

Global Rotavirus Information and Surveillance Bulletin

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Reporting period: January to December 2010

The Global Rotavirus Information and Surveillance Bulletin is produced by the World Health Organization (WHO) twice a year in order to share activities and data from the WHO-coordinated global surveillance network with partners at the national, regional and global levels.

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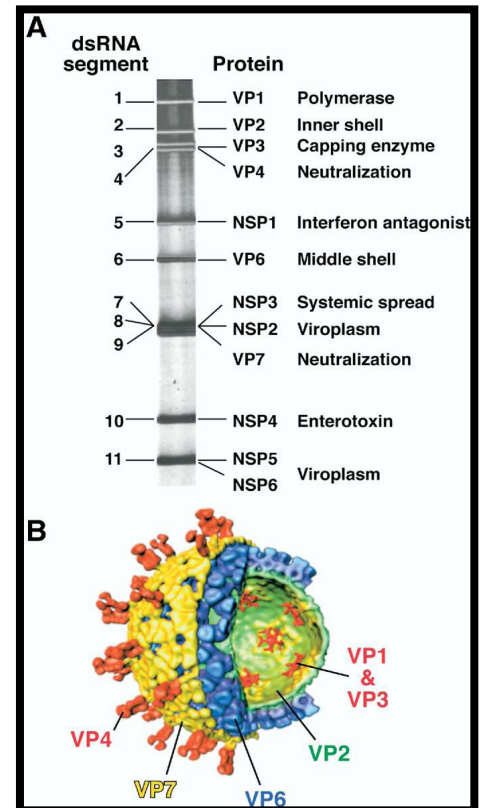
Spotlight on the 2011 Launch of the Global Laboratory External Quality Assurance (EQA) Programme:

The WHO coordinated and supported global EQA programme was launched in 2011 with the Global Reference Laboratory (GRL) at the U.S. Centers for Disease Control and Prevention as the lead implementing entity. During 2011, the GRL provided standard proficiency testing panels of simulated stool specimens to each WHO Regional Reference Laboratory (RRL) via dry ice shipment in order to validate the proficiency panels. Each RRL performed diagnostic testing including genotyping, and provided results to the GRL. With the intent of expanding the EQA programme to include national laboratories and hospital sentinel sites, the GRL initiated a technical assessment to determine the feasibility of shipping specimens at room temperature. Lessons learned will be incorporated in the 2012 EQA survey.

Spotlight on the Roles and Responsibilities of Regional Reference Laboratories:

The roles and responsibilities of WHO RRLs are multifaceted. RRLs provide technical support to enhance capacity by providing training in pathogen detection methods and providing on site support to hospital sentinel sites and national laboratories. RRLs also perform rotavirus genotyping by polymerase chain reaction (PCR), maintain a database to report nationally, regionally, and globally, and provide expert contributions to WHO annual meetings on viral identification, clinical sample analyses, and other technical issues. RRLs also monitor the implementation of EQA and quality control programmes.

Rotavirus surveillance data reporting period: January - December 2010



2009 May 7. Rotaviruses: from pathogenesis to vaccination. Greenberg HB, Estes MK.

Spotlight on the Expansion of Genotyping Surveillance Information during 2011:

RRLs first reported genotyping data to the WHO surveillance network in 2009. During 2010, eight (8) RRLs and four (4) national laboratories reported genotype data (Table 1.) The photograph on page 1 illustrates part of the genome of the virus.

Table 1. WHO Rotavirus Regional Reference Laboratories and Other Laboratories Reporting Genotype Data, 2010

Region	Name of Laboratory	Location	Countries Served
African Region (AFR)	Noguchi Institute for Medical Research, WHO Regional Reference Laboratory for Rotavirus	Ghana	Ghana, Nigeria
	University of Limpopo Medunsa Campus, WHO Regional Reference Laboratory for Rotavirus	South Africa	Burkina Faso, Cameroon, Côte d'Ivoire, Democratic Republic of the Congo (the), Ethiopia, Gambia (the), Kenya, Mauritius, South Africa, United Republic of Tanzania (the), Togo, Uganda, Zambia, Zimbabwe
Region of the Americas (AMR)	Centers for Disease Control and Prevention (CDC), WHO Regional Reference Laboratory for Rotavirus	Atlanta, USA	Guatemala, Honduras, Nicaragua, Suriname
	National Public Health Institute of Rio de Janeiro, Acting WHO Regional Reference Laboratory for Rotavirus*	Rio de Janeiro, Brazil	Brazil
Eastern Mediterranean Region (EMR)	Naval Medical Research Unit No. 3 (NAMRU), WHO Regional Reference Laboratory for Rotavirus	Cairo, Egypt	Sudan (the), Syrian Arab Republic (the)
European Region (EUR)	Republican Research and Practical Center for Epidemiology and Microbiology, WHO Regional Reference Laboratory for Rotavirus	Minsk, Belarus	Armenia, Azerbaijan, Georgia, Tajikistan, Ukraine
South-East Asia Region (SEAR)	Gajdamadah University Indonesian Laboratory*	Indonesia	Indonesia
	Christian Medical College, WHO Regional Reference Laboratory for Rotavirus	Vellore, India	Myanmar, Nepal
Western Pacific Region (WPR)	Murdoch Children's Research Institute (MCRI), Royal Children's Hospital, WHO Regional Reference Laboratory for Rotavirus	Melbourne, Australia	Fiji, Mongolia, Papua New Guinea
	Korea Centers for Disease Control and Prevention (KCDC), WHO Regional Reference Laboratory for Rotavirus	Seoul, Republic of Korea	Lao People's Democratic Republic (the), Mongolia
	China Centers for Disease Control and Prevention, Nominated as WHO Regional Reference Laboratory for Rotavirus	China	China
	Viet Nam Center for Research and Production of Vaccines and Biologicals*	Hanoi, Viet Nam	Viet Nam
Global Reference Laboratory	Centers for Disease Control and Prevention (CDC)	Atlanta, USA	Worldwide

