

**ORIGINAL ARTICLE**

**A Study of Various Factors Determining the Quality of Acute Flaccid Paralysis Surveillance of Beed District**

*Swapnil Vishnu Lale*

*District Immunization Officer, Zilla Parishad, Beed-431122, (Maharashtra), India*

---

**Abstract:**

*Background:* Surveillance of Acute Flaccid Paralysis (AFP) is an important component of polio eradication campaign. In Beed district, this is being done since 1998 with the co-operation of national polio surveillance project of the World Health Organization (WHO).

*Aims and Objectives:* To review various factors, which determine the quality of surveillance. They include timeliness of reporting units, taluka wise distribution, month wise distribution, monitoring of non-polio acute flaccid paralysis rate, percentage of notification within 10 days, percentage of stool samples sent for virological study within 14 days of onset of paralysis & reasons for delay in stool collection. Detection of non-polio enterovirus in stool cultures is an indicator of quality of the reverse cold chain. *Materials & Method:* Surveillance network consists of 2 very high priority, 4 high priority, 13 low priority reporting units & 25 informer units. Reporting units are expected to submit weekly reports. A total of 315 cases of AFP were investigated during last 10 years. Virological studies are conducted at Haffkine's Institute, Mumbai. *Results & Conclusion:* Timeliness of reporting units varied from 77 to 99%. Zero reporting blocks went down from 2-3 to 1. More cases of AFP were seen in months of July, august & September. Non polio AFP rate ranged

from 1.38 to 7.35%. Percentage of notification within 10 days of onset was between 72 to 94 %. Percentage of stool samples collected within 14 days of onset of paralysis varied from 73 to 86%. A close vigilance on all these factors, at all levels of administration is essential to ensure that no case of polio is missed out.

**Key Words:** Surveillance, Polio myelitis, Quality

**Introduction:**

Poliomyelitis is a highly infectious disease caused by an enterovirus. It invades the anterior horn cells of the nervous system [1]. It predominantly affects children under three years of age. Although acute & flaccid paralysis is the most visible sign of polio infection, less than 1% of polio infections ever result in paralysis. Polio virus can spread widely before cases of paralysis are seen. Because of this silent transmission and the rapid spread of polio virus, surveillance of acute flaccid paralysis is crucial. Stopping polio virus transmission has been pursued through a combination of routine immunization, pulse polio immunizations & acute flaccid paralysis (AFP) surveillance. The objective of AFP surveillance is to detect the exact geographic locations where wild polio viruses are circulating in the human population. All cases of acute flaccid paralysis in children aged <15

years are rigorously investigated by a trained medical officer, with collection of stool specimens to determine if polio virus is the cause of the paralysis. Analysis of the location of polio viruses isolated from AFP cases allows programme managers to plan immunization campaigns to prevent continuing circulation of virus in these areas.

Any disease eradication initiative relies on sensitive and timely surveillance. Such surveillance is especially challenging for polio eradication, because only one of every 200 polio virus infections results in clinically apparent paralytic disease. To ensure that paralytic polio cases will be detected if they occur, countries conduct surveillance for all acute flaccid paralysis (AFP) cases by using a standard case definition [2]. The stool samples of all cases are tested to determine whether paralysis is caused by polio virus infection. The criteria of good quality AFP surveillance are as follows: A rate of one or more AFP cases per 100,000 populations aged  $\leq 15$  years, examined within 48 hours of reporting & collection of stool samples in less than 14 days. This ensures that the surveillance is sensitive enough to detect polio. In 2008, total AFP cases investigated in India were 55,431 [3]. Out of that 14174 cases were found to have non polio enteroviruses (NPEV). In Beed district, this is being done since 1998 with the co-operation of national polio surveillance project (A WHO initiative). Beed district is a backward part of Marathwada region of Maharashtra, India & it has reported a few wild polio cases in recent

past. Therefore Beed district is selected for this surveillance activity. A study was undertaken with two Objectives. First Objectives was to review various factors determining the quality of surveillance. They include timeliness of reporting units, taluka wise distribution (silent blocks) , month wise distribution (seasonal variation), monitoring of non-polio AFP rate , percentage of notification within 10 days, percentage of stool samples sent for virological study within 14 days of onset of paralysis, study of the reasons for delay in stool collection. Second Objectives was to study the rate of non-polio enterovirus in stool samples. This is a proof of the potency of cold chain, with which the stool samples are collected, transported, submitted and analyzed in the laboratory.

