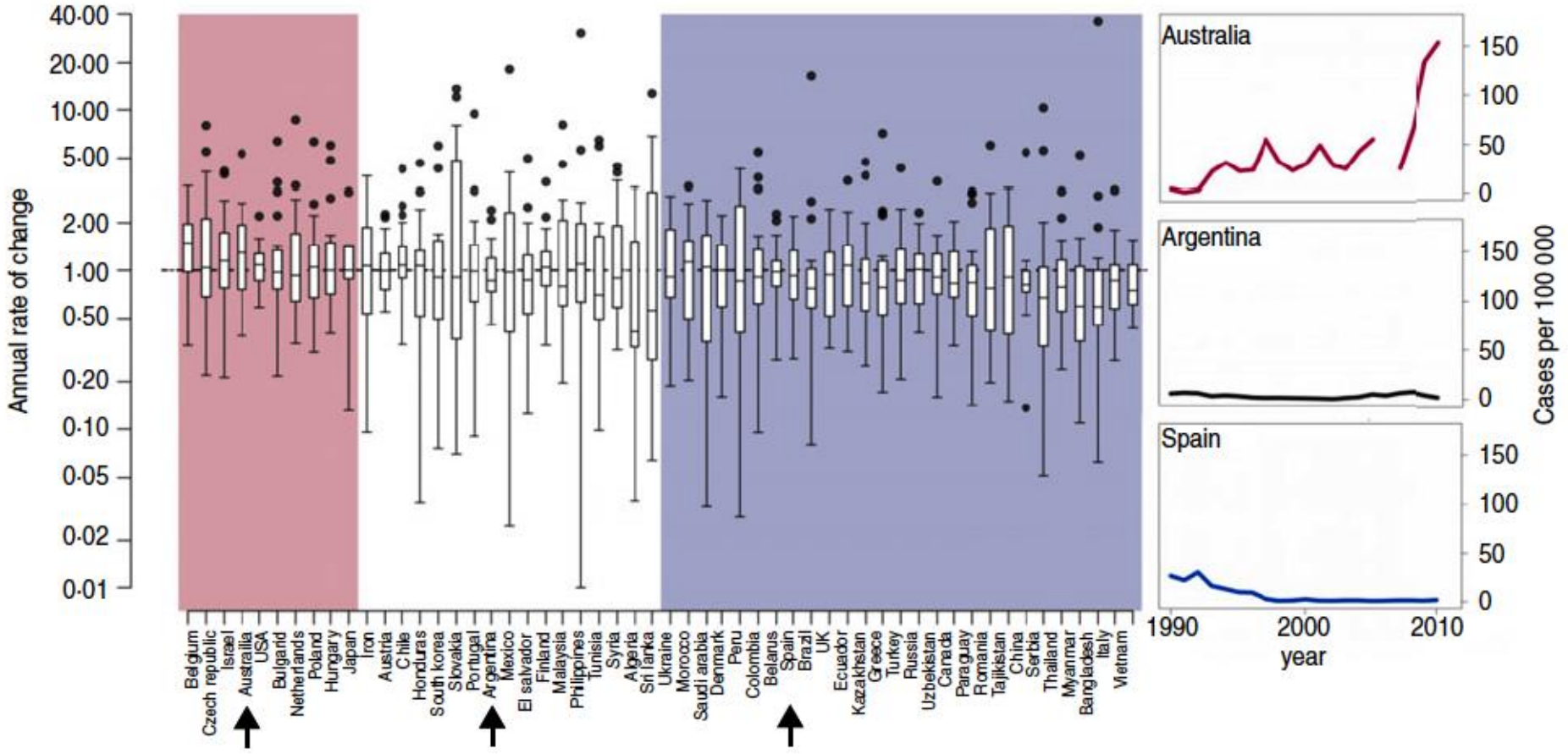
Pertussis epidemiology varies with settings



- What about Africa?
- Epidemiology data incomplete/missing: possible epidemic!!
- Need for vaccination policy review??

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Measles epidemiology

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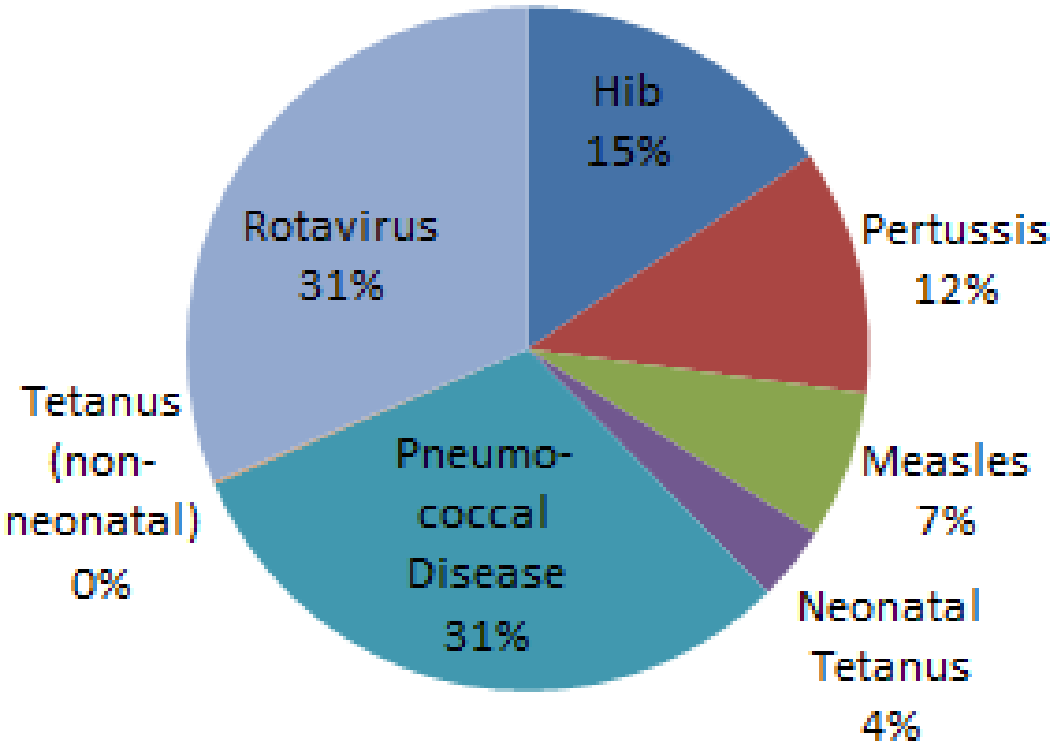
Vaccine Preventable Deaths in <5 years: 2008



