Innovations in the Implementation of Polio Surveillance Enhancement Plan in Oyo State, Nigeria: Key Benefits, Lessons Learned, Challenges and Opportunities

Enya Bassey Bassey1*, Walter Kazadi Mulomb1, Ahmed Mohamed Ahmed Khedr1, Rosemary Ifeoma Onyibe1, Olufunmilola Olawumi Kolude1, Oluwadare Marcus1, Oluwabukola Alawale1, Oluwatobi Adeoluwa Iyanda1, Omotunde Ogunlaja1, Taiwo Olabode Ladipo2, Maxwell Obeka1, Adeniyi Ayobami Adeniran1, Oluwynka Motunrayo Dania1, Olabumuyi Olubumi Olayide1, Oluwaseun Opeyemi Oni1, Moshood Babatunde Busari1, Faith Ehiaghe Ugba1, Ayobami Desmond Olatimehin1, Gbenga Stanley Olayinka1, Abayomi Oluwasegun Ayinde1, Chinwe Grace Azuka1, Olufemi Toheeb Okuneye1, Ahmed Bello1

1World Health Organization (WHO) Nigeria Country Office, Abuja, Nigeria
2Oyo State Emergency Operation Center, Ministry of Health, Ibadan, Nigeria

Email: *bassey69@yahoo.com, kazadimulombow@who.int, khedra@who.int, onyiber@who.int, koludeo@who.int, oludarerotimi@yahoo.com, alawaleolubukola@gmail.com, estriol13@gmail.com, aoogunlaja@yahoo.co.uk, tladps@yahoo.com, obeakam@who.int, baminiyi2004@gmail.com, oluyinkadania@yahoo.co.uk, laide.adigun@gmail.com, oluwaseunoni.so@gmail.com, b2moshud@gmail.com, faithugba@gmail.com, ayobamidesmond7@gmail.com, ambsog@gmail.com, yomi.ayinde@gmail.com, chinwag.azuka@gmail.com, femiokuneye87@gmail.com, belloah@who.int

How to cite this paper: Bassey, E.B., Kazadi Mulomb, W., Ahmed Khedr, A.M., Onyibe, R.I., Kolude, O.O., Marcus, O., Alawale, O., Iyanda, O.A., Ogunlaja, O., Ladipo, T.O., Obeka, M., Adeniran, A.A., Dania, O.M., Olajide, O.O., Oni, O.O., Busari, M.B., Ugba, F.E., Olatimehin, A.D., Olajinka, G.S., Ayinde, A.O., Azuka, C.G., Okuneye, O.T. and Bello, A. (2022) Innovations in the Implementation of Polio Surveillance Enhancement Plan in Oyo State, Nigeria: Key Benefits, Lessons Learned, Challenges and Opportunities. Health, 14, 442-455. https://doi.org/10.4236/health.2022.144035

Received: March 5, 2022
Accepted: April 22, 2022
Published: April 25, 2022

Abstract

Background: Nigeria attained the milestone of being certified wild poliovirus free in the year 2020. However, a drop in the key performance indicators of polio surveillance system was across various Local Government Areas (LGAs) in Oyo State. This drop highlighted the need for an innovative way of enhancing polio surveillance in Oyo State. Methods: This study was conducted in four phases and each phase utilized a cross-sectional study design and purposive sampling technique to select eligible LGAs and participants. LGAs that met at least two of the set-out criteria (had not reported at least a case of Acute Flaccid Paralysis (AFP) 12 months preceding the survey, with decline in AFP case detection rate, had not met AFP key indicators, are densely populated, and has an international border) were selected. A concurrent mixed method of data collection was utilized, and quantitative data were collected with a semi-structured questionnaire administered using Computer Assisted Personal Interviews (CAPI) during community active case search, health facility retroactive case search (HFRACS). Qualitative data collection was done...
E. B. Bassey et al.

Health through Focus Group Discussion (FGD). Surveillance intensification activities were conducted over eight weeks period. Data were analyzed using Microsoft Excel Software; summarization was done using frequencies and percentages while presentation was done using charts and spot maps. **Results:** A total of 1277, 49, 259 and 632 settlements, households and health facilities respectively were visited across 24 (73%) LGAs in Oyo State. Of the 150 suspected AFP cases identified, 45 (30%) were rejected cases, 33 (22%) were missed cases and 72 (48%) were true AFP cases. Non-Polio AFP Rate (NP-AFP rate) increased from 2.7 to 6.9 (P < 0.0001) after the surveillance intensification, also, the Non-Polio Enterovirus (NPENT) isolation was increased by 40% (16% to 23%). At the end of the intensification activities, all LGAs in Oyo State had met the WHO recommended Non-Polio Acute Flaccid Paralysis (NP-AFP) rate of ≥3/100,000 population. **Conclusions:** Innovative strategies implemented in AFP surveillance across Oyo State have resulted in improvement in AFP surveillance performance indicators in the State. There is therefore the need for dynamic and innovative ways of conducting AFP surveillance to prevent poliomyelitis epidemics and to ensure maintenance of Nigeria polio free certification status.