#### **Materials & Methods:**

Beed district has a population of 23,79,391; out of which children below 15 years of age are 8,20,890; and those below 5 years of age are 3,09,321. Surveillance network consists of 2 very high priority, 4 high priority, 13 low priority reporting units & 25 informer units.

#### **Criterion for prioritizing reporting units [4]-**

##### ***a. Very High Priority (VHP) reporting units/informer units:***

- Medical College hospitals
- Specialized Pediatric hospitals (Pediatric department, specialists)
- District hospitals
- Popular Child specialists
- Popular quack or “Polio doctors”

**b. High Priority (HP) RU**

- Reporting sites (RU / IU) in the network which see AFP cases and have missed reporting or have delayed reporting AFP cases
- Hospitals / doctors who habitually report AFP cases late
- Reporting units which have stopped sending weekly AFP zero reports.

**c. Low Priority (LP) RUs**

- All other RUs enrolled in the AFP surveillance reporting network, who see fewer AFP cases.

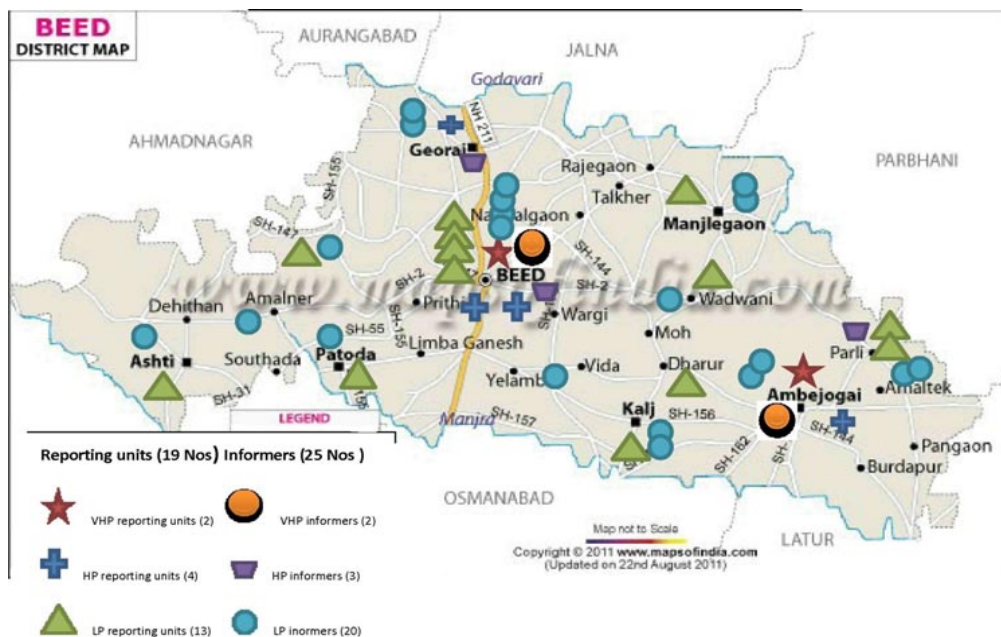
**d. Informer Units:**

These are smaller health facilities or clinicians who are visited by patients below 15 years but in relatively smaller numbers than reporting units and they inform the district authority

whenever they come across an AFP case. They do not send a weekly zero report but contact the district (DIO/SMO) only on seeing an AFP case. They usually do not maintain detailed documentation of the patients visiting them. These can be individual child specialists, private practitioners, popular “quacks or polio doctors” or religious places such as temples that are visited by AFP cases. Figure.1

This figure shows the distribution of very high priority, high priority, low priority reporting units & informer units. Reporting units should be two or more per lakh population; that comes to about 46 units. Actually there are 44 established units. There is unequal geographical distribution of reporting units. Ashti block is under-covered with reporting units though far from district headquarters. It is having low population density & heavy migration of sugar cane workers. Percentage

**Fig. 1 SPOTMAP OF REPORTING NETWORK,2008\* - BEED DISTRICT**



of private institutions to total reporting units is 83%. 8 to 10 cases of AFP are expected annually. Virological studies are conducted at Haffkine's Institute, Mumbai. A special messenger from zilla parishad is sent immediately (or as early as possible) to Mumbai; after receipt of second stool sample. Statistical analysis is done using appropriate tests.