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http://www.action.org/resources/item/vaccine-preventable-deaths

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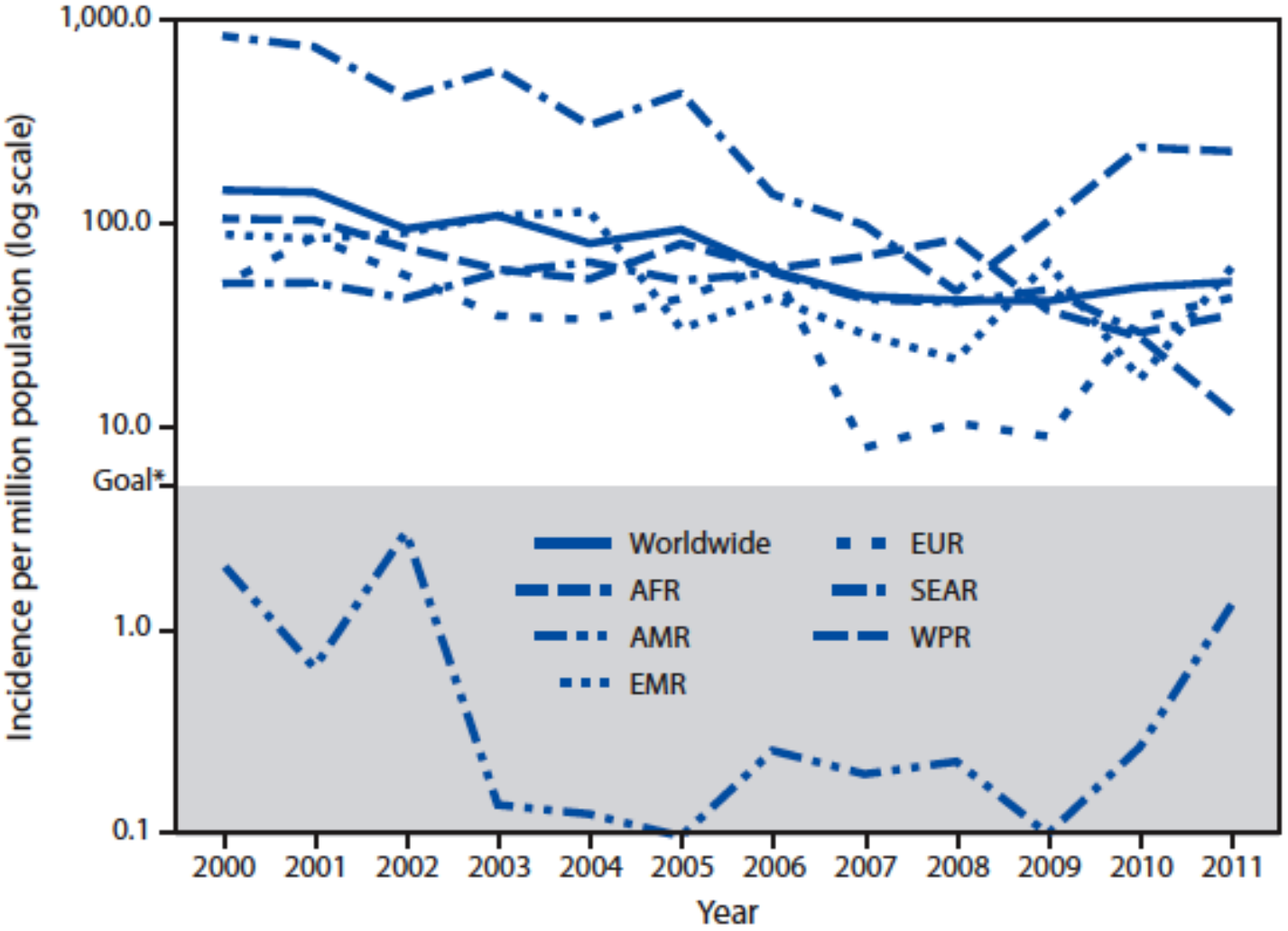
FIGURE. Reported measles incidence per million population, by World Health Organization region and worldwide, 2000–2011



Abbreviations: AFR = African; AMR = Americas; EMR = Eastern Mediterranean; EUR = European; SEAR = South-East Asia; WPR = Western Pacific.

* As a milestone to measles eradication, the World Health Organization has set a goal of reducing the global incidence of measles to <5 cases per million population by 2015.

