

# Global Burden of Rotavirus Disease

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Expanded Programme on Immunization



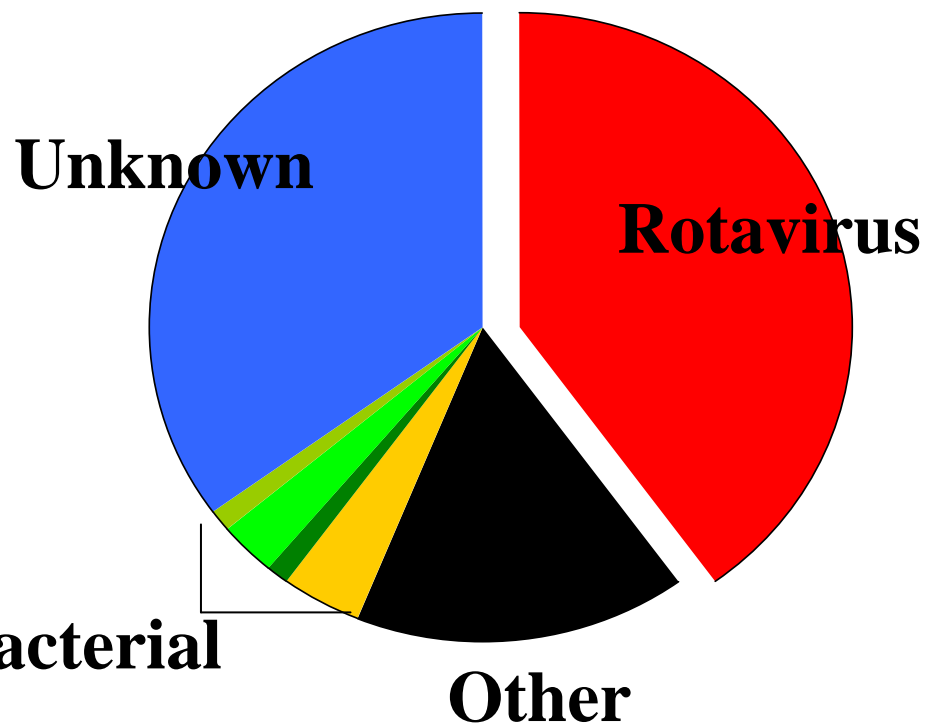
**World Health  
Organization**

# Rotavirus Infection

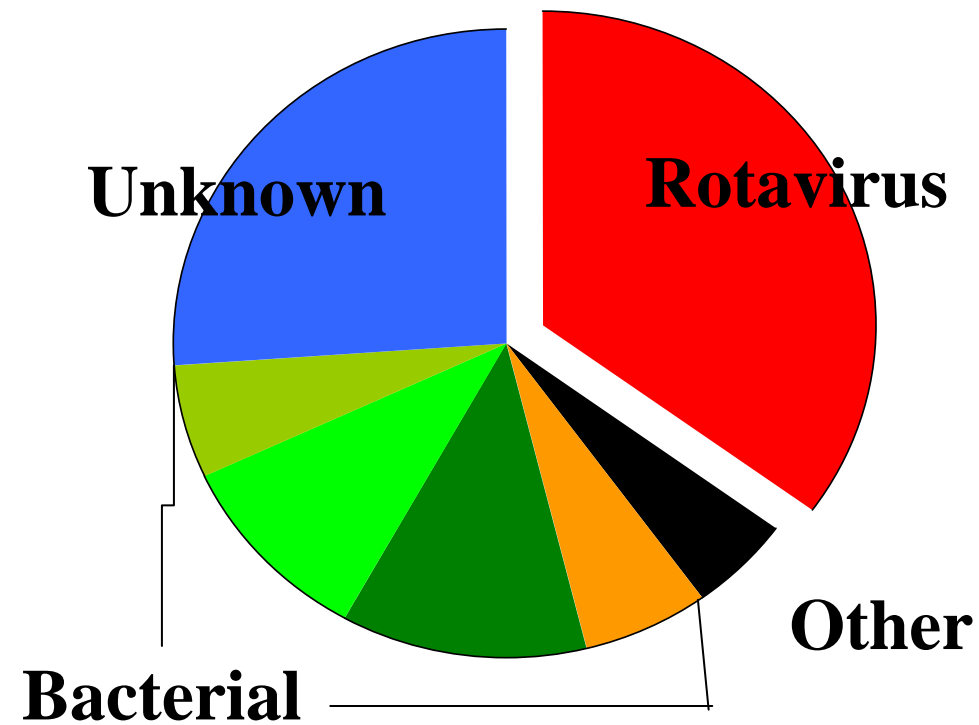
- Illness ranges from mild, watery diarrhea of limited duration to severe diarrhea with vomiting and fever that can result in dehydration with shock, electrolyte imbalances, and death
- Highly communicable and shed in high concentrations and for many days in the stool and vomitus of infected persons
- Transmission occurs primarily by the faecal–oral route
- However, universal occurrence of rotavirus infections suggests that clean water supplies and good hygiene have a limited effect on preventing virus transmission.

