

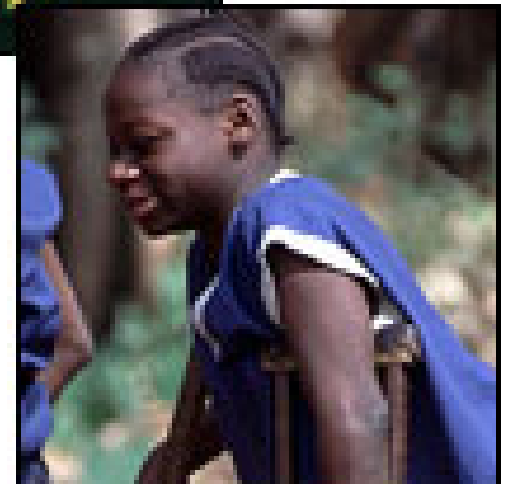
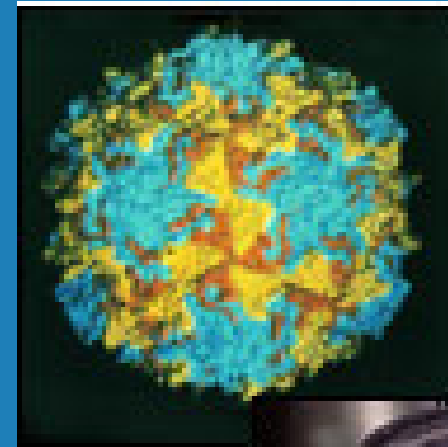
# AFP surveillance: Clinical aspects

Dr Mercy Kamupira

11 March 2016



World Health  
Organization



# Presentation outline

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- Epidemiological characteristics of Poliomyelitis
- Acute flaccid paralysis (AFP) case definition
- AFP surveillance
- AFP surveillance indicators



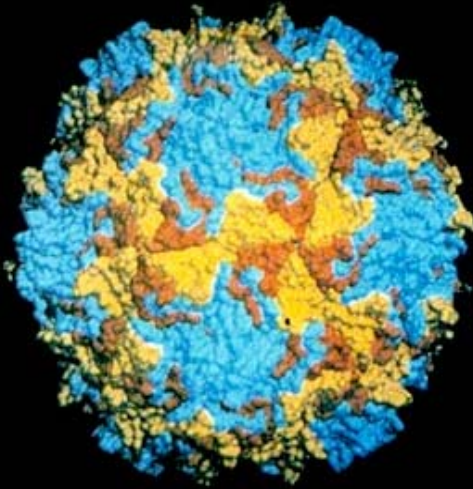
# Poliomyelitis

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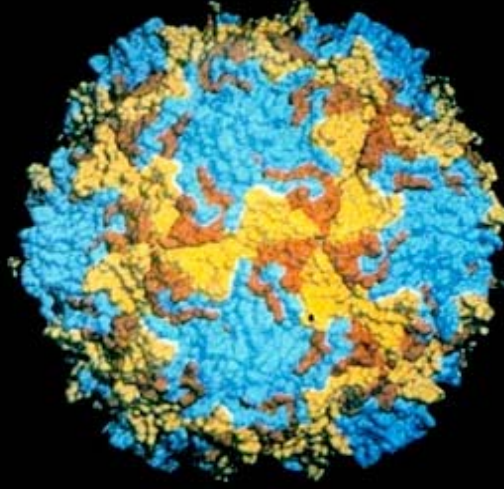
- Highly contagious, viral disease caused by 3 poliovirus serotypes
  - Wild poliovirus(WPV) type 2 is eliminated since 1999; Declared eradicated in September 2015
- In the absence of vaccination, WPV infects nearly all persons in a population
- Paralytic manifestations rare outcome (<1%)



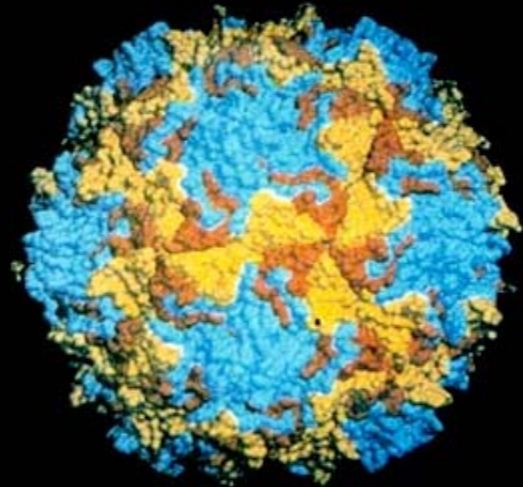
# Progress by type of Wild Poliovirus



POLIO TYPE 1



POLIO TYPE 2



Not detected since Nov  
2012

# Clinical aspects of Poliomyelitis infection

*Paralysis is an unusual manifestation of infection*

Paralytic poliomyelitis only 1 in 200 infections

Clinical illness, flu like symptoms & no paralysis

Most cases are asymptomatic infections



# Poliovirus Transmission

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- 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  $\geq 1$  month post-infection.
- Most viral shedding occurs just prior to the onset of paralysis and during the first two weeks after paralysis occurs.



# Pathogenesis

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- Virus enters oral cavity
- Local replication in tissues expressing receptor (e.g. tonsils, Peyer 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



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# POLIO VACCINES





# Types of Polio Vaccines

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- There are two categories of Polio vaccines
- **Live attenuated oral vaccines**
  - (OPV sabin; mono, bi or trivalent )
- **Inactivated Polio Vaccine / Injectable (IPV-Salk)**



# Vaccines Historical development

- Inactivated poliovirus trivalent vaccine (IPV) licensed in 1955 (Salk)

## Oral

- Monovalent live attenuated oral poliovirus vaccines (OPV) starting in 1961 (Sabin)
- Trivalent live attenuated OPV since 1963 (Sabin)
- **Bivalent live attenuated OPV (type 1 & 3) – 2009**



