

# Outbreak Response SOPs

## Technical Companion Document

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Version 5 2026



# Contents

- Number of breakthrough rounds
- New definitions and categories
  - Outbreaks
  - Persistent & chronic outbreaks
  - Consequential geographies
- Expansion of toolkit – alignment with SAGE
  - IPV recommendations
  - nOPV2 + bOPV coadministration
  - Expanded nOPV2 use

# Number of breakthrough rounds

# Breakthrough rounds:

Tracking breakthrough after each round to ensure all viruses are covered by at least two SIAs

## Context

- 285/486 (59%) round 2 or higher SIAs have had breakthrough transmission 2016-Present
  - cVDPV1 = 46.5% of SIAs
  - cVDPV2 = 60.6% of SIAs
  - cVDPV3 = 0% of SIAs
- Outbreak SOPs were updated to assess breakthrough after each round.
- SOPs now require that all viruses are covered by two rounds

## Data

Observational data of nOPV2 use in outbreak response

nOPV2	Baseline	1 SIA	2 SIA
<a href="#">Tajikistan</a> seropositivity	26% (20-30%)	77% (70-82%)	83% (77-88%)
<a href="#">Gambia</a> seropositivity	67% (62-71%)	88% (85-91%)	97% (94-98)
<a href="#">Liberia</a> seropositivity	NA	NA	42% (37-48%)
Kenya unpublished Immune Response	NA	43% (38-47%)	62% (57-66%)

## Key Takeaways

- Observational data of nOPV2 use in outbreak response showed varied results due to differences in population immunity at the start of the outbreak, outbreak response implementation,
- Requiring all breakthrough viruses to be covered by two rounds ensures sufficient opportunities to raise population immunity above herd immunity thresholds required to stop transmission

**Remaining Research Needs:** Additional analyses will be needed to assess the impact of the change from 1 to 2 SIAs required after breakthrough detections

# New definitions & categories: outbreaks

# Definition of an outbreak

Version 5 SOP updates the outbreak definition to be serotype specific and time bound

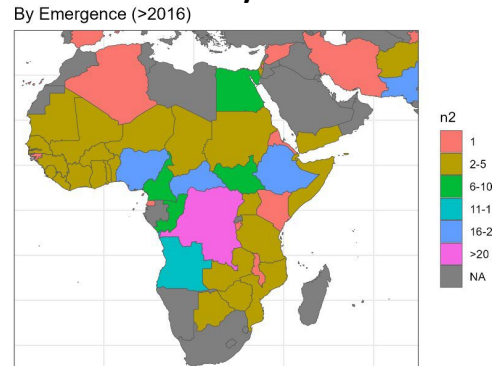
## Context

The new definition is anchored on serotype instead of emergence group

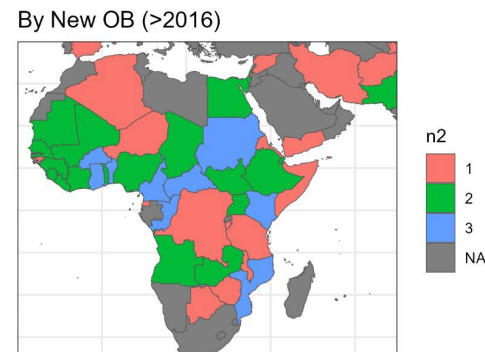
Definition is time bound: Detection of WPV or cVDPV with evidence of local transmission in a country previously **type-specific** free for  $\geq 12$  months

## Data

### Number Outbreaks by Old Definition



### Number Outbreaks by New Definition



## Key Takeaways

-New outbreak definition drops the total number of outbreaks from 266 to 124 since 2016

