

## Introduction of inactivated polio vaccine in the Center East region of Burkina Faso in 2018: lessons learned

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### Summary

#### Introduction:

To reduce the risk of re-emergence of type 2 poliovirus and boost children's immunity to type 1 and 3 poliovirus, Burkina Faso introduced inactivated polio vaccine (IPV) into routine immunization in 2018. This study was carried out to describe and draw lessons from the process of introducing this new vaccine into the local health system of Central East health region in Burkina Faso.

#### Materials and method

This was a descriptive cross-sectional study that covered the 7 health districts in the Central East region. It combined quantitative and qualitative methods in order to describe the process of introducing IPV and to collect the opinion of beneficiaries.

#### Results

A total of 223 health workers in 93.0% of health centers in the region and 39 mothers of children vaccinated with IPV participated in the survey. The staff responsible for coordinating the intervention had 6.5 years of experience in the management of vaccination programs (SD = ± 2.6 years) compared to 7.7 years (SD = ± 2.3 years) for health center workers. Over 87.0% of target children had received vaccination two months after the introduction of IPV with an average of 39.2 children per health center (SD = ± 0.37). The average age of children who received IPV vaccine was 4.25 months (SD = ± 0.37). The proportion of vaccinated children who presented with minor adverse events following vaccination was 9 %. Only 58.9% of

surveyed mothers knew what disease their child had been vaccinated against.

## Conclusion

This study described the process of introducing IPV into the Central East region as well as beneficiaries' perception of this new vaccine. It revealed the need to give a particular emphasis on communication with beneficiaries in order to strengthen their support and anticipate any reluctance in the strategy implementation.

## Keywords

Inactivated poliomyelitis vaccine, vaccination, Burkina Faso.

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## Introduction

In 2015, following the eradication of wild type 2 poliovirus and the use of bivalent oral polio vaccine (bOPV) living in routine vaccination, the World Health Organization (WHO) recommended introduction of at least one dose of inactivated polio vaccine (IPV) into the routine immunization schedules of countries using bOPV [1]. As a result of the Global Polio Eradication Initiative's ongoing efforts, the vision of which is consolidated in the 2013-2018 Strategic Polio Eradication Plan, the use of IPV aims to reduce the risk of re-emergence of type 2 polio and boost immunity against poliovirus types 1 and 3 in order to speed up their eradication in infected areas (Afghanistan, Pakistan and Nigeria) [2]. Determined to complete the eradication of all polioviruses (wild, derived from a vaccine strain or associated with the Sabin vaccine), the strategic polio eradication plan aims to achieve the following four objectives: detection of poliovirus and the interruption of its transmission, the strengthening of vaccination systems as well as the withdrawal of the oral polio vaccine, certification and finally, the planning of the transmission of the achievements of the fight against poliomyelitis to the health system [1,2]. Also in accordance with WHO guidelines, Burkina Faso has

developed a series of actions combining clinical and virological surveillance using the case definition of acute flaccid paralysis with vaccination using OPV in children 0 to 18 months (routinely and in the form of campaigns). Thanks to these efforts, no case of wild polio virus has been notified in Burkina Faso since 2010, which has earned the country to be described as "liberated from Polio Wild Virus" by WHO in 2015 [3, 4]. To reinforce this achievement, a plan to introduce IPV into routine vaccination was adopted by the Burkinabè ministry of health in February 2018 and allowed the start of systematic vaccination of children from their 16th week of life in all health centers in the country [5]. Like Burkina Faso, other countries such as Cameroon, Kenya, Nigeria, China and Bangladesh have also introduced IPV into their health systems with satisfactory results from the point of view of the compliance of populations and health personnel [6-9]. This study was carried out to describe the process of introducing this new vaccine into the systematic vaccination system of the Center East region in Burkina Faso and to collect the perception of beneficiaries.

## Materials and method

### Study framework

The study was conducted in the Central East region (RCE). In 2018, the RCE had 1,607,992 inhabitants spread across 7 health districts and 155 peripheral health centers. The average radius of action for the health region was 5.2 km. The number of new contacts per capita was 2.92 for children under the age of 5 and 1.27 for the general population in 2017 [10,11].

### Type of study

This was a descriptive cross-sectional study that covered the 7 health districts of the Central East region. She combined quantitative and qualitative methods to describe the process of introducing IPV into routine immunization and to collect the mothers' perception of vaccinated children.

