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The World Health Organization (WHO) produces a twice-yearly Global Rotavirus Surveillance Bulletin to share information and data with partners at the national, regional, and global levels. This Bulletin presents surveillance data for January through December of 2009, as reported by Member States participating in the WHO coordinated network for rotavirus sentinel surveillance that targets hospitalized children under five years of age.

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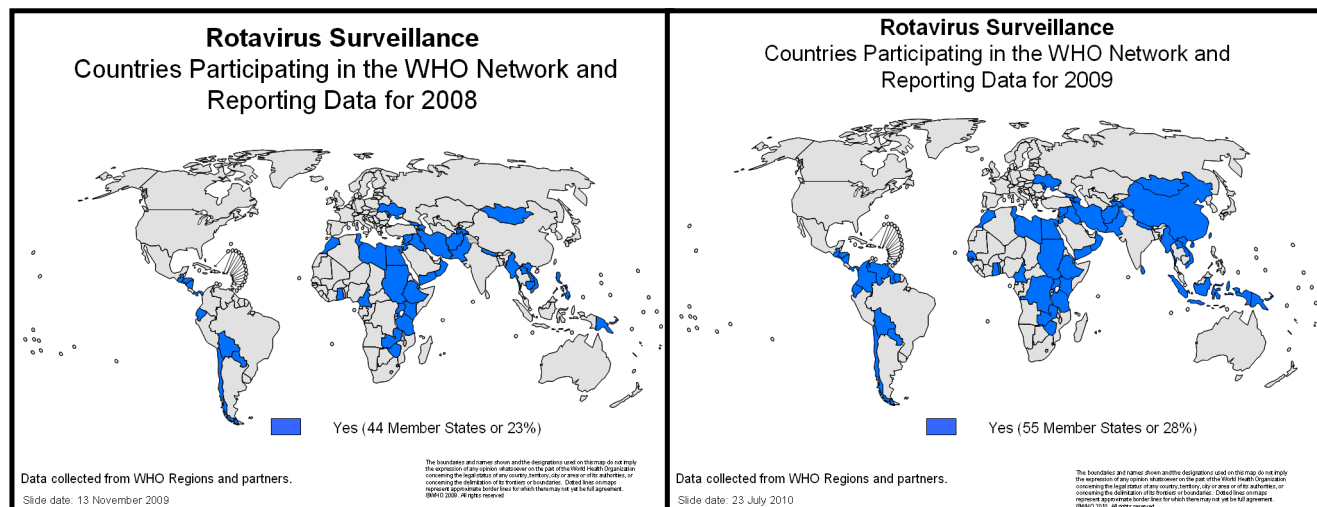
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**The WHO Rotavirus Surveillance Network Expands during 2009**

As compared with 2008, the number of Member States reporting to the WHO coordinated rotavirus surveillance network increased from 44 to 55 countries during 2009, a 20% increase (Figures 1 and 2).

Figure 1. Countries reporting rotavirus surveillance data to WHO in 2008.

Figure 2. Countries reporting rotavirus surveillance data to WHO in 2009.



Thirty nine (71%) of the reporting countries were based in three WHO African Regions, namely Africa (AFR), the Americas (AMR), and Eastern Mediterranean (EMR), (Table 1). The number of sentinel sites reporting per country ranged from 1 to 13, as some reporting countries had significantly expanded sites beyond the minimum recommended 1 to 3 sentinel sites per country, and had adopted a more national approach to data collection. Financial support was provided to GAVI eligible countries using funds made available to WHO from the

GAVI Alliance, whereas other countries received technical support and agreed to provide data to WHO using a standardized format. Of the 72 GAVI-eligible countries during 2009, 34 (47%) reported rotavirus data to WHO. Within the European Region (EUR), South East Asia Region (SEAR) as well as AFR, all reporting countries were GAVI eligible.