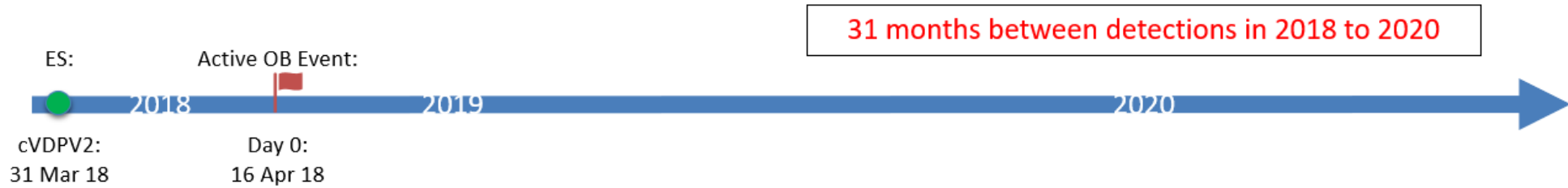
-New outbreak definition especially simplifies the number of outbreaks in Nigeria and DRC

# Example

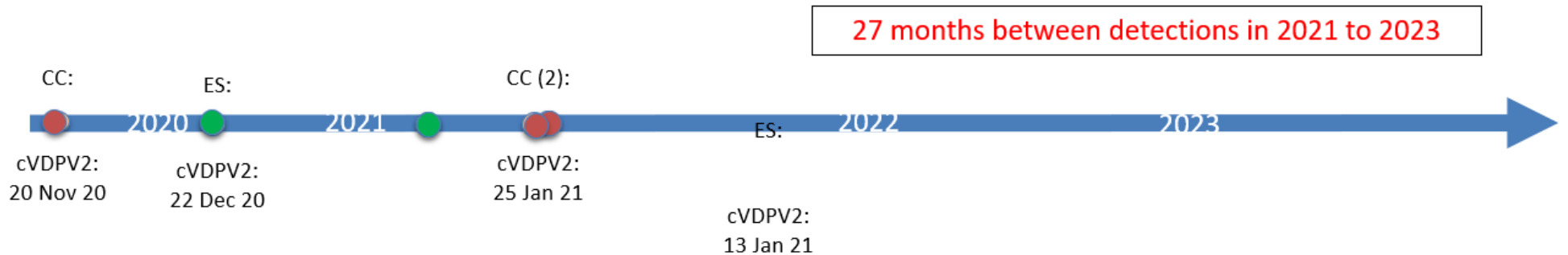
## Kenya's cVDPV2 Outbreak:

- AFP: Acute Flaccid Paralysis detection
- CC: Community detection / Close Contact
- ES: Environmental surveillance detection

cVDPV2 Event #1



cVDPV2 Outbreak #2



cVDPV2 Outbreak #3



Since 2018, Kenya has had multiple importations of SOM-BAN-1 linked back to Somalia that has seeded outbreaks.

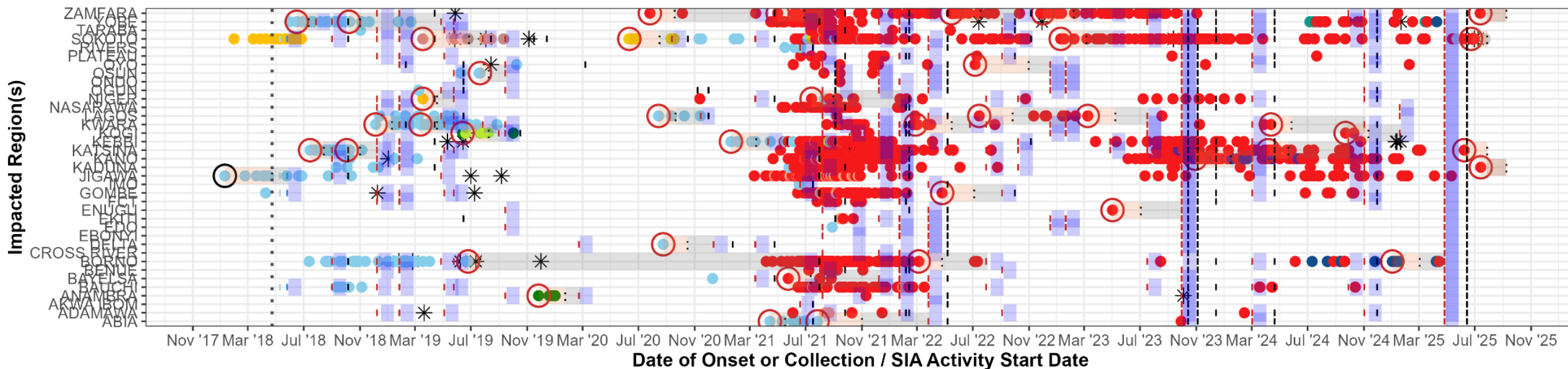
**Under the Version 5 SOP these are THREE different outbreaks**