**Keywords**

Polio-Surveillance-Indicators, Enhancement-Plan, Innovations, AFP-Case-Search

1. **Introduction**

Nigeria was certified free of the wild poliovirus by the African Regional Certification Commission on August 25, 2020. This certification is a significant national milestone and accomplishment, but it does not signal the end of polio surveillance activities. Surveillance for Acute Flaccid Paralysis (AFP) is critical to successful polio control or eradication programs because it allows program managers to track the effectiveness of intervention techniques and identify groups that require ongoing interventions where surveillance gaps exist.

A three-year comparison of Polio surveillance data from 2019 to 2021 shows significant reductions in AFP case detection, Non-Polio AFP rate, and LGAs meeting both core indicators, with 39 percent, 40 percent, and 38 percent, respectively. The observed decline is because active surveillance sites are not visited regularly by designated surveillance staff who are from the LGAs. There is also weak community-based surveillance, Surveillance staff lack resources to do their job effectively and travel to investigate cases in hard-to-reach areas.

This drop in key performance indicators prompted the creation of a costed surveillance improvement plan, with the goal of reviewing all aspects of the AFP surveillance system, determining whether standard operating procedures are in place and being followed at all levels, determining whether AFP cases are being missed by the surveillance system, and determining the level of knowledge among
key surveillance actors. It increases the level of awareness among all surveillance actors and important community informants, and actively looks for AFP cases in hospitals and communities.

The primary benefits of the surveillance intensification actions conducted are evaluated in this study, along with important challenges, opportunities, lessons learned, and some innovations.

2. Materials and Methods

2.1. Study Area

Oyo State is bordered to the north by Kwara, Osun and Ogun to the North, East and Southwest respectively. It also shares international border with the Republic of Benin. It has a projected population of 9,166,375 in 2021, covers approximately an area of 28,454 square kilometers. There are 33 LGAs (districts) and 351 political wards in Oyo State. The activity was conducted in 24/33 (73%) LGAs. These LGAs are: Atiba, Akinyele, Egbeda, Ibadan North, Ibadan North East, Ibadan North West, Ibadan South East, Ibadan South West, Ibarapa Central, Ibarapa East, Ibarapa North, Irepo, Iseyin, Itesiwaju, Kajola, Ogbomoso North, Ogbomoso South, Ogo Oluwa, Olorunsogo, Oluyole, Oorelope, Ona Ara, Saki East, Saki West.

2.2. Study Design

We conducted a cross-sectional study that was implemented in four phases. Each phase was implemented for 5 days as follows: June 7 - 11, June 20 - 25, July 11 - 17, and July 25 - 31 respectively. The study was conducted in phases to allow researchers to draw lessons from each phase and use them to improve the next phase.

2.3. Sampling and Selection Criteria

The criteria for selecting sites to be assessed during peer review, according to the guideline and Standard Operating Procedure (SOP) for Peer Reviews and Surveillance Intensification, include:

1) Silent LGAs (LGAs that have not reported at least 1 AFP case within the last 12 months or more?).
2) Declining AFP Case Detection.
3) Failure to achieve expected non-polio AFP rate of 3 per 100,000 (under 15 years) and/or stool adequacy of ≥80 percent.
4) Densely populated LGAs.
5) At least one LGA which is good performing (to demonstrate best practices)
6) LGA having an international border.

All Selected LGAs fulfilled at least 2 of the above criteria for selection.

2.4. Training and Selection of Participants

WHO recruited, trained, and deployed qualified and competent individuals as
LGA Coordinators for the activity to assist the LGAs in implementing and supervising the activities while also performing an evaluation at various levels in the LGAs.

All Disease Surveillance and Notification Officers (DSNOs) and Assistant Disease Surveillance and Notification Officers (ADSNOs) were included in each LGA, as well as select key informants for community active case search of AFP, Recorders, and Mobilizers.

To guarantee proper implementation, terms of reference were created for each designated participant to follow.

2.5. Activities Conducted, Measurements/Variables

Visits were made to health facilities to review the completeness of surveillance documentation and the status of earlier recommendations and action items, as well as retroactive AFP case searches in health facilities, are among the key tasks carried out.

