

Polio in the Asia Pacific

Annelies Wilder-Smith

MD PhD MIH DTM&H FAMS FACTM FFTS

Professor of Infectious Diseases
Director, Vaccinology and Global Health Program,
Lee Kong Chian School of Medicine, Singapore

Senior Advisor, Dengue Vaccine Initiative
Principal Investigator, DengueTools (funded by EU)

WHO Emergency Committee on Polio



Global Polio Eradication Initiative



The global effort to eradicate polio is the largest public-private partnership for public health

In fact, it is the largest-ever internationally-coordinated public health effort in history. It is spearheaded by national governments, WHO, Rotary International, the US Centers for Disease Control and Prevention (CDC) and UNICEF, and is supported by key partners including the Bill and Melinda Gates Foundation. Underpinning the effort is a global network of more than 20 million volunteers worldwide who have collectively immunized nearly 3 billion children over the past 20 years.

POLIO GLOBAL ERADICATION INITIATIVE



Region	Year certified polio-free
WHO African Region	
WHO Region of the Americas	1994
WHO South-East Asia Region	2014
WHO European Region	2002
WHO Eastern Mediterranean Region	
WHO Western Pacific Region	2000

Africa advances toward a polio-free continent

August 2015

11 August 2015 marks 1 year since the last wild polio case was detected on the entire African continent. A polio-free Africa would leave only 2 countries where polio transmission has never been interrupted: Pakistan and Afghanistan.



Polio

86%

Global coverage of infants with three doses of polio vaccine in **2014**

76%

Global coverage of infants with three doses of polio vaccine in **1990**

414

Number of confirmed polio cases in **2014** (including 359 wild virus confirmed cases)^a

350,000

Estimated number of polio cases in **1988**

3

Number polio-endemic countries in **2014**

125

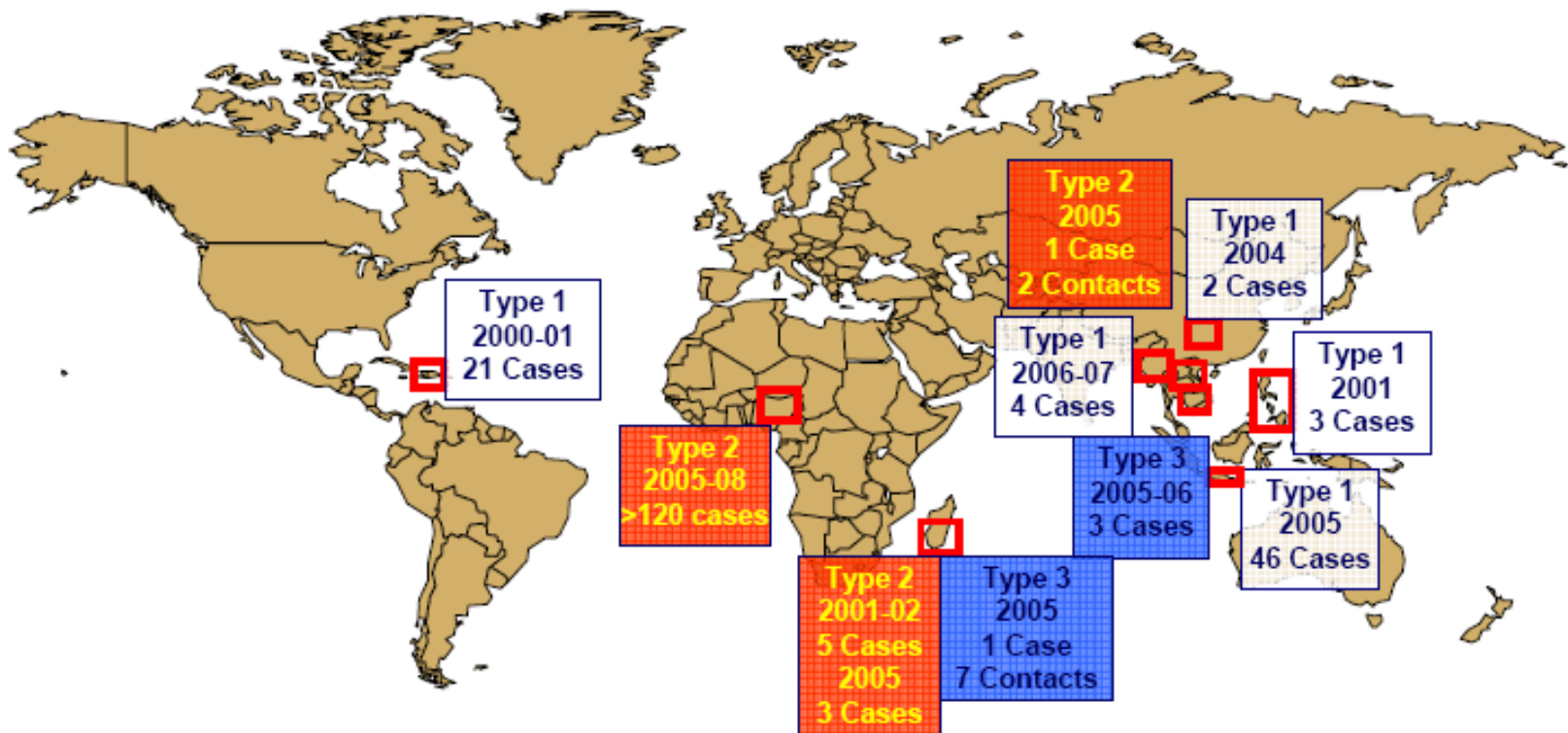
Number polio-endemic countries in **1998**