**Dr. Sabin: 1960 –Developed the DEATH BLOW to the poliomyelitis virus - the attenuated oral polio vaccine.**

# Updated WHO Position Paper on Polio Vaccination, WER, 28 February 2014

2014, 89, 73–92

No. 9



World Health  
Organization

Weekly epidemiological record  
Relevé épidémiologique hebdomadaire

Organisation mo

## Vaccination with OPV plus IPV

WHO no longer recommends an OPV-only vaccination schedule. For all countries currently using OPV only, at least 1 dose of IPV should be added to the schedule. The primary purpose of the IPV dose is to maintain immunity against type 2 poliovirus during and after the planned global withdrawal of OPV2 and switch from tOPV to bOPV. Depending on the timing of the IPV

and combinations of vaccines against diseases that have an international public health impact. These papers are concerned primarily with the use of vaccines in large-scale immunization programmes.

actualisées sur les vaccins et les associations vaccinales contre les maladies ayant des répercussions sur la santé publique internationale. Ces notes portent essentiellement sur l'utilisation des vaccins dans le cadre des programmes

### Contents

73 Polio vaccines: WHO position paper, January 2014

### Sommaire

73 Note de synthèse de l'OMS sur les vaccins antipoliotiques – Janvier 2014

# OPV and IPV Schedules

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- WHO/EPI schedule requires 4 doses of OPV at birth, 6, 10, 14 weeks
- Birth dose at first contact with health facility

**AND**

- At least one dose of IPV at 14 weeks (or nearest visit thereafter)



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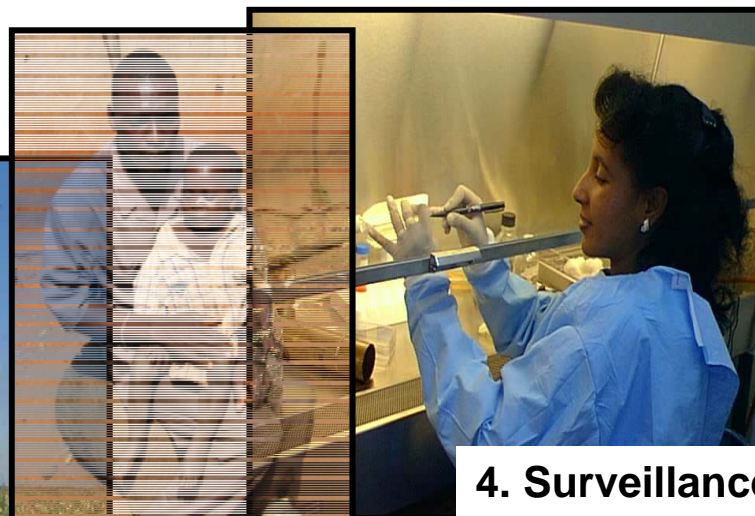
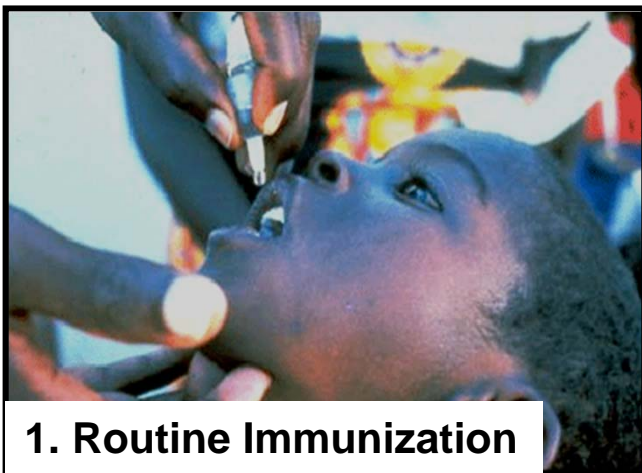
# POLIO ERADICATION STRATEGIES

“ Permanent reduction to **zero** of worldwide incidence of infection caused by a specific agent as a result of deliberate efforts thus removing the need for routine intervention measures” e.g Small Pox