Sensitization of Health Facility (HF) Surveillance Focal Persons, Clinicians, and Health Workers, Community Active Case Search for AFP, visit to and interview of Community Healthcare Services Providers (Patent Medicine Vendors (PMVs), Traditional Birth Attendants (TBAs), Faith Healers, and others), Sensitization of Community Healthcare Services Providers, Active Case Search for AFP at Community Healthcare Services Providers’ Facilities, and Focus Group Discussions with various categorizations.

For the LGA DSNOs, the following variables were considered: the availability of written workplans, written supervisory plans, terms of reference, a supervisory checklist that adequately addresses surveillance, records for active surveillance visits, surveillance review meetings, the availability of coordinating committees and rapid response teams, and the availability of line lists of reported AFP, measles, and nephritis cases.

We looked at availability on the polio surveillance framework and their training status in the previous year, knowledge of AFP Case definitions, presence of posters for case definitions, knowledge of proper notification channels, and availability of Immediate Case Notification Forms for Community Healthcare Service providers (Key Informants).

During the focus group talks, we also wanted to gain a better understanding of diverse groups’ knowledge, attitudes, and perceptions concerning AFP monitoring.

2.6. Major Innovations

An operation room was activated, where the Lead Coordinator for the state coordinated the activities on the field. Some of the activities conducted include provision of technical support to the LGA Coordinators, development of checklist for use at different levels in the LGAs, development of Terms of Reference for all participants, real time monitoring and assessment of field activities, especially
the initial investigation of suspected AFP cases. Video recordings of these cases (with the consent of their mothers/caregivers) were transmitted to the online operation room by the LGA DSNOs and LGA Coordinators. The Lead Coordinator was also tasked with the responsibility of providing daily data driven feedbacks of activities on the field and recommendations on remedial actions to be taken, based on gaps noticed in the day’s activity. Also, for the 3rd and 4th phases, extra field supervisors were engaged to monitor activities in a cluster of LGAs assigned to them by the WHO State Coordinator.

### 2.7. Data Tools and Data Collection

We employed the use of different data tools for the different activities that constituted our improvement plan. Health Facility Retroactive Case Search (HFRACS) Template for visits to Health Facilities, Community Active Case Search (CACS) Template for Community Active case search.

LGA Coordinators visited the Community Healthcare Providers (PMVs, TBAs, Bone Setters, Traditional Healers, etc.) and applied the community data collection tool for peer review, while the Active Case Search team visited the communities assigned to them to search for AFP cases using the CACS template. Also, in different groups, a single structured questionnaire on AFP was used for Focus Group Discussions. The DSNOs were assessed by the Lead Peer Reviewers using an abridged LGA Level Surveillance Peer Review Checklist.

Open Data Kit (ODK) was deployed for data collection and data management. While the data was downloaded and analyzed using Microsoft Excel Software. Primary and secondary data were entered, cleaned, and analyzed in Microsoft Excel 2016. Proportions were calculated for selected variables and key indicators.

### 2.8. Statistical Analysis

Extracted data was analyzed using SPSS® statistical software. We used paired t-test to compare the difference in number of AFP cases reported, Non-polio AFP rate, Non-polio enterovirus isolation rate and stool adequacy at baseline and after implementation of the improvement plan. We used a Z-test to compare the proportion of LGAs reporting AFP cases, and LGAs meeting the 2 core indicators.

### 3. Results

During the period under review, 24 LGAs were visited for Active case search and AFP Surveillance peer review, out of which 1277 settlements and 49259 households were also searched for suspected AFP cases. In these LGAs, desk reviews, clinicians’ sensitization and retroactive case search were conducted in 632 health facilities. We also conducted visits to key informants and community-based healthcare service providers in those LGAs, where we visited 460 PMVs, 160 TBAs, 73 Bone Setters and 32 Traditional Healers (Table 1).

We found a total of 150 suspected AFP cases during this surveillance intensification. All 150 suspected cases were investigated while 72 were found to be true
Table 1. Surveillance structures and sites visited by surveyors.