## Study period

The study spanned a five-month period (July to November 2018) with a 56-day data collection that covered the first 42 days following the introduction of IPV in RCE health centers ( D0 to two (2) weeks after D42).

**Target population** The study's target population consisted of children aged 0-5 years of the RCE (305,230 children), mothers of the children and health personnel. **Sample and sampling** Selection of data collection sites An exhaustive sampling of the 7 health districts and 155 health centers in the region was carried out. Selection of mothers of children 0-18 months The choice of mothers used as a sampling frame, the list of children who had already benefited from IPV. From this basis, a simple random drawing of 39 children whose mothers were included in the study was carried out. Selection of health personnel Two hundred and thirty-seven (237) health workers made up of all 155 health center managers, 54 randomly selected immunization officers and 28 reasoned district managers were selected from the sample. **Data collection techniques and tools** The following collection techniques were used: document review, observation and individual interview. Data were collected using a self-administered questionnaire (for staff), an observation guide and an interview guide (with mothers). **Collection of data** The data was collected in two (2) stages. A first collection was carried out during the first 42 days following the introduction of IPV in health centers (from D0 to D42). The second collection was carried out from D43 to D58. **Study variables** Variables relating to the human resource involved in the management of vaccination, the profile of the mothers of vaccinated children, communication, public acceptance of IPV and adverse post-injection manifestations have been described. **Data analysis** The quantitative data were entered in an input mask developed on the Epi info 7 software before their analysis. It was a descriptive analysis based on

the comparison of proportions. For qualitative data, a preliminary analysis was done throughout the data collection period in order to be able to incorporate additional questions on emerging themes. Then, use was made of the content analysis technique. The information obtained during the interviews was triangulated with that obtained through quantitative methods. **Ethical considerations** The first main ethical issue in this study lay in respecting the confidentiality and anonymity of the mothers of children benefiting from IPV who were asked to entrust information. The purpose of the survey was previously described by the investigators to these mothers. They were free to accept or refuse to answer questions. For those who accepted, free and informed consent was signed. They had the right not to answer questions without having to give reasons for this refusal. For the ethical issue related to the manipulation of data for aspects related to confidentiality, the data collected has been made anonymous and confidentiality has been safeguarded. **Results** Profile of health personnel surveyed Of the 237 agents selected, 223 actually participated in the survey, representing a participation rate of 94.1%. Distributed in 93.0% of the RCE health centers, these health workers represented the main players in implementing the activities planned in the plan to introduce IPV into the RCE. The coordination of this project was ensured in the seven districts by 28 managers, including 7 managers from the district EPI office, 7 doctors, district chief, 7 health promotion managers and 7 statistics managers. With an average of 6.5 years of experience in managing immunization programs (TE =  $\pm$  2.6 years), they had all benefited from training on the introduction of IPV. In the health centers, 195 agents (144 health center managers and 51 immunization managers) with experience of 7.7 years (SE =  $\pm$  2.3 years) were surveyed. seventeen percent (97.0%) had received training on the introduction of IPV into routine immunization.

### • Profile of beneficiaries surveyed

A total of 39 mothers of children vaccinated with IPV were interviewed. The average age of these mothers was 26 years (SE = ± 4.4 years) with extremes of 16 and 38 years. Their children had an average age of five (5) months (SD = ± 4.3 months). The youngest child was 5 months old, while the oldest was 12 months old.

- Activities carried out at district level as part of the introduction of IPV

On June 18, 2018, EPI office managers and chief medical officers from the 7 districts underwent one-day training at the regional health directorate level on the introduction of IPV into routine immunization. On their return to the district, they also led a one-day training course for the benefit of the EPI managers and the nurses responsible for the health centers. These trainings took place in the districts between June 19 and June 30, 2018, and members of district management teams also took part in this training. From interviews carried out, 98.6% of the health staff of the health centers confirmed that the training had indeed taken place at the district level.

During the period from June 18 to July 10, 2018, the managers of the EPI offices of the 7 districts of the region obtained IPV vaccines and consumables necessary for one month of consumption. This supply was made at the level of the regional health directorate where the IPV was pre-stored in a cold room at a temperature varying from two (2) to eight (8) degrees according to the temperature reading of the regional directorate of health.

It was a liquid vaccine that came in the form of a 5 ml (10 doses) bottle. Each vial of IPV contained a clear, colorless solution of inactivated strains of polio virus type 1, 2 and 3. Concurrently with these actions, and for a period of one month, the management teams of the 7 districts carried out communication activities towards the populations, the authorities and the health personnel of the districts. These included the production of radio broadcasts, the broadcasting of administrative announcements on the radio, the broadcasting of radio spots and advocacy

meetings with administrative and community authorities. Two weeks after the introduction of IPV, the district coordination teams carried out supervision trips by health center agents with the support of three technicians from the regional health department on the use of IPV.