# The Global Polio Eradication Initiative: *the 4 key strategies*



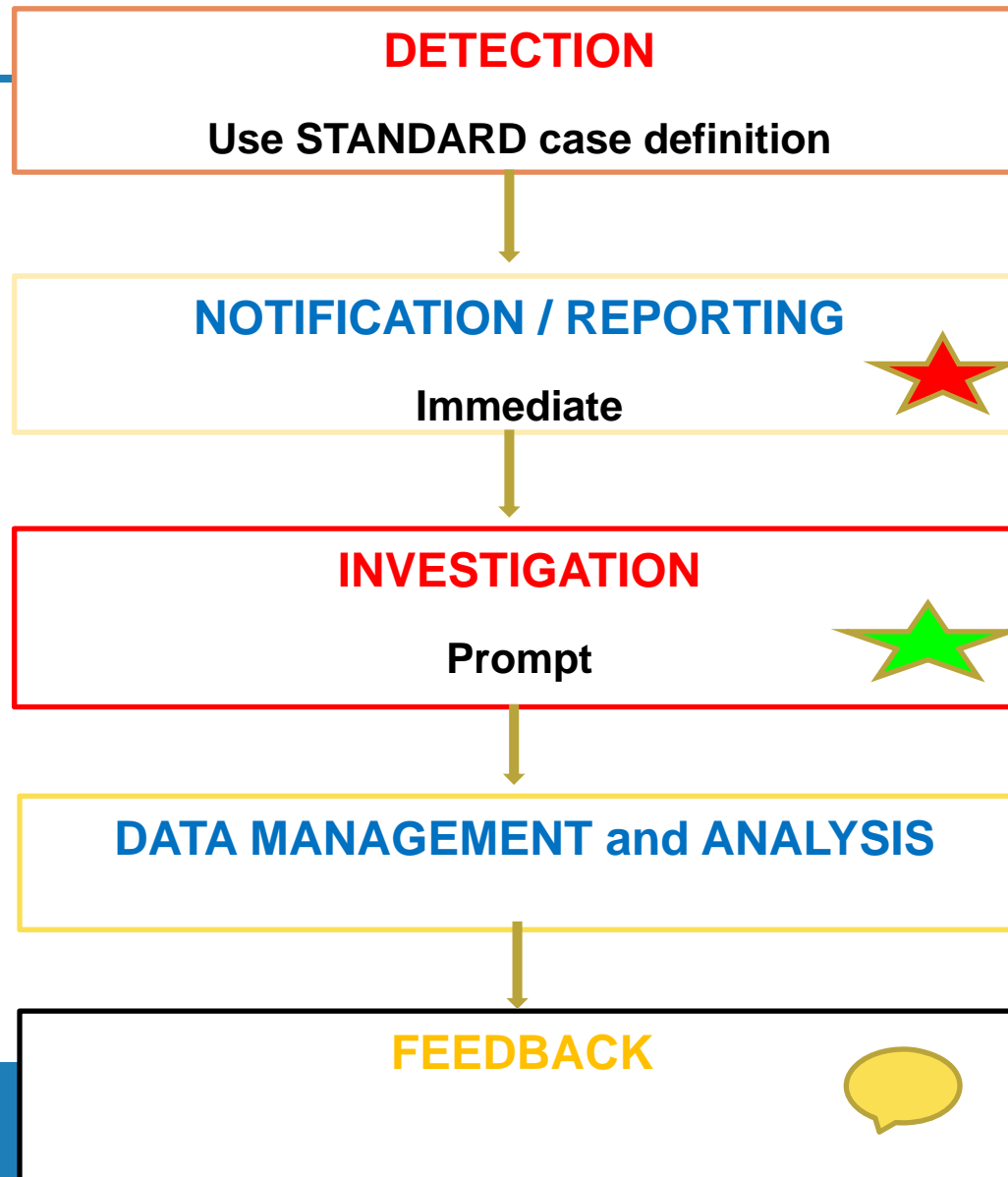
# Disease Surveillance: definition

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- Disease Surveillance is the **systematic** and **ongoing** regular collection of data on the occurrence, distribution and trends of a disease on an ongoing basis with sufficient **accuracy** and completeness to provide basis for action (disease control)



