

## Review Article

# An Evaluation of the Acute Flaccid Paralysis (AFP) Surveillance System in Zvimba District, Mashonaland West Province; a Descriptive Cross Sectional Study

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## Abstract

**Background:** In 2013, Zvimba district investigated 7 cases of AFP. Among the seven cases investigated, three had stool specimens collected more than 21 days after the onset of symptoms against a target of within 14 days. Only one of the seven cases had physical examination after 60 days from onset of symptoms. We therefore carried out this study to evaluate the AFP surveillance system in Zvimba district, Mashonaland West Province, Zimbabwe.

**Methods:** A descriptive cross sectional study was conducted at 36 health facilities in Zvimba District, Zimbabwe. Structured questionnaires, checklist and AFP notification forms were used to collect data. Permission to proceed was sought and granted from the Mashonaland West Provincial Medical Director, Zvimba District Medical Officer and the Zimbabwe Health Studies Office.

**Results:** Eighty-five percent of respondents were nurses. The median years in service was 7 years ( $Q_1=4$ ;  $Q_3=10$ ). Knowledge was good (83%). Ninety-six percent were willing to participate in the surveillance. Twenty four percent had ever completed an AFP form and eighty one percent reported that completion of the form was simple. All the 36 health centres in the district were accessible by road and had a cell phone and a working network reception. No form had laboratory results. Ninety nine percent perceived the AFP surveillance system as useful and 82% used data at local level.

**Conclusion:** knowledge of health workers was good. The AFP surveillance system was useful, simple, stable, sensitive and representative. However the system was not timely. Completeness of data on the notification forms was also poor. Follow up physical examination on AFP cases was not done.

**Keywords:** Acute flaccid paralysis, Polio, Surveillance, Zvimba district, Zimbabwe

## Introduction

Poliomyelitis is an infectious disease caused by the polio virus which affects mostly young children below fifteen years of age. The natural or wild polio infects human beings only. The virus is contracted through faecal-oral route. The incubation period for poliomyelitis is seven to fourteen days. Symptoms of polio infection include fever, headache, stiff neck, muscle pain, nausea, vomiting and diarrhoea [1,2].

About one per 200 of infected people develop some degree of paralysis which is sudden and rapid and often reach full development within a few hours but usually within three days. Guillain-Barre Syndrome and acute transverse myelitis are common differential diagnosis of poliomyelitis [3]. This is the reason why it is necessary to investigate all cases of Acute Flaccid Paralysis for polio. The definite diagnosis for polio is isolation of the poliovirus from patient's stools [1,2,3].

Polio is targeted for eradication. A region can consider certification when all countries in the region demonstrate the absence of wild poliovirus transmission for at least three consecutive years

in the presence of certification standard surveillance. In addition, all facilities holding wild poliovirus infectious and potentially infectious materials must have implemented bio-containment measures according to the Global action plan for laboratory containment of wild poliovirus [2].

Out of the six WHO regions, four regions have so far been certified polio free, with two regions yet to be certified polio free. The certified regions are: WHO Region of the Americas (1994); the Western Pacific Region (2000); the WHO European Region (2002) and the WHO South-East Asia Region (2014). The WHO Eastern Mediterranean and the WHO African Regions are yet to be certified as free from polio [3].

Disease surveillance is the ongoing systematic collection, analysis, interpretation and dissemination of data regarding a health-related event for use in public health action to reduce morbidity and mortality and to improve health [4].

The quality of AFP surveillance is measured by using a standard definition for sensitivity and completeness, as follows: a rate of one or more non-polio AFP cases per 100,000 population aged 15 years

or less with timely collection of specimens indicates that surveillance is sensitive enough to detect polio and allows comparison of AFP reporting completeness among and within countries [4,5].

Diagnosis of poliomyelitis is made when: virology laboratory confirms culture of polio in stool; residual paralysis persists beyond 60 days; death occurs within 10 days of onset of symptoms or lost to follow up [4,5,6].

