POLIO AND ITS ERADICATION INITIATIVES

Presentation made to the

South African Pharmaceutical Regulatory Affairs Association (SPRAA)

26th August 2016

Presentation by Prof (Emeritus) MJ Matjila,

Chairman: National Polio Expert Committee (NPEC - South African)

Outline of the presentation

1. Historical events on polio disease
2. Epidemiology
3. Foundation for disease eradication
4. Global polio eradication initiative
5. Activities undertaken thus far & planned – at global, regional & national levels
6. Roles of health care workers and of members of the civil society,
7. Key take home messages

A VERY BRIEF HISTORY OF POLIOMYELITIS

Barry D. Schoub

Polio Eradication Stakeholder's Symposium
Johannesburg. 10th Sept 2015

1400-1380 BCE


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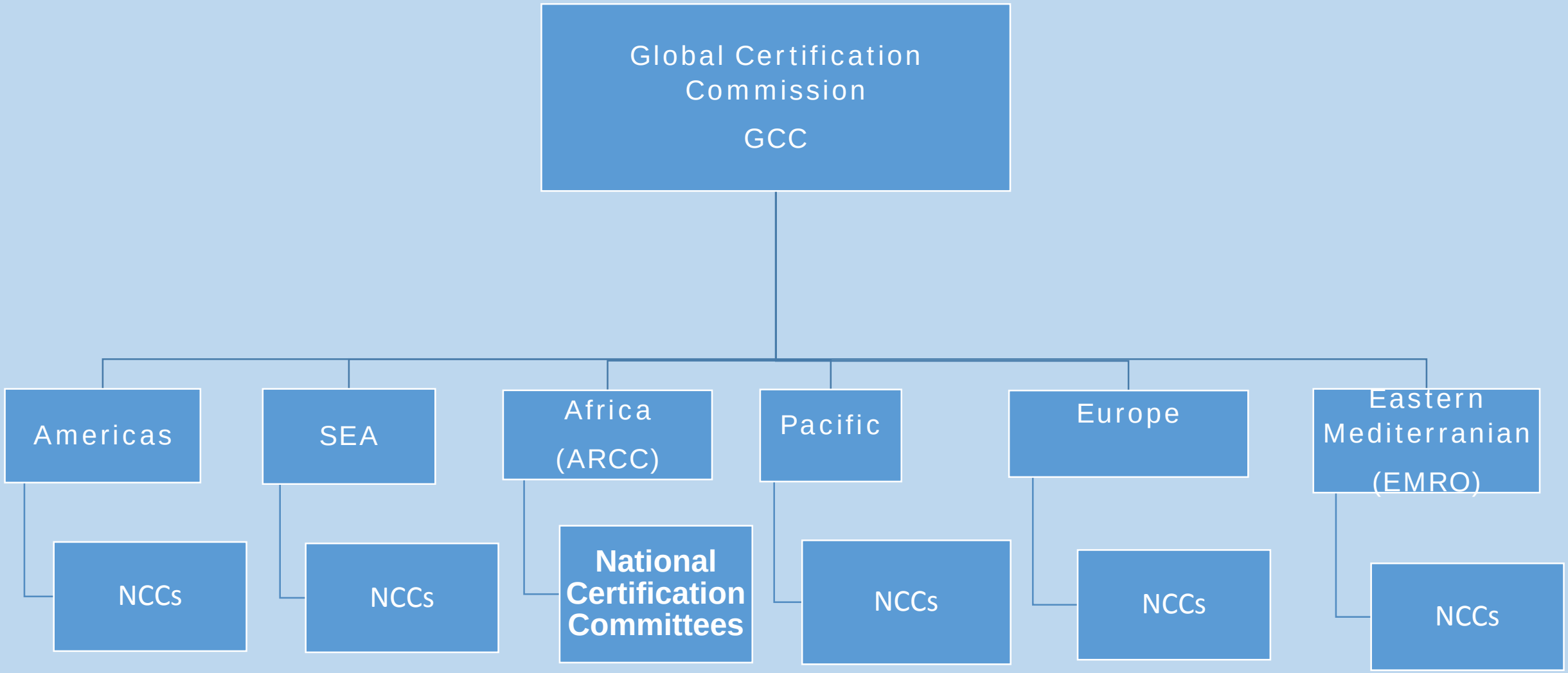
POLIOMYELITIS—UNITED STATES, 1950-2002


Global Certification Commission
GCC
Americas
SEA
Africa
(ARCC)
Pacific
Europe
Eastern Mediterranian
(EMRO)
NCCs
NCCs
National Certification Committees
NCCs
NCCs
NCCs

Country Polio Committees

Each country must appoint 3 committees for polio eradication:

1. NCC: Prepares country documentation for submission to ARCC, advocacy & oversees & implementation of polio containment activities

2. NTF: Polio containment

3. NPEC: Classifies AFP cases & oversee polio surveillance activities

Key Requirements For Certification - 1

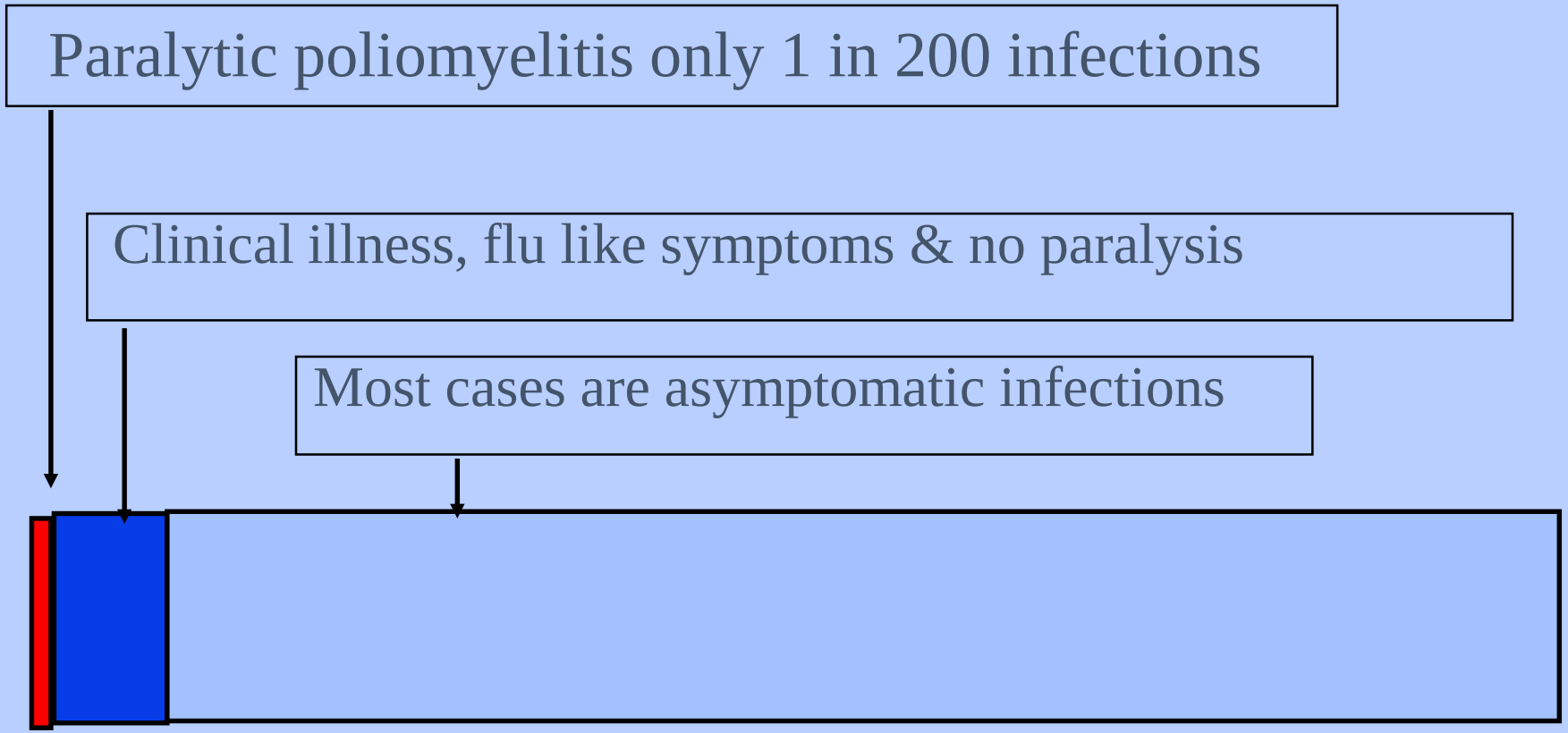
- Before any country is declared ***polio-free***, there must be no wild-type polio circulation for at least 3 years. AND:
- All the 5 certification criteria are reached and sustained.
  - A Non-polio AFP rate of at least 1/100,000 (Recently 2/100,000) in children aged less than 15 years
  - At least 80% Stools collected within 14 Days of onset of paralysis
  - At least 80% cases with late stools followed up
  - All stools to be tested in a WHO accredited laboratory
  - At least 80% of routine reports are submitted timeously i.e.