# Surveillance steps





# 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:

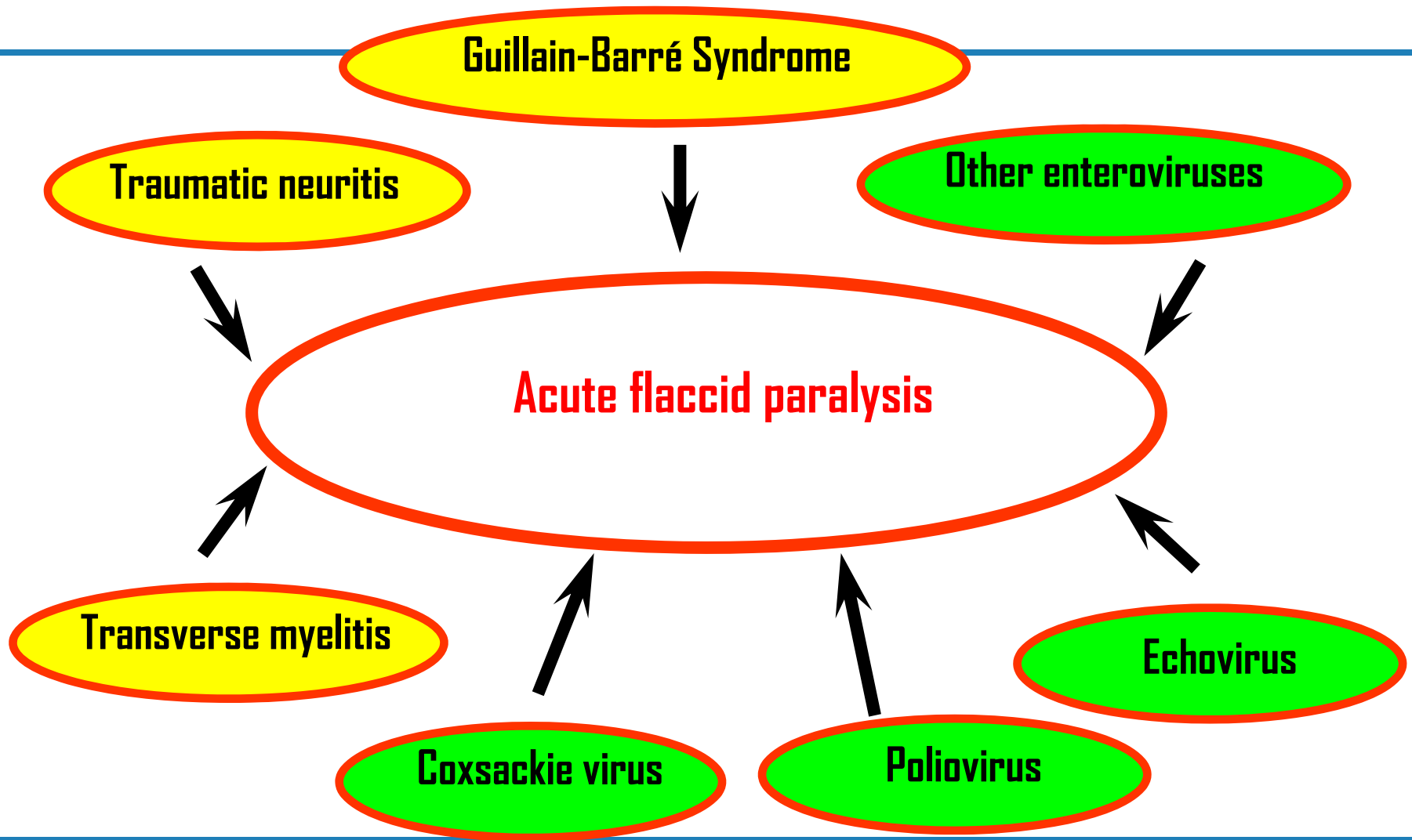
weakness, loss or diminution of motion

### 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 differential diagnosis

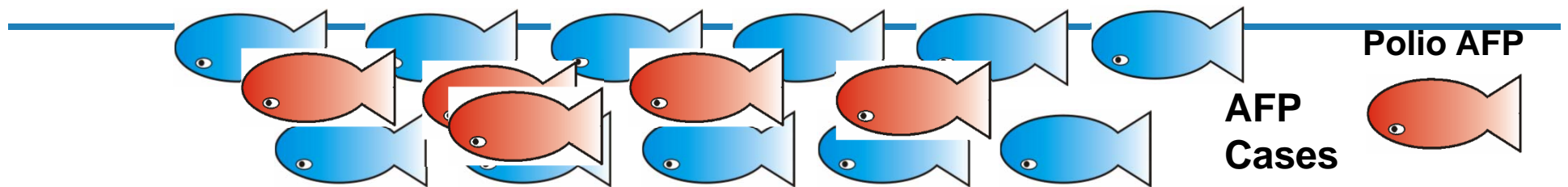


# 2015 annual report (AFP differential diagnosis)

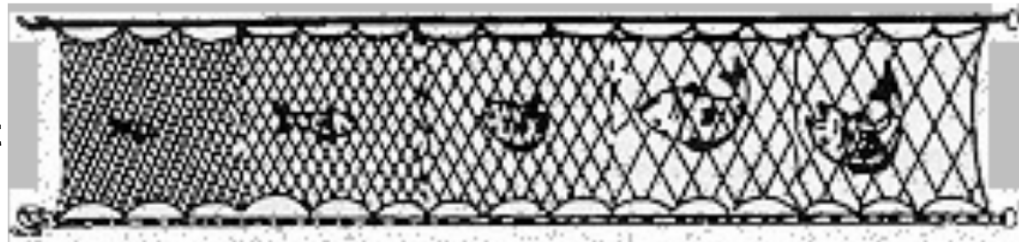
Year	GBS	Transverse Myelitis	Trauma	Other diagnoses (Please specify and attach list)	Unknown	Total cases discarded as non-polio	AFP
2015	117	4	0	174 (see list)	192	487	



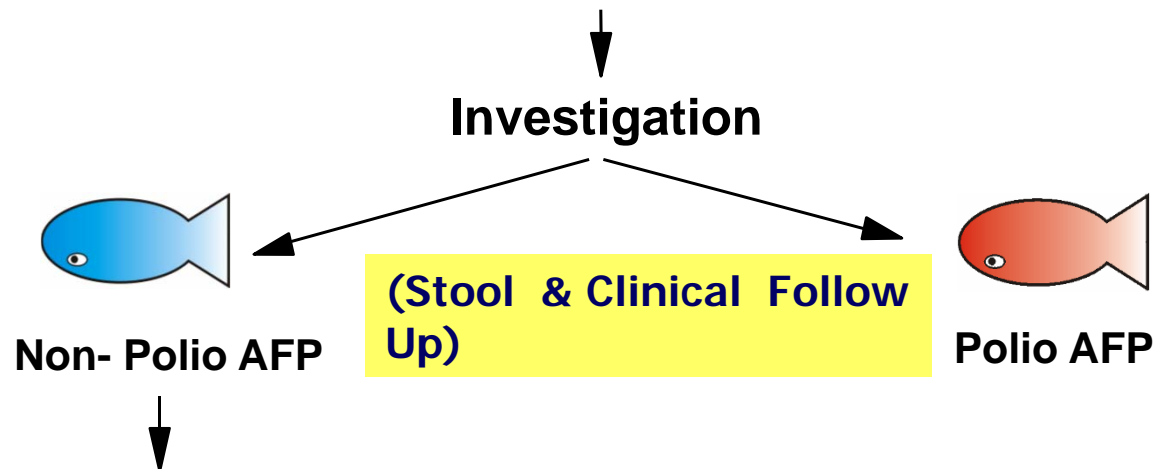
# The AFP Surveillance System



- Hospitals
- Sub-district Clinics



- Community Outreach Posts
- Traditional Healers



The minimum EXPECTED Non- Polio AFP rate is 4/100,000 <15yr



# AFP Surveillance

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- For the Polio Eradication program, crucial that AFP surveillance should not miss poliomyelitis cases
- Case definition has to catch as many cases as possible even those that are not polio:
  - High sensitivity
  - Low specificity
- All geographic areas to be covered, up to district
- All AFP cases investigated and polio excluded
- If we detect at least 4 cases of AFP per 100,000 under 15yr-olds, we are highly unlikely to miss a true Polio case if it occurs



# Major steps of AFP surveillance

- Case detection using the Standard AFP Case Definition;
- IMMEDIATE AFP Case Notification/reporting;
- Prompt Case Investigation, within 48 hours of notification;
- Collection of **TWO stool specimens, 24 to 48 hours apart in the first 14 days following the onset of paralysis**;
- Maintaining reverse cold chain with appropriate stool storage in the appropriate stool carriers;
- Perform virus isolation in a WHO-accredited laboratory
- Obtaining laboratory results and providing feedback to the program, family & community;
- Conducting 60 day Follow up; by clinicians/surveillance focal persons
- Obtaining Final classification by the NPEC according to WHO scheme ('confirmed polio', 'non-polio', 'polio-compatible')
- Providing epidemiologic situation report and sharing information

# AFP surveillance steps

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**DETECT:** Using Case Definition

**NOTIFY:** TELEPHONIC to District and Province (and get EPID number)

**EPID number eg: SOA\_KZP\_ETH\_15\_10**

**INVESTIGATE:** Correct Specimen & Case Investigation Form (CIF) completion



# SA ACUTE FLACCID PARALYSIS (AFP) CASE INVESTIGATION FORM (CIF)

(NB! All Dates dd-mm-yy. Use dark black ink & print legibly please)

Epid number: SOA - LPP -      -      -      Date Province Received CIF:     /    /      
(Will be assigned at Provincial Office) Country Prov Code District Code Year Onset Case number EPI (SA) Received CIF:     /    /      
 Surveillance Type (Active, Routine, Retrospective)     

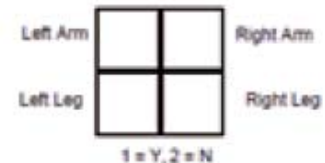
## IDENTIFICATION

Health District:      Province:      Nearest Health Facility to Patient home:       
 Surname & Name:      Father/Mother:      Cell No:       
 Address:      Town/City:       
 Date of Birth:     /    /     Age: years      months      Gender  M=Male  
(If DOB unknown / not entered) (Only if < 1 yr old) F=Female

## CLINICAL HISTORY

Site of Paralysis       
 Date Onset of Paralysis     /    /    

	1=Yes	2=No
Fever at onset of paralysis		
Flaccid & sudden paralysis		
Paralysis progressed <=3 days		
Asymmetrical		



Medical Diagnosis:     

