

The Novel Oral Poliovirus type 2 (nOPV2) vaccine accountability Monitoring in Ghana



INTRODUCTION

Much has been accomplished in the fight against polio, making the goal of eradication within reach. Achievements are the result of the Global Polio Eradication Initiative (GPEI), integrating immunization, international partnership, surveillance, social mobilization and catch-up activities. However, the emergence of vaccine-derived polio cases is compromising the prospects of immediate reach of the goals. The occurrence of these cases is linked to many factors combined with lack of optimal management of live vaccines supplied during vaccination campaigns. The challenge of accountability in relation to nOPV2 vaccine is to prevent live attenuated vaccine-derived viruses from finding their way into the environment as sources of contamination.

Since the inception of the GPEI, Ghana has continuously improved levels of polio immunization coverage, with both administrative and WHO/UNICEF Estimates above 90% for the last five years. As a result of this effort, in the country, wild poliovirus type 2 has not been detected since 1999 and was declared eradicated in 2015. Then, after cases of circulating vaccine-derived poliovirus type 2 (cVDPV2) in 2019, Ghana reported in 2020 up to 12 cases of cVDPV2. The advent of cases of

cVDPV2 is a sign of a decline in polio immunization coverage, and a presence of spots or cohorts of naïve and under-immunized children.

Ghana was still classified by the International Health Regulations (IHR) as a state infected with cVDPV2, with potential risk of international spreadⁱ. In 2022, the country was certified to use the novel nOPV2 vaccine and the first nOPV2 vaccine campaigns started in August 2022ⁱⁱ. Before nOPV2, prior to the introduction of vaccine accountability, vaccines handling, vaccine distribution and wastage management were not optimal. No tool was there for giving information on handling of vaccines. The number of the vials of vaccine before and after campaigns was not a serious issue. From the different levels of workers, there was little to discuss or justify as to what was provided and what could be traced and reported.

The introduction of nOPV2 is an advanced step in polio prevention effort that requires the application of new precautions for monitoring activities and traceability of remaining vials during and after vaccination campaigns. The process through which this precaution is organized is the vaccine accountability management, done using specific tools and procedures. After the first nOPV2 campaign in August, a second round of nOPV2 vaccine campaign was organized from 6th to 10th of October 2022. Up to 7,675,915 children under 5 years were vaccinated with 8,158,550 doses of nOPV2 vaccines, achieving a coverage of 111.5%. A strong process of accountability management was implemented during this campaign.

PROGRAMME PLANNING AND IMPLEMENTATION

ACCOUNTABILITY PLANNING

Partners involved in campaigns and in the accountability management procedures include EPI, Unicef, WHO, Ghana Education Service, District Assembly and other local actors like the Information Service Department. At regional level, additional actors like FDA officers, Environmental health officers and/or Environmental Protection Agency (EPA) officers are also members of the teams.

Program design and preparation for accountability management aligned with procedures defined in GPEI documents and guidelines (GPEI, 2021)ⁱⁱⁱ. For the purposes of nOPV2 management, accountability is to be understood as the responsibility of each member of the team handling nOPV2 to account for all vials of the vaccine received or kept in their custody and to properly document and return all vials to the next upper level at the end of the campaign in which they were engaged. At workers' level, accountability is a requirement meaning that every vial must be accounted for.

Planning accountability management starts at the national level where accountability is included in the objectives and where there is adequate personnel and capacity.

For the actual implementation, one or two people are sent to each of the 16 regions to supervise and report on the activities. At each of these levels, vaccine accountability actors are positioned. At national and regional levels there are Vaccine Accountability Monitors (VAM) and at District and subdistrict levels there are Vaccine Accountability Officers (VAO). The planning of the round 2 campaign accountability activities, that took place during a virtual meeting with the regions, was preceded by a review of round 1 campaign.

- Financial planning

Planning a campaign is a matter of budgeting and integrating accountability monitoring activities has some cost implications that need to be considered. All actors that will be working on vaccine

accountability need to be trained and will be paid for their work. This includes also planning for travel means and documents to be used.

-Training on Vaccine Accountability Management:

Training is done following a cascading approach. People are trained at the national level then these people will train district level actors and so on. The planning meeting was organized on the 30th of September 2022 where vaccine accountability and logistics management were among the areas of discussion. A virtual/in-person training was organized for national and regional Vaccine Accountability Monitors (VAM) on the 3rd of October 2022. Topics included filling of vaccine consumption monitoring tool and the Form A in the ODK. Regional actors were instructed to train district VAOs to make entries during and after the campaign. A lot of effort was made to avoid dilution of competence from the top to the field level and to have the same quality of training at all the levels of the system from national to local.