Critical Poliovaccine Problems

Unknown in 1988

- Polio vaccine associate paralytic polio (VAPP):
 - Under current vaccine policies estimated 250-500 cases per year
- Poliovaccine virus can be excreted for years (iVDPV)
 - More than 20 cases with excretion >1 year
 - One well studied case with 22 years excretion:
 - High titer
 - Resistant to antiviral therapies
- Poliovaccine virus can revert to virulence (cVDPV)
 - Several outbreaks of paralytic disease
 - Egypt, Hispanola, Madagascar, Philippines
 - Silent Spread for 2 to ? years

circulating Vaccine-Derived Poliovirus outbreaks (cVDPVs), 2000-2008*



* as of 10 August 2008

As world seeks to eradicate polio, Laos suffers vaccine-linked case

GENEVA/LONDON



DRUG PRICING



Prosecutors target Valeant

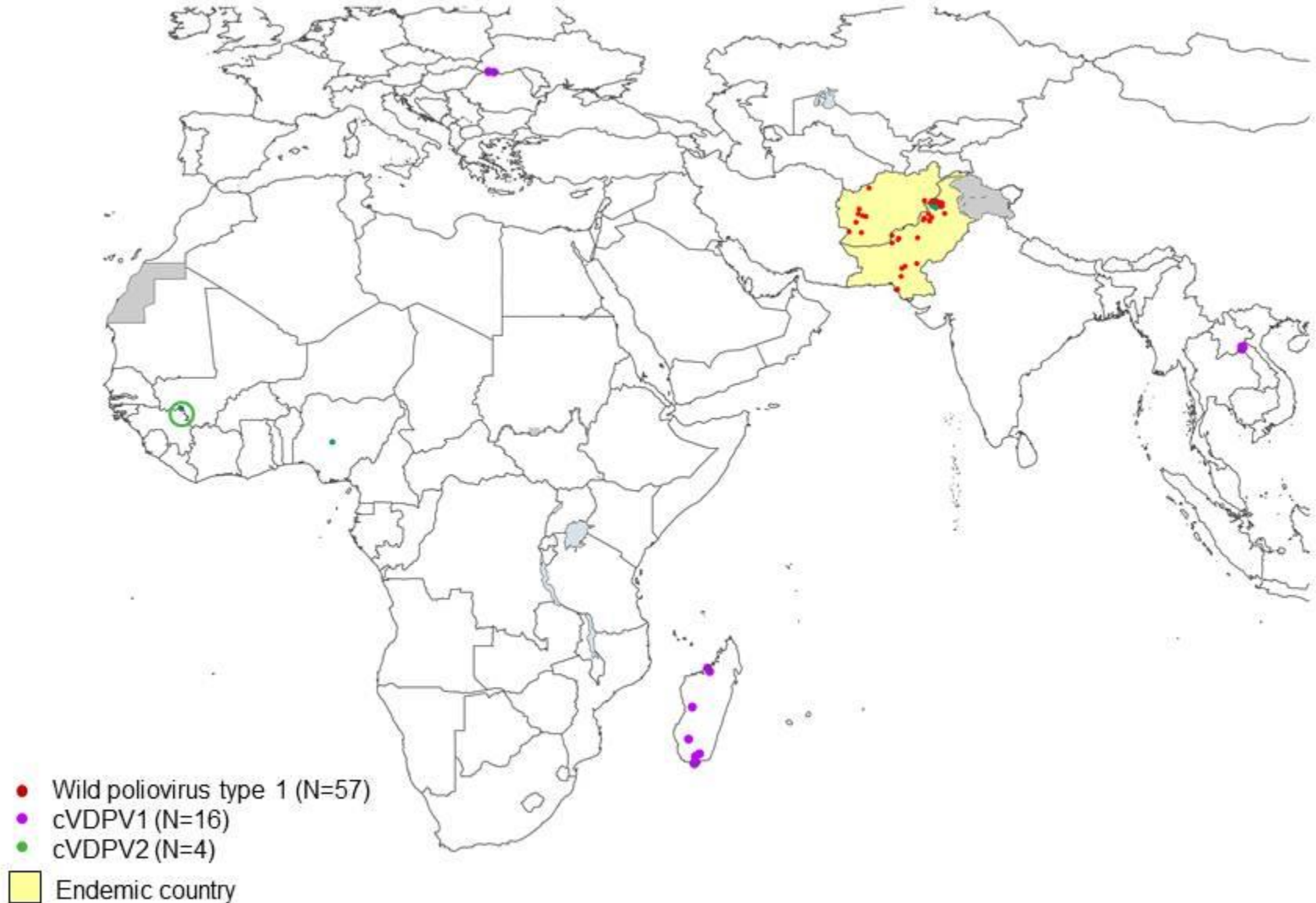
Prosecutors demanded details from Valeant Pharmaceuticals on its patient assistance programs, drug pricing and distribution practices. [Full Article »](#)