- Activities carried out at health center level as part of the introduction of IPV At the health center level, after taking part in training on the introduction of IPV at the district level, staff removed the vaccines and consumables from the district EPI offices. The survey shows that 96.5% of health centers were supplied with IPV before July 13, 2019 (deadline given in regional guidelines). Health center managers also facilitated orientation sessions (debriefing) for community health workers (65.6% of health centers) and other health workers in IPV health centers (96.2 % of health centers). They also carried out advocacy activities with community leaders (65.6% of health centers) as well as communication activities such as: announcing town criers or griots (68.6% of health centers) , chat sessions with mothers of children targeted by the IPV (95.3% of health centers), radio broadcasts (23.3% of health centers), awareness-raising in places of Muslim or Christian worship (56.3% of health centers) and awareness-raising in households by community health workers (59.4% of health centers)

Knowledge of mothers on IPV From interviews, it emerged that 95.7% of mothers had already heard of the introduction of a new vaccine into routine EPI. However, only 58.9% of mothers of children vaccinated with IPV knew what disease their child had been vaccinated against. About 80.0% of them knew that IPV prevented a paralyzing disease. Furthermore, 15.6% of mothers reported the following information: "The health workers gave me the information but I forgot."

- Start date of vaccination with IPV in health centers Although the official start date of the IPV is July 20, 2018 for the entire region, the health centers in the region have actually started the vaccination of children with the IPV over a period of time extending from July 16 to

August 6, 2018 However, as Figure 1 shows, the majority of health centers (67.1%) met the July 20 date. Also, 3.6% of health centers

started using IPV before July 20, while 28.6% did so after that date (see Figure 1).

3,6 % health centers	67,1 % health centers	28,6 % health centers
16 July 2018	20 July 2018	6 August 2018

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**Figure 1:** Time scale of the effective start of vaccination with IPV in health centers in the Center-East region in 2018. • Mothers' membership in the VPI In general, the mothers welcomed the new vaccine. They believed that IPV strengthens the health of their children. However, according to data reported from 9 health centers, some mothers have expressed concerns about the number of injections children receive in a single immunization session (three injections on the same day). So a 28-year-old mother reported: "There are too many injections at the same time, our children will be hot." Another 36-year-old mother added, "There are too many injections at the same time. It will increase the tears and fevers of our children ". In addition, three (3) cases of reluctance have been reported in health centers. The mothers allegedly pretended that they were going to prepare and come back another time. • Situation of children vaccinated with IPV in the region Out of a total of 6,181 EPI target children vaccinated during the study period, 5,411 had received IPV, representing 87.5% vaccination coverage. The average of children vaccinated by health center was 39.2 children (SD = ± 0.37). The sex ratio of children

## Discussion

Like other countries in the WHO African Region, Burkina Faso has committed to introduce IPV into its routine EPI in order to reduce the risk of re-emergence of type 2 poliovirus and boost immunity against poliovirus types 1 and 3 [12, 13]. In 2018, under the coordination of the vaccination prevention department, the 13 health regions of Burkina Faso developed activities to operationalize this intervention. The aim of

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n=140⇒

immunized with IPV was 0.92 in favor of girls. Their mean age was 4.25 months (SE = ± 0.37). About 17% of these children were vaccinated outside health centers at advanced sites (advanced strategy). Almost 90% of children vaccinated with IPV also benefited from two other injectable vaccines at the same time (DTP-HepB-Hib3 and Pneumococcus). Situation of adverse post-vaccination manifestations (AEFI) in children vaccinated with IPV in the region

In total, 50 children presented with minor AEFI after administration of IPV, i.e. a proportion of appearance of minor AEFI of 9 %. These AEFI were essentially of four (4) types: fever (80.0%), pain (5.0%), vomiting (5.0%), diarrhea (5.0%), and local redness-like reactions (5.0%). Only four (4) notification cards for these AEFIs were completed by the health personnel.

Four (4) lots of IPV vaccines were affected by these AEFIs. These are: lot N ° P3C12 accused in 58% of AEFI, lot N ° P3612V accused in 8% of AEFI, lot N ° P3612V accused in 8% of AEFI and lot N ° P3C121VH involved in 6% of MAPI registered.