Zimbabwe, as part of the WHO African Region is making efforts to get the free polio certification. In order to achieve this, we need to get high oral polio vaccine coverage and be able to maintain polio surveillance to meet the WHO polio surveillance indicators [6].

Zvimba District has 36 health facilities composed of Council, Government, Private and Mission owned facilities. In 2013, Zvimba district investigated 7 cases of AFP. Among the seven cases investigated, three had stool specimens collected more than 21 days after the onset of symptoms against a target of within 14 days. Only one of the seven cases had physical examination after 60 days from onset of symptoms. It is against this background that we set out to evaluate the AFP surveillance system in Zvimba district.

## Methods

A descriptive cross sectional study conducted in all the 36 health facilities in Zvimba district. Respondents on duty at each health centre who consented were conveniently selected into the study. The District Medical Officer, District Nursing Officer, District Environmental Health Officer and the District Health Information Officer were purposively selected as key informants.

The sampling frame for primary respondents was all health workers in Zvimba district. At 95% confidence level, using a surveillance study by C. Sibanda, Tsholotsho, Zimbabwe, 2009 (unpublished), assuming that 22% of the health workers had received training on AFP surveillance system, 10% precision, and using Dobson's formula:  $n = Z^2 p(1-p)/d^2 = 1.96^2 \times 0.22 \times 0.78 / (0.1)^2$ . A minimum sample size of 66 health workers was calculated.

Using Dobson's formula [ $n = Z^2 p(1-p)/d^2$ ], at 90% confidence interval ( $z=1.645$ ), proportion ( $p$ ) of AFP forms correctly filled in of 0.5 (for optimal sample) and an absolute precision ( $d$ ) of 20%, a minimum of 17 AFP case investigation forms were to be assessed.

A structured interviewer-administered questionnaire was used to interview health workers to determine their knowledge on the usefulness and operations of the AFP surveillance system. An interviewer guide was used to collect data from key informants. A checklist, using CDC guidelines on surveillance system evaluation was used to gather information on the system attributes. AFP notification forms from January 2013 to December 2013 were reviewed to check for data quality, completeness and timeliness of the system.

Permission to proceed was sought from the Provincial Medical Director for Mashonaland West Province, District Medical Officer for Zvimba District and the Health Studies Office. Informed written consent was sought from all the participants. The participants were interviewed privately and no information was disclosed to any persons other than those relevant to the study. Minimum disruption of normal health facility activities was assured.

Data were entered into Epi Info statistical software version 5.3.1. Data were checked for errors, omissions and duplications and were cleaned. Epi Info 5.3.1 was used for data analysis, to generate means, proportions and frequencies.

## Results

A total of 66 health workers were interviewed and the majority were nurses constituting 84.8% of the respondents. The median age in service was 7 years ( $Q_1=4$ ;  $Q_2=10$ ).

Knowledge of respondents on AFP surveillance was aggregated on a scale of 1-6 and graded as follows: poor (<3); average (3-4) and good (5-6). Majority of respondents had good knowledge (80.3%) while 10.6% had average knowledge and 9.1% had poor knowledge.

On acceptability, 63 respondents (95.5%) were willing to participate in the AFP surveillance while 58 respondents (87.9%) consistently did zero reporting and 62 respondents (93.95%) had no problems with the community during active search.

On simplicity, 66 respondents (24.2%), had ever suspected an AFP case and completed a notification form. Among the respondents who completed notification forms, 11 out of 16 took 15 minutes or less to complete the form while 5 respondents took between 15 and 40 minutes. None of the respondents reported that completion of the form was complicated. About 13 respondents (81.3%) reported that the completion of the notification form was simple while 3 out of 16 reported that it was time consuming. About 2 out of 16 respondents reported that they needed training on filling in the notification form while 14 did not need further training.

All the 36 health centres in the district are accessible by road and have a cell phone and a working network reception. Case definitions and flow charts were displayed in 28 out of 36 health centres. Specimen jars, cooler boxes, dial thermometers and AFP notification forms were available in a minimum of 25 out of 36 health facilities in the district.