Poliomyelitis:Clinical Manifestations

- Most of infections occur in children <5 years of age
- **Most of infections are in-apparent** (Reservoir of infection especially in children)
- About 5% of infections – minor nonspecific illness:
  - Fever, malaise, headache, nausea & vomiting.
- +2% of infections - nervous system involvement
  - About 1% Flaccid paralysis &
  - About 1% Aseptic meningitis
- **Flaccid paralysis occur in <1% of infections**
  - Extent of paralysis reaches its maximum development within 3-4 days - hence AFP
  - Residual paralysis tends to be permanent after 60 days of clinical onset

Clinical aspects of Poliomyelitis infection

*Paralysis is an **unusual** manifestation of infection*



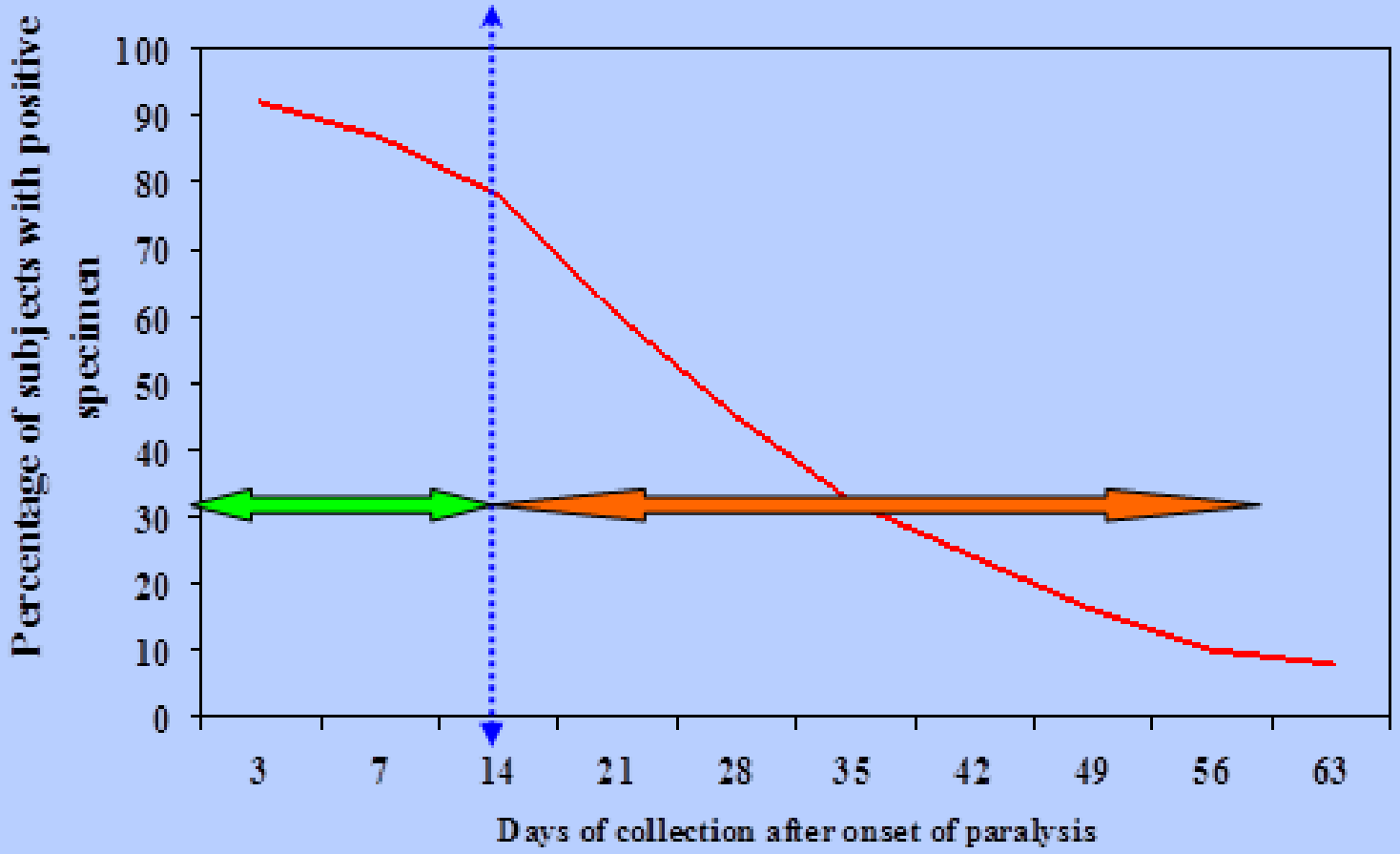
Poliovirus Transmission

- Poliovirus infects only human beings, no animal reservoir.
- Primarily person-to-person via the faecal-oral route
- The time between infection and onset of paralysis is 10-21 days.
- Virus intermittently excreted for ≥ 1 month post- infection.
- Most viral shedding occurs just prior to the onset of paralysis and during the first two weeks after paralysis occurs.

Pathogenesis

- Virus enters oral cavity
- Local replication in tissues expressing receptor (e.g. tonsils, Peyers patches of ileum, and lymph nodes)
- Viremia with hematologic spread to CNS
- Retrograde spread along neurons to spinal cord
- Motor neurons destroyed by viral replication
- Paralysis extent depends on proportion of motor neurons lost

Polio Virus shedding in stool



Poliomyelitis :Clinical Manifestations

- **Other causes of Acute Flaccid Paralysis**:
  - GBS
  - Other Entero-viruses, Coxsackie & Echo viruses
  - Others illnesses that affect the nervous system (including toxins

    Most of infections are in-apparent (Reservoir of infection especially in children)

Acute Flaccid Paralysis Surveillance

Not A Specific Disease,
Not Polio,

But A SYNDROME

AFP case definition

Acute:

rapid progression of paralysis, (from onset to maximum paralysis)

Flaccid:

loss of muscle tone, “floppy” (as opposed to spastic or rigid)

Paralysis:

weakness, loss or diminution of motion

Standard case definition

- Any patient under 15 years of age with acute, flaccid paralysis,

or

- a patient of any age in whom a clinician suspects polio

AFP surveillance steps

- Collect 2 stool specimens 24 to 48 hrs apart, within 14 days of onset of paralysis
- Put and seal in appropriate container
- Ship to NICD in reverse cold chain, arrive < 72 hrs. Copy of Case Investigation Form goes with the specimen
- If not adequately investigated: clinical notes, other diagnostic information/ results & 60 Day Follow Up