| LGA            | Health Facilities | Settlements | Households | PMVs | TBAs | Bonesetters | Traditional Healers |
|----------------|-------------------|-------------|------------|------|------|-------------|---------------------|
| Akinyele       | 17                | 78          | 2588       | 11   | 9    | 11          | 1                   |
| Atiba          | 14                | 83          | 2360       | 7    | 4    | 0           | 3                   |
| Egbeda         | 42                | 59          | 2696       | 8    | 21   | 23          | 2                   |
| Ibadan North   | 29                | 38          | 2065       | 19   | 15   | 8           | 5                   |
| Ibadan North East | 27         | 51          | 2500       | 16   | 20   | 3           | 0                   |
| Ibadan North West | 34       | 41          | 1911       | 8    | 11   | 1           | 0                   |
| Ibadan South East | 28       | 35          | 1797       | 15   | 8    | 0           | 0                   |
| Ibadan South West | 46       | 65          | 2632       | 10   | 3    | 2           | 0                   |
| Ibarapa Central | 15               | 48          | 2060       | 18   | 1    | 1           | 1                   |
| Ibarapa East   | 17                | 80          | 2290       | 23   | 0    | 1           | 1                   |
| Ibarapa North  | 15                | 61          | 1790       | 17   | 0    | 1           | 0                   |
| Irepo          | 20                | 50          | 2862       | 28   | 0    | 1           | 0                   |
| Iseyin         | 30                | 53          | 2160       | 17   | 7    | 1           | 2                   |
| Itesiwaju      | 18                | 63          | 905        | 25   | 2    | 0           | 1                   |
| Kajola         | 24                | 27          | 1031       | 10   | 2    | 4           | 2                   |
| Ogbomososo North | 68           | 44          | 2044       | 25   | 19   | 1           | 2                   |
| Ogbomososo South | 34       | 35          | 2321       | 40   | 0    | 1           | 2                   |
| Ogo Oluwa      | 20                | 81          | 2111       | 35   | 2    | 1           | 1                   |
| Olorunsogo     | 21                | 72          | 2197       | 9    | 0    | 0           | 0                   |
| Oluyole        | 27                | 75          | 2567       | 14   | 22   | 5           | 4                   |
| Ona Ara        | 31                | 27          | 1228       | 42   | 7    | 6           | 1                   |
| Oorelope       | 14                | 45          | 1980       | 20   | 1    | 2           | 0                   |
| Saki East      | 21                | 42          | 2328       | 28   | 3    | 0           | 2                   |
| Saki West      | 20                | 24          | 836        | 15   | 3    | 0           | 2                   |
| **Total**      | **632**           | **1277**    | **49,259** | **460** | **160** | **73**     | **32**              |

AFP cases with different forms of diagnosis. 33 were true AFP cases but upon initial investigation were found to be missed cases, which were notified late. 45 of the suspected AFP cases notified were found not to be consistent with the case definition of AFP, so they were rejected, while further investigation and sample collection was halted. Of the 72 cases that were true, 11 of them were found during record review and retroactive case search in the health facilities visited while 61 were notified when the Active Case Search teams visited households and conducted House to House Active Case Search. There were 5 true AFP cases reported in both Ibadan Northeast and Olorunsogo LGAs from this intervention while 4 cases each were
reported in Egbeda, Ibadan North, Kajola and Saki West (Table 2).

Table 3 shows a comparison of our major surveillance indicators at baseline and after the intervention had been conducted. A significant increase in AFP cases reported after implementation of the improvement plan, compared to baseline data was observed at \( P < 0.0001 \). Likewise, the Non-Polio AFP Rate which is one of the two core indicators used to measure surveillance performance

Table 2. Characteristics of AFP cases reported by surveyors during this surveillance.

| S/N | LGA          | Health Facility (A) | Community (B) | True Cases A + B | Missed cases | Rejected Cases |
|-----|--------------|---------------------|---------------|------------------|--------------|----------------|
| 1   | Akinyele     | 1                   | 2             | 3                | 2            | 4              |
| 2   | Atiba        | 0                   | 2             | 2                | 0            | 2              |
| 3   | Egbeda       | 1                   | 3             | 4                | 0            | 2              |
| 4   | Ibadan North | 1                   | 3             | 4                | 3            | 3              |
| 5   | Ibadan North East | 0               | 5             | 5                | 1            | 2              |
| 6   | Ibadan North West | 0               | 2             | 2                | 0            | 1              |
| 7   | Ibadan South East | 1               | 5             | 6                | 2            | 2              |
| 8   | Ibadan South West | 0               | 2             | 2                | 2            | 2              |
| 9   | Ibarapa Central | 0                | 3             | 3                | 0            | 1              |
| 10  | Ibarapa East | 0                   | 2             | 2                | 0            | 1              |
| 11  | Ibarapa North | 0                   | 2             | 2                | 2            | 1              |
| 12  | Irepo        | 0                   | 2             | 2                | 2            | 1              |
| 13  | Iseyin       | 1                   | 1             | 2                | 3            | 3              |
| 14  | Itesiwaju    | 0                   | 2             | 2                | 2            | 2              |
| 15  | Kajola       | 1                   | 3             | 4                | 0            | 1              |
| 16  | Ogbomoso North | 1               | 2             | 3                | 4            | 3              |
| 17  | Ogbomoso South | 0                | 2             | 2                | 1            | 1              |
| 18  | Ogo Oluwa    | 0                   | 2             | 2                | 1            | 1              |
| 19  | Olorunsogo   | 1                   | 4             | 5                | 0            | 2              |
| 20  | Oluyole      | 0                   | 3             | 3                | 2            | 3              |
| 21  | Ona Ara      | 1                   | 1             | 2                | 1            | 1              |
| 22  | Oorelope     | 0                   | 3             | 3                | 2            | 2              |
| 23  | Saki East    | 1                   | 2             | 3                | 2            | 2              |
| 24  | Saki West    | 1                   | 3             | 4                | 1            | 2              |
| TOTAL |           | 11                  | 61            | 72               | 33           | 45             |