On representativeness, all the 36 health centres in Zvimba district, including the seven private health centres participate in the AFP surveillance system. However six out of seven private health centres do not report consistently. Those six private health centres did not have AFP notification forms. About 27 respondents (40.9%) indicated that there are religious objectors in their catchment areas and they have engaged church community leaders to help improve the situation.

A total of seven AFP cases were investigated in 2013 in Zvimba District. All the seven notification forms were analysed and no notification form had laboratory results indicated. Two notification forms had no date indicating when the stool specimens were sent to the laboratory. Out of the seven cases investigated in 2013, three had stool specimens collected more than 21 days after the onset of symptoms against a target of within 14 days. Further inquiry revealed that those patients had presented to the health facility more than 21 days after the onset of symptoms and health workers had promptly collected the first stool specimens. All cases had two thumb sized stool specimens collected and had stool specimens submitted to the National Virology Laboratory within 72 hours of collection and at a temperature of +2°C to +8°C as recommended.

According to the WHO a sensitive AFP surveillance system is one that is able to detect at least 1 case of AFP per 100 000 children under 15 years per year. Zvimba District had a population of 170 050 for under 15 in 2013 and investigated seven AFP cases.

At least 80% of AFP cases should have a day 60 follow up examination for residual paralysis. Only one out of the seven cases only one case had physical examination after 60 days from onset of symptoms. Further inquiry into the reasons for not doing the follow up examination revealed that most health workers were not aware of the requirement and did not instruct the patients to return for the examination.

Among the respondents, 65 out of 66 perceived the AFP surveillance system as useful. About 51 respondents (77.3%) stated that they held surveillance meetings at local level. However none of the respondents from private health centres held surveillance meetings at local level. Though 51 respondents stated that they held surveillance meetings at local levels, only 38 respondents (58.5%) had minutes of such meetings. About 54 respondents (81.8%) reported using surveillance data at local level. About 27% of respondents had some public health actions taken based on AFP surveillance data that were collected at their respective health facilities. Among some of the public health actions taken were; carrying out AFP awareness campaigns (14/18) and implementation of active case search (11/18).

The cost of running the AFP surveillance System Zvimba district was calculated per month. It was assumed that the district investigates one case of AFP per month and mileage to the clinic was calculated based on distance to the furthest clinic. The Automobile Association of Zimbabwe rate of US\$0.40 per kilometre was used to calculate mileage cost. Assuming that when there is an AFP case, District Health Executive members (and one driver), would go to the health centre and to the community to investigate. The total cost of running the AFP surveillance system in Zvimba district is US\$317.00 per month.

## Discussion

Knowledge of health workers on the AFP surveillance system was good, however nearly 32% of the respondents were not aware that the targeted age group for AFP surveillance was under 15 years. This is consistent with study findings in Gwanda district, Zimbabwe, by Chimberengwa et al. (2012) in an AFP surveillance study, where some health workers were unaware of the targeted age group [7]. Lack of awareness of the target age group can be detrimental to the system as cases may be missed due to low index of suspicion.

Follow up examination was only done on one AFP case. Final classification of a case may not be possible in the absence of this follow up examination. This is similar to findings by Chimamise et al. in 2009 in Mberengwa district, Zimbabwe, where they found out that the 60 day follow up examination was not done [8].

Acceptability reflects the willingness of individuals and organizations to participate in the surveillance system. The majority of respondents were willing to participate in the AFP surveillance system, were consistent in zero reporting and reported no problems with the community during active search. The system AFP surveillance system in Zvimba district is therefore acceptable.