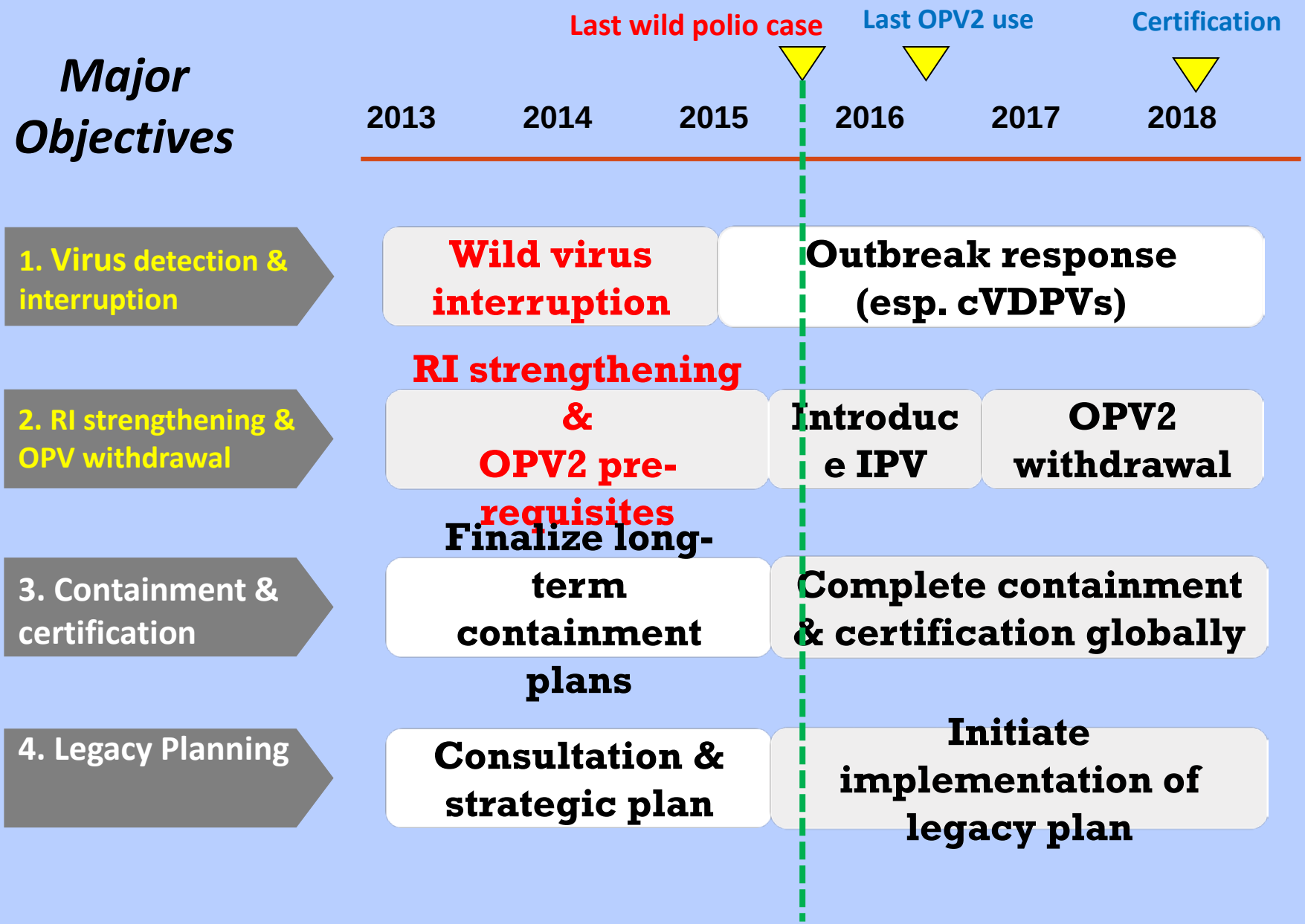
AFP Performance Indicators

1. **% of all expected AFP monthly reports that were received**
   Target: 90%
2. **Non-polio AFP rate in children < 15 years of age**
   Target: 4 / 100 000
3. **Investigation ≤ 48 hours of report *Target: ≥ 80%***
4. **2 stools collected at least 24 – 48 hours apart & within 14 days of paralysis onset – Target*: ≥ 80%***
5. **Stool specimens arriving at the lab ≤ 3 days of being sent**
   Target: ≥ 80%
6. **Stool specimens arriving at the laboratory *in "good condition"***
   Target: ≥ 80%

AFP Stool Adequacy Rate

- This is the second most important indicator for assessing the performance of AFP surveillance
- A sensitive AFP surveillance system MUST be
  - Capable of collecting 2 stool specimens within 14 days of onset of paralysis 24 to 48 hours apart
  - From at least 80% of all reported AFP cases.

Polio Eradication & Endgame Strategic Plan 2013-2018



Global Action Plan for Polio containment

Within 3 months of the switch, each country is required to have in place full containment of all wild type 2 as well as Sabin type 2 containing material, and any material which may be potentially infectious but not yet tested for wild or Sabin polio virus type 2 .

http://www.polioeradication.org/Portals/0/Document/Resources/PostEradication/GAPIII_2014.pdf

What samples need to be destroyed

- **Samples that have been confirmed as containing wild-type polioviruses**
- **Samples that have been confirmed as containing VDPV type 2 viruses**
- **Samples that have been confirmed as containing Sabin (Vaccine) strain of poliovirus type 2**

What samples need to be destroyed

- **Samples that may potentially contain wild type polio viruses, VDPV2 or Sabin 2 virus (even if they have not been tested for polio viruses)**

  - **stool samples**
  - **rectal swabs**
  - **environmental samples**
  - **Respiratory samples (throat swabs)**
  - **Polio permissive cells or animals that have had virus introduced to them**
  - **RNA and cDNA that may contain full genome or capsid sequences**

In the near future type 1 and type 3 viruses of the mentioned strains will need to be destroyed as well

Destruction of infectious materials

- **Polioviruses**
  - **small non-enveloped viruses (hardy)**
  - **Destroyed by prolonged exposure to bleach, or elevated temperatures above 56°C**

Destruction of infectious materials – before April 2016

- **Samples should be inventoried**

- **Any samples containing or potentially containing wild type viruses or VDPVs – needs to be autoclaved, autoclaved remains tracked and placed into a biohazardous container, incinerated as for destruction of biohazardous materials (usually controlled by a private 3rd party company), data trail of the destruction procedure should be kept on hand as proof of destruction**

- **Any samples containing or potentially containing Sabin type 2 polio virus – needs to be discarded as per biological waste (red bin, collected and incinerated by 3rd party company)**

Destruction of infectious materials – After July 2016

- **Samples should be inventoried**

- **Any samples containing or potentially containing wild type viruses or VDPVs or Sabin type 2 virus – needs to be autoclaved, autoclaved remains tracked and placed into a biohazardous container, incinerated as for destruction of biohazardous materials (usually controlled by a private 3rd party company), data trail of the destruction procedure should be kept on hand as proof of destruction**

If samples cannot be destroyed

- **Research projects still ongoing may require samples that may contain polio**

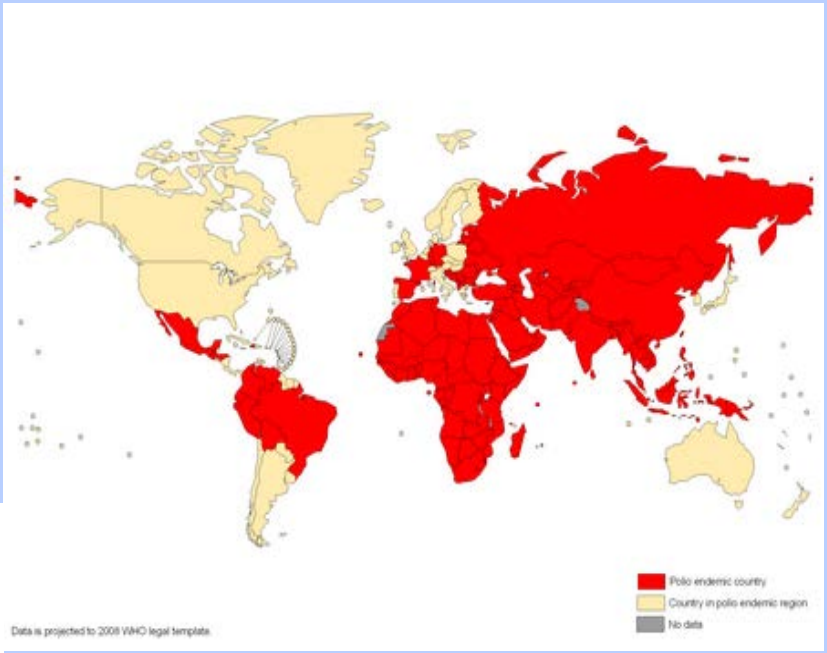
- **The laboratory will need to comply with the requirements set in the Global Action Plan (3rd edition) http://www.polioeradication.org/Portals/0/Document/Resources/PostEradication/GAPIII_2014.pdf**

- **Otherwise laboratories will need to be in contact with the WHO & NICD to discuss suitable storage until the completion of the project, at which time the samples will need to be destroyed**

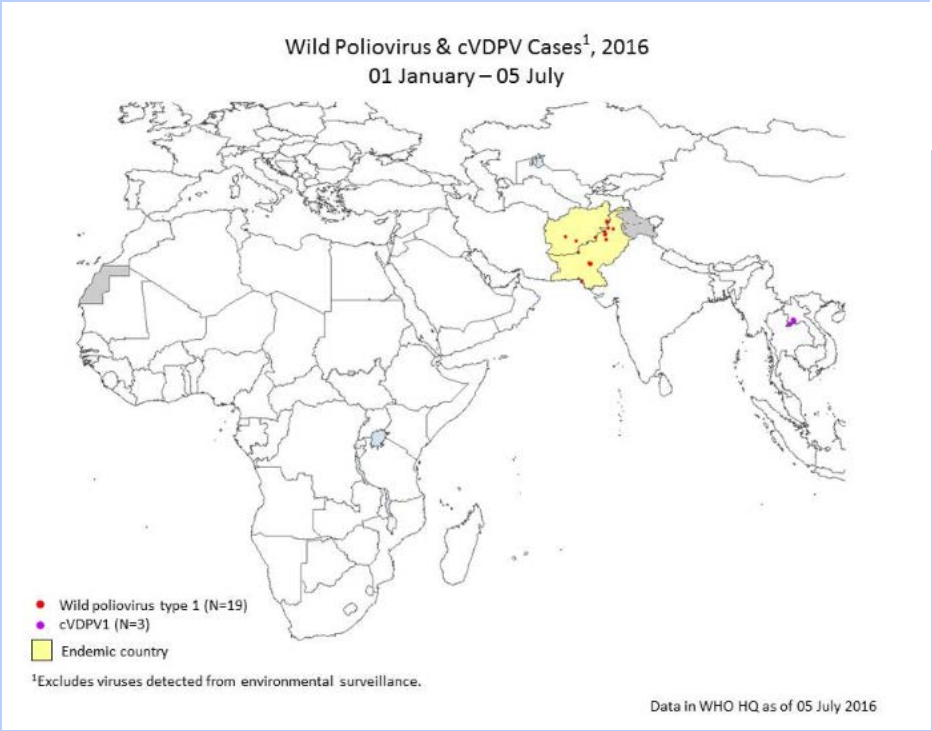
1988

a. The World Health Assembly passes a resolution to eradicate polio by the year 2000.

b. The Global Polio Eradication Initiative is launched.