# Causes of severe acute gastroenteritis among children <5 years

## Developed Countries



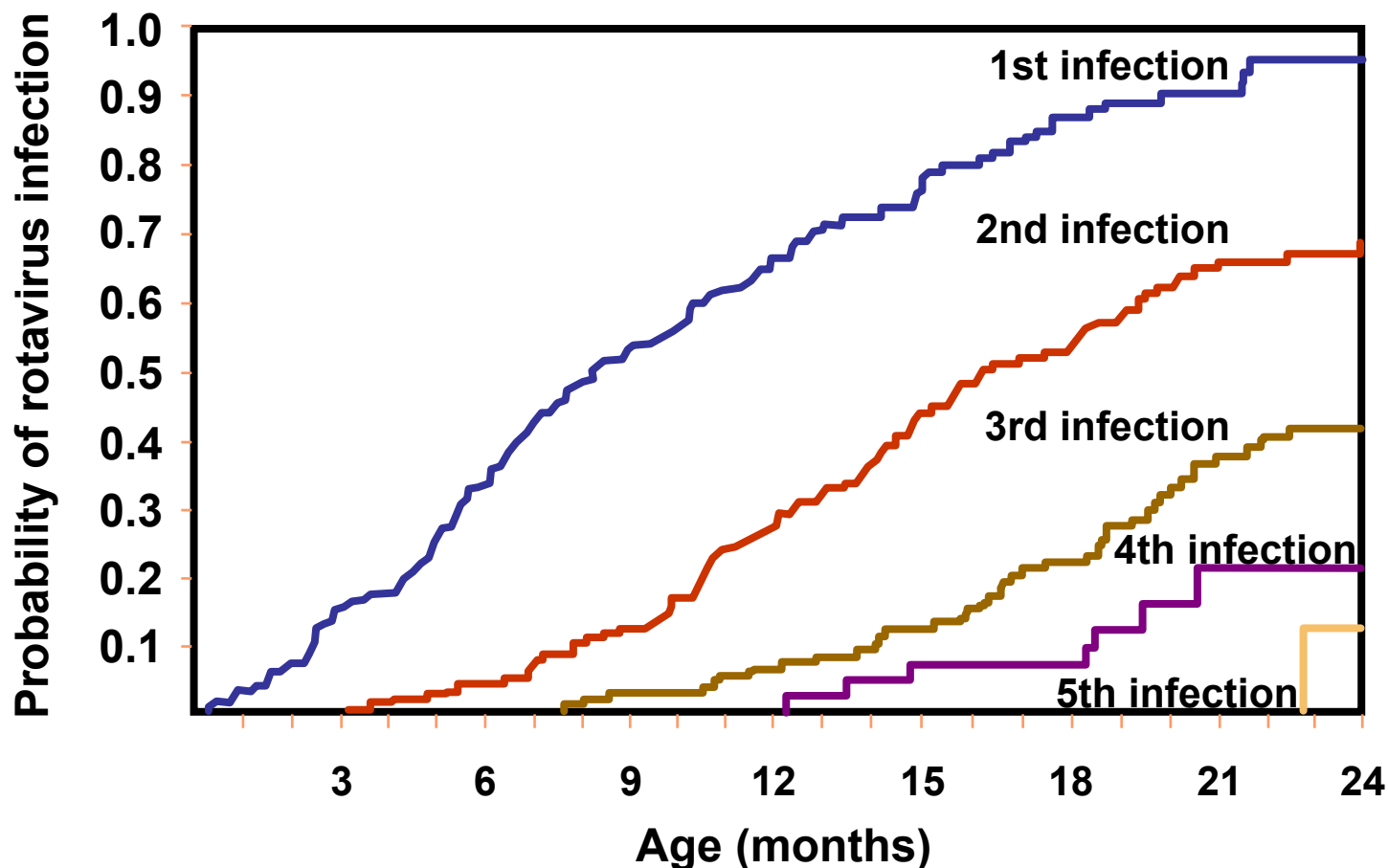
## Developing Countries



A. Kapikian, Fields Virology 2003

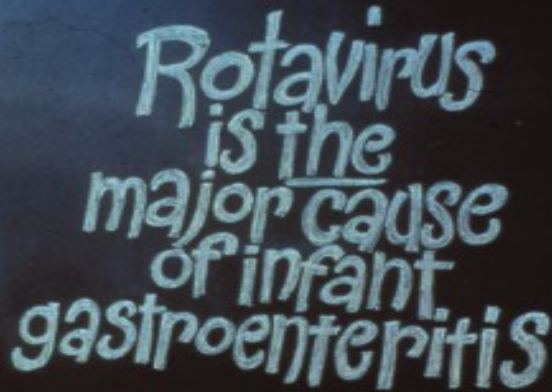


# All children will get at least one rotavirus infection early in life



Reproduced from Velázquez et al. *N Engl J Med*. 1996;335:1022-1028.

# Rotavirus



Rotavirus  
is the  
major cause  
of infant  
gastroenteritis

- Most common cause of severe diarrhea in children
- “*Democratic*” virus infects children in both developing and developed countries
- All children infected by age 5