In addition, no case of major AEFI has been reported.

this study was to describe the process of introducing IPV into the routine immunization system in the NCE. To do this, it used the systematic review of activity reports related to the introduction of IPV, the collection of the perception of beneficiaries as well as the analysis of events following administration of IPV as a methodological description approach and analysis of the facts. About 93.0% of the RCE health centers were covered by the study. In 2015, to document the introduction of the meningococcal serogroup A conjugate

vaccine (PsA-TT, MenAfriVac™), Meyer and colleagues used a national survey using stratified cluster sampling in Burkina Faso [14]. In the same year, Djingarey et al. collaborators used a literature review of national guidelines and reports to document the introduction of the same vaccine (PsA-TT, MenAfriVac™) in the belt countries meningitis [15]. The same was true for Soleine Scotney, which learned from the introduction of IPV in Cameroon, Kenya and Nigeria in 2017 [6]. As for Dan Zhao and collaborators, they had to use an interview with 83 health workers and 40 parents of children who had received IPV in 12 health centers to document the introduction of IPV in China in 2017 [7]. The choice of the exhaustive sampling carried out by this study is explained by the size of its field which was limited to a relatively well circumscribed geographical and administrative entity. It was a single health region that covered 7 health districts and 155 health centers. In addition to this approach, the originality of this study lies in part in the prospective collection of data during the first 42 days following the introduction of IPV in the health centers of the RCE. In fact, according to the Guide for the introduction of IPV based on the strategic plan for the eradication of polio and the final phase 2013-2018 published in 2017 by the WHO, these first 42 days are decisive in taking any corrective measures. [15]. Scotney maintains that this follow-up would not only improve public acceptance of the new vaccine, but would also strengthen routine vaccination [6]. Notwithstanding these strengths, it should be noted that the relative small size of the beneficiaries interviewed (39) and the fact that variables related to the cost of this process are not taken into account constitute a limitation of this study. The IPV introduction process included capacity building for health workers responsible for immunization in health centers. Also more than 98% of health personnel have been trained in the management and use of this new vaccine. They also benefited from specific supervision carried out by a joint team made up of staff from the regional health directorate and district management teams. In China, 93% of

health workers had received training on the introduction of IPV. However, in China, supervision actors on the use of IPV had been integrated into the routine supervision of health centers [7]. This finding suggests that this process of introducing IPV into routine NCE vaccination has been an opportunity to strengthen the skills of health personnel from health centers in the region. By making a similar observation in Cameroon, Kenya, and Nigeria, Scotney noted that training and supervising health personnel on the introduction of IPV would overall strengthen the capacities of health centers [7].

In addition, the RCE used a liquid vaccine contained in a 5 ml bottle making it possible to vaccinate ten children at the rate of 0.5 ml per dose and per child. Vaccines used in other countries of the WHO African region had a similar presentation [12,17]. While this presentation of IPV has the advantage of reducing the amount of vials to be stored, unfortunately it could be a missed opportunity for some children to get vaccinated. Indeed, some agents would wait to have a minimum of 10 children before opening a bottle. Liu Yan noted similar difficulties in Hangzhou [9].

In terms of compliance with the guidelines for the introduction of IPV into the routine EPI in the RCE, although all the districts carried out the planned operational activities, only 67.1% of the health centers had actually started using the IPV on the scheduled date. This not isolated observation could be explained by the conflicts of calendars, the scheduling of vaccination sessions in health centers which do not always coincide with the directive [2]. The proportion of mothers who were unaware of the disease for which their child had been vaccinated (41%) is indicative of insufficient communication with parents during vaccination sessions. This observation, which did not start people's acceptance of the new vaccine, corroborates the Ames HMRet study by Berlier [18, 19]. On the other hand, the proportion of AEFI reported (9 ‰) and the apprehensions of parents and children suggest under-notification of these insofar as AEFI is one of the frequent reasons for their reluctance to have their children vaccinated

[20-23]. Conclusion This study, which covered the process of introducing IPV into RCE as well as the first 42 days of its use, described the work of healthcare professionals as well as the beneficiaries' perception of this new vaccine. Although this introduction was generally successful, this experience reveals the need to put a particular emphasis on communication with beneficiaries in order to strengthen their support and anticipate any reluctance. It also shows the contextual factors that can influence compliance with vaccination program guidelines, however it would be wise to carry out an in-depth evaluation including effectiveness, efficiency and sustainability criteria in order to better assess this intervention.

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