Table 1. Characteristics of WHO Rotavirus Surveillance Network by WHO Region, 2009

WHO region	By GAVI eligibility			No.(%) of sentinel sites reporting	Total No.(%) of countries reporting
	No.(%) of GAVI-eligible countries	No.(%) of GAVI-eligible countries reporting	Proportion of GAVI-eligible countries reporting		
AFR	36 (50)	12 (35)	33%	18 (11)	12 (22)
AMR	6 (8)	4 (12)	67%	59 (34)	14 (25)
EMR	6 (8)	4 (12)	67%	68 (40)	13 (24)
EUR	8 (11)	6 (18)	75%	9 (5)	6 (11)
SEAR	9 (13)	4 (12)	44%	4 (2)	4 (7)
WPR	7 (10)	4 (12)	57%	13 (8)	6 (11)
<b>TOTAL</b>	<b>72 (100)</b>	<b>34 (100)</b>	<b>47%</b>	<b>171 (100)</b>	<b>55 (100)</b>

During 2009, over 50,000 children <5 years of age hospitalized for the treatment of acute gastroenteritis/diarrhoea were enrolled in the WHO rotavirus surveillance network, an increase of 22% as compared with 2008 (Table 2). A large increase in enrolled cases occurred in the SEAR region, partly due to addition of Indonesia and Sri Lanka to the reporting network.

Table 2. Number of children <5 years of age hospitalized for the treatment of acute gastroenteritis/diarrhoea and enrolled in the WHO rotavirus surveillance network, 2008 as compared to 2009.

WHO Region	Year 2008		Year 2009		% change in number of children enrolled from 2008 to 2009
	No. (%) of reporting countries	No. (%) of children enrolled	No. (%) of reporting countries	No. (%) of children enrolled	
AFR	8 (18)	3,838 (9)	12 (22)	5,071 (10)	+32
AMR	9 (20)	13,761 (33)	14 (25)	16,427 (32)*	+19
EMR	13 (30)	14,640 (35)	13 (24)	14,477 (29)	-1
EUR	5 (11)	4,801 (12)	6 (11)	6,330 (12)	+32
SEAR	2 (4)	324 (1)	4 (7)	2,596 (5)	+701
WPR	7 (16)	4,050 (10)	6 (11)	5,511 (11)	+36
<b>TOTAL</b>	<b>44 (100)</b>	<b>41,414 (100)</b>	<b>55 (100)</b>	<b>50,412 (100)</b>	<b>+22</b>

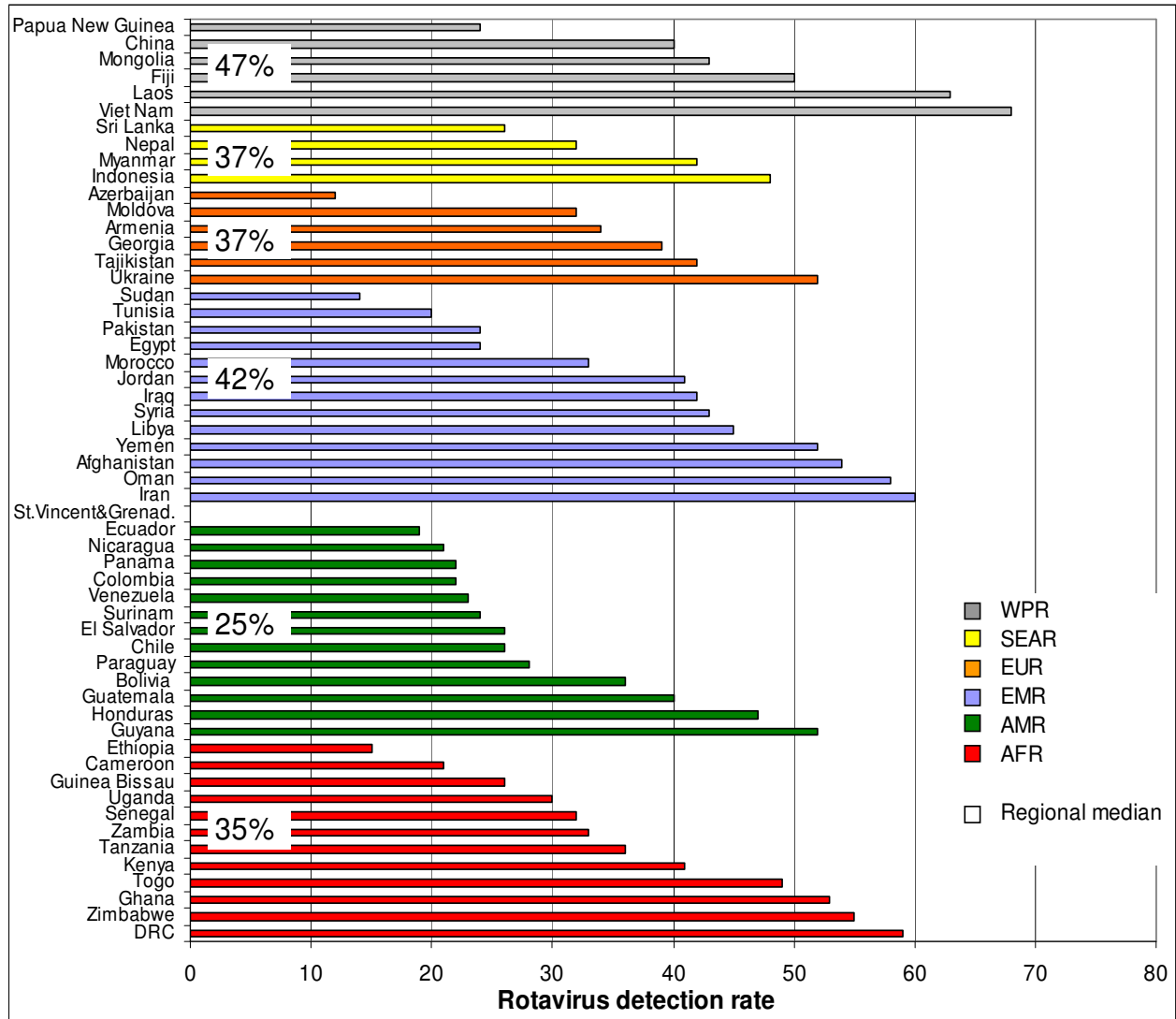
\*No data from the AMR countries of St. Vincent & Grenadines and Surinam.