# Differences in epidemiology of rotavirus in developing versus industrialized countries

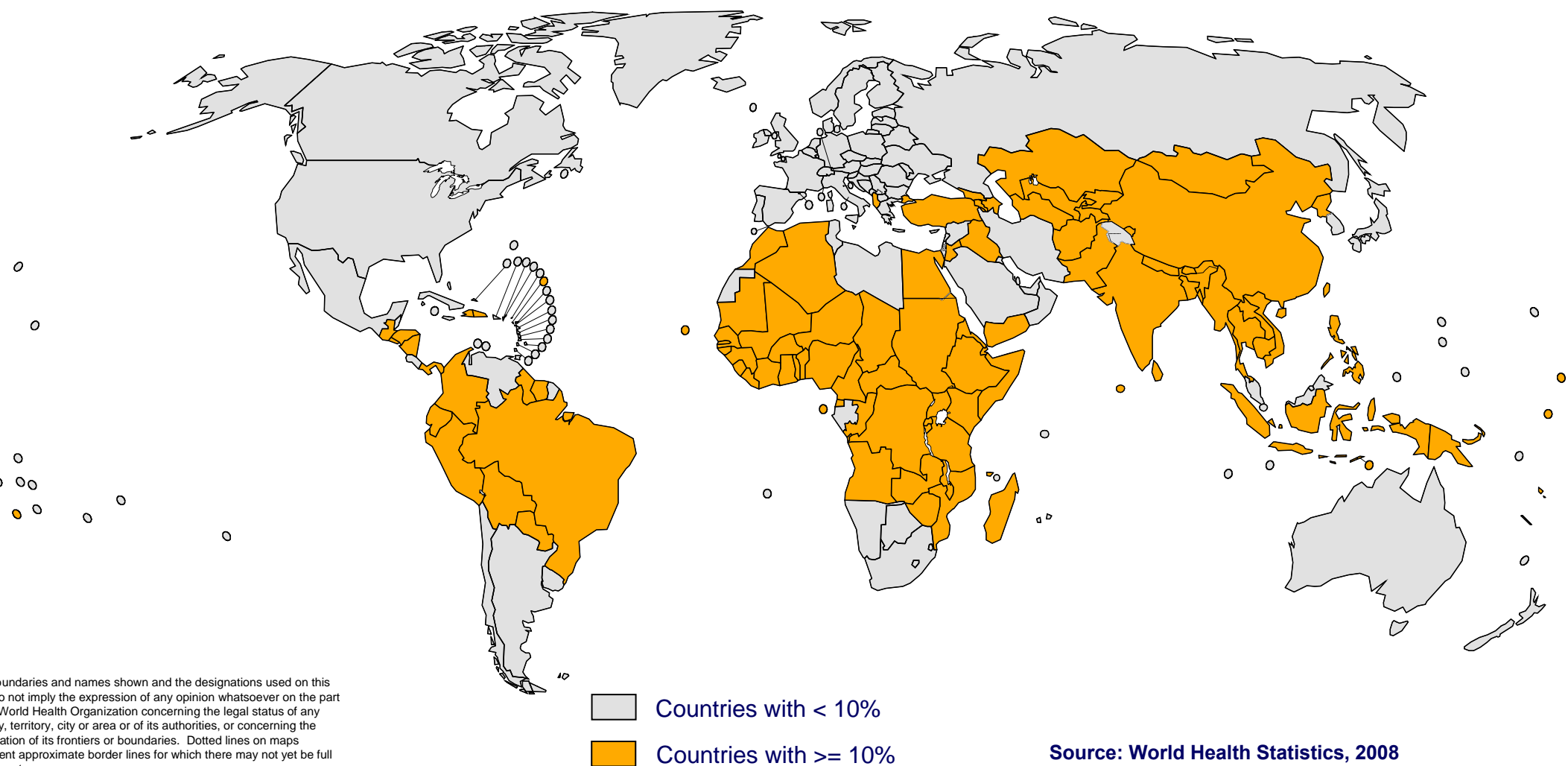
Feature	Less-developed countries	Industrial countries
Seasonality	year-round	winter
Case fatality	high	low
Age at infection	6-9 months	9-15 months
Proportion infected by 1 year of age	80%	65%



# **Preventing serious disease due to rotavirus is the best way to protect children in poor countries.**

- Rotavirus case-fatality is high in developing countries due to lack of access to supportive therapy to address severe dehydration from diarrhea and vomiting.
- Neither antibiotics nor other drugs can cure rotavirus.
- Improvements in sanitation and hygiene that stop many bacteria and parasites have not prevented the transmission of rotavirus.