### Results & Discussion:

Since 1998, a total of 315 AFP cases are investigated by doctors in the rank of additional district health officer. Amongst these cases 163 are girls & 152 are boys. There is no statistically significant difference between the two sexes. SMO has investigated 44 cases, District immunization officer (DIO) 174, Additional

DHO 46, Assistant DHO 51 cases. Involvement of responsible health officers ensures the credibility in investigation. DIO is the nodal officer for AFP surveillance. WHO collaborative study in 32 African countries has reported similar findings [5]. Out of 315 cases investigated; only one (In August 2006, a four years old girl) has been confirmed to be a polio case. Out of 315 cases 132 are children under 5 years of age. Similar observation is made by RMK Lam, THF Tsang et al [6].

Zero case reporting blocks were (Silent blocks) 3 in 1998, 2 in 1999, 3 in 2000, and 4 in 2001 and so on. AFP workshops were conducted in Beed & many of the silent blocks with the help of the SMO. Number of visits to the reporting

**Table1: District-wise distribution of AFP cases 1998-2008\***

Sr. No.	Blocks	Population <15 years	Years										
			1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
1	Beed	149511	10	5	1	3	3	6	1	6	9	17	10
2	Shirur	39409	0	1	0	0	1	1	1	3	2	2	2
3	Ambajogai	89474	3	1	1	1	2	1	2	6	3	3	9
4	Dharur	23621	2	2	2	0	0	3	1	4	0	3	1
5	Ashti	78511	2	2	0	0	1	0	3	1	3	3	0
6	Kej	86110	0	3	2	1	1	3	2	2	5	6	9
7	Patoda	36391	3	0	4	1	1	2	0	4	5	1	3
8	Parali	89526	3	5	2	2	0	1	1	7	5	8	5
9	Majalgaon	81685	1	1	0	1	1	1	2	4	3	6	3
10	Wadwani	47421	0	0	0	0	0	0	0	4	0	2	3
11	Gevrai	99231	4	1	2	1	1	3	3	2	4	9	7
	<b>Total</b>	<b>820890</b>	<b>28</b>	<b>21</b>	<b>14</b>	<b>10</b>	<b>11</b>	<b>21</b>	<b>16</b>	<b>43</b>	<b>39</b>	<b>60</b>	<b>52</b>

\* - Data available till 10 October 2008

sites were conducted as per their priority (low, high or very high). They were adequately met as per guidelines [4]. As we increased our vigilance and supervision from the district level, the number of silent blocks decreased from the year 2005. Silent blocks were nil in 2005 & 2007, 2 in 2006 and one in 2008. Beed block reported maximum number of AFP cases, while Wadwani block reported lowest number of cases. That is proportional to its population size (Table 1).

Cases were found to occur more in the months of July, August & September combined, compared to rest of the year. ( $P < 0.05$ ) Similar findings are noted by L. Fiore, F. Novello et al

[7]. Though polio myelitis is water borne disease; AFP is caused by a spectrum of diseases like GB syndrome, transverse myelitis, traumatic neuritis, muscular dystrophy, etc. These diseases are without infectious pathology. Therefore seasonal variation cannot be explained on the basis of rainy season & subsequent faeco-oral transmission. Lowest number of AFP cases is reported in the months of October, November & December. Pulse polio rounds are conducted in these months because circulation of polio viruses is generally low in these months (Table 2). Polio myelitis is implicated as a cause of AFP in only 1 in 315 cases in this study.

**Table2: Month-wise Distribution of AFP cases 1998-2008 in Beed district\***

Sr. No.	Months	Years										
		1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
1	January	5	2	1	1	0	2	2	4	6	2	6
2	February	1	0	2	0	1	0	2	0	1	4	2
3	March	3	3	1	1	2	0	1	1	4	9	3
4	April	0	2	3	1	1	3	1	0	3	5	4
5	May	0	0	1	0	2	1	2	4	1	3	6
6	June	1	3	1	1	1	1	1	2	2	6	5
7	July	1	2	2	0	2	4	2	8	5	15	14
8	August	2	0	2	0	1	2	1	5	5	5	8
9	September	1	0	0	3	0	4	2	9	5	6	3
10	October	7	3	1	1	0	2	0	4	3	0	1
11	November	3	3	0	0	0	0	1	5	3	1	
12	December	4	3	0	2	1	2	1	1	1	4	
	<b>TOTAL</b>	<b>28</b>	<b>21</b>	<b>14</b>	<b>10</b>	<b>11</b>	<b>21</b>	<b>16</b>	<b>43</b>	<b>39</b>	<b>60</b>	<b>52</b>