Vaccines Distribution:

Monitoring accountability requires the availability of the appropriate logistics at all levels of the health system. This includes markers, Ziploc and various forms to be used for reporting by actors. This also includes the nOPPV2 vaccines. In addition to 1,177,750 doses remaining from round 1 the country received 8377500 doses of nOPV2 vaccines for the round 2 campaign bringing the total to 9,555,250 doses of nOPV2 vaccines available for round 2. For the 16 regions 8767900 doses were distributed for the round 2 campaign.

ACCOUNTABILITY IMPLEMENTATION

Vaccine Accountability During Campaign:

Implementation of the activity involved field visits, observations, reporting, physical counting of tools and other logistics, and awareness-raising among stakeholders after observations. In terms of visits, regional and national VAMs visited colleagues and cold stores at district, sub-district and team levels. Several aspects including vaccine storage, fridge/freezer thermometers and temperature observations, electricity stability, daily vaccine distribution and retrieval, storage of empty, partially used and broken vaccines, as well as record keeping and form filling were observed. Reporting activities were properly carried out daily between districts and regions. The same applies to the verification of cold stores. Reporting activities were carried out using the daily vaccine consumption monitoring tool. This was sent daily by each sub-district VAO in the ODK. Sub-district and district data could be monitored via the Power BI dashboard. Reporting was completed by submitting Form A at the end of the campaign. Vaccine shortages in the regions and districts were easily detected, and replenishments were organized from the national stockpile or from neighboring regions. Unopened and unusable vials (with broken or peeled-off labels) were documented and reported to the regions. The use of WhatsApp groups set up at regional level facilitated the various activities. No cases of missing vials were reported.

Vaccine Accountability Committee

As mentioned above, the partners involved in implementing accountability are present at all levels, depending on the relevance of their presence. At regional level, this is reflected in the participation of various bodies in vaccine accountability committees. These include Deputy Directors of Public Health

(DDPHs), national and regional VAMs, FDA officers, environmental health officers and/or EPA officers, partners (WHO, UNICEF, CDC), etc. These specialized committees, set up for campaign activities, were reactivated for this campaign, particularly for the disposal of vials. Meeting for the purposes of this campaign, these committees were able to plan and establish vaccines retrieval schedules for the districts. They were then able to decide on the types and sites of disposal and inspect these sites for unusable vials at the end of the campaign. All the usable and unusable vials retrieved were disposed of under the supervision of the committee members, who signed the disposal forms once the destruction process had been completed.

Tools for the national, for the regions, for the district's levels and tools for the subdistricts are used. **The tools** are filed every day to show « *this is what you gave me, this what I have used, this what is remaining* ». With the tools, it is possible to track and account for daily transaction and see what is received at each level and what is passed down to the lower level. The tools helped also to know how the vaccines get retrieved, both empty vials and used ones. **Reports:** reporting is done daily from subdistrict to district and from district to region. At the regional level they don't report daily. When the work was paper-based, reports were done and sent to the district and the regional levels. Now that ODK is used, teams have both paper and ODK version to send to district and regional levels so that the situation of the vaccine at regional level is known when needed.

Resources and cost

Resources for the activities are provided by all partners including Unicef, WHO, the government of Ghana and Gavi. All partners of the GPEI are contributors. In addition, local actors are also contributing, mainly in-kind. This is the case of Ghana Education Services and District Assembly who sometimes provide vehicles for the activities. Planning and implementation of accountability activities have many cost implications that are also important. Vaccine monitors and vaccine accountability officer must be paid including all campaign personnel. These are additional costs to consider.

RESULTS

Vaccine retrieval

At the retrieval stage, all unusable vials were collected for destruction. Usable vials were stored in freezers in regional cold rooms and then transferred to the national level. At this stage of vaccine retrieval and record keeping, it was found that no vials (usable or unusable) were missing. However, one sealed package of nOPV2 vaccines contained 9 vials instead of 10 when opened. The observation made in Sekyere South (Ashanti region), more precisely at Agona Hospital, was brought to the attention of regional and national VMA officials. A report on the case (considered as a packaging error by the manufacturer) was made to the higher levels, with supporting photos.