# Countries with $\geq 10\%$ under-5 deaths due to diarrhoeal diseases

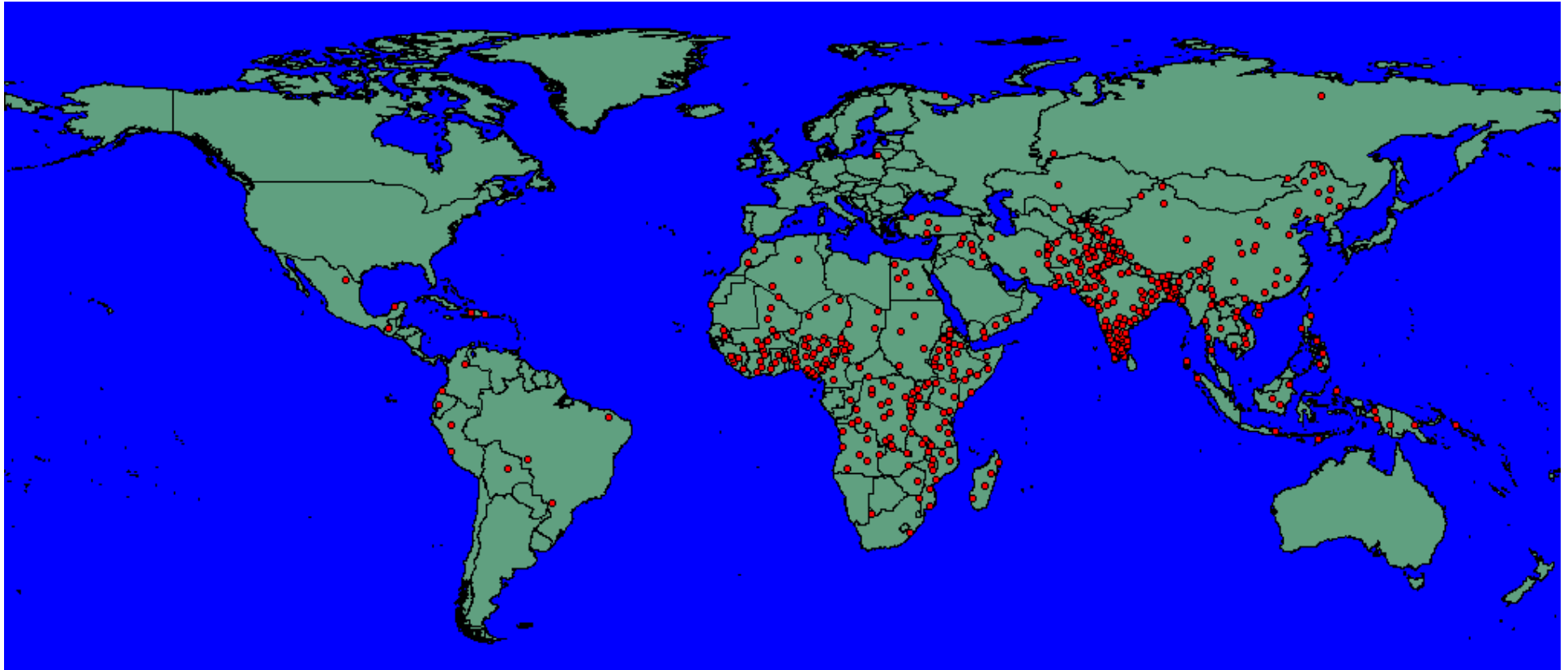


Source: World Health Statistics, 2008

publication available at <http://www.who.int/whosis/>