*Brazil, Indonesia and Viet Nam contribute genotype data to the WHO surveillance network, but are not currently categorized as WHO RRLs.

In 2010, there was an increase in countries reporting genotype data from 20 countries in 2009 to 37 countries in 2010. P[8] G1 was the predominant rotaviral serotype reported (Figures 1 and 2).

Figure 1. Percent Distribution of Rotavirus Genotypes among Specimens Typed, by Country and WHO Region, 2010. The number of genotyped specimens (n=) stated next to the country.

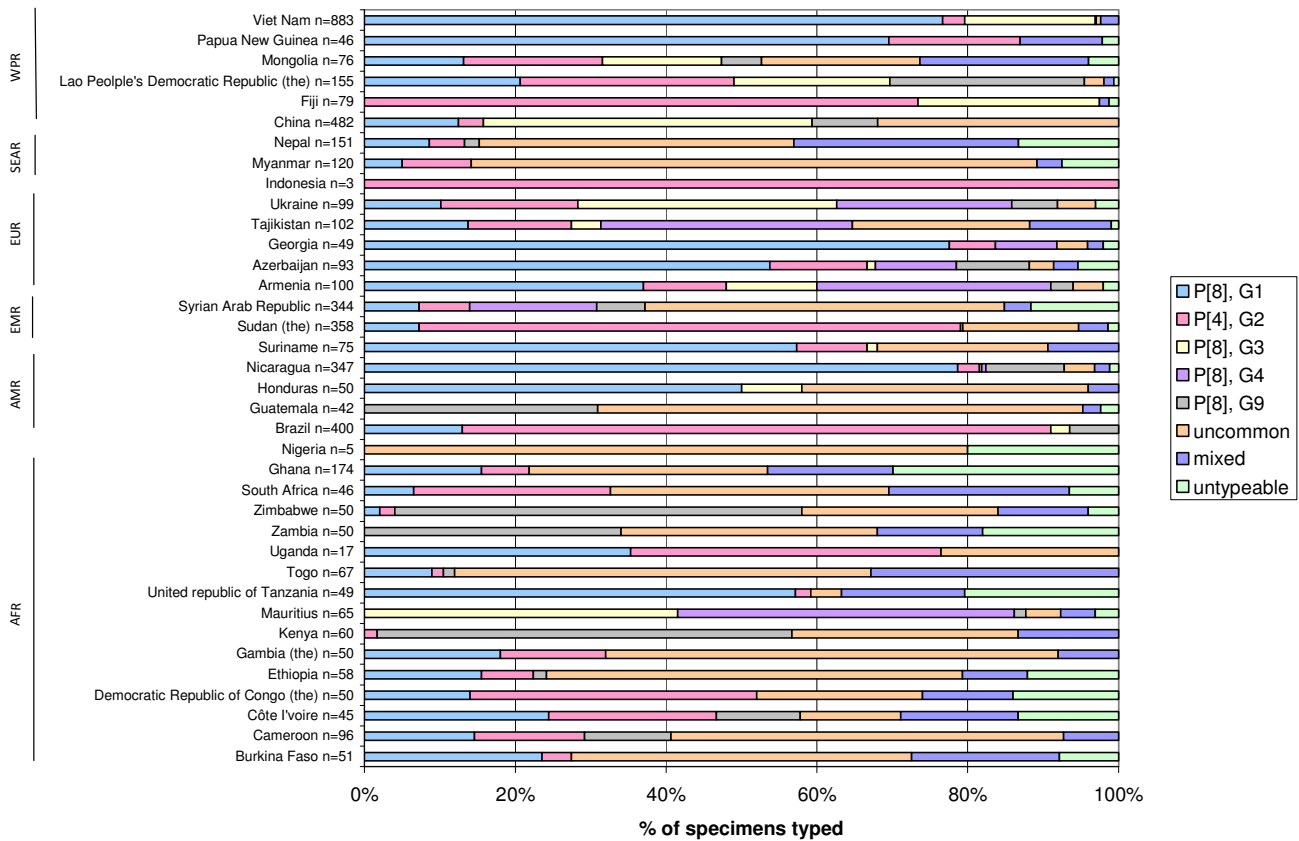
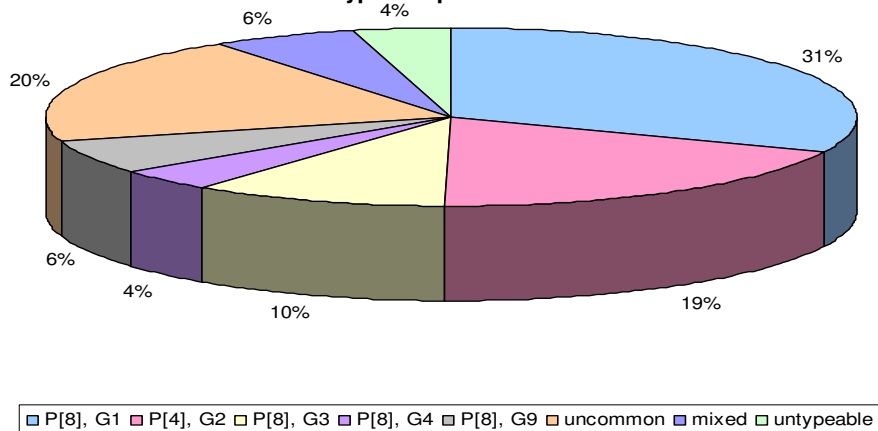