# Example

Nigeria now has 1 outbreak instead of 17 separate outbreaks for each cVDPV2 emergence

## Nigeria: cVDPV2 Outbreak (NIE-cVDPV2-2)

Status: active



Circles represent detections that trigger initial outbreak or expanded outbreak responses  
 Orange shading indicates time from onset/collection to day 0 of expanded response  
 Grey shading indicates time from day 0 to the start date of an SIA response  
 Blue shading indicates 28-day post SIA washout period  
 Produced by: CDC-CGH-GID-PEB. Source: POLIS (Data as of 2025-09-17)

# New definitions & categories: persistent & chronic outbreaks

# Persistent Outbreaks

## Creation of new outbreak categories

### Context

Since 2016, 57/123 of outbreaks lasted more than 180 days

- Outbreaks closed after >180 and <365 days had 2-16 SIAs completed

Since 2016, 34/123 of outbreaks lasted more than 365 days

- Outbreaks *closed* after >365 days took 2-19 SIAs to be closed
- Outbreaks *with ongoing transmission* >365 days have completed 2-69 SIAs

### Data

#### New Definitions

**Persistent Outbreak:** Outbreaks with continued transmission for >180 days (day zero to last detection)

**Chronic Outbreak:** Outbreaks with continued transmission for >365 days (day zero to last detection)

### Key Takeaways

-Persistent outbreaks require additional SIAs and potentially non-SIA interventions to stop transmission

-Understanding the reasons why outbreak responses fail to stop transmission is key

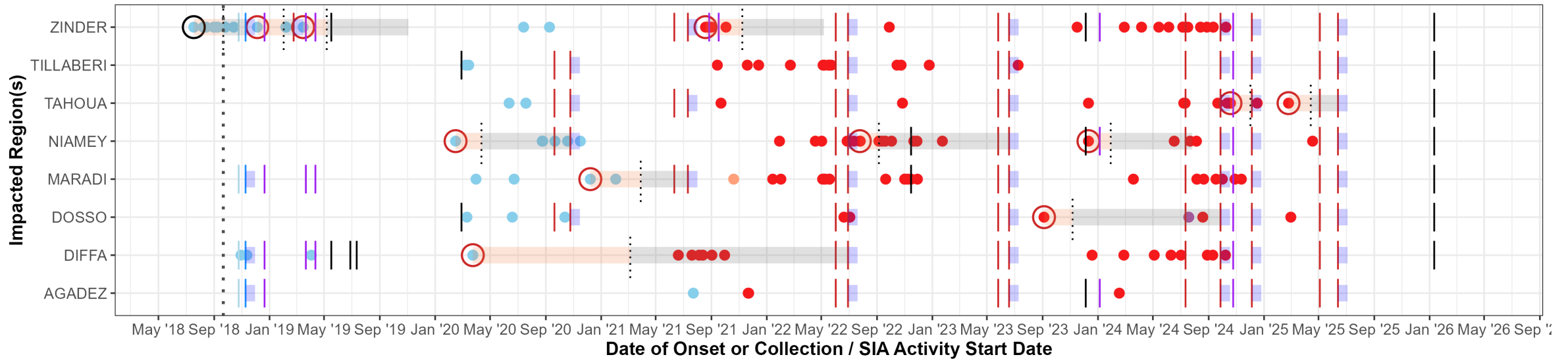
**Remaining Research Needs:** non-SIA interventions will need to be piloted and assessed for effectiveness of stopping persistent outbreaks