THE FORM **Join Reuters and Harvard for a discussion on drug pricing on Oct. 23**
HARVARD T.H. CHAN SCHOOL OF PUBLIC HEALTH



Wild Poliovirus & cVDPV Cases¹, 2015

01 January – 24 November



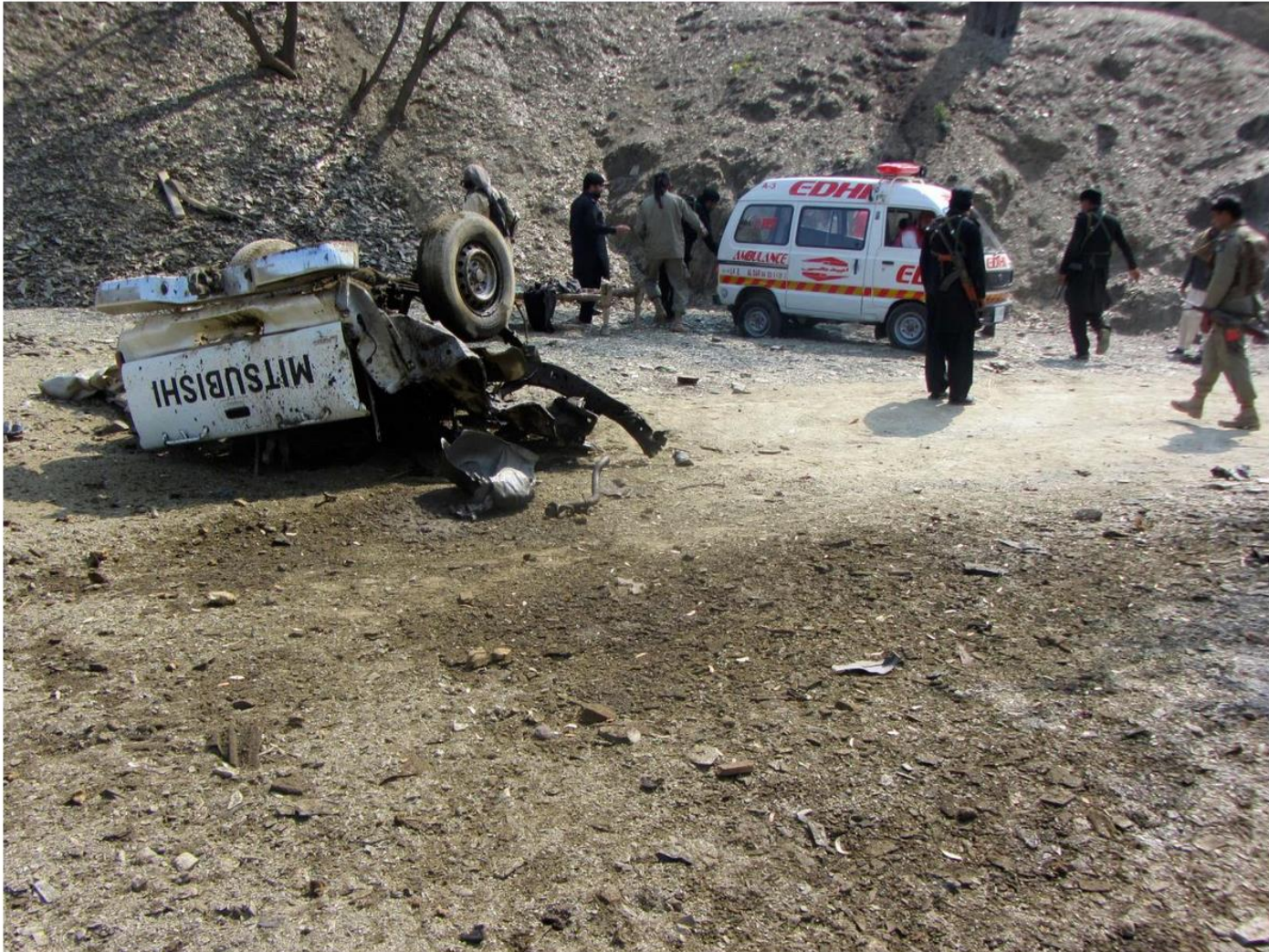
¹Excludes viruses detected from environmental surveillance.

Data in WHO HQ as of 24 November 2015

Federally Administered Tribal Areas



Taliban Assassins Target Pakistan's Polio Vaccinators



A bomb attack on a polio vaccination team in Jamroud, Pakistan, claimed the lives of 12, including bystanders.