### Rotavirus Detection

Stool specimens were collected from case-children and tested for rotavirus. The proportion of stool specimens positive for rotavirus (i.e. rotavirus detection rate) varied between reporting countries (Figure 3). The global median detection rate was 36%, with a range of 0 to 68%. The regional median detection rate for AFR, AMR, EMR, EUR, SEAR and WPR were 35%, 25%, 42%, 37%, 37% and 47%, respectively. However, the data should be interpreted cautiously as 5 countries did not report data for at least one quarter of the year, and seasonality of disease occurrence may have biased their annual estimates (Table 3). The lowest regional median detection rate, 25%, among AMR countries corresponded with the use of rotavirus vaccine in the national immunization schedule of AMR countries in 2009;

this was the only WHO region with the vaccine in use. However, it is more meaningful to make comparisons within a country, before and after vaccine introduction. These analyses will be conducted over future years as countries begin to introduce the vaccine into their national immunization schedules and data surrounding vaccine introduction becomes available.

Figure 3. The proportion of stool specimens positive for rotavirus (i.e. rotavirus detection rate), by country and WHO region, 2009.



Countries with rotavirus vaccine in their national immunization schedules: Bolivia, Colombia, Ecuador, El Salvador, Honduras, Nicaragua, Panama, Venezuela.

Table 3: Seasonality of rotavirus detection, by country and WHO region, 2009.

Country/Region	No. of stool specimens tested	Rotavirus detection rate											
		Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
<b>AFR*</b>													
Ghana	519												
Guinea Bissau	387					ND							ND
Senegal	167				ND	ND	ND						
Togo	153												
Cameroon	164												
DRCongo	140	ND	ND	ND	ND	ND	ND						
Ethiopia	445												
Kenya	515												
Tanzania	248												
Uganda	599												
Zambia	1,128												
Zimbabwe	606												
<b>AMR</b>													
Bolivia	1,395												
Chile	1,005												
Colombia	503												
Ecuador	2,058												
El Salvador	1,328												
Guatemala	1,877												
Guyana	25												
Honduras	1,819												ND
Nicaragua	2,327												
Panama	216												
Paraguay	174												
St.Vinc & Grenadines	15												
Surinam	111												
Venezuela	232												
<b>EMR</b>													
Afghanistan	621												
Egypt	870												
Iran	166												
Iraq	484												
Jordan	66												
Libya	454												
Morocco	726												
Oman	203					ND	ND	ND	ND	ND	ND	ND	ND
Pakistan	2,362												
Sudan	3,442												
Syria	639												
Tunisia	205												
Yemen	672												
<b>EUR</b>													
Armenia	926	ND											
Azerbaijan	1,027												
Georgia	737												
Moldova	1,160												
Tajikistan	995											ND	ND
Ukraine	1,485												
<b>SEAR*</b>													
Indonesia	864	ND	ND	ND									
Myanmar	875												
Nepal	514												
Sri Lanka	343	ND	ND	ND	ND	ND	ND	ND					
<b>WPR</b>													
China	1,501												
Fiji	284												
Laos	275												
Mongolia	689												
Papua New Guinea	354												
Viet Nam	1,874												