Missed: A true AFP case identified after 60 days of onset of paralysis that has never been investigated as per guidelines; Rejected: DSNO confirms it is an AFP and intends to collect stool, on verification, verifier says it is not an AFP and stops stool collection before it gets to the laboratory.
was suboptimal statewide at baseline (2.7), while it rose to 6.9 after the surveillance intensification (p < 0.0001). The rise in enterovirus isolation from 0.16 to 0.23 was rather statistically insignificant (p = 0.9184). In addition, there was a significant increase (p = 0.0015) in number of LGAs that had reported at least a case of AFP after implementation of the improvement plan compared to baseline data. As shown in Figure 1 however, after intervention all LGAs had reported at least one AFP case, and all LGAs had met the requirement for Non-Polio AFP rate, (3/100,000) as shown in Figure 2(a) & Figure 2(b).

As part of the surveillance intensification efforts, we paid visits to different levels within the surveillance structure to search for AFP cases and assess the knowledge of the surveillance actors with different designations, as well as availability of posters and case definitions, while we also conducted Focus Group Discussions for different groups. Our findings are presented in Table 4.

**Table 3.** Comparison of indicators at baseline and after intensification improvement plan.

| Indicator (State)                  | Baseline | After Improvement Plan | P-Value |
|-----------------------------------|----------|------------------------|---------|
| Number of AFP Cases               | 53       | 178                    | 0.0001  |
| Non-Polio AFP Rate                | 2.7      | 6.9                    | 0.0001  |
| NPENT Isolation Rate              | 0.16     | 0.23                   | 0.9184  |
| Stool Adequacy                    | 0.97     | 0.98                   | 0.9596  |
| Reporting LGAs                    | 14       | 24                     | 0.0015  |
| LGAs meeting core indicators      | 14       | 24                     | 0.0015  |

![Figure 1](image.png)

**Figure 1.** AFP case detected pre and post surveillance intervention.
Figure 2. LGAs (Districts) with NP-AFP rate of 3/100,000 population pre and post surveillance intervention.

Table 4. Knowledge of key informants on polio surveillance.

| Designation                        | PMVs (n = 460) | TBAs (n = 160) | THs (n = 73) | BSs (n = 32) | Mothers (n = 40) | LT (n = 60) | CLs (n = 60) | HWs (n = 60) |
|-----------------------------------|----------------|----------------|--------------|--------------|-----------------|-------------|--------------|--------------|
| N (%)                             | (N%)           | (N%)           | (N%)         | (N%)         | (N%)            | (N%)        | (N%)         | (N%)         |
| **AFP Case Reporting**            |                |                |              |              |                 |             |              |              |
| Yes                               | 78 (17)        | 8 (5)          | 0 (0)        | 4 (13)       | 0 (0)           | 3 (5)       | 9 (15)       | 18 (30)      |
| No                                | 382 (83)       | 152 (95)       | 73 (100)     | 28 (87)      | 40 (100)        | 57 (95)     | 51 (85)      | 42 (70)      |
| **Availability of Posters and Case Definitions** |                |                |              |              |                 |             |              |              |
| Yes                               | 161 (35)       | 16 (10)        | 0 (0)        | 5 (16)       | N/A             | 60 (100)    | 6 (10)       | 30 (50)      |
| No                                | 299 (65)       | 144 (90)       | 73 (100)     | 27 (84)      | N/A             | 0 (0)       | 54 (90)      | 30 (50)      |
| **Knowledge of AFP Case Definitions** |                |                |              |              |                 |             |              |              |
| Yes                               | 221 (48)       | 40 (25)        | 0 (0)        | 3 (10)       | 0 (0)           | 18 (30)     | 6 (10)       | 18 (30)      |
| No                                | 239 (52)       | 120 (75)       | 73 (100)     | 29 (90)      | 40 (100)        | 42 (70)     | 54 (90)      | 42 (70)      |
| **Knowledge of Proper Channel of Reporting** |                |                |              |              |                 |             |              |              |
| Yes                               | 244 (53)       | 40 (25)        | 0 (0)        | 3 (10)       | 0 (0)           | 18 (30)     | 6 (10)       | 18 (30)      |
| No                                | 216 (47)       | 120 (75)       | 73 (100)     | 29 (90)      | 40 (100)        | 42 (70)     | 54 (90)      | 42 (70)      |
| **Knowledge of Mode of Transmission** |                |                |              |              |                 |             |              |              |
| Yes                               | 129 (28)       | 8 (5)          | 0 (0)        | 0 (0)        | 0 (0)           | 27 (45)     | 0 (0)        | 24 (40)      |
| No                                | 331 (72)       | 152 (95)       | 73 (100)     | 32 (100)     | 40 (100)        | 33 (55)     | 60 (100)     | 36 (60)      |
| **Knowledge of Risk Factors**     |                |                |              |              |                 |             |              |              |
| Yes                               | 46 (10)        | 8 (5)          | 0 (0)        | 0 (0)        | 0 (0)           | 36 (60)     | 12 (20)      | 30 (50)      |
| No                                | 414 (90)       | 152 (95)       | 73 (100)     | 32 (100)     | 40 (100)        | 24 (40)     | 48 (80)      | 30 (50)      |