# Global distribution of rotavirus mortality



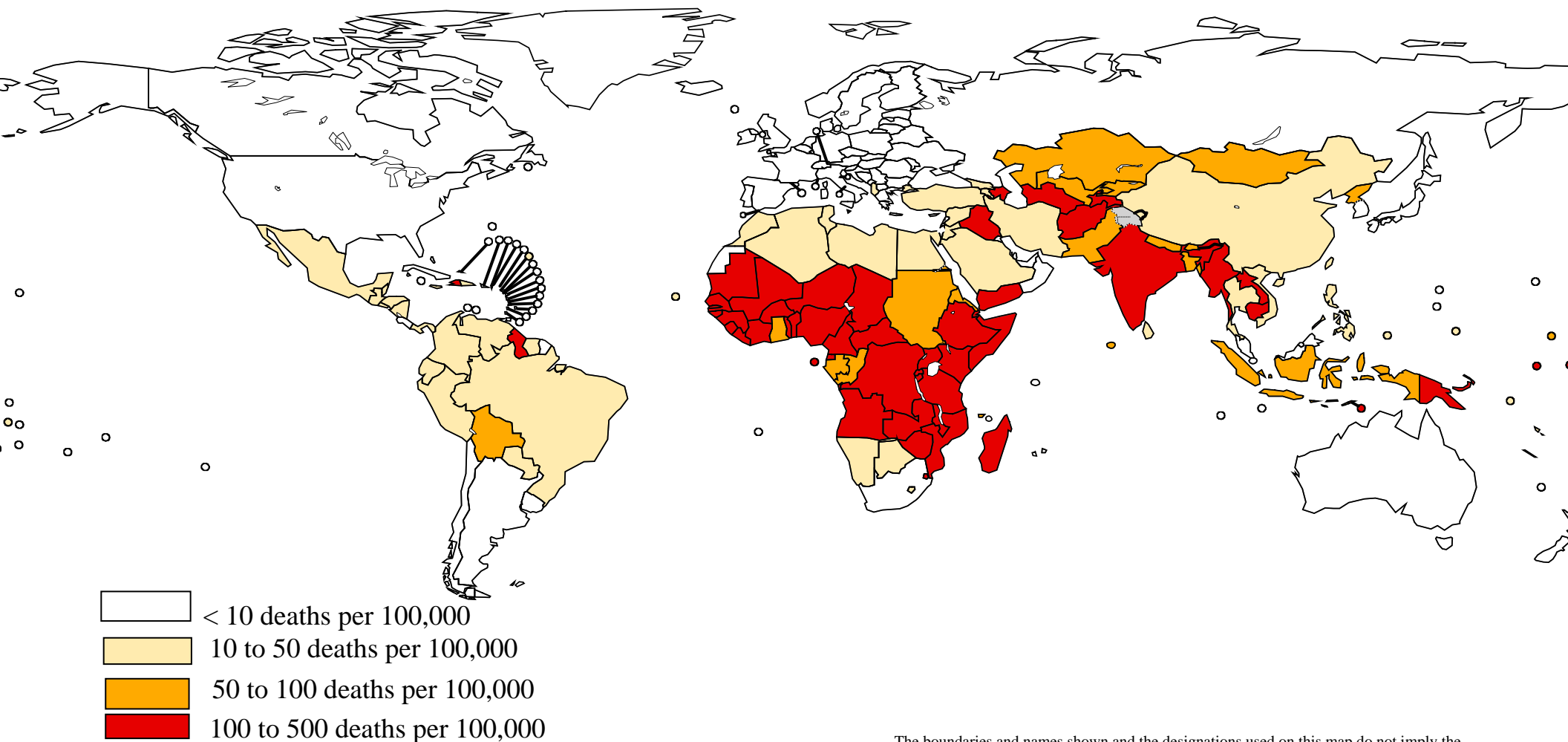
Each dot = 1000 deaths.

- 85% of these in developing countries.

**Parashar et al., 2006; WHO report, 2007.**

- ~527,000 rotavirus (RV) related deaths per year in young children <5 years.