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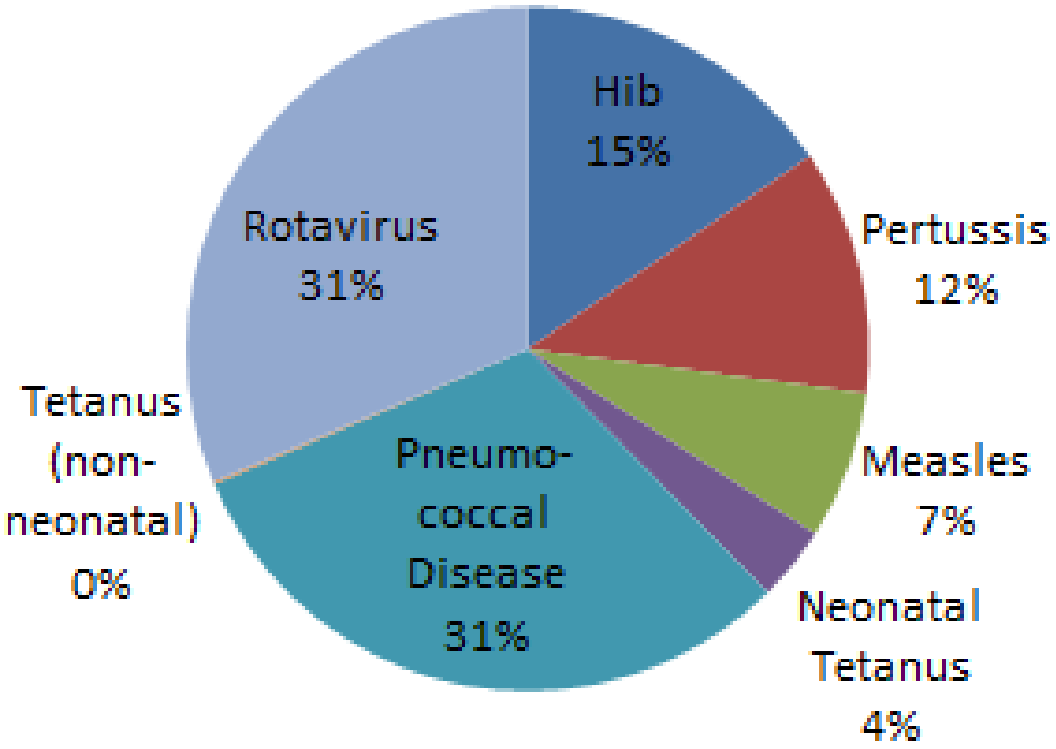
Tetanus epidemiology

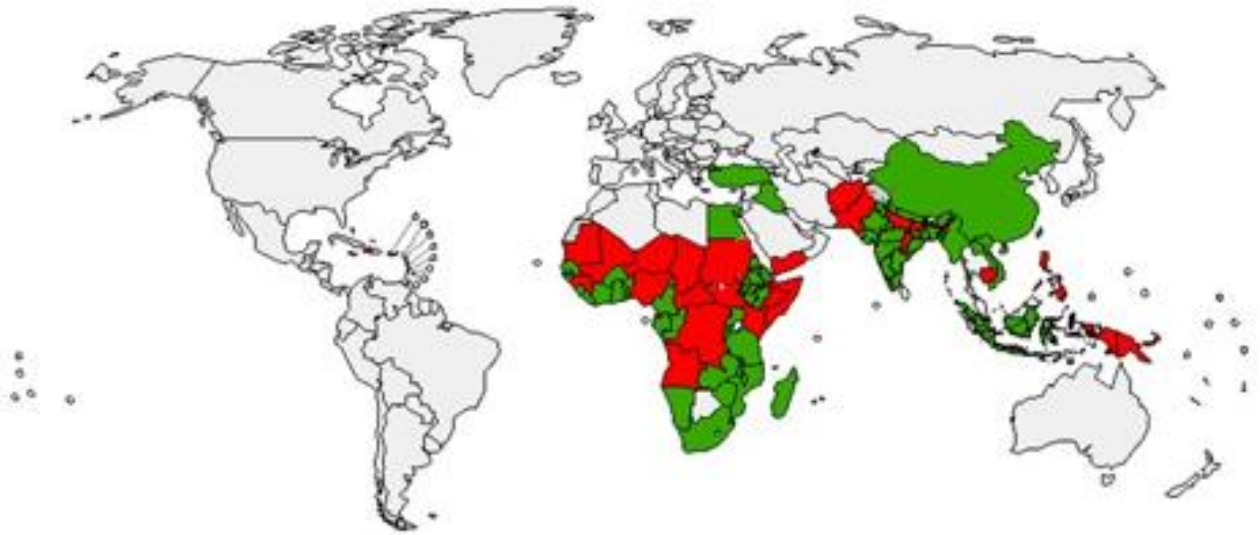
Vaccine Preventable Deaths in <5 years: 2008



http://www.action.org/resources/item/vaccine-preventable-deaths

35 Countries eliminated MNT between 2000 & June 2014

*(Plus 23 States out of 35 in India, Ethiopia all except Somali region and 29 provinces out of 33 in Indonesia) leaving 24 countries yet to eliminate MNT



Data Source: WHO/UNICEF database, May 2014

194 WHO Member States.

Map production: Immunization Vaccines and Biologicals, (IVB), World Health Organization