\*AFR and SEAR: the number of children enrolled with acute gastroenteritis/diarrhoea was used to approximate the number of specimens tested

**Rotavirus detection rate:**

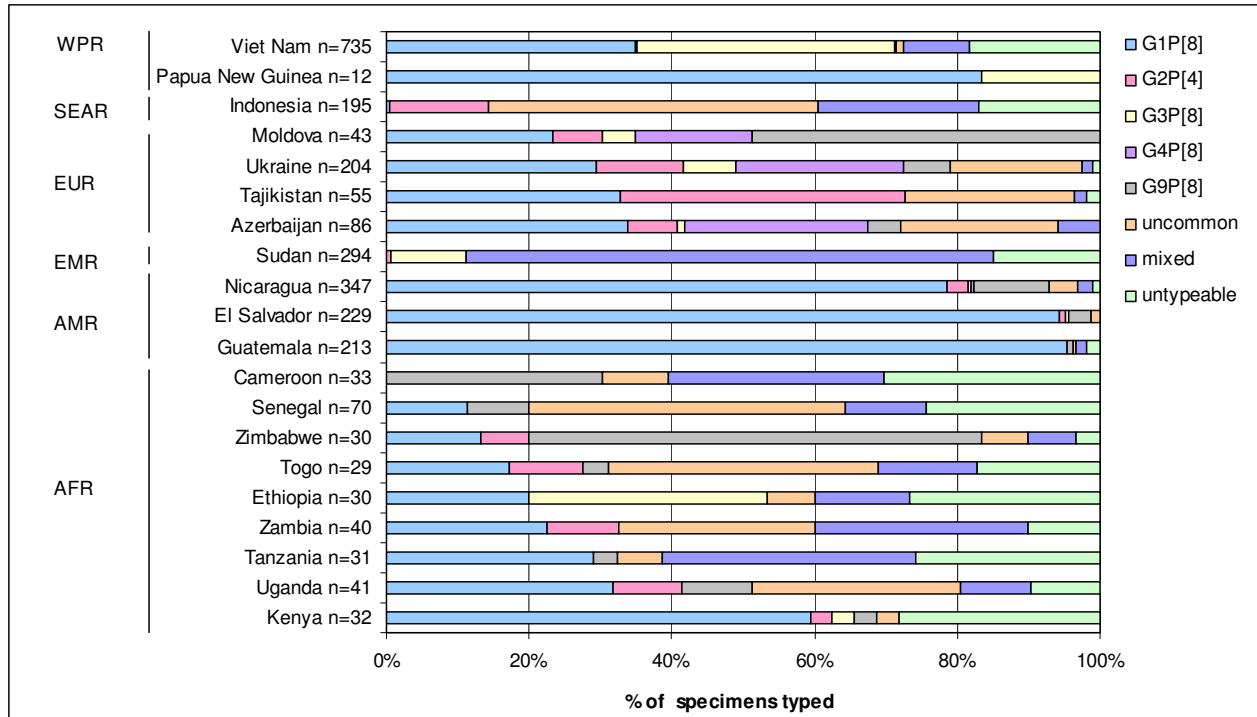
	>= 40% of tested samples were positive for Rotavirus
	>=30% and <40% of tested samples were positive for Rotavirus
	>=20% and <30% of tested samples were positive for Rotavirus
	>=10% and <20% of tested samples were positive for Rotavirus
	<10% of tested samples were positive for Rotavirus
	No data available

## Genotype Data

The first rotavirus genotyping results were reported to the WHO network during 2009, following transition of the various existing networks to WHO coordination in 2008. Detected rotavirus genotypes varied by country; however, genotype G1P[8] was predominant in most countries (Figure 5). Country-specific distributions may be compared with an estimated global distribution, shown in Figure 6.