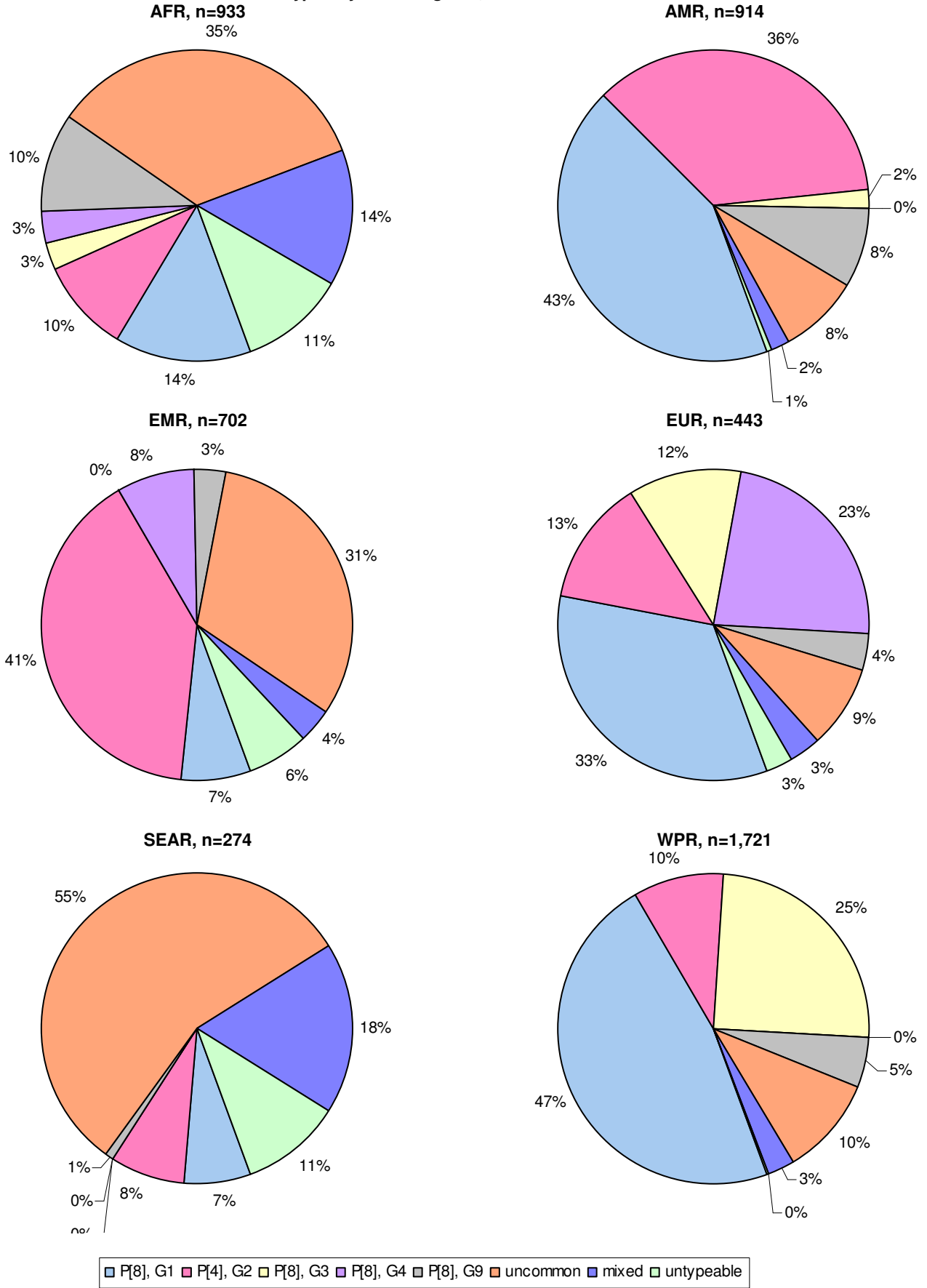
Figure 2. Global Distribution of Rotavirus Genotypes Reported to the WHO Surveillance Network (n=4,987), 2010