# Example of a chronic outbreak

## Niger cVDPV2

### Niger: cVDPV2 Outbreak (NIG-cVDPV2-1)

Status: active



- |                   |                            |                            |             |
|-------------------|----------------------------|----------------------------|-------------|
| <b>Detection:</b> | <b>Emergence Group(s):</b> | <b>OBX/Event Response:</b> | <b>SIA:</b> |
| ● cVDPV2          | ● NIE-JIS-1                | ○ Expanded                 | — Rd1       |
|                   | ● NIE-SOS-7                | ○ Initial                  | — Rd2       |
|                   | ● NIE-ZAS-1                |                            | — prev_sia  |
|                   | ● NIG-DOS-1                |                            |             |

Circles represent detections that trigger initial outbreak or expanded outbreak responses.  
 Orange shading indicates time from onset/collection to day 0 of expanded response.  
 Grey shading indicates time from day 0 to the start date of an SIA response.  
 Blue shading indicates 28-day post SIA washout period.  
 Produced by: CDC-CGH-GID-PEB. Source: POLIS (Data as of 2026-03-18)

# New definitions & categories: consequential geographies

# Consequential Geographies:

Some outbreaks are more “consequential” for the global program because they prolifically export virus and/or generate many new emergences and/or have a high paralytic burden

## Context

**Consequential Geographies** are a subset of countries with a chronic (>12 month) outbreak (breakthrough after multiple responses ) **AND** at least one of the following:

1. Generation of multiple (>=3) new serotype specific emergences of cVDPV (i.e. the emergence was first detected within the country)
2. Multiple exportations (n >=10) to other countries defined by the nearest neighbor data
3. Paralytic burden (>=100) paralytic cases detected during the outbreak

Responses - consider an Epi Block approach to ensure transmission is stopped and immunity is sustained across the entire block

## Data

Assessing Consequential Geography status of all active outbreak countries with outbreaks >2 years old

Country	Emergences	Cases	Exportations	OBX length	SIAs
Angola	12	29	4	2.14	9
Tanzania	2	2	0	2.69	2
DRC (cVDPV2)	31	753	10	8.82	59
DRC (cVDPV1)	4	266	1	3.52	18
Algeria	1	4	0	3.69	8
Cote D'Ivoire	2	7	0	4.04	9
Chad	2	169	8	4.13	15
Yemen	3	441	3	4.32	8
Cameroon	3	9	0	4.4	16
Niger	4	77	2	7.49	30
Nigeria	19	787	29	7.91	73
Somalia	4	48	4	8.1	35

Nigeria and DRC meet all three indicators

## Key Takeaways

-Consequential Geographies are unable to interrupt transmission within the geography despite numerous SIA (e.g. 73 SIAs in Nigeria over almost 8 years for an average of ~9 per year)

-Additional non-SIA approaches should be considered including expanded use of nOPV2

-Consequential Geographies require an Epi block approach to address the exportation of virus to neighboring countries (e.g. Nigeria exports to West Africa and the Lake Chad Basin countries)

# Alignment with SAGE: IPV recommendations

# IPV recommendations

SAGE recommendations:  
[2023](#), [2024](#)

## Inclusion of IPV in outbreak response rounds in OPV-using countries

### Context

[Systematic review](#) of seroconversion studies<sup>†</sup>

[RCT](#) of outbreak response in Pakistan

[Case control analysis](#) of non-polio AFP data in Nigeria estimating per-dose effectiveness

RCTs in India in children aged A) [1-4 years](#), and B) [6m to 10 years](#) in children previously immunized with OPV. [Review](#).

<sup>†</sup>see slide 20 for update

### Data

Two full IPV doses given to infants seroconverts >79% infants against all 3 serotypes and seroconversion increases with age

OPV2+IPV resulted in ≥98% seroconversion, compared to 48% - 76% for children receiving either tOPV or mOPV2 without IPV.

In Nigeria nOPV2 & mOPV2 per dose effectiveness in children <60m estimated to be <20% (12-29%) against poliomyelitis whilst one dose of IPV was 43% (23-58%)

Children randomized to either receive one IPV dose, one bOPV dose, or no vaccine.