# Under-5 mortality rate due to rotavirus disease per 100,000 population (<5 years of age)

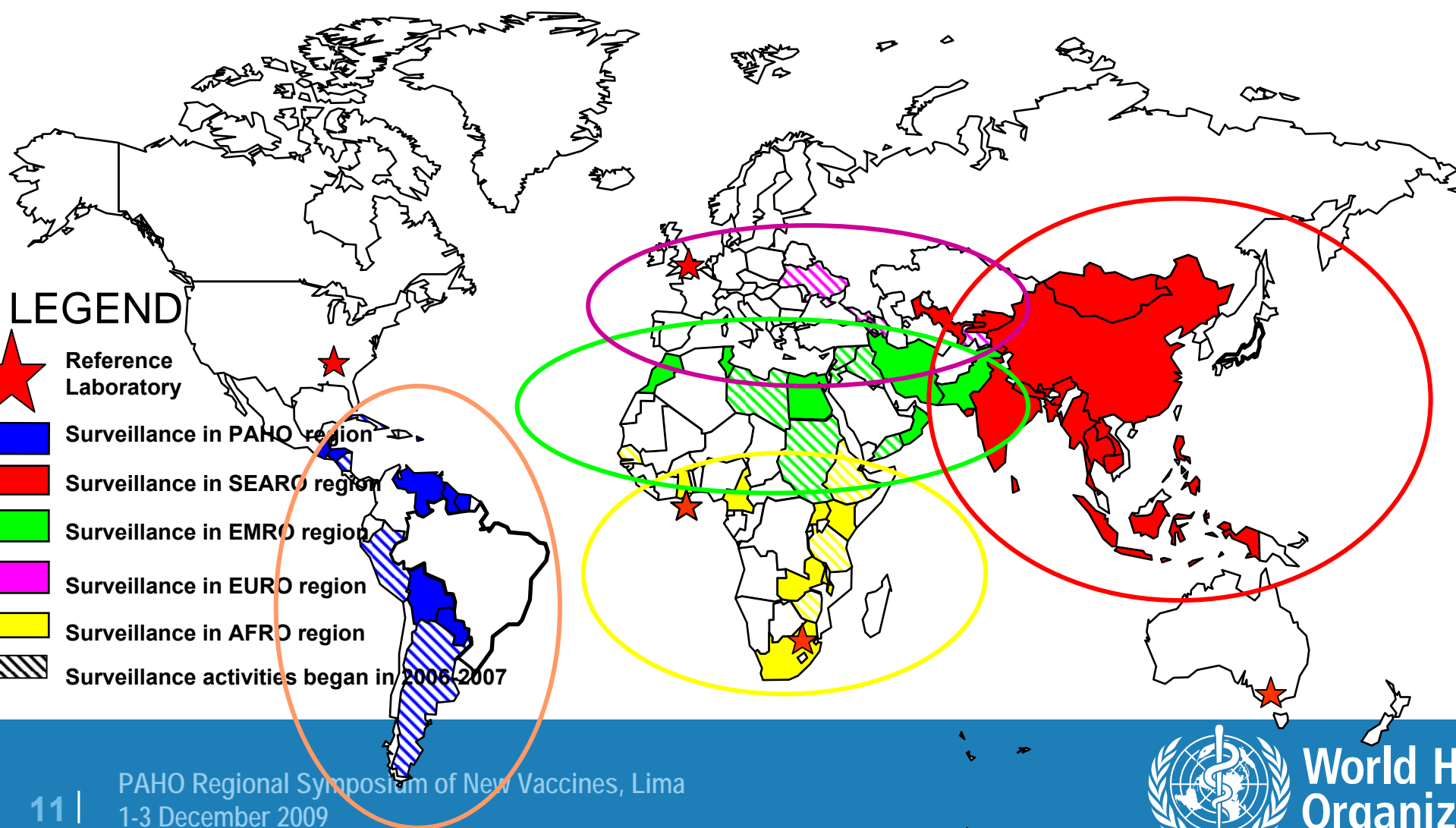


The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers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

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# Surveillance Networks

*>80 sites in more than 40 countries!*



# Rotavirus Surveillance – Worldwide, 2001-2008

Rotavirus detection in hospitalized patients < 5 years with acute diarrhea

WHO region	No. of countries	Total no. of patients tested (range by country)	Median detection rate for all countries (range by country)	
			Rate (%)	Range
AFR	4	4,356	41	(39-52)
AMR	11	26,065	34	(10-51)
EUR	3	3,374	40	(38-45)
EMR	9	17,291	40	(29-55)
SEAR +WPR	8	11,498	45	(28-59)
Total	35	62,584	40	(10-59)