VACCINATION HISTORY:  Exclude Birth dose      OPV/IPV doses Birth     /    /     1<sup>st</sup>     /    /      
00=unknown  
 2<sup>nd</sup>     /    /     3<sup>rd</sup>     /    /     4<sup>th</sup>     /    /     If >4, last OPV/IPV dose     /    /    

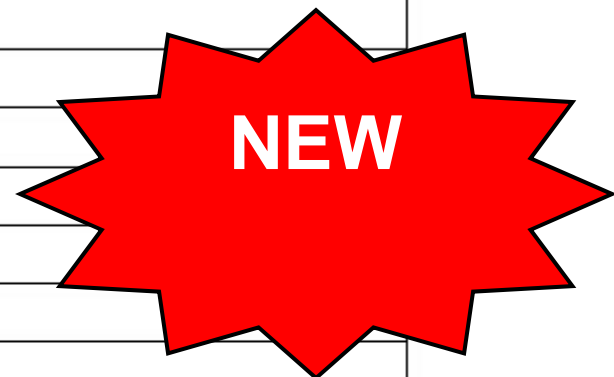
NOTIFICATION/INVESTIGATION Notified by:      Tel      Date Notified:     /    /     Date Case Investigated:     /    /    

HOSPITALIZATION Admitted to hospital:  1=Yes 2=No Date of Admission:     /    /      
 Medical Record No:      Facility Name:



**NEUROLOGICAL ASSESSMENT FORM FOR ALL ACUTE FLACCID PARALYSIS (AFP) CASES**

1	EPID number	SOA-- _____ -- _____ -- _____ -- _____ Country    Province    District    Year    Case number				
<b>IDENTIFICATION</b>						
2	Province					
3	District					
4	Name of AFP case					
5	Date of Birth					
6	Onset of paralysis					
<b>NEUROLOGICAL EXAMINATION</b>						
6	Glasgow Coma Scale	Eye Opening (5)				
		Verbal Response (5)				
		Motor Response (5)				
		<b>SCORE (15)</b>				
7	<b>Power (0-5)</b> 0 = No movement 1 = Flicker 2 = Gravity eliminated 3 = Against gravity 4 = Just below normal 5 = Normal for age	<b>Upper Limb</b>		<b>Lower Limb</b>		
		Right	Left	Right	Left	
8	<b>Tone</b> (Normal/Increased/decreased)	<b>Upper Limb</b>		<b>Lower Limb</b>		
		Right	Left	Right	Left	



# AFP surveillance steps

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- 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 surveillance: STOOL

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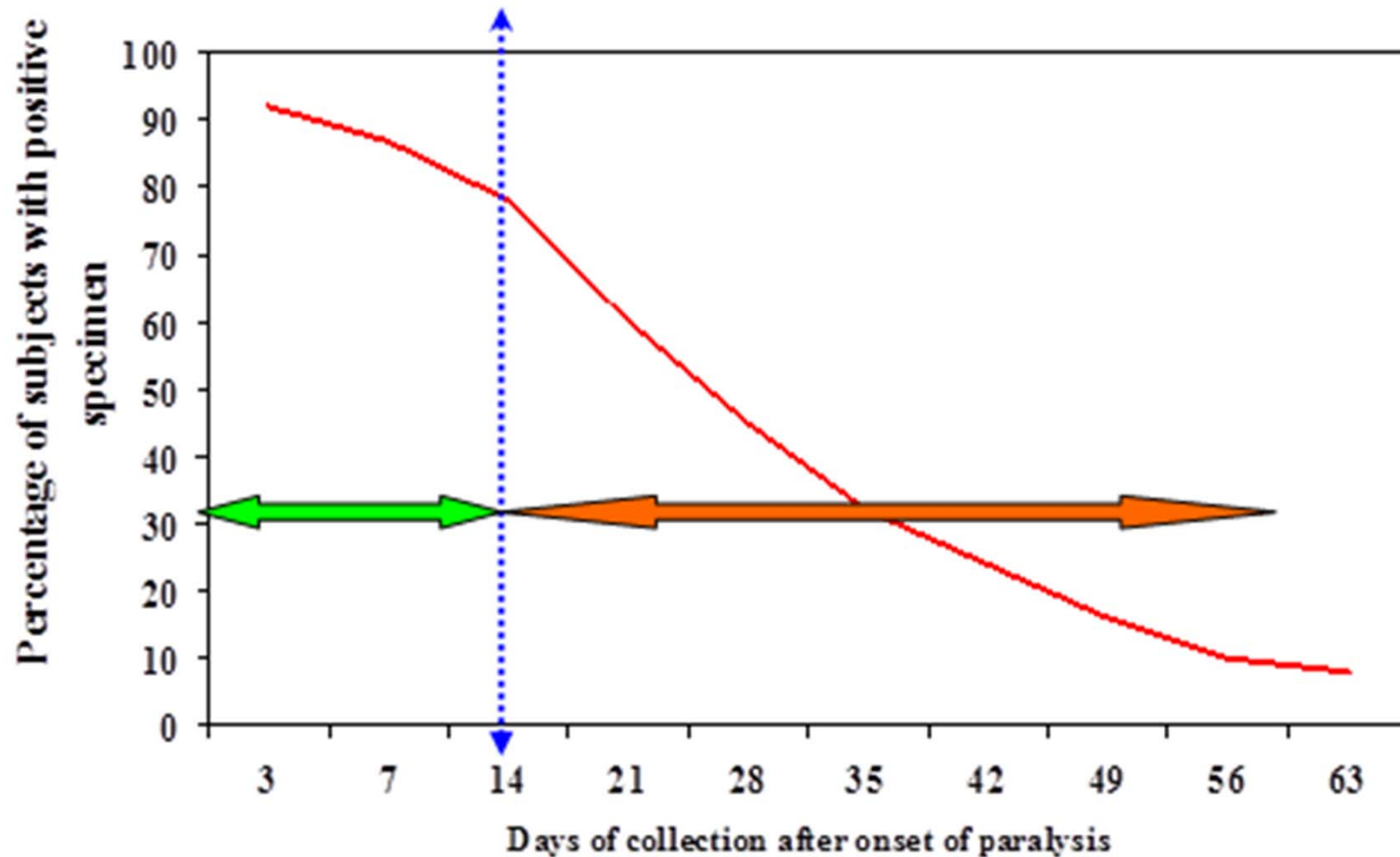
- Two stool specimens collected within 14 days since onset of paralysis and arriving at laboratory in \* «Good Condition ».
- “Good Condition” means that upon arrival: There is ice or a temperature indicator (showing  $< 8^{\circ}\text{C}$ ) in the container, the specimen volume is adequate ( $>8$  grams) there is no evidence of leakage or desiccation )