PMVs = Patent Medicine Vendors, TBAs = Traditional Birth Attendants, TH = Traditional Healers, BS = Bone Setters, CL = Community Leaders, HW = Health Workers, LT = LGA Team.
We found that a higher percentage of Health Workers (30%) had reported at least 1 AFP case in the last 3 years compared with other groups, while 17% of all PMVs have reported AFP cases at least once within that period. Traditional Healers and Mothers have never reported any AFP cases before. We found AFP Posters and Case Definitions at 100% of the LGA Teams offices visited, 50% of the Health Facilities visited, 35% of the PMVs posts Visited and 16% of the Bone Setters Visited. Traditional Healers do not have any posters and case definitions, while only 10% of TBAs and Community Leaders could show us AFP posters and Case Definitions. Compared to other groups, a larger percentage of PMVs (48%) could adequately define AFP, while 30% of health workers and LGA teams also knew the case definition. Traditional Healers and Mothers are not aware of AFP case definitions. 53% of TBAs could tell us the proper channel of reporting suspected AFP cases, while 30% each of LGA teams and Health Workers also knew it. None of the Traditional Healers or Mothers could tell us the proper channel of reporting suspected AFP cases while only 10% of Bone Setters had the knowledge.

We found better knowledge of modes of transmission of the poliovirus among healthcare workers and LGA team members; 40% and 45% respectively, while 28% of PMVs could also tell us the correct modes of transmission, along with only 5% of TBAs. Traditional Healers, Bone Setters, Mothers and Community Leaders could not tell us the correct modes of transmission of the poliovirus. We also found similar results when asking questions about knowledge of risk factors as 50% of healthcare workers and 60% of LGA team members could tell us the risk factors predisposing children to infection with the poliovirus. None of the Traditional Healers, Bone Setters and Mothers could adequately identify the risk factors for contacting the poliovirus.

4. Discussion

This study presents the comprehensive view of the surveillance improvement intervention conducted in selected LGAs in Oyo State, the category of places where active/retroactive case search was conducted, the improvement recorded, benefits of the intervention, the key lesson learned, challenges that led to poor surveillance performance and the identified opportunities that contributed to the good results post intervention.

The community-based healthcare service providers (PMVs, TBA, bone setters, traditional healers) identified and visited within the settlements of the 24 prioritized LGAs constitute greater than half (53%) of the health-seeking places where the active/retroactive case search and AFP surveillance sensitization were conducted during the intervention period. Worthy of note is also that households visited within the settlements constitute 36 times the total healthcare service providers visited. This is consistent with the method used in a project conducted in Ethiopia by Dora et al. (2013) which yielded doubling of reported AFP cases when community-based surveillance was implemented [1].