- A) A lower proportion (12%, 8%) of IPV recipients shed Sabin viruses (types 1, 3) than those receiving no vaccine (19, 26%).
- B) Similar results and the reduction in shedding was greatest at 10 years of age and was significantly greater in IPV than OPV recipients

### Key Takeaways

-IPV elicits excellent humoral protection against paralysis

-Immunogenicity is not reduced by malnutrition or co-circulating enteroviruses to the same extent as OPV

-IPV provides a strong boost to intestinal mucosal immunity in children previously vaccinated with OPV (boosting stronger with IPV in older children than OPV)

# IPV recommendations

## Inclusion of IPV in outbreak response rounds in OPV-using countries

SAGE recommendations:  
[2023](#), [2024](#)

### Context

Interrupted time series analysis of AFP and ES data 90 days before and 90 days after campaigns (ref [1](#), [2](#)) 2014- 2018

[Modelling study](#) estimating type-2 population immunity from IPV in RI combining estimates of seroconversion with age and country-specific declines of RI coverage with age (see slide 25)

[Simulations](#) from a global mathematical model of cVDPV2 transmission

[Statistical analysis](#) of cVDPV2 emergence groups reported in Africa between 2016-2020 (slide 26)

### Data

	AFP Incidence Rate Ratio (95%CI)		ES Prevalence Ratio (90%CI)	
	IPV+OPV	tOPV	IPV+OPV	bOPV
Nigeria	0.17 [0.04 – 0.78]	0.59 [0.18 – 1.97]	0.16 [0.02–1.33]	0.45 [0.21– 0.95]
Pakistan	0.62 [0.23–1.14]	0.79 [0.64 – 0.98]	0.63 [0.47–0.81]	0.92 [0.83–1.00]

Estimated median serotype 2 population immunity in 2025 among children under five years of age is at 61% (IQR: 52%, 72%), rising to 71% (IQR: 57%, 80%) in 2031, with 8 countries having immunity <50%

Model predicts delaying outbreak response can considerably increase total case numbers

Poliomyelitis incidence increased 12% per week (95% CrI 5-21%) during the interval of index case paralysis onset and first mOPV2 outbreak response campaign.

### Key Takeaways

-Campaigns of IPV alongside OPV substantially reduced the incidence and prevalence of poliomyelitis compared to OPV-only campaigns

-Although  $\geq 2$  IPV should be delivered through RI, IPV immunity gaps persist in some geographies

-Inclusion of IPV must only occur if it does not delay OPV response

# IPV recommendations

## Inclusion of IPV in outbreak response rounds in OPV-using countries

### Context

Review of outbreak response with IPV only in OPV-using countries after the tOPV-bOPV Switch in specific contexts.

### Data

During the 2019 cVDPV2 outbreak in [China](#), two campaigns with Sabin IPV were conducted in the affected prefecture and the neighbouring population targeting children aged 2m to 5 yrs; 58% of the children were born before 2016, so had been eligible to receive tOPV during routine immunisation, meaning intestinal immunity might have been boosted by IPV administration.

In late 2021, in [Ukraine](#), there were two cases of AFP and several contact and ES detections. The outbreak response included a nationwide accelerated catch-up campaign with IPV for underimmunised children aged 6 months to 6 years, but full implementation was delayed until September 2022, due to the active conflict in the country. No new cVDPV2 detections followed the response.

Fractional IPV was also used in response to VDPV2 event (detection of VDPV2 from an environmental sample in May 2016) in [Telangana state](#) in India. Children 6w-3yrs were targeted and tOPV-induced mucosal immunity would have been boosted. No more detections occurred subsequently.

### Key Takeaways

-In a minority of historic specific contexts, IPV has been used in outbreak response, largely through boosting OPV-induced mucosal immunity.

# IPV recommendations

## Inclusion of IPV in outbreak response rounds in OPV-using countries

SAGE recommendations: 2024

### Context

RCT in Cuba infants of intramuscular (im) vs intradermally (id) administered fIPV to 196 children at 4 and 8 months of age

RCT in Bangladesh infants 4 arms, comparing full dose and fractional IPV (id)

Meta-analysis and systematic review of fractional versus standard dose IPV (based on 10 studies)

### Data

Seroconversion with fIPV im was noninferior to fIPV id for all poliovirus serotypes

Seroconversion after two doses of fIPV administered at 6,14 weeks was significantly higher at 22 weeks than infants receive full dose IPV at 14 weeks for all three poliovirus types. For children administered a full IPV dose at 14 weeks, an fIPV booster given at 22 weeks was non-inferior to a full dose IPV booster at 22 weeks for all poliovirus types (measured at 26 weeks of age).