Date of Slide: 20 June 2014

http://www.unicef.org/health/index_43509.html

Pneumococcal epidemiology

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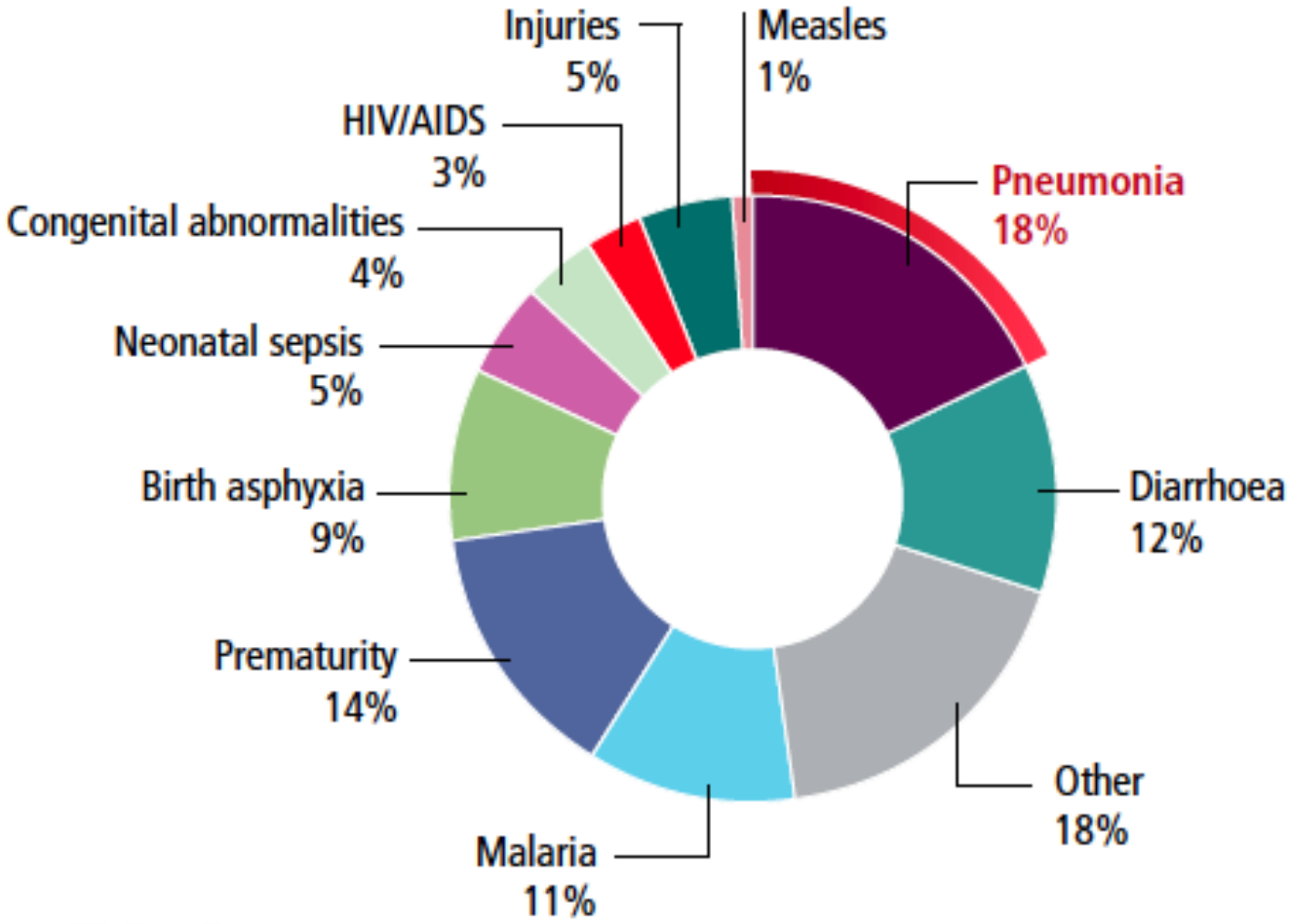
Causes of deaths in <5 years: 2012