A sensitive AFP surveillance system will capture all the suspected AFP cases
within the communities and those reporting at the health facilities with signs and symptoms consistent with AFP case definition [2] [3]. Our intervention benefited from case search at health facilities, and intensified visits to communities to search for AFP cases from house to house. These resulted in the detection of many AFP cases (at least 1) in all LGAs visited. We however found more AFP cases in the communities than in the health facilities, even though we found an appreciable number of cases during health facility record reviews. This agrees with the studies conducted in Congo Brazaville [4]. The number of missed cases seen during the activity goes a long way to establish the weak sensitivity of the AFP surveillance system in the LGAs prior to our intervention. There were lots of suspected AFP cases that fit the case definition, but the detection was too late to carry out any meaningful investigations [5]. Further probe about reasons for the non-reporting or late notification of these AFP cases suggested a few challenges including ignorance of the mothers, superstitions and perceived stigma attached to public discovery of the disease, as well as a broken link between the surveillance actors and the immediate community. The challenges listed above are consistent with the findings of Macama et al. in their Angolan study, as well as different studies in Hong Kong and Niger Republic conducted to find out the reasons for late notifications and non-reporting of true AFP cases [6] [7] [8].

The AFP surveillance performance indicators measure the sensitivity and quality of the surveillance system as well as to monitor countries’ progress towards the polio eradication journey. There is a remarkable improvement in the two core performance indicators post intervention with all the 33 LGAs in the State meeting the NP-AFP rate of ≥3/100,000 and stool adequacy of ≥80% whereas slightly over a half of the LGAs were meeting both indicators at baseline. Another important indicator is the NPENT isolation rate, which measure the sensitivity of the system in isolating the poliovirus from stool specimen. At baseline, the State, though meeting the WHO target of ≥10% NPENT rate, had rate a little above the target but rose to 23% post intervention. All these performance attest to the success of the intervention and suggest that the active case search was suboptimal prior to intervention. This result echoes the findings of similar interventions conducted in South Africa and Angola [9] [10] [11] [12].

During the visitation to the community-based healthcare service providers and health facilities, the service providers’ knowledge on AFP surveillance was assessed. Overall, a larger proportion of health workers have good knowledge of the polio mode of transmission and risk factors compare to other groups. This is not surprising since they may have encountered the knowledge in the course of their education and during the different trainings and peer-led learning they are opportune to assess. The availability of posters and AFP guidelines in all health facilities may have also contributed to the better knowledge. However, a larger proportion of the PMVs show better knowledge of the AFP case definitions and proper reporting channels. This finding is satisfactory as it indicates that most cases in the community that seek care from the PMVs will be reported [13]. Worrisome though is the proportion of health workers who are expected to be
better informed in terms of case identification and reporting channels, as this may suggest missing cases in the health facilities. Alarming but not surprising is that interviewed mothers and traditional healers especially could not tell us anything about AFP and poliovirus infections. This interesting finding point at areas that could be targeted for improvement. Inclusion of large number of traditional healers to the surveillance network as done with the PMVs and increasing the frequency of visitation for case search could help in this regard. Incorporation of AFP sensitization in health talks to mothers during vaccination could also help improve caregivers’ knowledge and reporting of AFP cases. Approximately 24 Local Government Areas (LGAs) were included in the study, accounting for only 72.7 percent of the state’s LGAs. Because of the restricted availability of funding resources, the surveillance augmentation plan was only implemented for one week during each phase. Limited implementation in hard-to-reach villages due to bad terrain and insecurity. The impact of the surveillance enhancement plan was restricted due to a lack of enough human resources to carry out some of the anticipated advances. There aren’t enough past research studies on the subject. This explains some of the study’s limitations.

5. Conclusion

In 2021, the AFP surveillance performance indicators in Oyo State’s 24 LGAs with sub-optimal AFP surveillance indicators may have improved significantly because of the various activities and innovations implemented to increase AFP monitoring in these areas. Other Nigerian states and nations across the world with inadequate AFP surveillance should duplicate our initiatives, as do we. Even though Nigeria has been declared polio-free, the state government and development partners should continue to implement these innovations and use the polio structure to control and prevent epidemics, now and in the future.

Ethics Approval and Consent to Participate

The analysis for this work is based on secondary data. This data is available at the WHO server api.whonghub.org/whonghub and permission was given by WHO country office. Data collected, collated, and used were readily accessed from the available database for polio surveillance. All methods were carried out in accordance with Helsinki Declaration. Written informed consent was obtained from all participants prior to the interview.

Availability of Data and Materials

The data were generated as part of the activities supporting disease surveillance and routine immunization in Nigeria. The data are kept at the WHO server and are subject to protection.

Authors’ Contributions

BEB conceived and led the study design, interpretation of results, and manu-
script conceptualization and preparation. WKM, AMA, MRG, RIO, OOK, OM, OA, OO, IAO, ATA, OSO, and OTL reviewed the first draft, conducted a systematic literature review, data management and interpretation. All authors read and approved the final manuscript.