Table 1 : Usable and unusable vials retrieved at the regional level (GHS/EPI, 2022)

Usable and Unusable Vials Retrieved at The Regional Level							
S/N	Name of Districts	Total nOPV2 Vials Issued	Empty Vials	Vials Returned		Total Unusable vials	Vials Unaccounted
			No of Empty Vials Returned	Usable (VVM1&2)	Un-usable (VM3,4,broken, damaged,distorted label)		
1	AHAFO	3,467	2,864	595	8	2,872	
2	ASHANTI	28,571	28,441	100	30	28,471	1
3	BONO EAST	7,953	6,410	1,530	13	6,423	
4	BONO	6,413	6,054	348	11	6,065	
5	CENTRAL	15,647	15,471	137	39	15,510	
6	EASTERN	15,051	14,726	303	22	14,748	
7	GREATER ACCRA	31,562	31,260	280	22	31,282	
8	NORTH EAST	4,608	3,433	1,170	5	3,438	
9	NORTHERN	15,886	12,086	3,784	16	12,102	
10	OTI	5,511	4,306	600	5	4,311	
11	SAVANNAH	4,439	3,614	815	10	3,624	
12	UPPER EAST	8,270	7,652	615	3	7,655	
13	UPPER WEST	5,122	4,641	470	11	4,652	
14	VOLTA	7,840	7,600	227	13	7,613	
15	WESTERN	10,482	10,206	252	15	10,221	
16	WESTERN NORTH	4,536	4,407	119	18	4,425	
TOTAL		175,358	163,171	11,345	241	163,412	1

Wastage rate

As the table below shows, the wastage rate was at an acceptable level during the second campaign. For the country, it was 6.0% for open vials and 0.1% for closed vials. Closed vials wastage were generally due to mishandling of the vaccines, resulting in broken vials.

Destruction

Several approaches to destroying unusable vials are possible. In the second campaign, except for the Greater Accra and Eastern regions, where the autoclaving method was used, all regions opted for incineration as the disposal method for unusable vials. The chosen process required all unusable vials to be organized and transported to the final disposal site on the day agreed by the committee. Burial was required after incineration and autoclaving, so all remains were buried in a safe place. In detail, 163,434 unusable vials were destroyed at the end of Cycle 2. This figure takes into account 22 unusable vials from the first round (20 empty vials which had not been destroyed in the Eastern region, and 2 vials used nationally for training regional teams, which were expired).

Table 2 : Close and open vial wastage (GHS/EPI, 2022)

Close and Open Vial Wastage										
S/N	Name of Districts	Target Population	Total nOPV2 Vials Issued	Empty Vials	Vials Returned	Vials Unaccounted	Total target Immunized	%Coverage	Reported Open Vial wastage Rate	Reported Closed Vial wastage Rate
				No of doses of Empty Vials Returned	Un-usable (VM3,4,broken, damaged, distorted label)					
1	AHAFO	133,928	3,467	143,200	8	-	136,578	102%	4.6%	0.2%
2	ASHANTI	1,229,886	28,572	1,422,050	30	1	1,356,248	110%	4.6%	0.1%
3	BONO EAST	264,998	7,953	320,500	13	-	295,412	111%	7.8%	0.2%
4	BONO	267,773	6,413	302,700	11	-	287,715	107%	5.0%	0.2%
5	CENTRAL	672,767	15,647	773,550	39	-	739,977	110%	4.3%	0.2%
6	EASTERN	648,246	15,051	736,300	22	-	684,969	106%	7.0%	0.1%
7	GREATER ACCRA	1,242,365	31,562	1,563,000	22	-	1,504,834	121%	3.7%	0.1%
8	NORTH EAST	160,971	4,608	171,650	5	-	169,742	105%	1.1%	0.1%
9	NORTHERN	497,264	15,886	604,300	16	-	572,948	115%	5.2%	0.1%
10	OTI	181,608	4,911	215,300	5	-	193,007	106%	10.4%	0.1%
11	SAVANNAH	157,590	4,439	180,700	10	-	173,209	110%	4.1%	0.2%
12	UPPER EAST	306,974	8,270	382,600	3	-	344,471	112%	10.0%	0.0%
13	UPPER WEST	194,086	5,122	232,050	11	-	204,555	105%	11.8%	0.2%
14	VOLTA	300,531	7,840	380,000	13	-	329,140	110%	13.4%	0.2%
15	WESTERN	448,002	10,473	510,300	15	-	483,237	108%	5.3%	0.1%
16	WESTERN NORTH	191,603	4,544	220,350	18	-	199,237	104%	9.6%	0.4%
			0	-		-				
TOTAL		6,898,592	174,758	8,158,550	241	1	7,675,279	111%	6%	0.1%