2016



1991

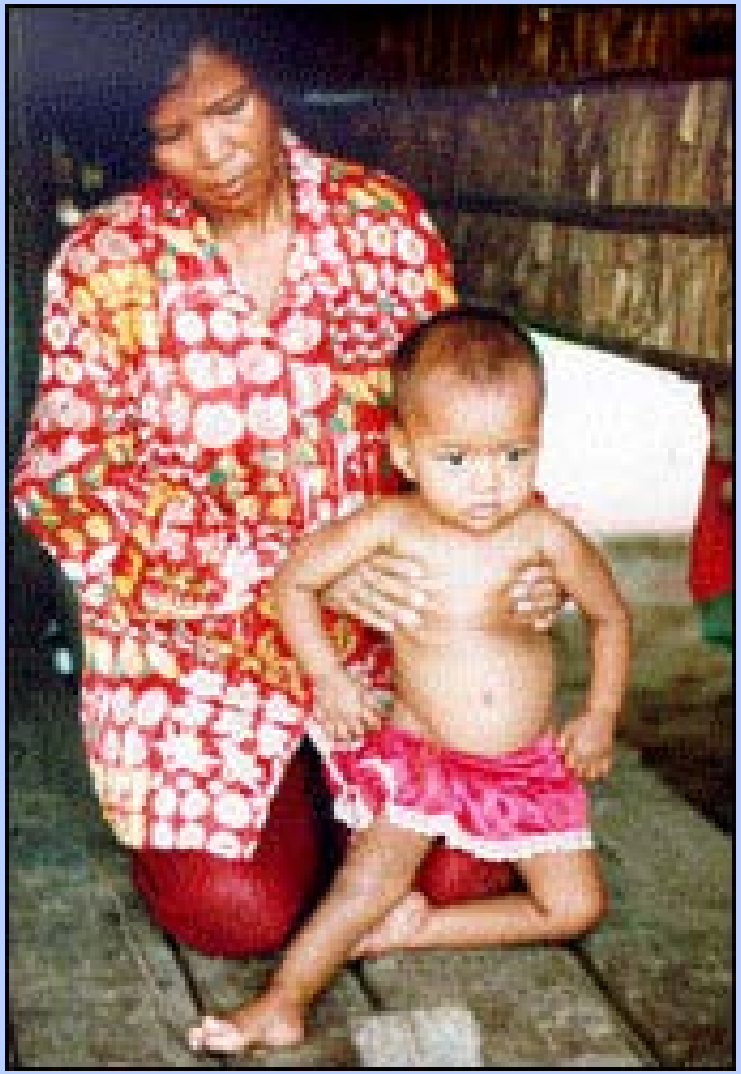
Luis Fermin Tenorio, a 3 years old boy living in Junin, Northern Peru was the last case of wild polio in the WHO Region of the Americas

1994

The WHO Region of the Americas was certified polio-free

1997

Mum Chanty, a 15-month-old girl living near Phnom Penh, Cambodia reported as the last case of wild polio in the WHO Western Pacific Region.



2000

The WHO Western Pacific Region was certified polio-free

1998

In Turkey on 26 November, 1998, Melik Minas, a 33-month-old unvaccinated child, is the last child paralysed by indigenous wild poliovirus in the European Region.

2002

The WHO European Region was certified polio-free

Towards a polio-free India

2011

Rukhsar Khatun, a 18 months old girl from West Bengal of India, remains the last polio crippled child in the South East Asia Region

2014

The WHO South East Asia Region was certified polio-free

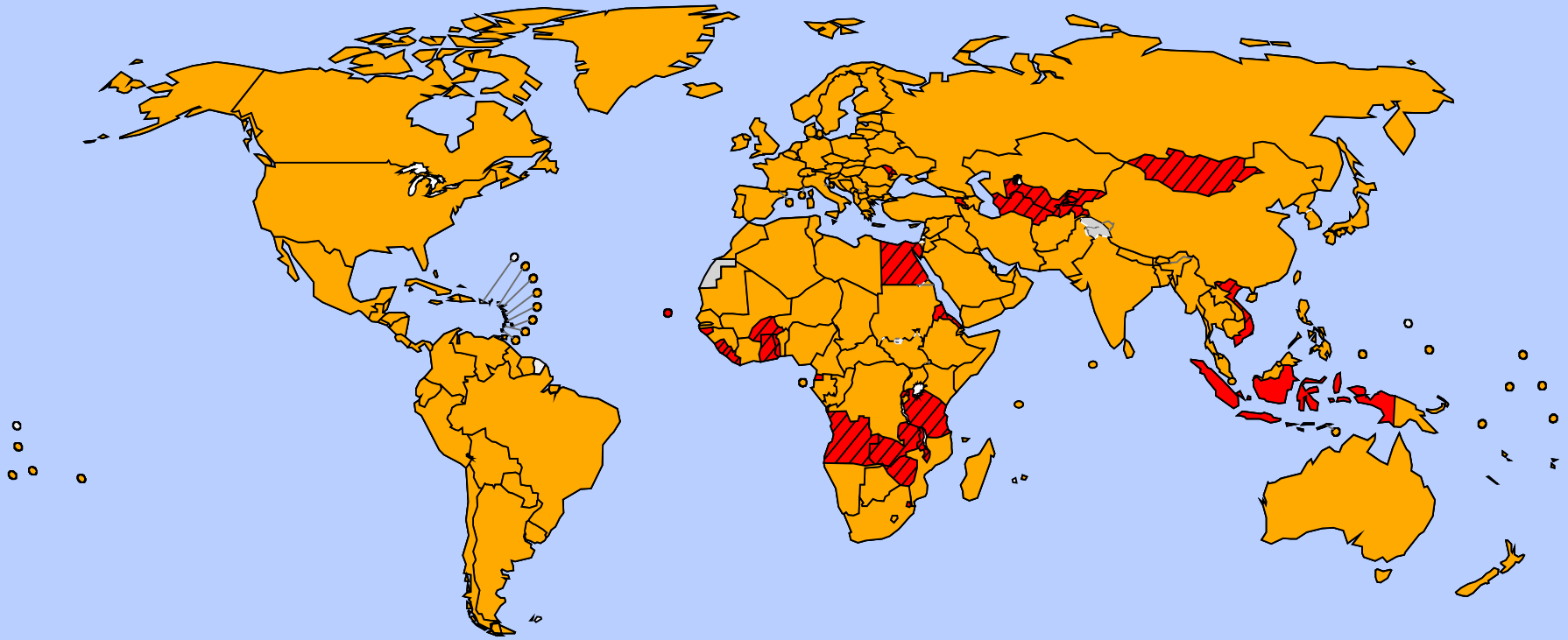
The Switch: An Update

Indicator	Status
Countries no longer using tOPV in RI	**155/155 (100%)**
Independent monitoring has started	152/152* (100%)
National Validation Committee has received switch monitoring data	151/152* (99%) *(Libya)*
WHO Regional Office has received the National Validation Report	151/155 (97%) *(China, Iraq, Libya, Philippines)*

*Three countries moved to an IPV only schedule before the switch and thus did not need complete monitoring or validation activities for tOPV removal. Israel, Malaysia, Poland.