# Polio Virus shedding in stool



# AFP surveillance indicators

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- Total of 10+ indicators
- 2 categories:
  - AFP surveillance system (5)
  - Laboratory performance(5)



# AFP Performance indicators

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- Allow for objective assessment of performance against global targets
- Regular monitoring of indicators facilitates detection of sub-optimal performance for corrective actions
- AFP surveillance performance indicators should be monitored at all levels
- Depth of analysis depends on the level at which it is being conducted





# 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  $\leq$  48 hours of report *Target:  $\geq$  80%***

**4 2 stools collected at least 24 – 48 hours apart & within 14 days of paralysis onset – Target:  $\geq$  80%**

**5 Stool specimens arriving at the lab  $\leq$  3 days of being sent**

***Target:  $\geq$  80%***

**6 Stool specimens arriving at the laboratory *in "good condition"***

***Target:  $\geq$  80%***



# Other AFP Surveillance Indicators

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- 7.** Number of AFP cases investigated within 48 hours of detection. Target: least 80%
- 8.** Non-Polio Enterovirus (NPENT) detection rate. (Minimum Rate = 10%).
- 9.** Number of polio compatible cases reported. Classification of cases as compatible is an indication of sub-optimal quality of the surveillance system.
- 10.** Number of AFP cases pending final classification by the NPEC with onset of paralysis beyond 90 days.
  - Indication of the performance of the NPEC/Secretarial support to NPEC

# There are two main AFP surveillance indicators

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1. Non Polio-AFP detection rate
2. Stool adequacy rate

# Non- Polio AFP Detection Rate

- Indicates the ability of the AFP surveillance system to detect all AFP cases wherever they may present
- It is based on the population of children **below 15 years** in a district, province or country
- In calculating the NP-AFP detection rate, cases reported as
  - WPV,
  - Compatibles
  - and VDPVs'
- Are excluded from the numerator



# Non-Polio AFP Detection Rate

- Until June 2005, minimum AFP detection rate was 1 AFP case per 100,000 children below 15 years (1.0/100,000 < 15 years)
- After June 2005, minimum detection rate was set at 2 per 100,000 children less than 15 years (2.0/100,000)
  - To increase sensitivity
- **Now the detection rate recommended is 4/100,000 children below 15 years of age.**
  - To further increase sensitivity as we are getting closer to eradication.



# Non-polio AFP detection rate

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Number of reported **non-polio AFP cases** < 15 years X 100 000

total number of children < 15 years of age

- **Non-polio AFP cases** *are the discarded cases (non-polio AFP cases = Total AFP cases minus WPV cases, compatible cases, pending classification)*



# Examples

**Example 1:** Calculate non-polio AFP rate for a district with a population of 2,000,000 of <15 year children. The district has reported 45 non-polio AFP cases for the year.

- Non-polio AFP rate =  $\frac{45 \times 100,000}{2,000,000} = 2.25$

**Example 2:** Calculate non-polio AFP rate for a district with a population of 2,000,000 of <15 year children. The district has reported 15 non-polio AFP cases by week 31.

Non-polio AFP rate =  $\frac{15 \times 52 \times 100,000}{2,000,000 \times 31} = 1.26$

- This is called **annualized** Non Polio AFP rate and is calculated for a certain time period



# AFP Stool Adequacy Rate

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- 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.



<b>1<sup>st</sup> Appropriate Administrative Level (state, Province, etc)</b>	<b>Population aged &lt;15 yrs</b>	<b>Total 'non-polio' AFP cases reported &lt;15 yrs</b>	<b>Non-polio AFP rate*</b>	<b>Total AFP cases with 2 adequate stool samples</b>	<b>% AFP cases with adequate stool samples</b>
<b>Eastern Cape</b>	<b>2 170 461</b>	<b>84</b>	<b>3.9</b>	<b>65</b>	<b>76</b>
<b>Free State</b>	<b>748 211</b>	<b>19</b>	<b>2.6</b>	<b>15</b>	<b>79</b>
<b>Gauteng</b>	<b>3 024 680</b>	<b>99</b>	<b>3.3</b>	<b>72</b>	<b>70</b>
<b>KwaZulu-Natal</b>	<b>3 421 246</b>	<b>95</b>	<b>2.8</b>	<b>82</b>	<b>80</b>
<b>Limpopo</b>	<b>1 785 108</b>	<b>68</b>	<b>3.8</b>	<b>64</b>	<b>93</b>
<b>Mpumalanga</b>	<b>1 291 346</b>	<b>65</b>	<b>5.1</b>	<b>58</b>	<b>87</b>
<b>Northern Cape</b>	<b>346 705</b>	<b>7</b>	<b>2.0</b>	<b>4</b>	<b>57</b>
<b>North West</b>	<b>1 078 689</b>	<b>17</b>	<b>1.6</b>	<b>15</b>	<b>83</b>
<b>Western Cape</b>	<b>1 586 793</b>	<b>33</b>	<b>2.1</b>	<b>24</b>	<b>71</b>
<b>RSA</b>	<b>15 452 879</b>	<b>487</b>	<b>3.2</b>	<b>399</b>	<b>79</b>