Overall result

The overall outcome of the accountability monitoring process is that two years after the campaigns, cases of vaccine derived polio are less reported than in the years preceding the campaigns and the implementation of accountability procedures. From January 2023 to mid of 2024, Ghana is among the rare countries in West Africa where no environmental detection was reported^{iv}.

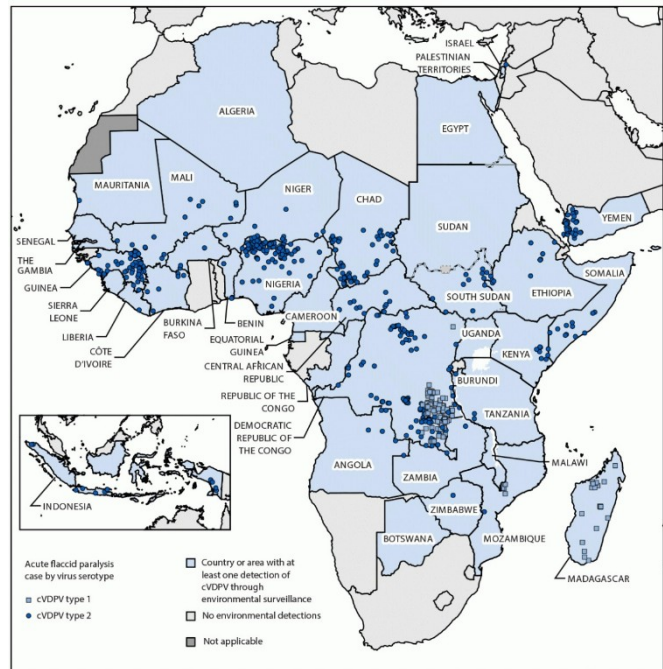
Figure 1 : Countries and areas* reporting circulating vaccine-derived polio outbreaks (N = 39) — worldwide, January 2023–June 2024† (Apophia N.-F. et al., 2024)

Abbreviation:

cVDPV = circulating vaccine-derived poliovirus.

* Some boundaries might differ under World Health Organization mapping guidelines.

† Data as of September 18, 2024.



BEST PRACTICES

- **Good implementation of the accountability management activities at all levels:** the report indicated that all activities planned for the accountability were undertaken as anticipated. The tools provided for the different levels of actors were adequately used. With the accountability tools it is possible to trace them to who is liable for the vials they cannot account for and based on that at the level of Unicef or at managers' levels, whatever compensation the actors were supposed to get from that campaign they will get it. Because of that compensation, people became more serious about handling of the vaccine and passing it to a higher level with details on what they received, what they used and what is left, on giving the vials and the records.

- **From polio to other campaigns:** The application of accountability processes to other campaigns including measles and yellow fever from the experience of polio (nOPV2) is one best practice Ghana is experimenting. All things considered, the accountability procedures proved to be relevant for other vaccine management areas. With the tools, teams prove liable for all vaccine given to them. Whatever happened with the vaccines on the fields are reported. The accountability procedures and tools are also relevant for monitoring immunization teams' performance. For example, if it is supposed to be twenty doses per vial, and a team has a track record of fifty percent wastage rate on daily basis, it is obvious that there is something wrong. Maybe they don't know how to give, or they are deliberately purring away the vaccine because it is away out of the expected wastage.

- **Using lessons of accountability in routine immunization:** Because of the training given to them, workers are now using the knowledge they obtained to manage the routine immunization activities and vaccines. Accountability brought a change of attitude at workers' levels. Although this has not been

evaluated and not all of them will have the mindset of accountability but some of them will. The use of tools provided for accountability activities like zip-lock to protect documents was also adopted by workers when performing other immunization activities.

- **Retrieving a lost vial.** It happens that a vaccination team loses a vial. These are cases that are rare but can happen. A case was reported and to find the missing vial all village inhabitants were mobilized to comb everywhere to find where the vial was. In that case some procedures are used to try to destroy the viral that is supposed to be in the vaccine before it mutates. This consists in pouring red or hot ashes on the place so that the viral is killed and cannot spread in the environment.