For poliovirus type 2, there were no significant differences in the proportions of seroconversions between fractional and full doses of IPV for two or three doses: the risk ratio for seroconversion at one dose was 0.61 (95% CI 0.51–0.72), at two doses was 0.90 (0.82–1.00), and at three doses was 0.95 (0.91–1.00).

### Key Takeaways

-IPV can be administered as a full dose intramuscularly using needle and syringe, a fractional dose (fIPV) intramuscularly with needle and syringe or intradermally with either needle and syringe or with needle-free jet injector

-GPEI summary for fIPV in SIAs

# IPV recommendations

## IPV for outbreak response rounds in IPV-only using countries

SAGE recommendations: 2022

### Context

Literature review of previous programmatic experience of poliovirus outbreak response with IPV

Phase 4 non-randomized clinical trial in Nepal

Retrospective cohort study in Italy in 123 young adults

### Data

See slide 27. Poliovirus transmission in IPV-only using countries was stopped solely through the use IPV in 11/15 countries. In these settings transmission was largely within unvaccinated communities. Transmission was more widespread in the other 4 countries that used OPV to stop transmission.

Children aged 7-12months receiving their first dose of IPV seroconverted (223/234) 30 days after one IPV dose. Children aged >2 yrs previously vaccinated with IPV had persistence of poliovirus type 2 humoral immunity 28 months after receiving a booster IPV dose (233/234 children)

Evidence of duration of humoral protective antibodies against all three poliovirus types for at least 18 years after four doses of IPV (3 primary doses +1 booster dose)

### Key Takeaways

IPV may be used in the vaccination response if there is a high level of sanitation and hygiene in the country and if the outbreak is defined within a limited scope. If transmission persists or increases in spread, a shift to using OPV will be warranted

One IPV dose provides a life-time booster and high seroconversion in unvaccinated children.

**Alignment with SAGE:  
nOPV2 + bOPV in outbreak response to  
co-circulation of serotypes 2 and 1/3**

# nOPV2 + bOPV recommendations

SAGE recommendations: [Mar 2023](#), [Sep 2023](#), [Sep 2024](#)

Safety and efficacy of co-administration

Safety and efficacy of sequential administration

## Context

[RCT](#) in Bangladesh<sup>[1]</sup>, doses at 6, 10, 14 weeks:

- nOPV2 only
- nOPV2/bOPV (i.e., co-administration)
- bOPV only

RCT in Bangladesh<sup>[2]\*</sup>, doses at 6, 10, 14 weeks:

- 3 nOPV2/bOPV + IPV
- 2 nOPV2/bOPV, IPV
- 2 nOPV2, IPV
- bOPV, nOPV2, IPV

## Data

No serious adverse events were attributed to vaccination

Cumulative immune response rates (at 14 weeks)

Serotypes	nOPV2 only	nOPV2 + bOPV	bOPV only
Type 1	4%	92%	93%
Type 2	86%	65%	2%
Type 3	2%	88%	86%

Seroconversion rates (after 1 dose)

Serotypes	1 bOPV/nOPV2	1 bOPV, 1 nOPV2	1 nOPV2
Type 1	84%	84%	2%
Type 2	39%	69%	75%
Type 3	68%	74%	1%

## Key Takeaways

Safe to co-administer nOPV2 and bOPV

Co-administration of nOPV2 and bOPV interferes with immunogenicity for type 2, but not for types 1 and 3

- Benefits of co-administration need to be weighted against the reduced type 2 immunogenicity

Separation of bOPV and nOPV2 by 4 weeks overcomes interference for type 2 immunogenicity

\*Unpublished work – results shared with PRAG

# nOPV2 + bOPV recommendations

Adding IPV to the last co-administration closes immunity gaps of type 2  
 Co-administration vs. sequential administration

## Context

RCT in Bangladesh<sup>[2]\*</sup>, doses at 6, 10, 14 weeks:

- 3 nOPV2/bOPV + IPV
- 2 nOPV2/bOPV, IPV
- 2 nOPV2, IPV
- bOPV, nOPV2, IPV

[Modeling analysis](#) of co-administration vs. sequential administration in hypothetical population experiencing cVDPV1 and cVDPV2 outbreaks<sup>[3]</sup>

## Data

Seroconversion rates for serotype 2 (at 14 and 18 weeks)

Time	2 nOPV2, IPV	2 bOPV/nOPV2, IPV
14 weeks (pre-IPV)	90%	72%
18 weeks (post-IPV)	100%	93%

Seroconversion rates (at 18 weeks)

- $\geq 90\%$  for all serotypes following 2 bOPV/nOPV2, IPV
- $\geq 95\%$  for all serotypes following 3 bOPV/nOPV2 + IPV

- Co-administration achieved the smallest cVDPV case burden of both types, but with high oSIA costs
- Responding to only one serotype while delaying response to the other until the first was eliminated resulted in the highest case burden for both types

## Key Takeaways

IPV reduces the type 2 immunity gap created by co-administration, but still significant differences after 2 doses

IPV added to the 3<sup>rd</sup> co-administration of nOPV2 and bOPV achieves high seroconversion for all serotypes

- At least 3 doses of bOPV/nOPV2 co-administration plus 1 IPV in OBR for co-circulation

Prioritize co-administration of bOPV and nOPV2

Use sequential administration when co-administration is not feasible

\*Unpublished work – results shared with PRAG

# nOPV2 + bOPV recommendations

## Intervals between consecutive nOPV2 administrations

SAGE recommendations: [Mar 2023](#), [Sep 2023](#), [Sep 2024](#)

### Context

[RCT](#) in the Dominican Republic<sup>[4]</sup>, 2 nOPV doses with:

- 1-week interval
- 2-week interval
- 4-week interval

[Modeling analysis](#) of risk factors for cVDPV2 emergences in Africa caused by OPV2 campaigns<sup>[5]\*</sup>

\*Unpublished work – results shared with PRAG

### Data

Seroconversion rates for serotype 2 (4 weeks after 2 doses)

1-week interval	2-week interval	4-week interval
87.5%	91.8%	95.5%

Non-inferiority shown for 2-week interval, but not for 1-week interval, compared with 4-week interval

No severe or serious adverse events were associated to tested nOPV2 vaccination schedules

Singleton campaigns, defined as SIAs conducted more than 8 weeks apart from another campaign in the same geography, were estimated to be significantly 2.4 times more likely to lead to a new cVDPV2 emergence than campaigns that had at least one additional round within 8 weeks.

### Key Takeaways

nOPV2 outbreak response schedules with an over 1-week interval can be used to hasten protection

The interval between consecutive nOPV2 rounds can be as small as 1 week but no larger than 8 weeks

### Remaining Research Needs

- Field data on co-administration
- Modeling evaluation on co-administration followed by IPV (e.g., how many rounds? what coverage? cost-effectiveness of adding IPV?)

# Alignment with SAGE: Expanded nOPV2 use

# Expanded nOPV2 Use

Operational adaptation endorsed by SAGE to address persistent cVDPV2 transmission in targeted high-risk settings.

## Context

While short-duration SIAs remain the primary approach to rapidly and effectively stop cVDPV2, certain high-risk settings with persistent transmission may benefit particularly from nOPV2 expanded use beyond SIAs.

Endorsed by SAGE following September 2025 meeting.

## Data

Modeling indicates additive benefit of layering expanded use of nOPV2 as complementary approach to SIAs.



Expanded use strategies include:

- In-Between Round Activities (IBRAs)
- Transit point vaccination
- Periodic Intensification of Routine Immunization (PIRI)
- Opportunistic use (under consideration)

## Key Takeaways

nOPV2 can be used in SIA and non-SIA strategies to interrupt persistent transmission

Expanded use refers to deployment beyond short-duration SIAs, while remaining within the outbreak response framework.

**Further work:** Given diversity and novelty of expanded use approaches, monitoring and evaluation of implementation is critical.