The distribution of rotavirus genotypes detected in each WHO Region during 2010 is shown in Figure 3, and detected genotypes differed widely. Genotypes other than P[8] G1, P[4] G2, P[8] G3, P[8] G4, and P[8]G9 were referred to as "uncommon." ¹

¹ Gentsch et al. Serotype Diversity and Reassortment between Human and Animal Rotavirus Strains: Implications for Rotavirus Vaccine Programs. JID, 192:S1, S146-59.

Figure 3. Distribution of Rotavirus Genotypes by WHO Regions, 2010



Rotavirus surveillance data reporting period: January - December 2010

Four (4) WHO Regions provided information on the distribution of 'uncommon' genotypes and these also varied among the Regions (Table 2.) During 2011, WHO and technical partners will review the definition of 'uncommon' for each Region.

Table 2. Distribution of Uncommon Genotypes for Reporting WHO Regions, 2010

	AFR	AMR	SEAR	WPR
Total number of genotyped samples	n= 933	n=914	n=274	n=1721
Number of uncommon genotypes	n=322 (35%)	n=77 (8%)	n=153 (56%)	n=179 (10%)
List of uncommon Genotypes with >5% repetition in the Region	P[6], G2 n=89 (28%) P[6], G3 n=69 (21%) P[6], G1 n=36 (11%) P[6], G9 n=28 (9%) P[6], G12 n=23 (7%) P[8], G12 n=21 (7%) P[4], G8 n=17 (5%) Not specified: n=17 (5%)	P[4], G9 n=45 (58%) P[6], G3 n=17 (22%) P[8], G2 n= 8 (10%) P[4], G1 n= 6 (8%)	P[8], G12 n= 85 (56%) P[6], G12 n= 52 (34%) P[6], G9 n= 10 (7%)	P[4], G1 n= 40 (22%) P[8], G2 n= 21 (12%) P[4], G3 n= 19 (11%) P[6], G9 n= 17 (10%) P[10], G3 n= 14 (8%) P[9], G3 n= 12 (7%) P[10], G1 n= 9 (5%) P[6], G3 n= 9 (5%)
Uncommon genotypes with <5% repetition	n=22 (7%)	n=1 (2%)	n=6 (4%)	n=38 (21%)

Note: The five (5) most common 'uncommon' genotypes across the four WHO Regions that reported this data are highlighted in colour.

Summary of January through December 2010 Rotavirus Surveillance Data

This Bulletin presents surveillance data for January through December 2010, as reported by Member States participating in the WHO-coordinated global surveillance network for rotavirus. Data are collected through sentinel surveillance of children < 5 years of age who are hospitalized for treatment of acute gastroenteritis/diarrhoea. Summarized below are the main findings from January through December 2010:

Member States reporting surveillance data (clinical or genotype)

- ❖ 61 Member States reported data, either clinical or genotype information
- ❖ 39 of 61 (64%) reporting countries were GAVI-eligible

Rotavirus Vaccine Introduction²

- ❖ 2006: Brazil, El Salvador, Panama, Venezuela (Bolivarian Republic of)
- ❖ 2007: Ecuador
- ❖ 2009: Colombia, Honduras, Paraguay
- ❖ 2010: Guatemala, Guyana, Morocco

Annual rotavirus detection:

- ❖ 57 Member States reported rotavirus clinical surveillance data to WHO from 175 sentinel sites
- ❖ Of these, 48 (84%) countries reported at least 100 cases and reported the number of stool specimens tested for all 12 months either monthly or quarterly. The latter required to account for seasonal disease variation. Data from these 48 countries were thus used to calculate rotavirus detection.
- ❖ Global median rotavirus detection (among 48 countries): 40%

² Rotavirus vaccine included in National Immunization Schedules.

Annual rotavirus detection continued:

- ❖ By WHO Region:
 - Highest: Western Pacific Region (47%)
 - Lowest: Region of the Americas (27%)
- ❖ By country:
 - Highest: Guatemala (77%)
 - Lowest: Saint Vincent and the Grenadines (9%)

Note: Eight (8) of the nine (9) countries that had introduced rotavirus vaccine into their national immunization schedule before or during 2010 were based in the Region of the Americas. Panama and Guyana were excluded from calculation of global and regional medians because Panama only reported cases positive for rotavirus and Guyana tested <100 specimens.