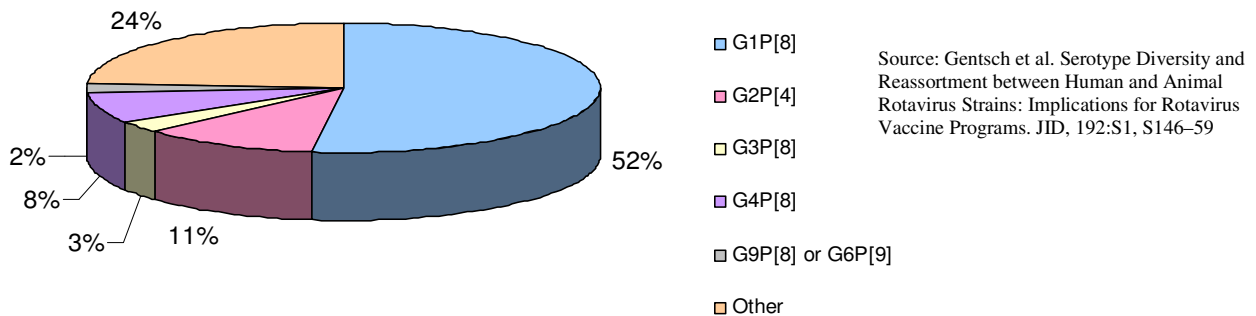
Five countries specified their uncommon genotypes and the distribution of these varied, though one or both genotypes G2P[8] and G1P[4] accounted for >30% of uncommon genotypes in 4 out of 5 of these countries. Regional and Global Reference Laboratories are assessing reasons for identification of untypeable genotypes, and subsequent bulletins will provide updates.

Figure 5. Percent distribution of rotavirus genotypes among specimens typed, by country and WHO region, 2009.



**NOTE:** Total number of specimens typed (n= ) stated next to each country. Missing strain data from AFR countries: South Africa, Cote d'Ivoire, Ghana and Guinea Bissau. Countries with rotavirus vaccine in their national immunization schedules: Nicaragua, El Salvador

Figure 6. Global distribution of rotavirus genotypes where n=21,256; 1994-2003



### **Spotlight on Global Laboratory Network**

A strong laboratory network is essential in ensuring a high-quality rotavirus surveillance network as the laboratory will ultimately determine whether enrolled children suffer from gastroenteritis due to rotavirus or another organism. During 2008 and 2009, the global rotavirus laboratory network has expanded to include a global reference lab and regional reference labs as shown in Table 3:

**Table 3.** Global and Regional Rotavirus Laboratories of the WHO Rotavirus Surveillance Network, 2010

<b>Reference Rotavirus Laboratory</b>	<b>Institution Name and Location</b>
Global Reference	Centers for Disease Control and Prevention, Atlanta, USA
Reference for African Region	<ul style="list-style-type: none"> <li>• Noguchi Memorial Institute for Medical Research, Ghana</li> <li>• University of Limpopo (Medunsa Campus), [Medunsa]South Africa</li> <li>• Kenya Medical Research Institute (KEMRI), Nairobi</li> </ul>
Reference for Region of the Americas	<ul style="list-style-type: none"> <li>• Centers for Disease Control and Prevention, USA</li> <li>• National Public Health Institute of Rio de Janeiro, Rio de Janeiro, Brazil</li> </ul>
Reference for Eastern Mediterranean Region	U.S. Naval Medical Research Unit No. 3, Cairo, Egypt
Reference for European Region	Republican Research and Practical Center for Epidemiology and Microbiology, [Minsk], Belarus
Reference for Southeast Asia Region	Christian Medical College, Vellore, India
Reference for Western Pacific Region	<ul style="list-style-type: none"> <li>• Murdoch Children's Research Institute, Royal Children's Hospital, Melbourne, Australia</li> <li>• Korea Centers for Disease Control and Prevention, Seoul, South Korea</li> </ul>

The Global Reference Laboratory provides requested training and support to Regional Reference Laboratories who in turn assist national and hospital sentinel site laboratories. Work is under way to define the specific roles and responsibilities of global, regional, national and hospital sentinel site laboratories; to develop a checklist and performance indicators to assess a laboratory and its quality, and to standardize external quality assurance procedures. These issues were discussed in depth by Regional and Global Reference Laboratories during the 22-24 September 2010, Global Rotavirus and Vaccine Preventable Invasive Bacterial Diseases Surveillance meeting in Geneva, Switzerland.

### **Acknowledgements**

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