Acknowledgements

We wish to acknowledge the tireless and selfless effort of the personnel at the State and LGA levels.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] Dora, C., Filimona, B., Ellen, C. and Penny, A. (2013) Reaching beyond the Health Post: Community-Based Surveillance for Polio Eradication. Development in Practice, 23, 69-78. https://doi.org/10.1080/09614524.2013.753410

[2] Muzondo, M., Shamu, A., Shambira, G., et al. (2018) Evaluation of the Acute Flaccid Paralysis (AFP) Surveillance System in Mwenezi District, Masvingo, 2018: A Descriptive Study. BMC Research Notes, 11, 875. https://doi.org/10.1186/s13104-018-3981-6

[3] Shah, N.K., John, T.J., Thacker, N., Vashishtha, V., Kalra, A. and Ugra, D. (2006) Polio Eradication Strategies in Indian Recommendations under IAP Action Plan 2006. Indian Pediatrics, 43, 1057-1063. http://www.ncbi.nlm.nih.gov/pubmed/24033476

[4] Alleman, M.M., Meyer, S.A., Mulumba, A., Nyembwe, M., Riziki, Y., Mbule, A., Mayenga, M. and Coulibaly, T. (2014) Improved Acute Flaccid Paralysis Surveillance Performance in the Democratic Republic of the Congo, 2010-2012. The Journal of Infectious Diseases, 210, S50-S61. https://doi.org/10.1093/infdis/jit670

[5] Wassilak, S.G.F., Williams, C.L., Murrill, C.S., Dahl, B.A., Ohuabunwo, C. and Tangermann, R.H. (2017) Using Acute Flaccid Paralysis Surveillance as a Platform for Vaccine-Preventable Disease Surveillance. The Journal of Infectious Diseases, 216, S293-S298. https://doi.org/10.1093/infdis/jiw593

[6] Lam, R.M.K., Tsang, T.H.F., Chan, K.Y., Lau, Y.L., Lim, W.L., Lam, T.H. and Leung, N.K. (2005) Surveillance of Acute Flaccid Paralysis in Hong Kong: 1997 to 2002. Hong Kong Medical Journal, 11, 164-173. https://www.ncbi.nlm.nih.gov/pubmed/15951581

[7] Diaye, S.M., Quick, L., Sanda, O. and Niandou, S. (2003) The Value of Community Participation in Disease Surveillance: A Case Study from Niger. Health Promotion International, 18, 89-98. http://www.ncbi.nlm.nih.gov/pubmed/12746380 https://doi.org/10.1093/heapro/18.2.89

[8] Kamso, J., Mvika, E.S., Ota, M.O., Okeibunor, J., Mkanda, P. and Mihigo, R. (2016) The Contribution of the Polio Eradication Initiative to Narrowing the Gaps in the Health Workforce in the African Region. Vaccine, 34, 5150-5154. http://www.ncbi.nlm.nih.gov/pubmed/27395564 https://doi.org/10.1016/j.vaccine.2016.05.061

[9] Khuzwayo, L.S., Kuonza, L.R. and Ngcobo, N.J. (2013) Evaluating the Acute Flaccid
Paralysis Surveillance System in South Africa, 2005-2009: An Analysis of Secondary Data. *The Pan African Medical Journal*, **14**, 86. https://doi.org/10.4314/pamj.v9i1.71208

[10] Macama, A., Okeibunor, J., Grando, S., Djibaoui, K., Yameogo, R.K., Morais, A., Gasasira, A.N., Mbaye, S., Mihigo, R. and Nshimirimana, D. (2014) Reasons and Circumstances for the Late Notification of Acute Flaccid Paralysis (AFP) Cases in Health Facilities in Luanda. *The Pan African Medical Journal*, **18**, 239. https://doi.org/10.11604/pamj.2014.18.239.3770

[11] Global Polio Eradication Initiative. WHO Polio Weekly Global Surveillance Update. http://www.polioeradication.org/

[12] Saleh, M., Al-Serouri, A. and Break, A. (2013) Ministry of Public Health and Population in Yemen. Evaluation of Acute Flaccid Paralysis Surveillance System in Costal Hadramaut Governorate, Yemen. https://www.dropbox.com/s/k9htb1zifucu6wl/1st%20Y-FETP%20National%20Conference%20Book%2028-29%20Feb%202014.pdf?dl=0

[13] Bassey, B., Gasasira, A., Mitula, P., Frankson, U. and Adeniji, J. (2011) Surveillance of Acute Flaccid Paralysis in Akwa Ibom State, Nigeria 2004-2009. *The Pan African Medical Journal*, **9**. https://doi.org/10.4314/pamj.v9i1.71208