Source: WHO, World Health Statistics 2012

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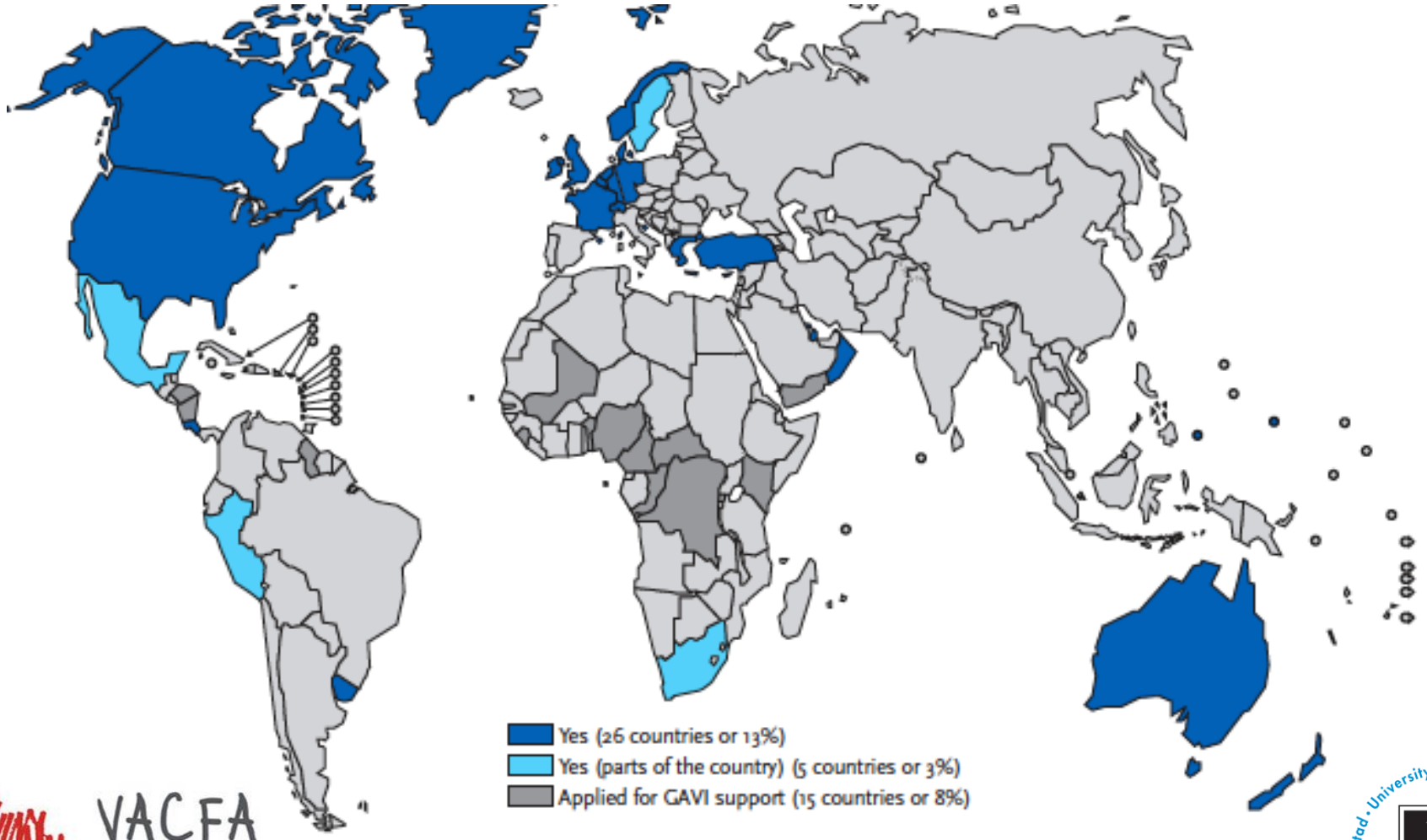
PCV introduction in the national Immunization programs, 2008



Source: WHO/IVB database, 193 WHO Member States, July 2009

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Rotavirus epidemiology

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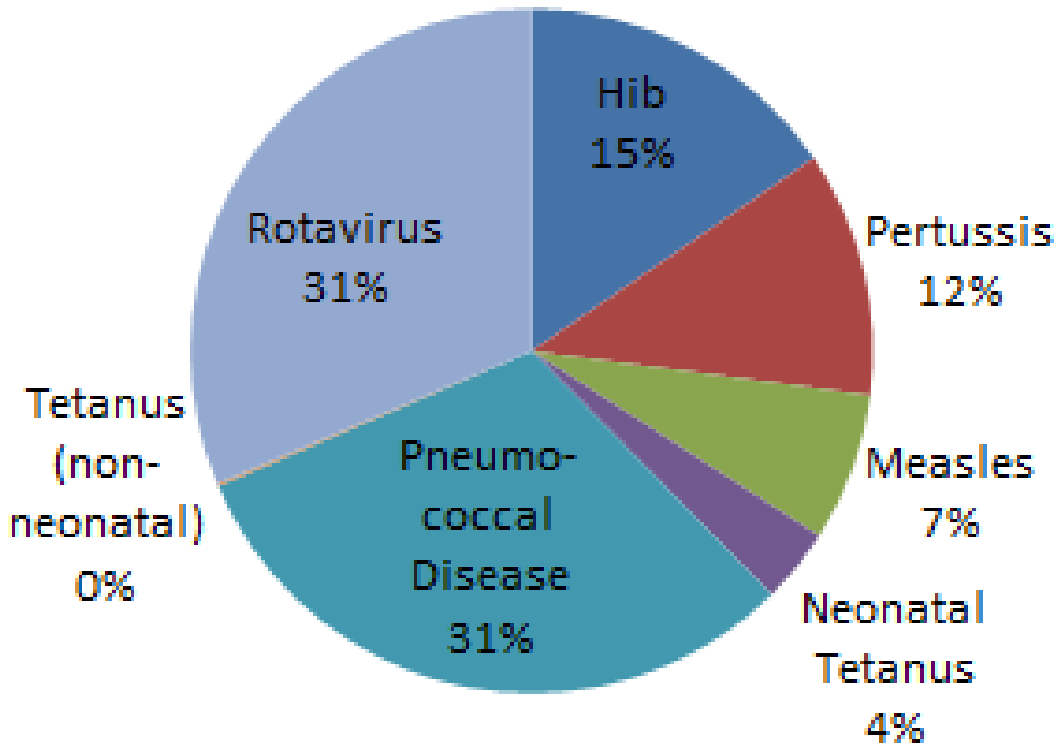
Vaccine Preventable Deaths in <5 years: 2008



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http://www.action.org/resources/item/vaccine-preventable-deaths