No.	N. Hospital	Sex	Age	Sex	Age	Sex	Age	Sex	Age	Sex	Age	Sex	Age	Sex	Age	Sex	Age
313	040215	M	08-05-2011	7	4 ^m	18-10-2009	05-05-2011	2137	16-05-2011	08-05-2011							
314	040214	F	21-05-2011	7	4 ^m	18-10-2009	05-05-2011	2137	16-05-2011	08-05-2011							
315	040218	F	21-05-2011	7	12 ^m	03-05-2010	21-05-2011	2135	16-05-2011	08-05-2011							
316	040422	F	08-05-2011	7	3 ^m	10-06-2010	08-05-2011	2136	16-05-2011	08-05-2011							
317	040425	F	09-05-2011	7	16 ^m	18-10-2009	05-05-2011	2137	16-05-2011	08-05-2011							
318	040423	F	08-05-2011	7	16 ^m	08-05-2011	08-05-2011	2138	16-05-2011	08-05-2011							
319	040575	F	08-05-2011	7	26 ^m	01-01-2011	08-05-2011	2138	16-05-2011	08-05-2011							
320	040574	F	09-05-2011	7	8 ^m	01-02-2010	05-05-2011	2136	16-05-2011	08-05-2011							
321	040303	F	11-05-2011	7	22 ^m	11-01-2009	18-05-2011	2141	16-05-2011	08-05-2011							
322	040606	F	11-05-2011	7	26 ^m	05-05-2009	11-05-2011	2142	16-05-2011	08-05-2011							
323	040702	F	13-05-2011	7	1 ^m	06-08-2009	13-05-11	2143	16-05-2011	08-05-2011							
324	040608	F	13-05-2011	7	5 ^m	23-05-2010	13-05-2011	2144	16-05-2011	08-05-2011							
325	040605	F	13-05-2011	7	8 ^m	08-08-2010	13-05-2011	2145	16-05-2011	08-05-2011							
326	040707	F	13-05-2011	7	4 ^m	17-01-2011	13-05-2011	2146	16-05-2011	08-05-2011							
327	040609	F	13-05-2011	7	36 ^m	12-05-2008	13-05-2011	2147	16-05-2011	08-05-2011							
328	040903	F	14-05-2011	7	14 ^m	09-10-2010	14-05-2011	2148	16-05-2011	08-05-2011							

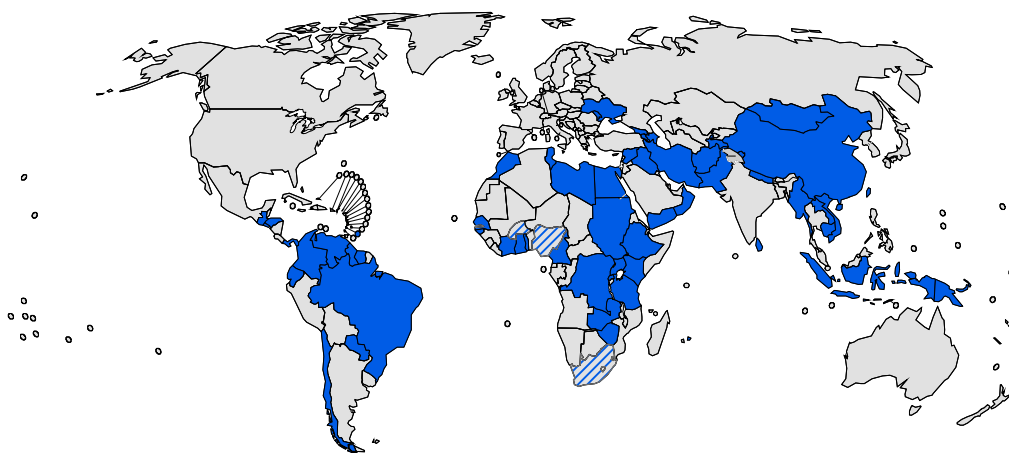
In a sentinel site in the Western Pacific Region, record keeping for rotavirus is detailed and organized into a surveillance logbook. Well organized clinical and laboratory logbooks are an important component of a well functioning surveillance sentinel site.

Annex: January through December 2010 Rotavirus Surveillance Data

The Global Surveillance Network for Rotavirus

Since 2008, the number of countries reporting to the WHO-coordinated global rotavirus surveillance network has continued to rise. In 2008, 44 countries reported; this expanded to 55 countries in 2009, and finally in 2010, to 61 WHO Member States who participated in the global rotavirus surveillance network (Figure 4, Table 3). Seventy two percent of these countries were based in three (3) WHO Regions: AFR, AMR and EMR. Overall, 39 participating countries (64%) were eligible for GAVI funding. Among the 57 countries reporting clinical data in 2010, the following countries joined the rotavirus reporting network: Côte d'Ivoire, Mauritius, and Rwanda from AFR, Brazil from AMR, and Cambodia from WPR. Some countries left the surveillance network: Bolivia (Plurinational State of) and Nicaragua from AMR, and Jordan* from EMR. This left a net gain of two new countries that reported clinical data and were included in the network in 2010 compared to 2009. Globally, 47,668 children who were hospitalized for the treatment of acute gastroenteritis/diarrhoea were enrolled in the WHO rotavirus surveillance network (Table 4).