	Population Under 15	Cases in Database	No. AFP cases	Annualised Non-polio AFP rate*	AFP cases with 2 stools within 14 days of onset*		CLASSIFICATION STATUS					Inadequate stools	NF >3	
					(n)	%	Confirmed	VDPV	Discarded	Unclassified	Denotified			>90 days
Botswana	698,033	0	0	0.0	0	#DIV/0!	0	0	0	0	0	0	0	
Comores	327,272	0	0	0.0	0	#DIV/0!	0	0	0	0	0	0	0	
Eritrea	1,724,347	0	0	0.0	0	#DIV/0!	0	0	0	0	0	0	0	
Ethiopia	39,687,455	127	127	2.1	116	91%	0	0	77	50	0	0	11	
Kenya	17,610,058	49	49	1.8	41	84%	0	0	0	49	0	0	8	
Lesotho	688,899	0	0	0.0	0	#DIV/0!	0	0	0	0	0	0	0	
Madagascar	10,583,643	19	19	1.2	18	95%	0	0	0	19	0	0	1	
Malawi	7,324,653	7	7	0.6	4	57%	0	0	0	7	0	0	3	
Mauritius	261,003	1	1	2.5	1	100%	0	0	0	1	0	0	0	
Mozambique	11,268,865	20	20	1.2	18	90%	0	0	1	19	0	0	2	
Namibia	855,253	4	4	3.1	4	100%	0	0	3	1	0	0	0	
Rwanda	5,045,746	14	14	1.8	14	100%	0	0	5	9	0	0	0	
South Sudan	7,779,166	23	23	2.0	18	78%	0	0	2	21	0	0	5	
Seychelles	22,802	0	0	0.0	0	#DIV/0!	0	0	0	0	0	0	0	
South Africa	15,452,879	20	20	0.9	15	75%	0	0	13	7	0	0	0	
Swaziland	429,705	4	4	6.2	3	75%	0	0	0	4	0	0	1	
Tanzania	22,498,109	31	31	0.9	25	81%	0	0	0	31	0	0	6	
Uganda	17,760,127	82	82	3.1	79	96%	0	0	54	28	0	0	3	
Zambia	6,311,676	17	17	1.8	16	94%	0	0	12	5	0	0	1	
Zimbabwe	6,008,098	19	19	2.1	18	95%	0	0	0	19	0	0	1	
<b>Block Total</b>	<b>172,337,79</b>	<b>0</b>	<b>437</b>	<b>437</b>	<b>1.7</b>	<b>390</b>	<b>89%</b>	<b>0</b>	<b>0</b>	<b>167</b>	<b>270</b>	<b>0</b>	<b>0</b>	<b>42</b>

# Interpretation of AFP surveillance indicators

- Annualized AFP detection rate less than 4/100,000:
  - Active surveillance is sub-optimal
  - Possibility of missed cases;
  - All components of the network may not be involved in surveillance;
  - Weak capacity for surveillance, especially at Health Facility and Community level



# Interpretation of AFP surveillance indicators

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- **AFP stool adequacy rate less than 80%:**
  - Late detection of AFP cases (parents and communities not aware of system);
  - Delay in investigating cases (health workers not involved, inadequate active surveillance),
  - Inadequate logistics (stock-out of kits, carrier boxes, transport, etc);
  - Difficult access to investigate cases
  - Inappropriate reference of cases to higher levels without prior investigation



# General recommended actions

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- Involve all sites (private, community)
- Ensure prioritization of surveillance sites
  - Priority 1 visit at least once a week
  - Priority 2 at least once every 2 weeks
  - Priority 3 at least once a month
- Monitor frequency of active surveillance visits; **DOCUMENTED EVIDENCE**
- Improve capacity for AFP surveillance at all levels
  - Training and Re-training of Staff
  - Sensitization of Clinicians and Communities
- Ensure availability of logistics and funds for active surveillance



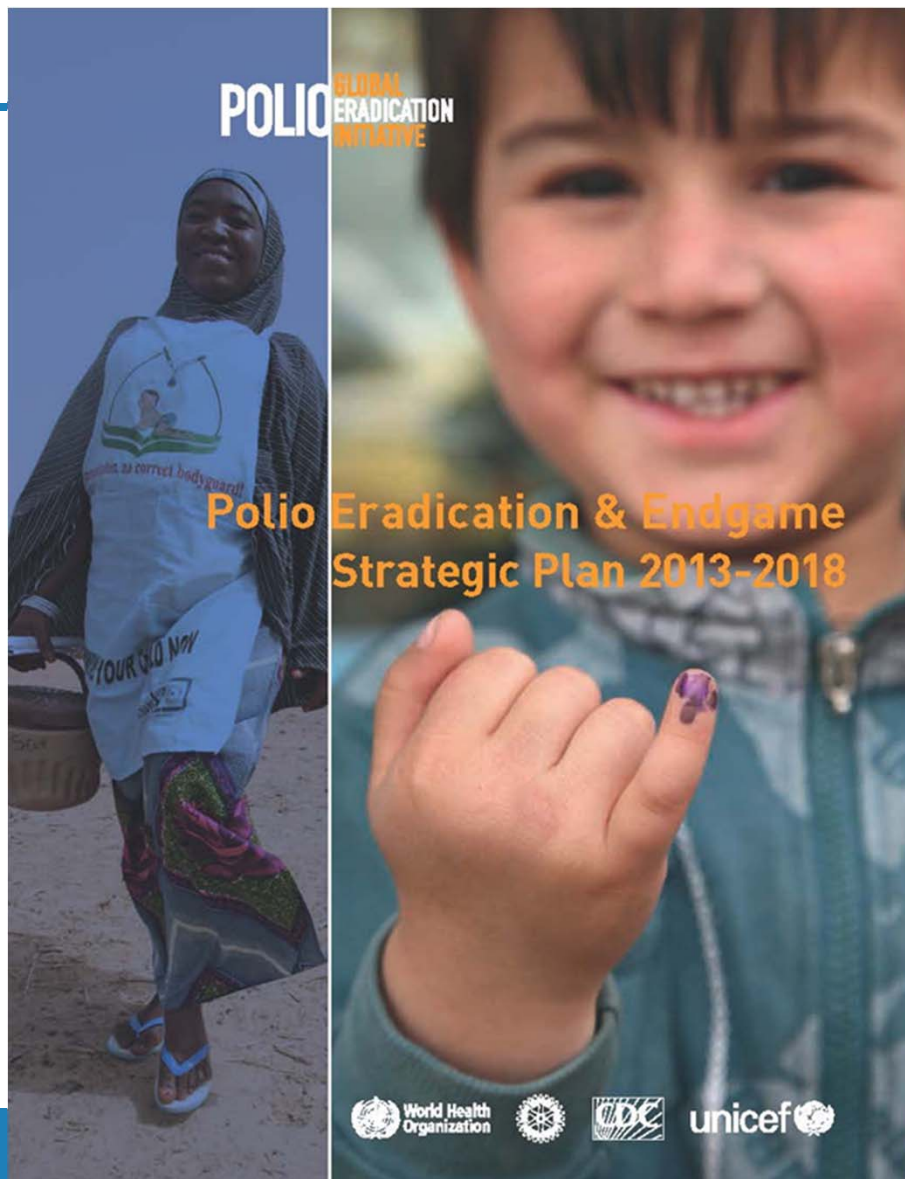
# What is the role of clinicians?