Current IPV introduction status

100/126 have introduced to date



Introduced to date* *(169 countries or 87%)*

Formal commitment to introduce in 2016 *(5 countries or 3%)*

Introduction delayed in 2017 *(20 countries or 10%)*

Not available

Not applicable

* *Including partial introduction in India*

6 additional introductions planned in 2016

VDPV2 events, outbreaks 2016
Post Switch

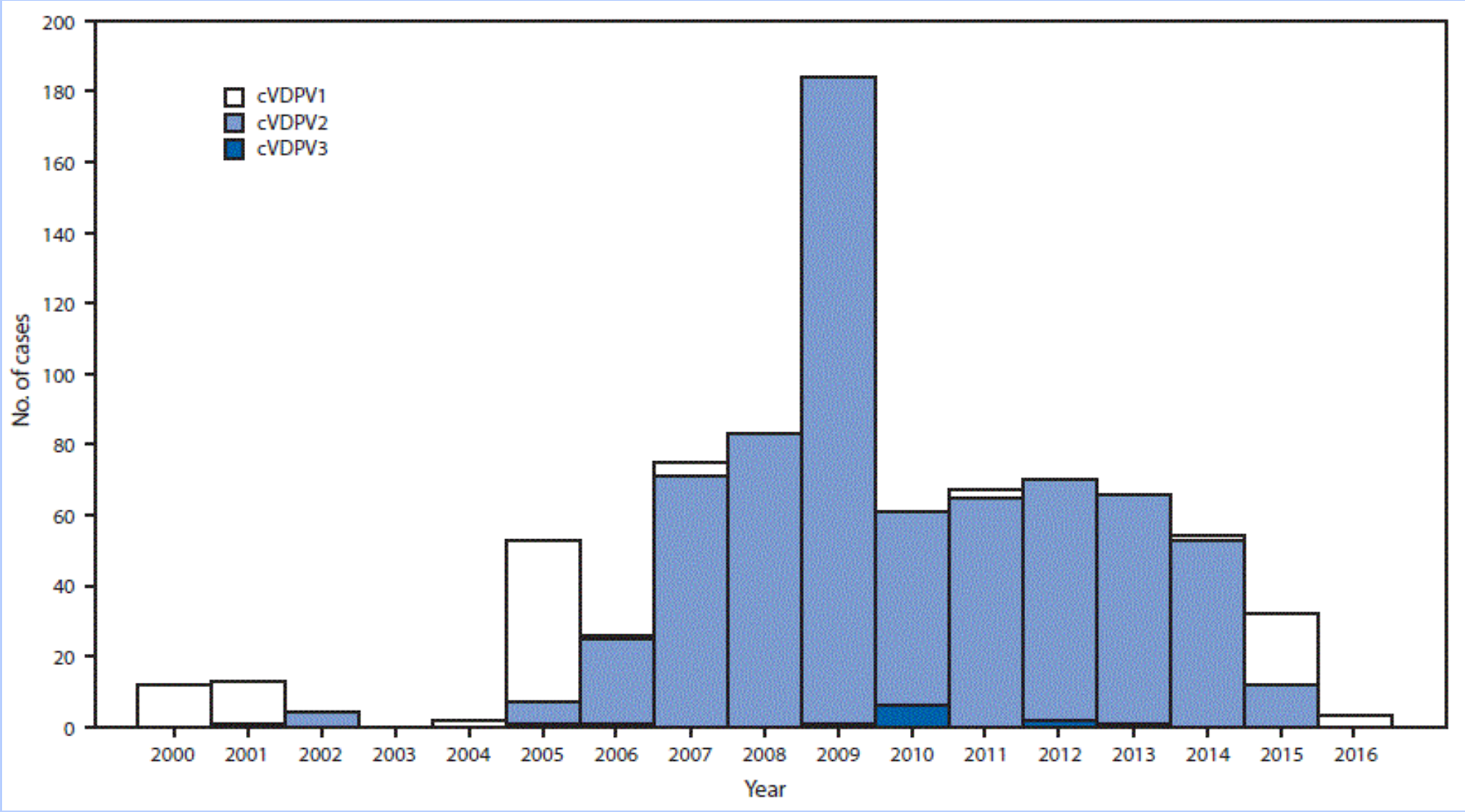
POST SWITCH						
Country, Province	**PV TYPE**	**# nucleotide divergent**	**AFP-ES**	**DT ONSET, SAMPLE COLLECTION**	**RESPONSE**	
Nigeria, Borno	**cVDPV2**	**32**	**ES**	**23-Mar-16**	**mOPV2**	Reported 29 Apr 2016
Nigeria, Jigawa	**VDPV2**	**8**	**AFP**	**14 May 2016**	**nil**	
India, Telangana	**VDPV2**	**10**	**ES**	**16 MAY 2016**	**fIPV-ID**	
India, Kolkata	**VDPV2**	**6**	**ES**	**25 APR 2016**	**nil**	
India, Delhi	**VDPV2**	**8**	**ES**	**6 JUN 2016**	**nil**	
India, Telangana	**VDPV2**	**14**	**ES**	**10 JUN 2016**	**nil**	

Current Status – Week of 24 August 2016

States currently exporting wild poliovirus or cVDPV
Afghanistan (WPV)
Pakistan (WPV)
States infected with wild poliovirus or cVDPV but not currently exporting
Guinea (cVDPV)
Lao People's Democratic Republic (cVDPV)
Madagascar (cVDPV)
Myanmar (cVDPV)
Nigeria (WPV and cVDPV)
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
Chad
Equatorial Guinea
Niger
Somalia
Ukraine

cVDPV

Source: MMWR / August 5, 2016 / Vol. 65 / No. 30



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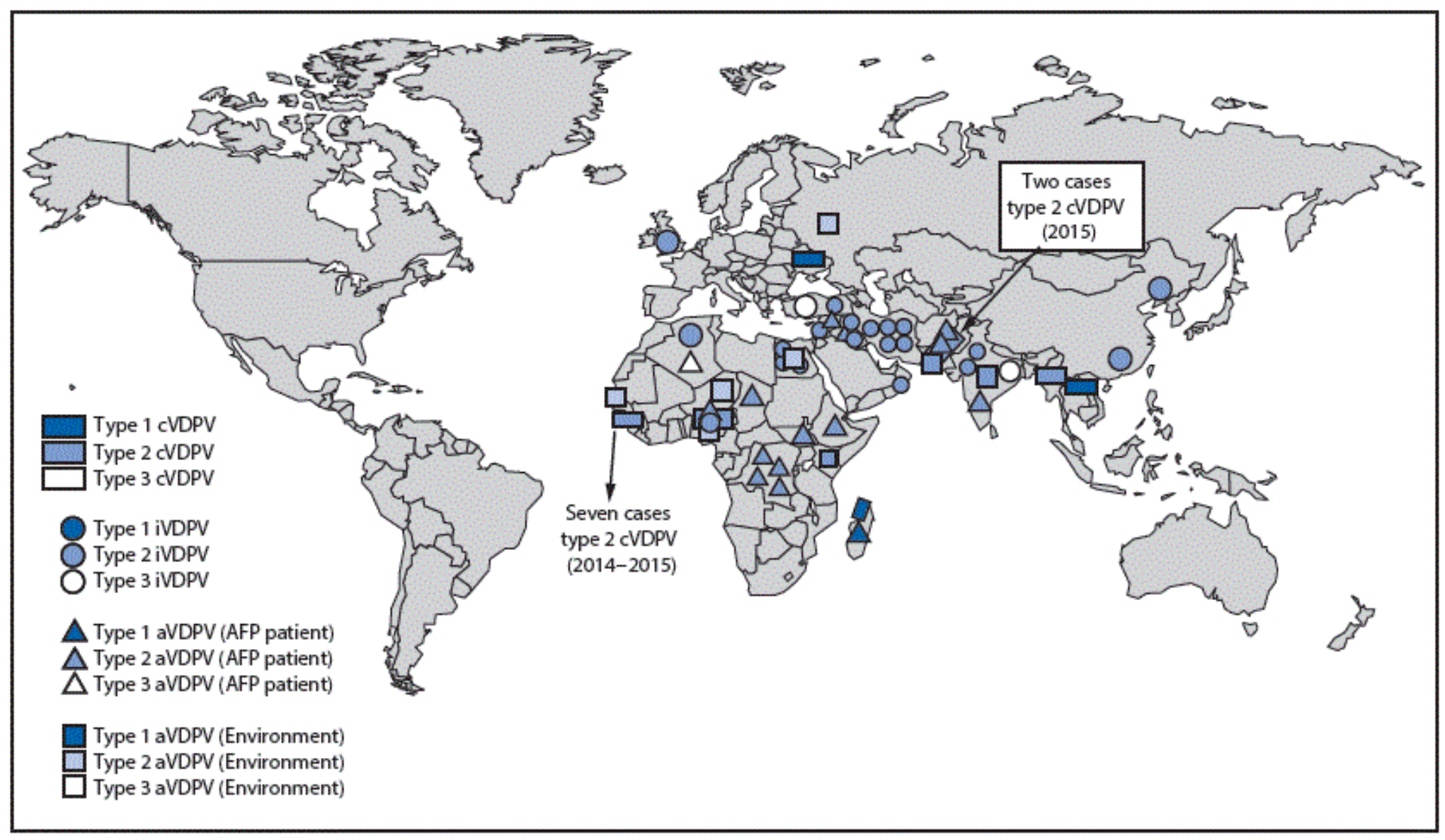


Monthly distribution of WPV cases - Africa 2012 – 2016

Source: WHO PEP - Polio Weekly update 12.Aug.2016

Country	2012 Total	2013 Total	2014 Total	2015 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	2016 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Total	DONSET most recent WPV
Angola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	07-Jul-11
Benin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19-Apr-09
Burkina Faso	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25-Oct-09
Burundi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12-Sep-09
Cameroon	0	4	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	09-Jul-14
Central Afr. Republic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	08-Dec-11
Chad	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14-Jun-12
Congo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22-Jan-11
Cote d'Ivoire	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24-Jul-11
DRC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20-Dec-11
Ethiopia	0	9	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	05-Jan-14
Equatorial Guinea	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	03-May-14
Gabon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15-Jan-11
Ghana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	08-Nov-08
Guinea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	03-Aug-11
Kenya	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14-Jul-13
Liberia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	08-Sep-10
Mali	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23-Jun-11
Mauritania	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28-Apr-10
Niger	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15-Nov-12
Nigeria	122	53	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	13-Jul-16
Senegal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30-Apr-10
Sierra Leone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28-Feb-10
Togo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28-Mar-09
Uganda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15-Nov-10
Total in endemic	122	53	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	
Total in non-endemic	6	27	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	**128**	**80**	**17**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	

Eish!!