POLIO'S SURPRISING COMEBACK

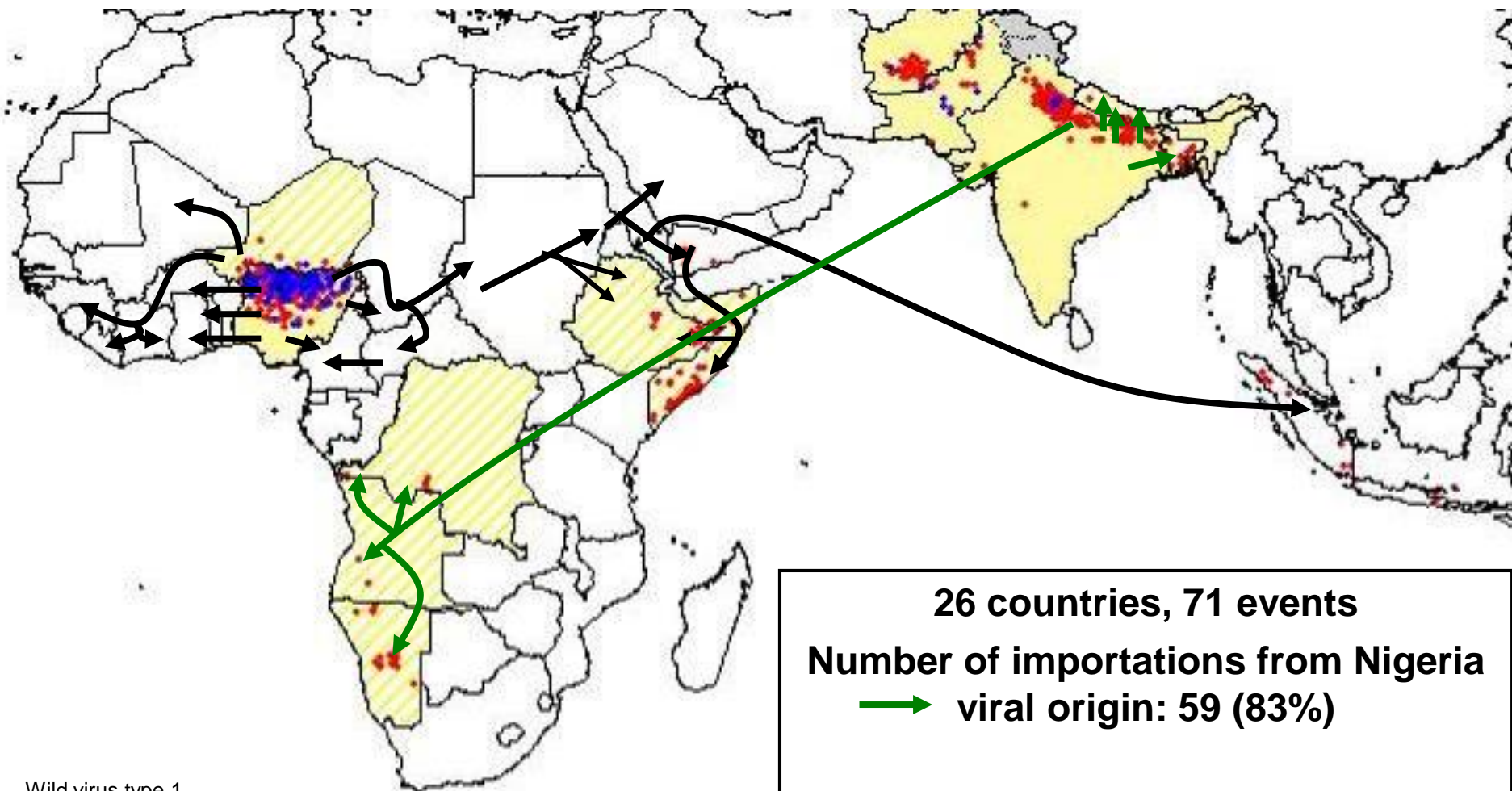
Fighting Polio Amid the Chaos of Syria's Civil War

Courageous bands of volunteers are standing up to ISIS and the Assad regime to vaccinate their children.

Saving Kids From Polio in Islamic State Territory



Poliovirus spread, 2003-2006



- Wild virus type 1
- Wild virus type 3
- Wild virus type 1 & 3

- Endemic countries
- ▨ Case or outbreak following importation (last 6 months)
- Case or outbreak following importation (6 - 12 months)

26 countries, 71 events
Number of importations from Nigeria
→ viral origin: 59 (83%)

Number of importations from India
→ viral origin: 12 (17%)



PULAR VIDEOS

WHO Declares Health Emergency on Polio

WHO Declares Military Coup

Novan Gets Kicked Out of Bounds

Says It Will Bring Back the Air

San Antonio Mayor for Cabinet Position

HEALTH INFECTIOUS DISEASE

WHO Declares Health Emergency on Polio

Alice Park @aliceparkny | May 5, 2014



The World Health Organization declared polio an international health emergency on Monday as the rise in cases threatens eradication efforts and singled out the conflict zones of Syria, Cameroon and Pakistan as worrisome sources of its spread

An ancient scourge triggers a modern emergency

EDITION: INTERNATIONAL

U.S.

MÉXICO

ARABIC

TV: CNNI | CNN en Español

Set edition preference



Home

Video

World

U.S.