From: MMWR 2008: 57; 1255-1257

PAHO Regional Symposium of New Vaccines, Lima  
1-3 December 2009

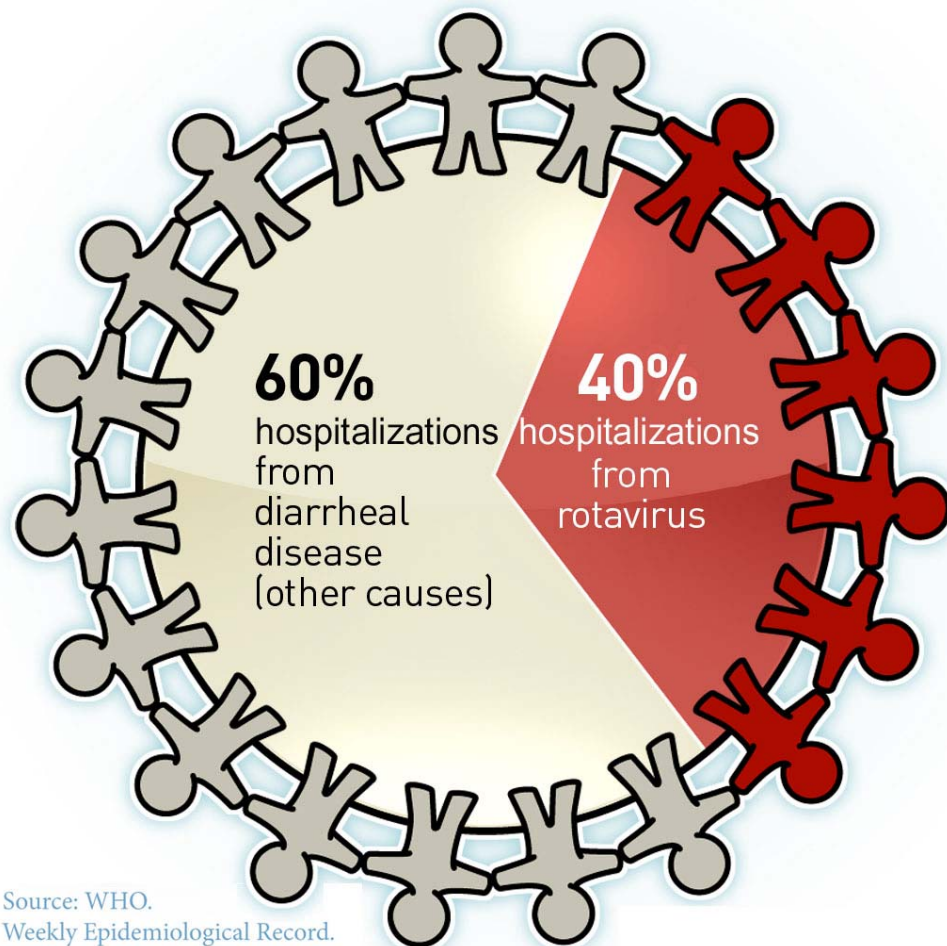


# Global Burden of Rotavirus Disease

Each year it causes:

- 111 million cases
- 25 million outpatient visits
- 2 million hospitalizations
- Over 500,000 deaths

Global surveillance shows that 40% of diarrheal hospitalizations are due to rotavirus. In developing countries, nearly 1,400 children die from rotavirus infections *each day*.



Source: WHO.  
Weekly Epidemiological Record.  
2008;83(47).



# Currently available rotavirus vaccines

	<b>Rotarix® (GSK Bio)</b>	<b>RotaTeq® (Merck)</b>
<b>Origin</b>	Human monovalent	Bovine pentavalent
<b>Strain</b>	G1, P[8]	G1, G2, G3, G4, P[8] & G6P[7]
<b>Vaccine course</b>	2 doses - oral	3 doses - oral
<b>Presentation</b>	Lyophilized, reconstituted or liquid	Liquid
<b>Pivotal Phase III trial</b>	n=63,225 (20,169 for efficacy) Latin American and Finland	n=70,301 (5,673 for efficacy) United States and Finland
<b>Efficacy vs rotavirus GE</b>	85% - 100% vs severe rota GE	98% vs severe rota GE
<b>Efficacy vs all-cause severe GE</b>	42% hospitalization for severe GE of any cause	59% hospitalization for diarrhea of any cause
<b>Intussusception risk</b>	No association observed	No association observed
<b>WHO Pre-qualification</b>	Yes, Jan 2007	Yes, Oct 2008





# Child mortality rates by cause and region, 2004