Figure 4. WHO Member States that reported to the global rotavirus surveillance network from January – December 2010.



■ 57 Member States reported clinical data to the surveillance network
▨ 4 Member States reported genotype only data to the surveillance network

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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Table 3: Characteristics of the global surveillance network for rotavirus, by WHO Region - 2010

WHO Region*	Total number of countries reporting	Number of GAVI-eligible countries reporting	% of all countries reporting who are GAVI-eligible	Total number of sentinel sites reporting
AFR	19	17	89%	22
AMR	13	3	23%	55
EMR	12	4	33%	64
EUR	6	6	100%	9
SEAR	4	4	100%	7
WPR	7	5	71%	18
Total	61	39	64%	175

*The following countries participated in the global surveillance network for rotavirus from January through December 2010: Cameroon, Côte d'Ivoire, Democratic Republic of the Congo (the), Ethiopia, Ghana, Guinea-Bissau, Kenya, Mauritius, Rwanda, Senegal, Togo, Uganda, United Republic of Tanzania (the), Zambia and Zimbabwe in the African Region (AFR); Brazil, Chile, Colombia, Ecuador, El Salvador, Guatemala, Guyana, Honduras, Panama, Paraguay, Suriname, Saint Vincent and the Grenadines and Venezuela (Bolivarian Republic of) in the Region of the Americas (AMR); Afghanistan, Egypt, Iran (Islamic Republic of), Iraq, Libyan Arab Jamahiriya, Morocco, Oman, Pakistan, Sudan (the), Syrian Arab Republic, Tunisia and Yemen in the Eastern Mediterranean Region (EMR); Armenia, Azerbaijan, Georgia, Republic of Moldova, Tajikistan and Ukraine in the European Region (EUR); Indonesia, Myanmar, Nepal and Sri Lanka in the South-East Asian Region (SEAR); Cambodia, China, Fiji, Lao People's Democratic Republic, Mongolia, Papua New Guinea and Viet Nam in the Western Pacific Region (WPR).

Burkina Faso, Gambia (the), Nigeria and South Africa from the African Region (AFR) reported genotype data only

* Jordan resumed reporting in 2011.

Table 4. Number (No.) of children <5 years of age hospitalized for the treatment of acute gastroenteritis/diarrhoea and enrolled in the WHO rotavirus surveillance network, by WHO Region 2010.

WHO Region	No. of children	% of Total	Range (by country)
AFR	9,329	20	31-1621
AMR	10,210	21	33-2276
EMR	13,021	27	67-6461
EUR	6,361	13	665-1577
SEAR	2,699	6	402-850
WPR	6,048	13	213-2267
TOTAL	47,668	100	31-6461

Rotavirus Detection

Rotavirus detection was calculated as the percent of stool specimens positive for rotavirus among specimens tested. Panama was excluded as information was reported only for cases with positive specimens. Figure 5 displays these percentages by month, country and WHO Region for 2010. SEAR countries are not listed as the number of tested specimens was only provided annually.

Figure 5. Monthly rotavirus detection, by country and WHO region, 2010.