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- CASE DETECTION
- CASE NOTIFICATION
- FOLLOW-UP OF SUSPECTED AFP CASES
- PROVISION OF INFORMATION IF REQUESTED
- EDUCATE OTHERS

**BE INVOLVED!**





## 4 Objectives

1. Poliovirus detection and interruption
2. Immunization systems strengthening and OPV withdrawal
3. Containment and certification
4. Legacy planning

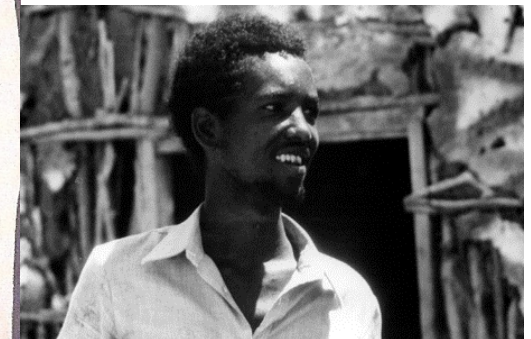
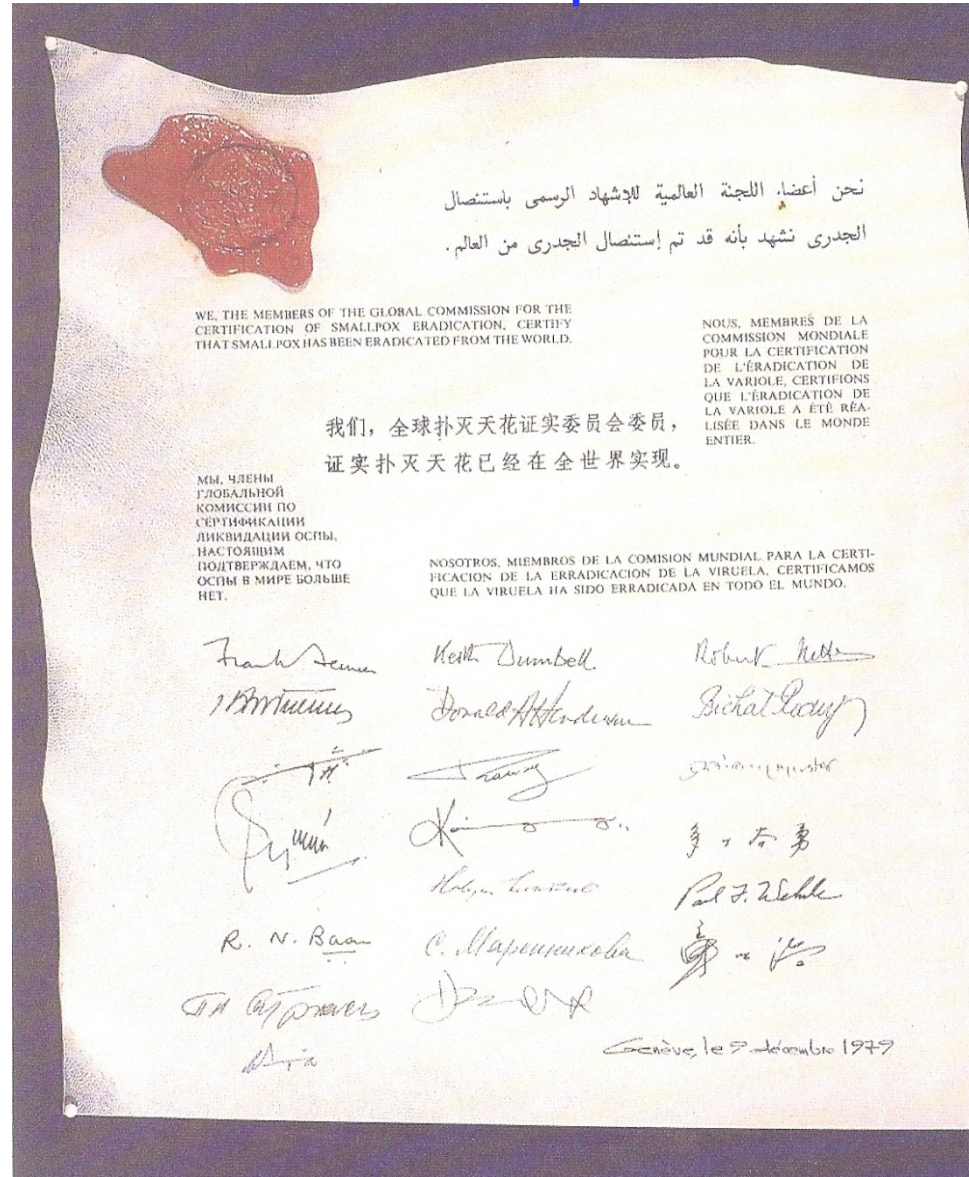




# Certificate of small pox eradication in 1979

Nous, membres de la commission mondiale de la certification de l'éradication de la variole, certifions que l'éradication de la variole a été réalisée dans le monde entier.

Genève, déc. 1979







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# THANK YOU



# Acknowledgements

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- WHO/IST
  
- WHO/AFRO



# Acknowledgements

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- WHO IST/ESA
- Dr Balcha Masresha



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# Thank you



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# CASE DEFINITIONS



# NNT case definition

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New-born with history of normal sucking for first 2 days,

Onset of illness usually between 3 and 10 days after birth,

Inability to suck followed by stiffness, hyper-extended neck / body position and convulsions, often death.



# Suspected measles case

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Any person with fever **and** maculopapular rash (i.e. non-vesicular)

**and** (any one of the 3 Cs) cough, coryza (i.e. runny nose) or conjunctivitis (i.e. red eyes)'

**OR**

Any person in whom a clinician suspects measles infection.