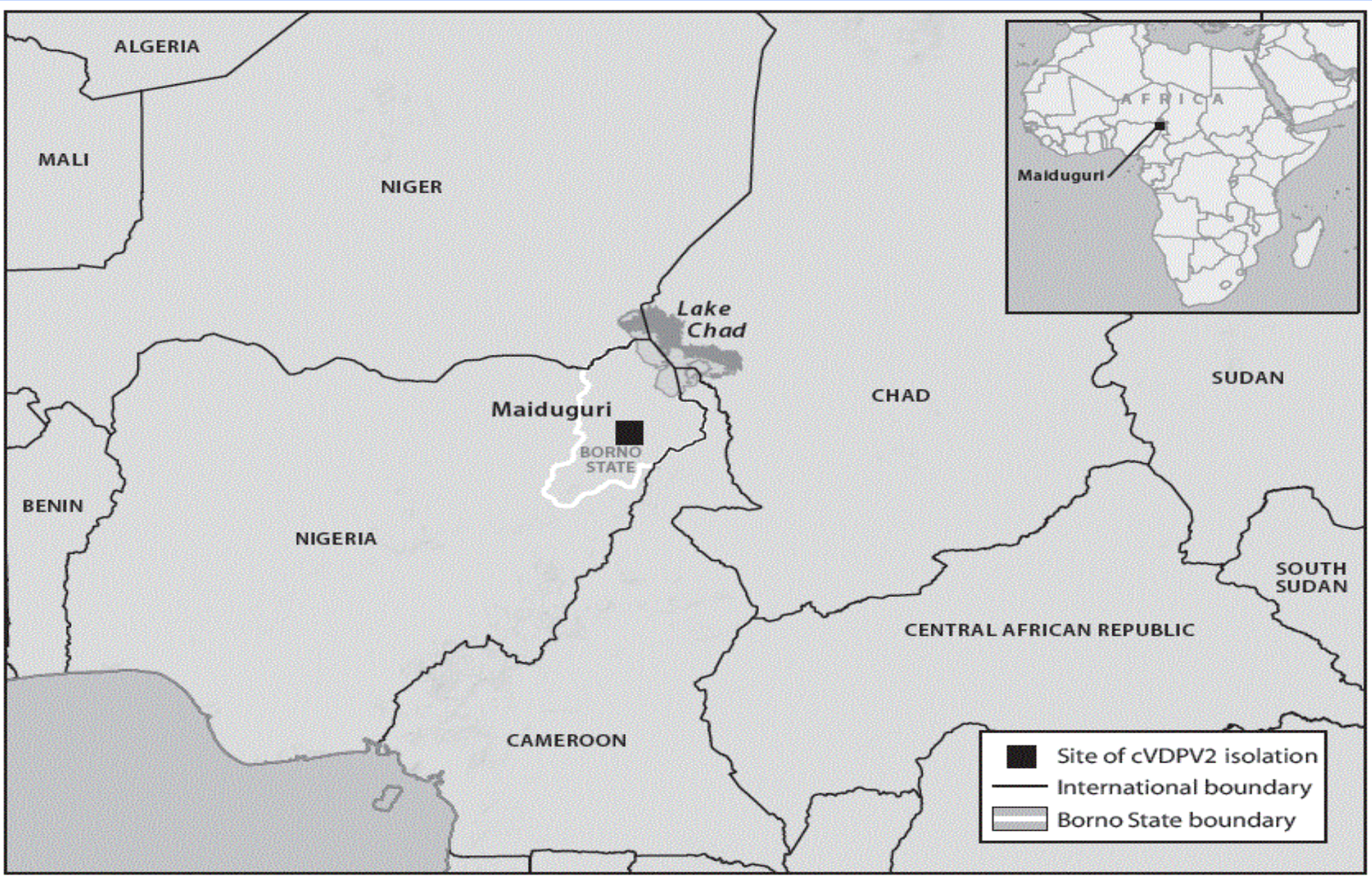
Current Status

Total cases	Year-to-date 2016		Year-to-date 2015		Total in 2015	
	WPV	**cVDPV**	WPV	cVDPV	WPV	cVDPV
Globally	**21**	**3**	37	12	74	32
- in endemic countries	**19**	**0**	37	3	74	3
- in non-endemic countries	**2**	**3**	0	9	0	29

Current polio status-
(as at 24. Aug.2016)

Countries	Year-to-date 2016		Year-to-date 2015		Total in 2015		Onset of paralysis of most recent case	
	WPV	cVDPV	WPV	cVDPV	WPV	cVDPV	WPV	cVDPV
Afghanistan	6	0	8	0	20	0	29-May-16	NA
Pakistan	13	0	29	2	54	2	18-Jun-16	09-Feb-15
Guinea	0	0	0	0	0	7	NA	01-Dec-15
Lao Pepople's Democratic Republic	0	3	0	0	0	8	NA	11-Jan-16
Madagascar	0	0	0	9	0	10	NA	22-Aug-15
Myanmar	0	0	0	0	0	2	NA	05-Oct-15
Nigeria	2	0	0	1	0	1	13-Jul-16	16-May-15
Ukraine	0	0	0	0	0	2	NA	07-Jul-15

Source: MMWR / August 5, 2016 / Vol. 65 / No. 30



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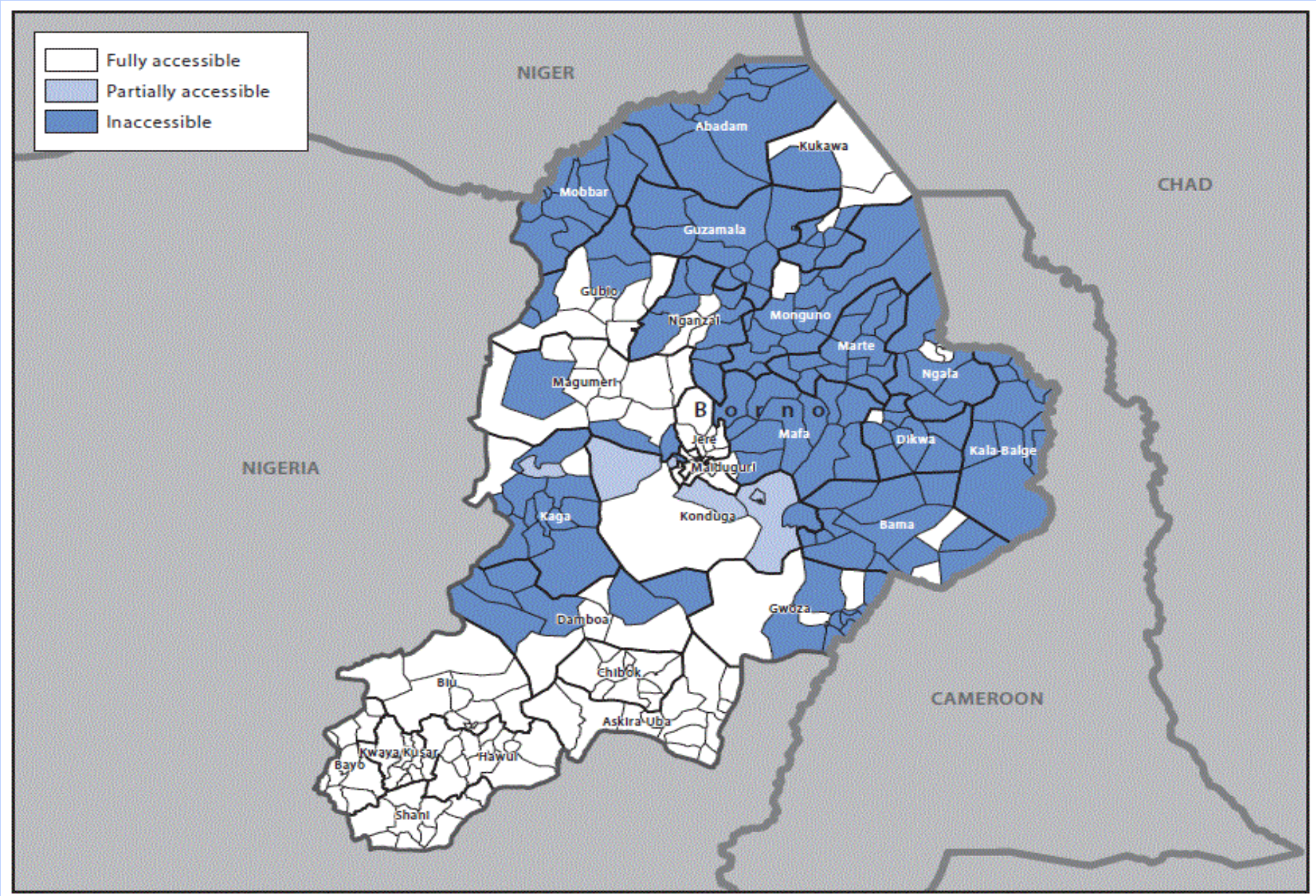


2 new WPV cases from Nigeria

- Two new WPV type 1 cases were reported
- WPV type1 from Borno State in:
  - Jere LGA from a contact (onset of paralysis of index case: 4 July 2016) (the index case had a negative test result)
  - Gwoza LGA (onset of paralysis: 13 July 2016)

2 new WPV cases in Nigeria

- 1st Case reported on 4th July 2016 -

- Genetic sequencing suggests these isolates are most closely linked to WPV1 last detected in Borno in 2011.
- Genetic analysis can therefore be interpreted to mean that the virus detected had circulated undetected for several years
- These isolates are the first WPV1s detected in Nigeria since July 2014
- Significant surveillance gaps and area generally inaccessible

2 new WPV cases from Nigeria

What are the implications for countries?

- Until global polio eradication is achieved, there is a risk that any country can be affected by those countries with continued polio transmission.

- Important that countries remain vigilant by strengthening AFP surveillance

- Important that routine immunization activities be strengthened to ensure adequate population immunity.

WHO – ARCC's RESPONSE

The World Health Organization Regional Committee for the African Region met on the 21 August and **declared the recent polio outbreak a public health emergency for the countries of the Lake Chad Basin,** calling for a coordinated outbreak response across the region.