Africa

Asia

Europe

Latin America

Middle East

Business

En

Part of complete coverage on

Vital Signs

vital+signs
with Dr. Sanjay Gupta

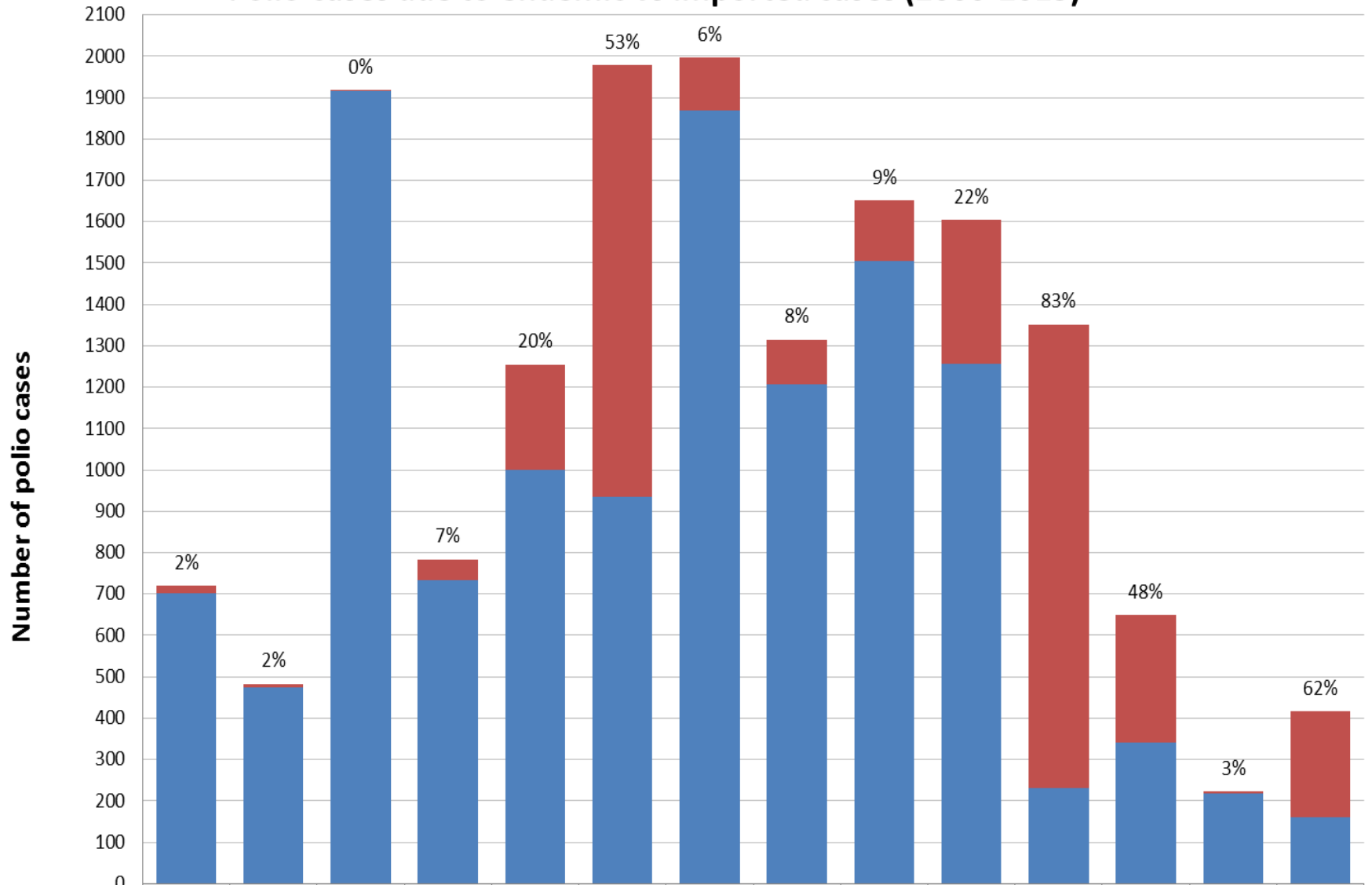
WHO sounds alarm on spread of polio

By **Ashley Hayes**, CNN

May 5, 2014 -- Updated 1818 GMT (0218 HKT)