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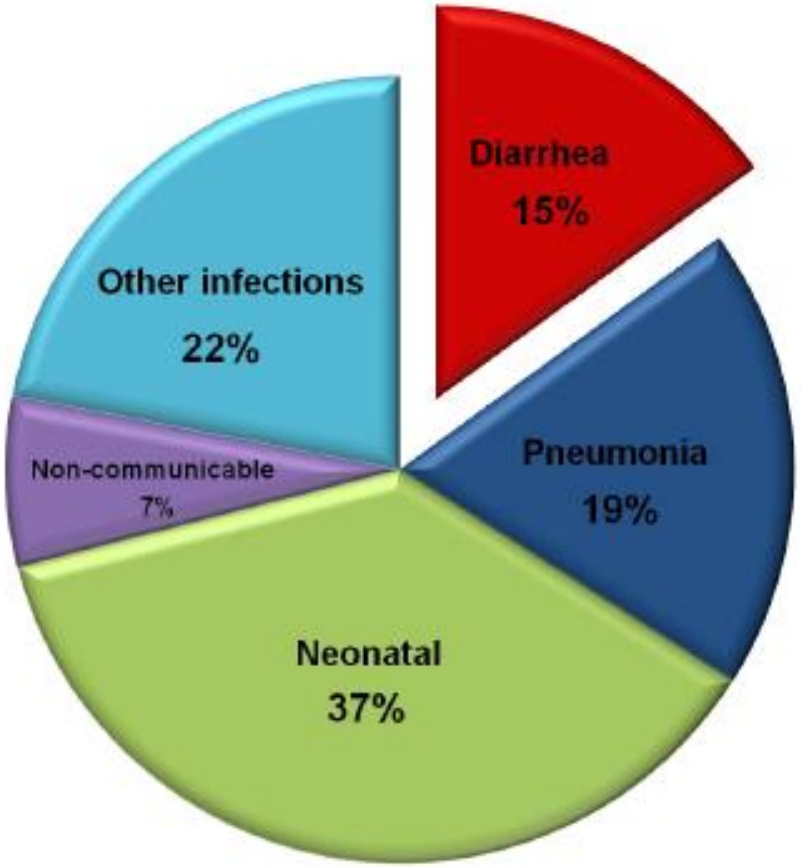
Global childhood deaths due to diarrhea



- In 2008, 15% of all deaths in children <5 years of age due to diarrhea
  - ~1.3 million (0.8 to 2.1 million) childhood diarrhea deaths globally

Black et al 2010 Lancet

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http://www.sabin.org/sites/sabin.org/files/Jacqueline%20Tate.pdf