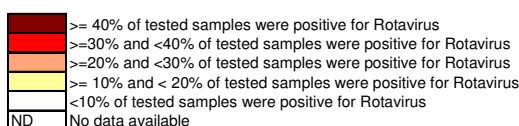
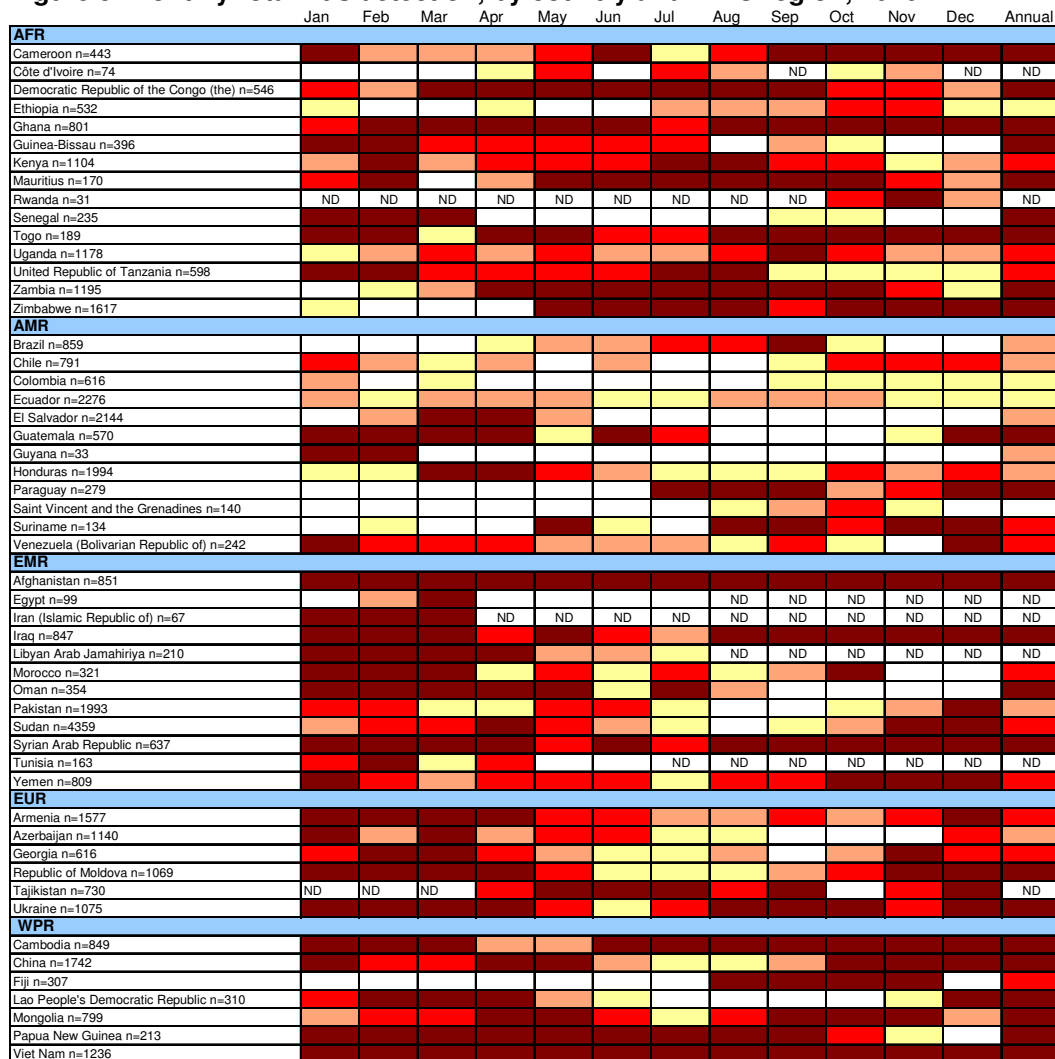
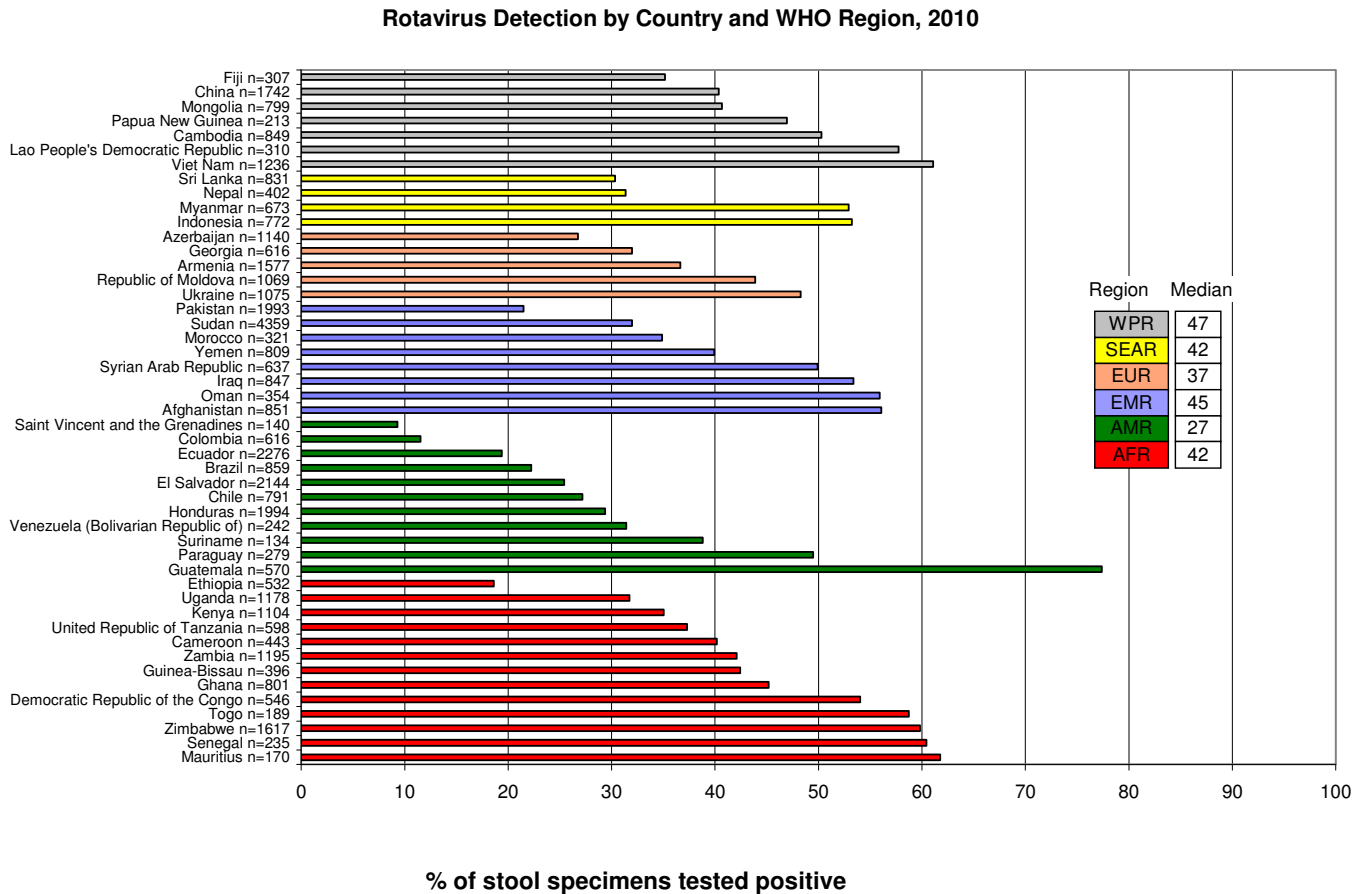