2 new WPV cases from Nigeria

What is Nigeria doing now?

- Conducting several rounds of outbreak response activities / campaigns that will be synchronized with neighbouring countries in the Lake Chad Basin that have been affected by insecurity and inaccessibility: Chad, Cameroun, Niger and Central African Republic.

- Additionally, surveillance is being further strengthened in these countries to avoid missing any circulation.

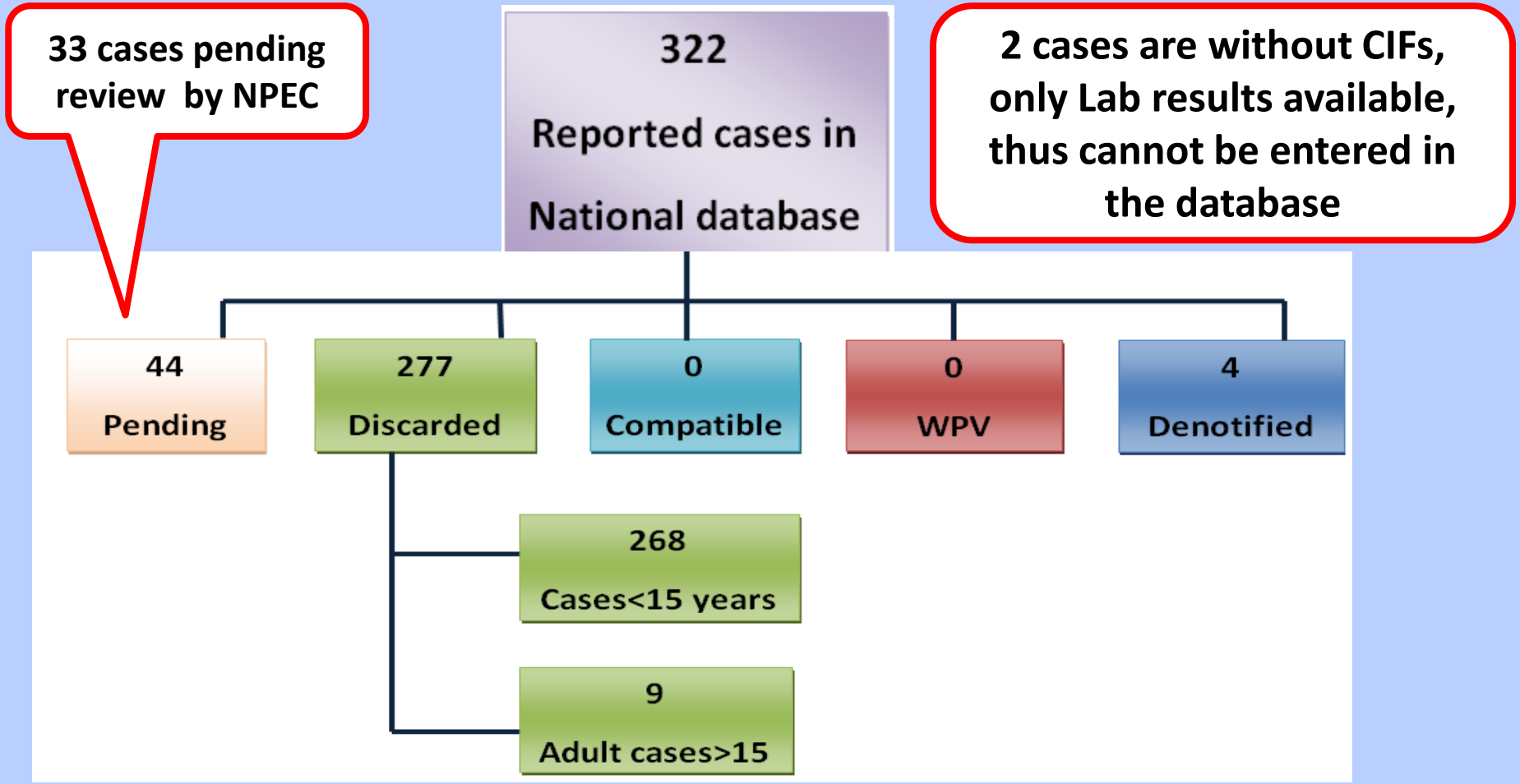
2 new WPV cases from Nigeria

What are the implications for the AFRO regions?

- Since a WHO region needs to be polio free for at least 3 years, to be certified to have eradicated polio, with the new cases, the earliest the region can be certified is 2019.

- It's Important that all countries maintain high immunization coverage especially in the hard-to-reach sub-populations populations.
  - Through strengthened routine immunization activities
  - Hightened Supplementary Immunization Activities (SIA)

RSA AFP CASE CLASSIFICATION STATUS, WEEK 1-34, 2016



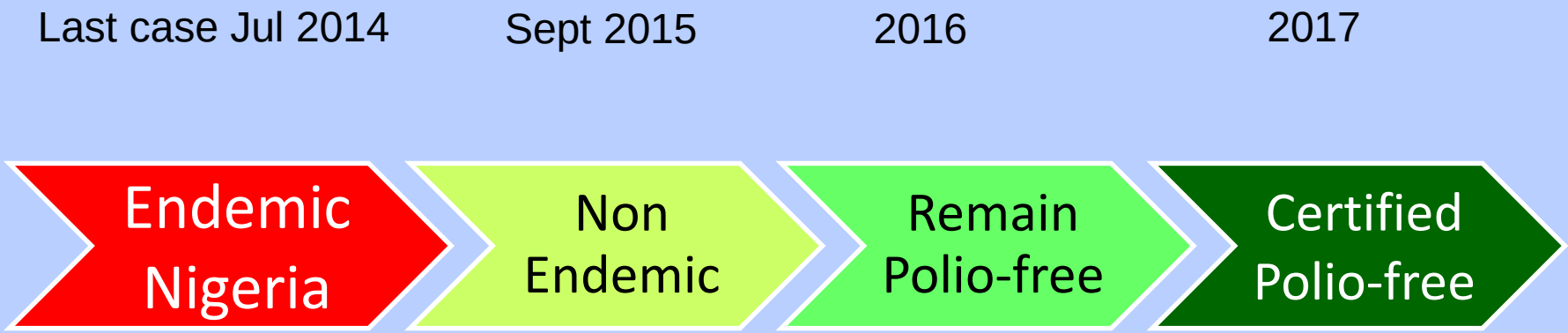
RSA AFP SURVEILLANCE INDICATORS, WEEK 1-34

SOUTH AFRICA TARGETS AND PERFORMANCE, 2016

INDICATORS	TARGET	2016*	LEGEND
Non-Polio AFP rate per 100 000 of ≤ 15 years old target population	4.0 / 100 000	2.6	≥ 4.0 2.00 - 3.99 0.00 - 1.99
Stool Adequacy: cases with 2 adequate stools collected 24 to 48 hours apart within 14 days of onset of paralysis	80%	79%	≥ 80% 60.00 -79.99% 0.00 -59.99%