- **Tracing origin of cases of vaccine derived polio:** As reported in the introduction, 18 cases were detected in the country mainly in the northern region. The investigation around the cases has taken accountability to another level by tracing the origin of 2019 and 2020 circulating vaccine derived polio cases. A multidisciplinary approach desk reviews, AFP surveillance operations and immunization evaluation, interview, review of patients' admission records, active case search for AFP, laboratory analysis and virus sequencing were used. It was finally demonstrated that all strains were genetically linked to a Nigerian cVDPV2 strain that circulated in 2018. Existence of pocket of low immunization coverage in context of substandard sanitation, lack of toilet, open defecation pollution of drains with fecal matter by resident were among possible causes that favor the spread of the virus. Recent cases of cVDPV2 are also said to come from Nigeria.

LESSONS LEARNED

Lesson 1: Implementing all activities that are necessary for monitoring vaccine accountability is resource consuming. However, the importance of the issue requires that all activities planned are fully financed for their proper implementation. This was not the case during the second-round campaign. Resource limitations have impacted supervision activities and, in some cases, National VAMs had to share vehicles, therefore, could not make adequate visits to lower levels to support them.

Lesson 2: More effort and training are required for vaccine management and reporting. At vaccine retrieval it was obvious that vaccines mishandling needed to be addressed given the high close vial wastage reported. District and Sub-district VAMS were sensitized to encourage teams on the immediate reporting of broken vials on the field to higher levels. While sensitization can be of good help, it is more important to have a dual and combined approach in the form of hands-on training or supportive supervision.

Lesson 3: Consistency in reporting is important at all levels. The reports indicate that vials had been issued to some teams who did not record the receipt of the vials on their forms. The need for all teams to record receipts of vial before leaving for the field is to be raised at both District and Sub-district VAMs and actors' levels. Adequately identifying the forms to fill and doing good calculation for indicators to be reported on the forms is important to succeed in accountability monitoring.

Lesson 4: Good practices promote themselves. Health workers are usually adopting approaches that can facilitate their activities and improve their performance. As mentioned in the best practices section, health workers have integrated into their practices the elements from the implementation of accountability activities they found relevant. However, scaling up these same practices requires support insofar as not all healthcare providers have a proactive attitude to innovation.

Lesson 5: The use of three documentation tools - manual forms, the ODK application and photo/whatsApp - is an advantageous approach. The use of manual forms enables checks to be carried out to re-establish the authenticity and completeness of the information. The use of ODK makes information quickly available on the platform, enabling supervisors to act or react to events on the ground during the campaign. Finally, photos make problems visible and share them just as instantly. Despite the technical difficulties and the time and cost issues involved, maintaining these different reporting approaches improves the implementation of accountability monitoring activities.

CONCLUSION

The implementation of vaccine accountability procedures during the second vaccination campaign with the nOPV2 vaccine in 2022 was a success. Further documentation on the application of accountability approaches is required. Similarly, the adaptation of the approach to other campaigns, notably measles and yellow fever, needs to be well documented and lessons learned shared. As mentioned in the results, accountability management has opened up new perspectives in the implementation of vaccination campaigns. Training in this area has been a source of improvement in workers' knowledge and performance. As an ultimate result, the implementation of the approach has prevented the population of Ghana, and specifically children, from suffering new cases of vaccine-derived polio, notably from the nOPV2 vaccine. This is a convincing result which contributes to the overall efforts made by decision-makers, workers and populations and GPEI to make the total eradication of polio a reality. Initiatives to adopt accountability monitoring approaches must consider the planning aspects, particularly financial issues, but more specifically the rigor of implementation is important.

- i GPEI (2021). Ghana <https://polioeradication.org/where-we-work/ghana/>
- ii GHS/EPI, (2022). National Immunization Days against polio round II, 06 – 09 October 2022. Vaccine accountability report for national immunization days (NIDs) against polio round two.
- iii GPEI (2021). Novel Oral Polio Vaccine (nOPV2) Management, Monitoring, Removal and Disposal (in 50-dose vials with VVM type 2) p14
- iv Apophia N.-F. et al. (2024). Update on Vaccine-Derived Poliovirus Outbreaks — Worldwide, January 2023–June 2024. Morbidity and Mortality Weekly Report 73, 41 909-916.