Figure 6 provides the annual rotavirus detection only for countries that tested at least 100 specimens and those countries that reported the number of stool specimens tested for all 12 months either monthly or quarterly in order to account for seasonal variation in rotavirus disease. For 2010, 48 out of 57 countries (84%) met these criteria.

Figure 6: Rotavirus Detection for the 48 Countries that Tested \geq 100 Stool Specimens and Reported the Number of Specimens Tested and Tested Positive for Each Reporting Period Used (Monthly or Quarterly) by WHO Region, 2010



❖ NOTE: Countries with Rotavirus vaccine in National Immunization Schedules: 2006: Brazil, El Salvador, Venezuela (Bolivarian Republic of); 2007: Ecuador; 2009: Colombia, Honduras, Paraguay; 2010: Guatemala and Morocco.

Median values as an entire region (Figure 6, above right) were calculated for 2010. The median detection of rotavirus by region ranged from 27% in AMR to 47% in WPR. The global median was 40% in 2010. The percentage by country ranged from 9%-77% among the 48 countries meeting the two criteria.

Among the 48 countries meeting the two criteria and listed on Figure 6, the annual detection of rotavirus from January to December 2010 was also stratified by age group (Table 5). In 2010, 31 countries reported data by age among 4 WHO Regions, with AFR and EUR first providing this information in 2010. Among the 12 AFR countries, the median detection was highest among children 6-11 months old (47%) and lowest among children 24-59 months old (28%). Among 8 EMR countries, the median detection was highest among children 12-23 months old (50%) and lowest among children 24-59 months old (32%). Among 4 EUR countries, median detection was highest among those 12-23 months old (46%) and lowest among 0-5 months old (25%). Among 7 WPR countries, median detection was highest among those 6-11 months old (51%) and lowest among 0-5 months old (38%).

Table 5: Annual rotavirus detection rates, medians by age group and WHO region - 2010

WHO Region	No. of countries*	Median detection rate (%)				
		0-5months	6-11months	12-23months	24-59months	All children < 5 years of age
AFR	12	45	47	45	28	42
EMR	8	37	49	50	32	45
EUR	4	25	37	46	42	37
WPR	7	38	51	50	48	27

*Countries meeting the criteria for inclusion in 2010 full-year analysis and reporting surveillance data by age group: Cameroon, Ethiopia, Ghana, Guinea Bissau, Kenya, Mauritius, Senegal, Togo, Uganda, United Republic of Tanzania (the), Zambia, and Zimbabwe in the African Region (AFR); Afghanistan, Iraq, Morocco, Oman, Pakistan, Sudan (the), Syrian Arab Republic and Yemen in the Eastern Mediterranean Region (EMR); Armenia, Georgia, Republic of Moldova, and Ukraine in the European Region (EUR); Cambodia, China, Fiji, Lao People's Democratic Republic, Mongolia, Papua New Guinea and Viet Nam in the Western Pacific Region (WPR).

Acknowledgements

WHO gratefully acknowledges the dedicated efforts of the numerous individuals and organizations involved with compiling this surveillance information, including Ministries of Health, sentinel hospitals, as well as the network of global, regional and national reference laboratories.

WHO Rotavirus Surveillance Websites

<http://www.who.int/nuvi/rotavirus/en/index.html>

<http://www.who.int/nuvi/surveillance/en/>