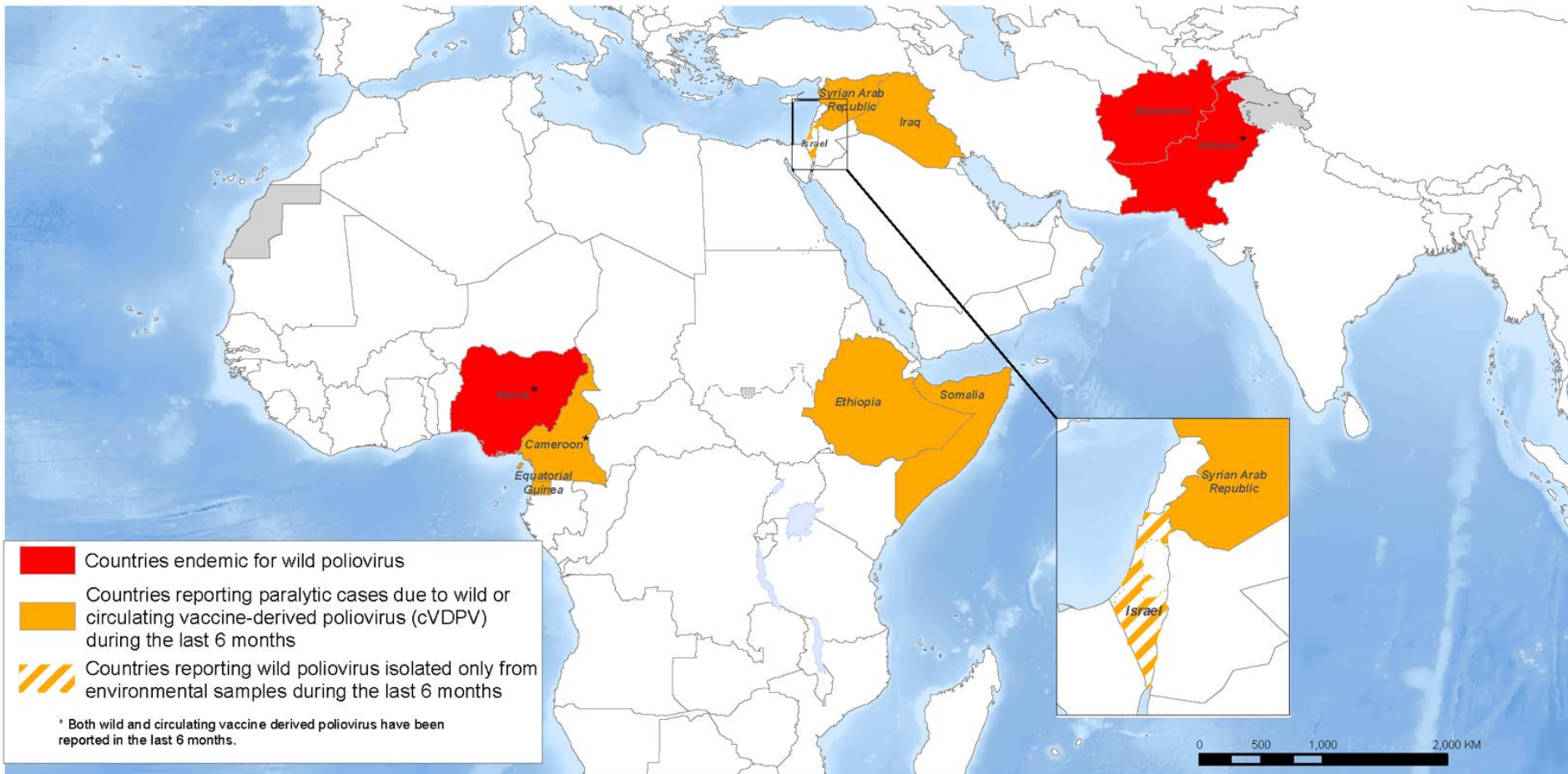


Polio cases due to endemic vs imported cases (2000-2013)



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
proportion imported	2%	2%	0%	7%	20%	53%	6%	8%	9%	22%	83%	48%	3%	62%
■ imported virus cases	17	8	3	52	256	1045	128	107	146	348	1120	309	6	256
■ endemic virus cases	702	475	1915	732	999	934	1869	1208	1505	1256	232	341	217	160

Polio-infected countries for which WHO recommends polio immunization of persons traveling to or from the country, as of 05 May 2014



Data Source: World Health Organization
 Base Map: GEBCO
 Map Production: Global Polio Eradication Initiative,
 World Health Organization



© WHO 2014. All rights reserved.

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 and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

Exporting countries*

Cameroon

Pakistan

Syria

Recommendations

Countries which are currently exporting wild poliovirus should ensure that all residents and long-term visitors (of over 4 weeks) receive a dose of oral polio vaccine (OPV) or inactivated poliovirus vaccine (IPV) between 4 weeks and 12 months before international travel; and should ensure that such travellers are provided with [proof of vaccination](#).

[Full recommendations](#)

Other polio-affected countries*

Afghanistan

Equatorial Guinea

Ethiopia

Iraq

Israel

Nigeria

Somalia

Recommendations

Other polio-affected countries are encouraged to vaccinate residents and long-term visitors before international travel.

[Full recommendations](#)

*These recommendations came into effect from 5 May 2014 and will be reviewed in 3 months





Countries with visa entry requirements for polio vaccination

- Saudi Arabia: for Hajj and Umrah pilgrims from polio-infected countries



RESEARCH ARTICLE

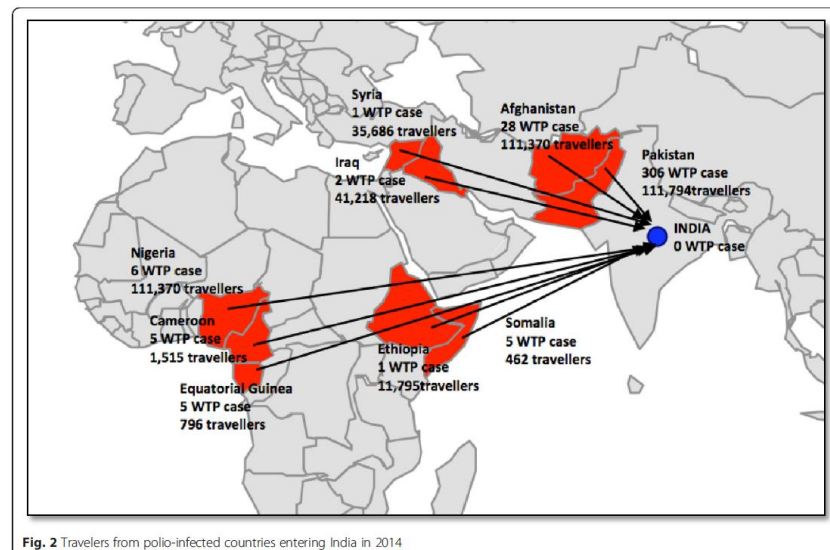
Open Access



Potential for international spread of wild poliovirus via travelers

Annelies Wilder-Smith^{1,2*}, Wei-Yee Leong¹, Luis Fernandez Lopez^{3,8}, Marcos Amaku⁴, Mikkel Quam⁵, Kamran Khan^{6,7} and Eduardo Massad^{8,9}