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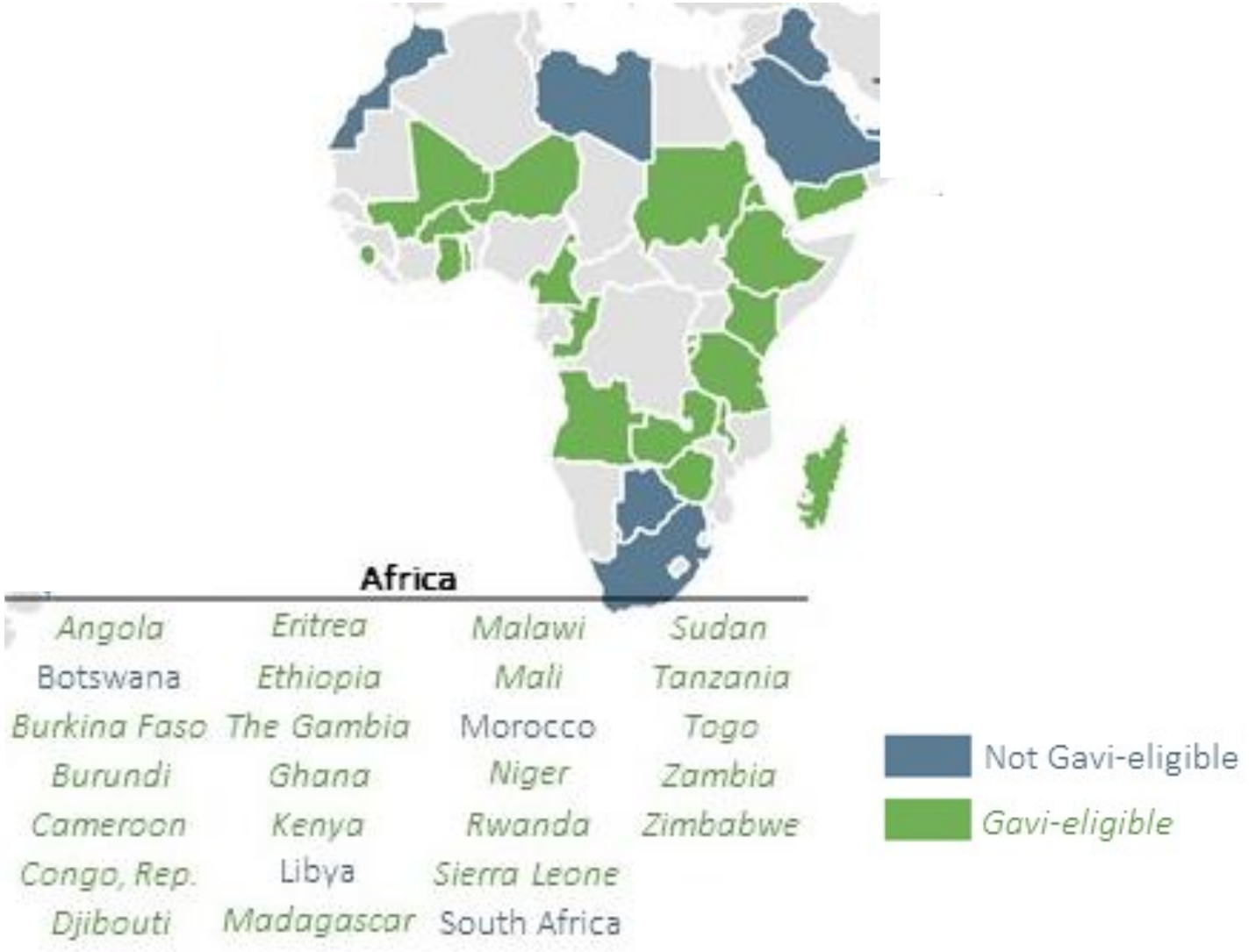
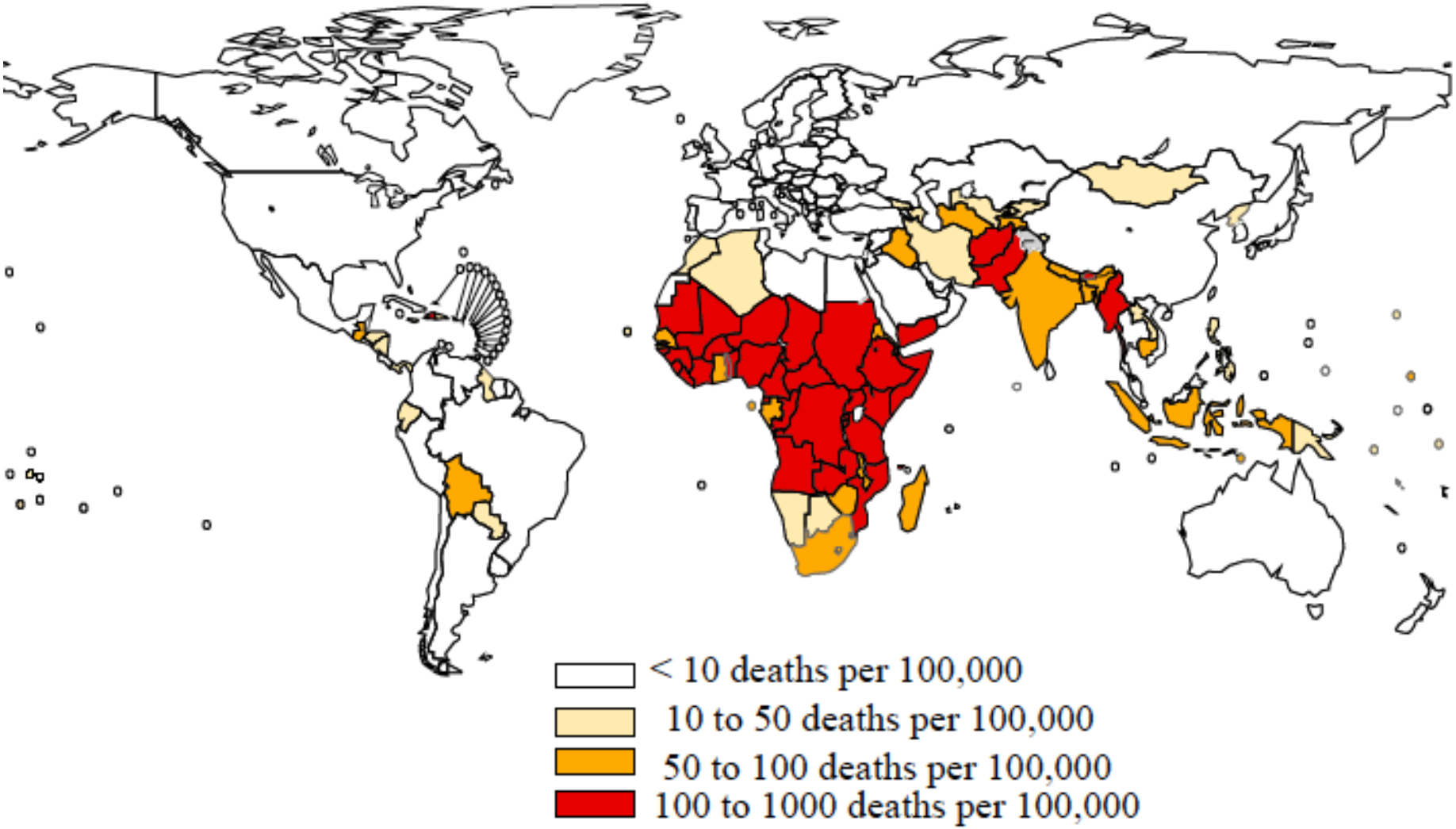
National RV introduction as of 1st Sep 2014



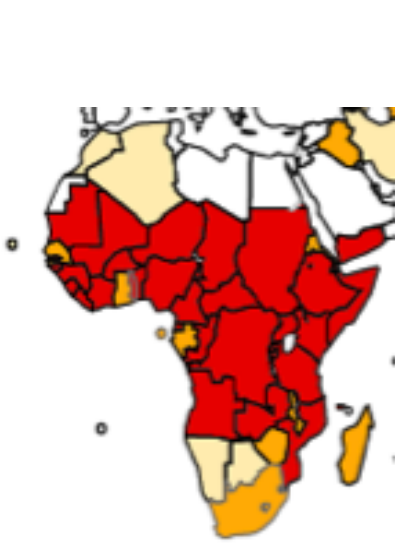
http://sites.path.org/rotavirusvaccine/files/2012/09/PATH-Worldwide-Rotavirus-Vaccine-Introduction-Map_10.27.jpg