AFRO

Scenario prior to the July 2016 Nigeria cases



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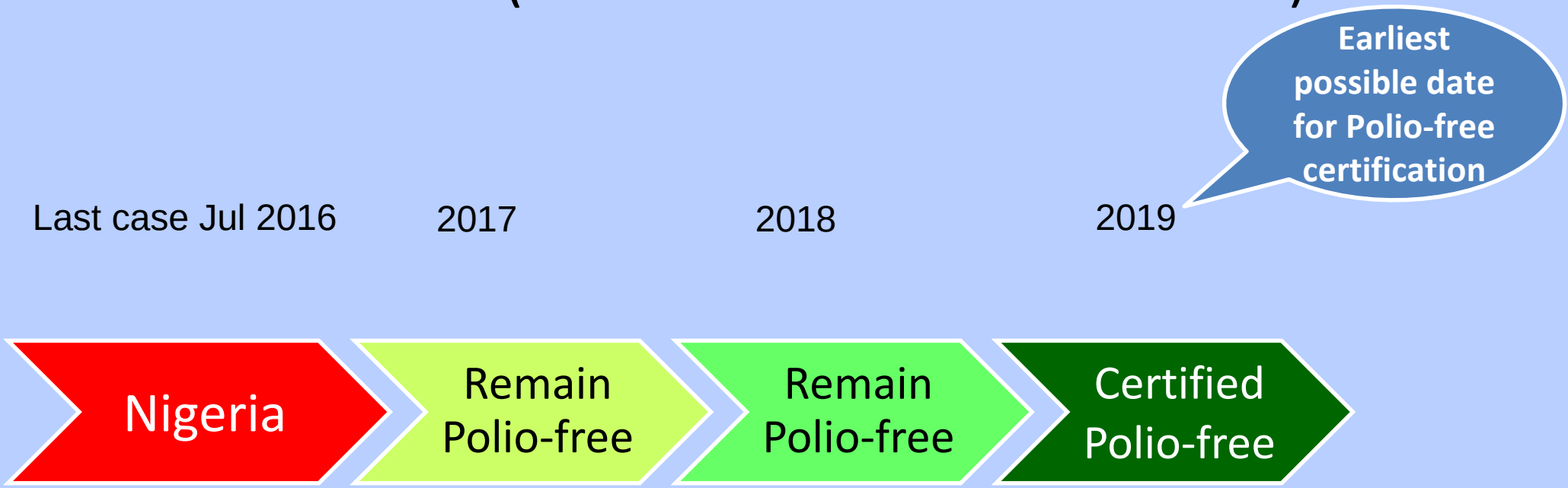
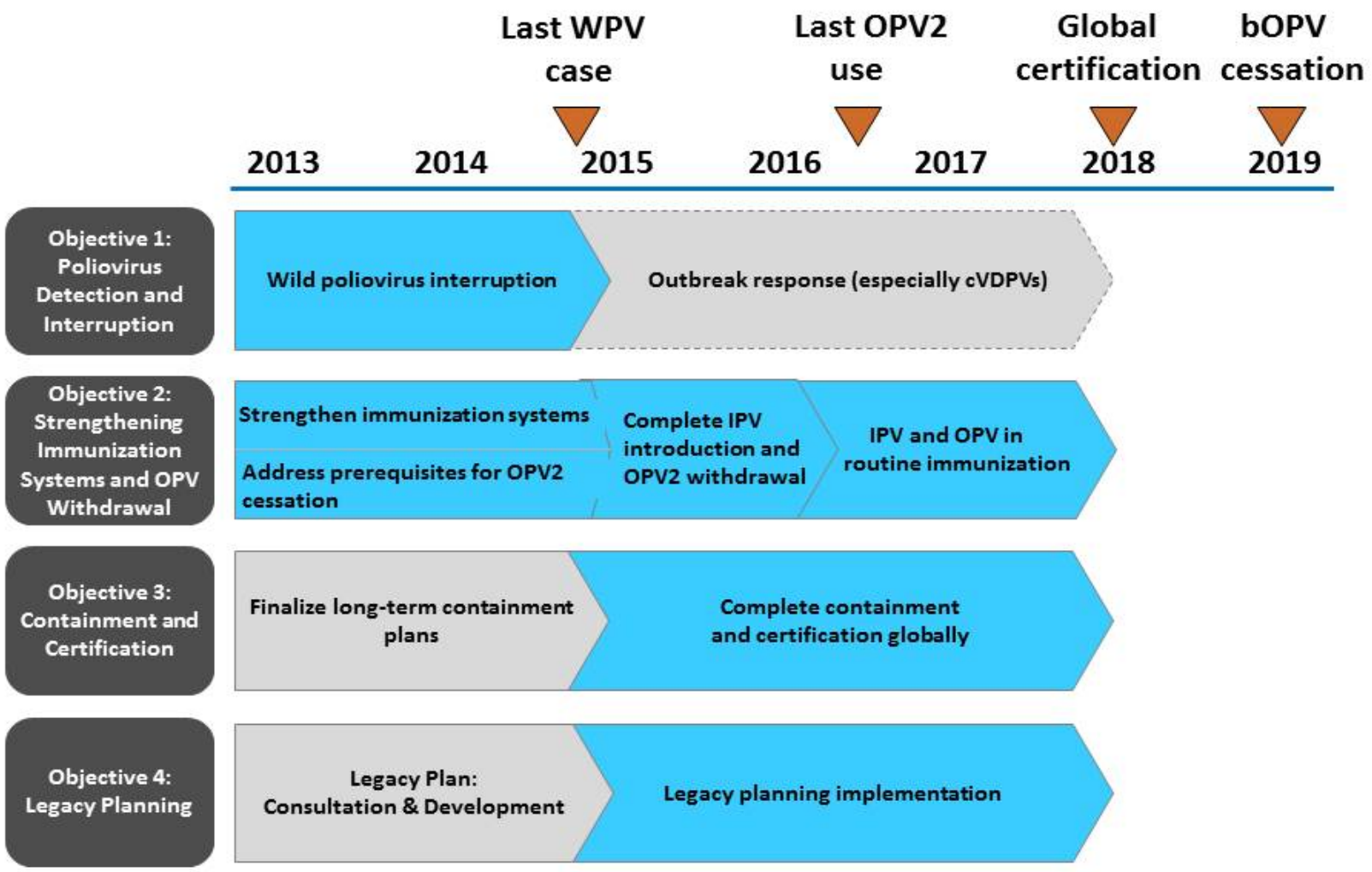
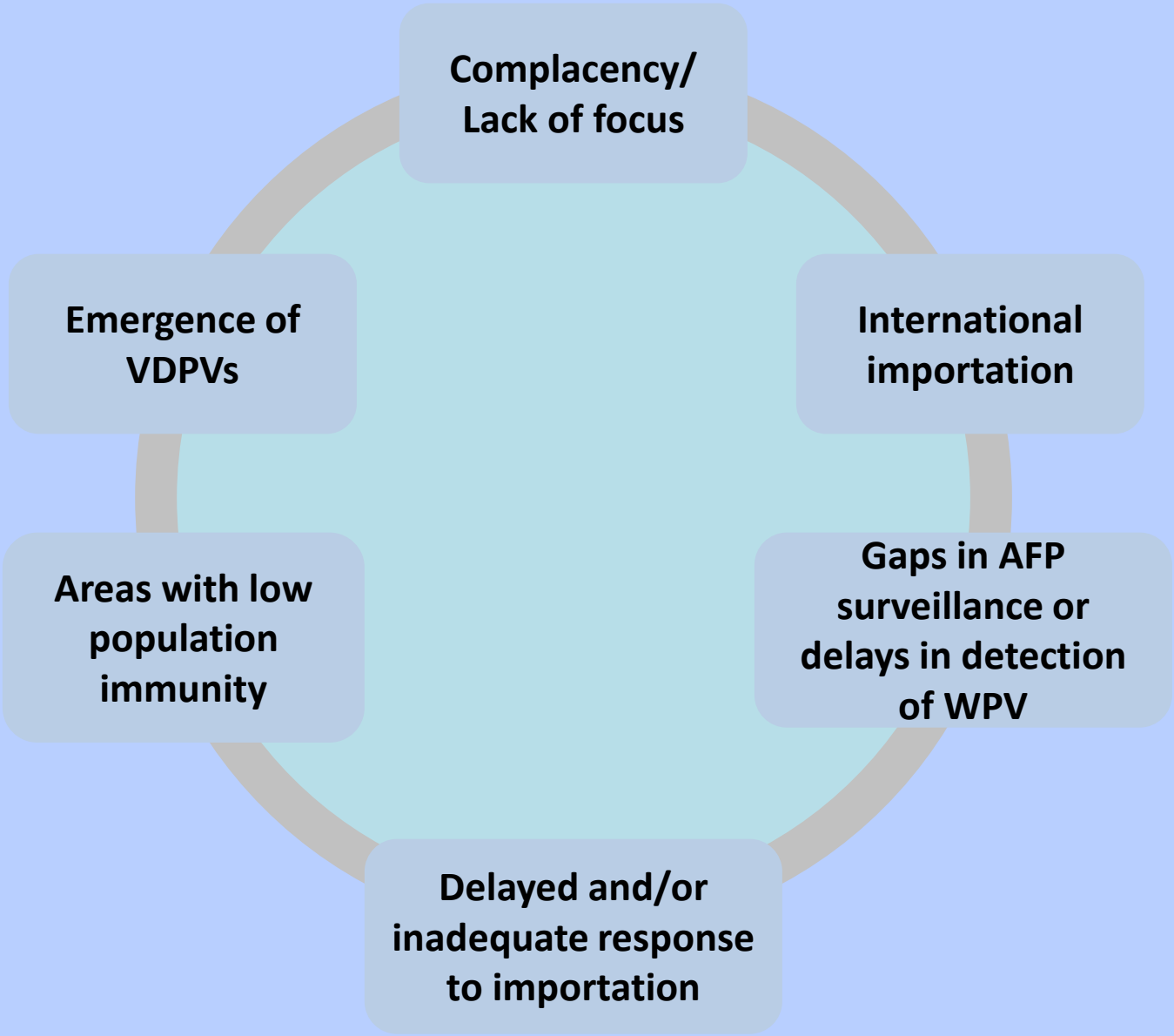
Current Scenario (if no further new cases occur)




Last WPV case
Last OPV2 use
Global certification
bOPV cessation
2013
2014
2015
2016
2017
2018
2019
Objective 1: Poliovirus Detection and Interruption
Wild poliovirus interruption
Outbreak response (especially cVDPVs)
Objective 2: Strengthening Immunization Systems and OPV Withdrawal
Strengthen immunization systems
Address prerequisites for OPV2 cessation
Complete IPV introduction and OPV2 withdrawal
IPV and OPV in routine immunization
Objective 3: Containment and Certification
Finalize long-term containment plans
Complete containment and certification globally
Objective 4: Legacy Planning
Legacy Plan: Consultation & Development
Legacy planning implementation

Mitigation of Risks



Current priorities for polio eradication

1. Maintaining high population immunity through polio vaccination campaigns and RI coverage

2. Sustaining sensitive surveillance for detection of poliovirus

3. Mitigating risk of importation – cross border vaccination/vaccination of international travellers

4. Emergency preparedness & response planning

5. Polio end game strategy

THANK YOU