Results: Our model estimated 665 polio exportations (>99 % of which were asymptomatic) from nine polio-infected countries in 2014, of which 78.3 % originated from Pakistan. Our model also estimated 21 importations of poliovirus into Saudi Arabia via Hajj pilgrims and 20 poliovirus infections imported to India in the same year.



Situation in November 2015

States currently exporting wild poliovirus or cVDPV

Afghanistan

Pakistan

States infected with wild poliovirus or cVDPV but not currently exporting

Guinea

Lao People's Democratic Republic

Madagascar

Nigeria

Ukraine

States no longer infected by wild poliovirus or cVDPV, but which remain vulnerable to international spread, and states that are vulnerable to the emergence and circulation of VDPV

Cameroon

Equatorial Guinea

Ethiopia

Iraq

Israel

Somalia

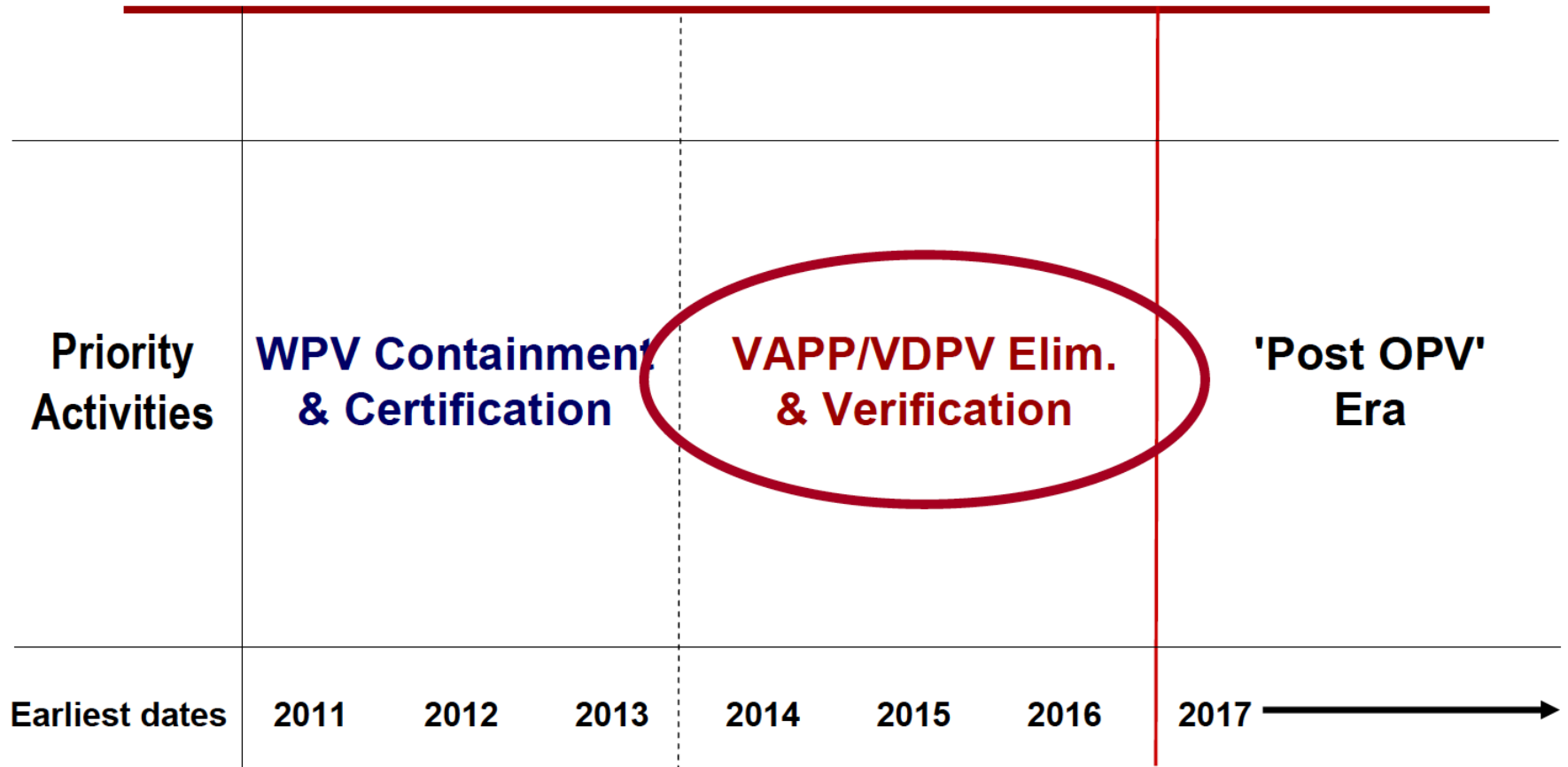
South Sudan

Syrian Arab Republic

Polio situation in the Asia Pacific Region



Major Developments: The Post-Eradication Timeline



Failure to vaccinate

OR

Vaccine Failure?

