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Original Research

Profiling the immunity status of children with non-polio acute flaccid paralysis who had not received any doses of oral polio vaccine in the South–South region, Nigeria 2011–2014

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ABSTRACT

Objectives: To demonstrate the immunity status of children with non-polio acute flaccid paralysis (NP AFP) reported through the AFP surveillance system in the South–South region of Nigeria.

Study design: A retrospective study was conducted using AFP surveillance data collected routinely between January 2011 and December 2014 by the Disease Surveillance Department of the regional health service and the World Health Organization (WHO)-accredited regional reference polio laboratory. All cases of AFP reported to the Disease Surveillance Network from all six zones during this period were included in the study.

Methods: In total, 5111 cases of AFP in children aged ≤15 years were reported between 2011 and 2014. These cases were investigated and verified by WHO surveillance officers using a standard questionnaire, which captured the number of doses of oral polio vaccine (OPV) received by the child. Two stool samples were collected for each case, 24–48 h apart, within 14 days of the onset of paralysis, and transported to the national polio laboratory under reverse cold chain storage. Data retrieved were stored in an AFP database hosted by the WHO server. EPIINFO software was used to query the database and extract the information required for analysis in this study.

Results: The percentage of children who had received at least three doses of OPV (which serves as a threshold to measure immunity status) decreased from 87% in 2011 to 82% in 2014. The percentage of children who had not received any doses of OPV decreased from 2% in 2011 to 1% in 2014. Forty-eight percent of the children who had not received any doses of OPV were aged <1 year.

Conclusion: Given the decrease in OPV immunity status, the region risks re-introduction of poliovirus. Swift steps should be taken to improve the immunization coverage, which would boost immunity status in Nigeria.

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Introduction

Poliomyelitis is an acute communicable disease of humans caused by the wild poliovirus (WPV), a human enterovirus of the *Picornaviridae* family. This virus is composed of a single-stranded positive-sense RNA genome and a protein plasmid. It also consists of three genetically distinct serogroups.[1]

The WPV is transmitted through oral contact with secretions or faecal materials from a person who is infected. One in 200 infections can lead to irreversible paralysis. There is no present cure for poliomyelitis. Therefore, prevention is only possible through immunization using the oral polio vaccine (OPV).[1]

Developed in 1961 by Albert Sabin, the OPV consists of a mixture of the three live-attenuated poliovirus serotypes (Sabin types 1, 2 and 3), selected for their lower neurovirulence and reduced transmissibility.[2] In accordance with the National Expanded Programme on Immunization schedule, a minimum of three OPV doses should be given to each child at 6, 10 and 14 weeks of life (4 weeks apart).[3] This normally generates a protective immune response against subsequent infections. However, the number of doses required to immunize a child depends entirely on the child's health, nutritional status and the number of viruses to which the child has been exposed.[4] This means that the child has to be immunized multiple times for the vaccine to be effective and to confer lifelong immunity. It also highlights the need to immunize every child in every vaccination round of the national immunization plus days.[4]

Worldwide, the number of WPV cases has decreased from >350,000 cases in 1988 to 359 cases in 2014.[5] This follows decisions made at the 1988 World Health Assembly on the eradication of poliomyelitis. In Nigeria, the last case of polio was reported on 24 July 2014,[6] showing that the country is well on its way towards eradicating the virus.

The South–South (Niger Delta) region of Nigeria consists of six states: Akwa Ibom; Bayelsa; Cross River; Delta; Edo and Rivers. A sensitive acute flaccid paralysis (AFP) system is relied upon to identify and confirm cases of poliomyelitis caused by viral isolation. The World Health Organization's (WHO) target for case detection and adequate stool specimen collection monitors surveillance performance. Globally, an AFP surveillance system must be sufficiently sensitive to detect at least two cases of non-polio AFP (NP AFP) per 100,000 children aged ≤15 years.[7] It should be noted that all six states mentioned previously surpassed the global indicator rate; for example, the AFP system in Delta state is sufficiently sensitive to detect at least 10 cases of non-polio AFP per 100,000 children aged ≤15 years. The system also aims to investigate at least 80% of all cases of AFP with adequate stool specimens collected within 14 days of initial onset of paralysis.[8]

Despite the improved AFP surveillance system, concerns remain regarding the OPV immunity status in the region as the country marches towards complete polio eradication. As such, this study investigated the immunity status of cases of NP AFP reported through the AFP surveillance system in Niger Delta, Nigeria between 2011 and 2014.

Methods

Study location

This study was conducted in the Niger Delta region of the South–South geopolitical zone of Nigeria. It is referred to as the Niger Delta region because it consists of the six oil-producing states in Nigeria: Akwa Ibom; Bayelsa; Cross-river; Delta; Edo and Rivers. The region is strategically located at the point where the 'Y' tail of the River Niger joins the Atlantic Ocean through the Gulf of Guinea. It extends over 70,000 km^2 and represents 7.5% of Nigeria's land mass.

The six states within the region have a total of 123 local government areas (LGAs), as follows: Akwa Ibom (31); Bayelsa (8); Cross River (18); Delta (25); Edo (18) and Rivers (23).

As such, 123 LGA disease surveillance and notification officers (DSNOs), 1738 surveillance designated sites and >7000 community informants are involved in the surveillance network across these six states.

Study design

A retrospective study was conducted using AFP surveillance data collected routinely between January 2011 and December 2014 by the Disease Surveillance Department of the regional health service and the WHO-accredited regional reference polio laboratory. All cases of AFP reported to the Disease Surveillance Network during this period from the six states were included in the study.

Study population

The study population consisted of all 5111 cases of AFP in children aged ≤15 years that were reported by the regional WHO surveillance system from 1 January 2011 to 31 December 2014.

Data collection methods

All cases of AFP reported in children aged ≤15 years were detected through active surveillance by a network of surveillance officers in all 123 LGAs of the six states in the Niger Delta region from 1 January 2011 to 31 December 2014.

The DSNOs collected two stool samples at least 24–48 h apart within 14 days of the onset of paralysis for each case. WHO staff verified and confirmed the cases as true AFP. The stool samples were transported to the laboratory for analysis. The DSNOs obtained verbal consent from parents or caregivers before the collection of stool samples. Note that a true case of AFP in a child aged ≤15 years must show signs of sudden onset of weakness, floppiness or paralysis in one or more limbs.

During case verification, a standardized questionnaire was used to conduct the community survey as part of a detailed investigation of cases of NP AFP; this is part of the polio eradication programme. WHO officers administered the questionnaire, and the DSNOs served as interpreters to facilitate communication to respondents.