Most respondents perceived the AFP surveillance system as useful. When health workers perceive the system to be useful, they are more likely to participate constructively and diligently. Most respondents stated that they held surveillance meetings at local level. However none of the respondents from private health centres held surveillance meetings at local level. Though most respondents stated that they held surveillance meetings at local levels, only two thirds had minutes of such meetings. Failure to produce minutes of meetings purportedly held is an indication that such meetings were probably never held. Most respondents reported using surveillance data at local level. This is commendable since use of data at local level shows that the surveillance system is useful to them. Some respondents had some public health actions taken based on AFP surveillance data that were collected at their respective health facilities. Among some of the public health actions taken were: carrying out AFP awareness campaigns and implementation of active case search. Carrying out community awareness campaigns is very important as an informed community is able to report early in the event that there is a case in the community. Awareness campaigns are also an opportunity to engage religious objectors and hard to reach areas. All three health centres which reported AFP cases in 2013 conducted active case search during that period. This is very important in order to identify secondary cases and to prevent further spread of the disease.

Zimbabwe's standard is to investigate two AFP cases per 100 000 under 15 population per year. Zvimba District had a population of 170 050 for under 15 in 2013 and investigated 7 AFP cases. The system was therefore sensitive. This is contrary to findings reported by Chimamise et al. in 2009 in an AFP surveillance study in Mberengwa district, in Zimbabwe where they found out that the system was not sensitive [8]. Pomerai et al. in Masvingo in 2010 also found the AFP surveillance system not to be sensitive [9].

Among the respondents who completed AFP notification forms, 11 out of 16 took 15 minutes or less to complete the form. Most respondents reported that completion of the notification form was simple. Only 2 out of 16 respondents indicated that they needed training on AFP surveillance. Completion of forms was found to be simple. Similar findings were made by Pomerai et al. in Masvingo in 2010 in an AFP surveillance study [9]. However, this was contrary to findings by Chimamise et al. in Mberengwa where completion of forms was found to be time consuming [8]. This disparity may be due to differences in staff attitudes towards the surveillance system.

The AFP surveillance system in Zvimba district was found to be stable. All health centres have working cell phones and cell phone network reception. All facilities are accessible by road. Notification forms were available at most health centres. This is contrary to findings by Bangure et al. in 2013 in an AFP surveillance system evaluation in Sanyati district where the road network was poor and some clinics were inaccessible by road [10].

All the health centres in Zvimba district, including the seven private health centres participate in the AFP surveillance system. This is contrary to findings by Makurira et al. in Masvingo in 2007, where private clinics were not participating in disease surveillance [11]. Bangure et al. in Sanyati district in 2013 also found out that all private clinics were not participating in the AFP surveillance system [10]. Participation by private health centres is commendable since it reduces chances of missing AFP cases.

Three of the stool specimens were collected more than 21 days after onset of symptoms. Late collection of stools reduces chances of isolating the polio virus, resulting in false negatives.

No AFP case investigation form had laboratory results indicated. It is important that the district makes a follow up on results from the virology laboratory and they should enter the results on the notification form. Two forms had no date indicating when the stool specimens were sent to the laboratory. Failure to indicate this date makes it difficult to believe that the stool were sent to the virology laboratory within 72 hours, further questioning the authenticity of the stool adequacy reported.

## Conclusion

We therefore conclude that knowledge of health workers on the AFP surveillance in Zvimba was good. The AFP surveillance system in Zvimba district was useful, simple, stable, sensitive and representative. However the system was not timely. Completeness of data on the notification forms was also poor. Follow up physical examination on AFP cases was not done. The cost of running the AFP surveillance system in Zvimba district is US\$317.00 per month.

## Authors' Contributions

TS were responsible for the conception of the problem, design, collection, analysis and interpretation of data and drafting the final article. MN was responsible for the conception of the problem, design, analysis and interpretation of data and drafting the final article. DB was responsible for the conception of the problem, design, analysis and interpretation of data and drafting the final article. NG was responsible for the conception of the problem, design, statistical analysis and interpretation of data and drafting the final article. MT was responsible for the conception of the problem, design, analysis and interpretation of data and drafting the final article. All the authors had oversight of all the stages of the research and critically reviewed the final draft for academic content, read and approved the final manuscript.

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