Comparison -- Smallpox and Polio

Smallpox

- Surveillance-Containment
 - Visible rash – all cases
 - Readily diagnosed
 - Minimal demand for lab
 - Targeted containment
- Epidemiology
 - Transmission only by cases
 - Moderately contagious

Polio

- 1/200 with paralysis
- Flaccid paralysis problem
- Heavy lab demand
- Area-wide campaigns
- Primarily by asymptomatic
- Very contagious
- Vaccine problems: VAPP and cVDPV



- Oral polio vaccine (OPV)
- Monovalent oral polio vaccines (mOPV1 and mOPV3)
- Bivalent oral polio vaccine (bOPV)
- Inactivated polio vaccine (IPV)



Protective efficacy of a monovalent oral type 1 poliovirus vaccine: a case-control study

Nicholas C Grassly, Jay Wenger, Sunita Durrani, Sunil Bahl, Jagadish M Deshpande, Roland W Sutter, David L Heymann, R Bruce Aylward

Summary

Lancet 2007; 369: 1356-62

Published Online

April 12, 2007

DOI:10.1016/S0140-

6736(07)60531-5

See [Comment](#) pages 1321 and 1322

See [Articles](#) page 1363

Department of Infectious Disease Epidemiology, Imperial College London, London, UK (NC Grassly DPhil); National Polio Surveillance Project, WHO, New Delhi, India (J Wenger MD, S Durrani BSc, S Bahl MD); Enterovirus Research Centre, Parel, Mumbai, India (J M Deshpande PhD); and Global Polio Eradication Initiative, WHO, Geneva, Switzerland (R W Sutter MD, D L Heymann MD, R B Aylward MD)

Background A high-potency monovalent oral type 1 poliovirus vaccine (mOPV1) was developed in 2005 to tackle persistent poliovirus transmission in the last remaining infected countries. Our aim was to assess the efficacy of this vaccine in India.

Methods We estimated the efficacy of mOPV1 used in supplementary immunisation activities from 2076 matched case-control pairs of confirmed cases of poliomyelitis caused by type 1 wild poliovirus and cases of non-polio acute flaccid paralysis in India. The effect of the introduction of mOPV1 on population immunity was calculated on the basis of estimates of vaccination coverage from data for non-polio acute flaccid paralysis.

Findings In areas of persistent poliovirus transmission in Uttar Pradesh, the protective efficacy of mOPV1 was estimated to be 30% (95% CI 19–41) per dose against type 1 paralytic disease, compared with 11% (7–14) for the trivalent oral vaccine. 76–82% of children aged 0–23 months were estimated to be protected by vaccination against type 1 poliovirus at the end of 2006, compared with 59% at the end of 2004, before the introduction of mOPV1.

Interpretation Under conditions where the efficacy of live-attenuated oral poliovirus vaccines is compromised by a high prevalence of diarrhoea and other infections, a dose of high-potency mOPV1 is almost three times more effective against type 1 poliomyelitis disease than is trivalent vaccine. Achieving high coverage with this new vaccine in areas of persistent poliovirus transmission should substantially improve the probability of rapidly eliminating transmission of the disease.

Post-Eradication

- Developing an affordable inactivated polio vaccine
- Managing risk associated with vaccine derived polio virus (cVDPV) and polio vaccine associated paralytic polio
- Antivirals

Eradication of polio virus type 2

- The last case of type 2 was reported in 1999 and its eradication was declared in September 2015;
- the most recent case of type 3 dates to November 2012
- Polio virus type 1: ongoing

Surveillance indicators

Indicator	Minimum levels for certification standard surveillance
Completeness of reporting	At least 80% of expected routine (weekly or monthly) AFP surveillance reports should be received on time, including zero reports where no AFP cases are seen. The distribution of reporting sites should be representative of the geography and demography of the country
Sensitivity of surveillance	At least one case of non-polio AFP should be detected annually per 100 000 population aged less than 15 years. In endemic regions, to ensure even higher sensitivity, this rate should be two per 100 000.
Completeness of case investigation	All AFP cases should have a full clinical and virological investigation with at least 80% of AFP cases having 'adequate' stool specimens collected. 'Adequate' stool specimens are two stool specimens of sufficient quantity for laboratory analysis, collected at least 24 hours apart, within 14 days after the onset of paralysis, and arriving in the laboratory by reverse cold chain and with proper documentation.
Completeness of follow-up	At least 80% of AFP cases should have a follow-up examination for residual paralysis at 60 days after the onset of paralysis
Laboratory performance	All AFP case specimens must be processed in a WHO-accredited laboratory within the Global Polio Laboratory Network (GPLN)

Establishing affordable options for IPV use in any setting -

- dose-reduction strategy using intradermal administration of fractional IPV doses
- schedule requiring fewer doses (for example, two doses given six months apart)
- adjuvant use to reduce the quantity of antigen required in the vaccine
- IPV production processes to facilitate manufacture in low-cost sites.