Rates of rotavirus mortality by country, 2008



http://www.sabin.org/sites/sabin.org/files/Jacqueline%20Tate.pdf

National RV introduction as of 1st Sep 2014



Africa

Angola	*Eritrea*	*Malawi*	*Sudan*
Botswana	*Ethiopia*	*Mali*	*Tanzania*
Burkina Faso	*The Gambia*	Morocco	*Togo*
Burundi	*Ghana*	*Niger*	*Zambia*
Cameroon	*Kenya*	*Rwanda*	*Zimbabwe*
Congo, Rep.	Libya	*Sierra Leone*	
Djibouti	*Madagascar*	South Africa	

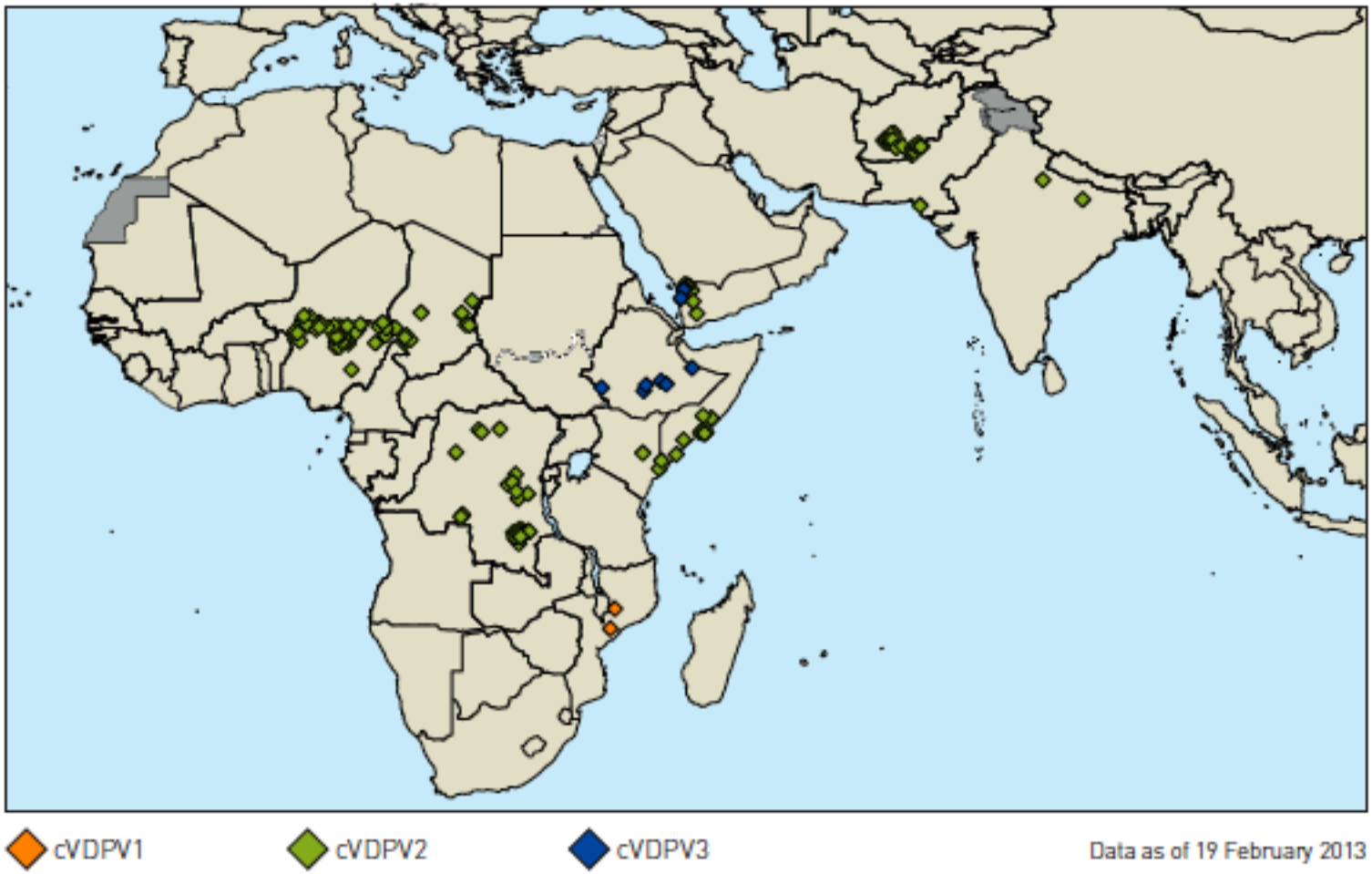
Not Gavi-eligible

Gavi-eligible

http://sites.path.org/rotavirusvaccine/files/2012/09/PATH-Worldwide-Rotavirus-Vaccine-Introduction-Map_10.27.jpg

Polio eradication endgame plan by WHO

Figure 4: Circulating vaccine-derived poliovirus cases by type, 2010-2012



Three major deadlines missed prompted a critical review of the programme:

- Interruption of transmission by 2000
- Certification of eradication in 2005
- Interruption of transmission by 2012

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In conclusion

- Improved vaccination coverage results to reduced mortality associated with VPD

- Africa has made steady progress in increasing vaccination coverage

- Most countries have sub-optimal coverage

- Many more lives can be saved in Africa through improved vaccines uptake

- We all have responsibilities to save these lives. Know your role! Take up your role!

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