\* - Data available till 10 October 2008

AFP rate ranges from 1.38 to 7.35%. Percentage of notification within 10 days of onset is between 73 to 94 %. Percentage of stool collected within 14 days of onset of paralysis varies from 73 to 88 %.(adequate samples). This observation is in line with the Centers for Disease Control (CDC) study conducted in 2003-04 [8]. Timeliness of reporting units varies from 84 to 99%. The isolation of Non Polio Enterovirus (NPEV) in stool samples is an indirect proof of potency and efficacy of the cold chain system with which stool samples are transported. NPEV rate in present study is between 12 to 27 %. Similar observations were made by TS Saraswati, NS Khairulla et al [9]. As surveillance medical officer (W.H.O.) & district immunization

officer personally monitored the quality of cold chain, the NPEV proportion increased accordingly. Ice packs in these carriers need to be changed periodically. Transportation from Beed to Mumbai was done overnight. (At lower ambient temperature) (Table 3).

Fig. 2 shows various reasons for not being able to collect stool samples within 14 days of onset of paralysis. Most common being “missed by the reporting system” & “late in contact with reporting system”. This creates the need to re-organize & to motivate the reporting units. The hospitals, where the missed patients visited first, should be included in the surveillance network. Frequent visits to the private reporting units serve as a reminder. Other causes being constipation, discharge against

**Table 3: Year wise AFP rate, notification rate, sample adequacy, timeliness & NPEV rate in Beed District**

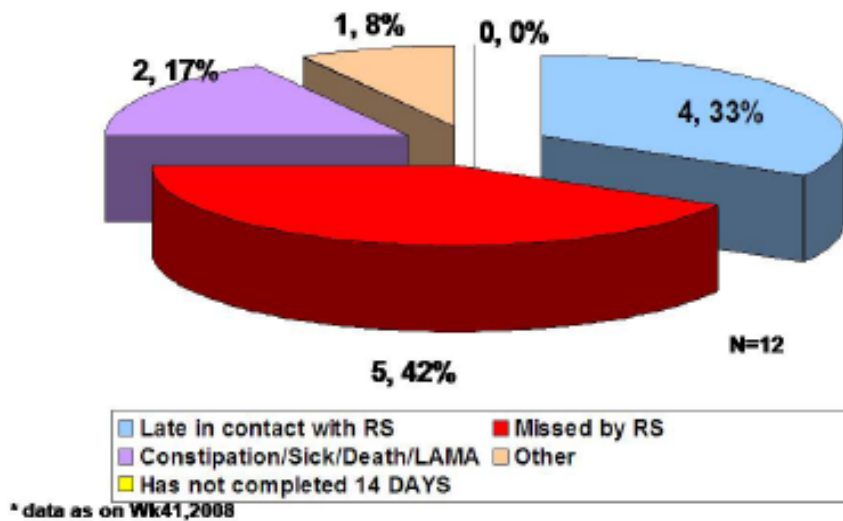
Year	AFP rate	% notification within 10 days of onset	% Adequate samples	timeliness of reporting units	NPEV rate
1998	1.31	71	76	96	16
1999	1.71	82	81	91	14
2000	1.52	77	80	89	11
2001	1.43	80	80	97	17
2002	1.38	73	82	89	15
2003	2.63	81	86	98	12
2004	2.04	94	88	98	21
2005	5.64	84	73	92	20
2006	4.83	85	85	99	22
2007	7.35	82	75	84	23
2008	7.18	78	76	84.2	27

AFP rate & NPEV rate has increased significantly in recent 3 to 4 years. (P<0.05)

medical advice, very sick child or death of child. A close vigilance on all these quality

Furthermore existing reporting units need to be frequently visited & sensitized. Some reporting units giving very low yield & low

**Fig. 2. Reasons for Inadequate Stools, 2008\***  
**BEED District**



parameters, at all levels of administration is essential to ensure that no case of polio is missed out.

**Conclusions & Recommendations**

AFP surveillance remains the gold standard of poliovirus surveillance and all efforts should be made to maintain it at high level of performance and improve it when necessary. It is necessary to sensitize all workers, in order to obtain spontaneous and prompt reporting. Important hurdle in the surveillance system is that ‘cases are missed by the reporting system’. For that purpose it is necessary to identify the health facilities where the AFP cases visit first. And then conscious efforts are made to bring these facilities into surveillance net.

OPD turn-over may be deleted to reduce the strain on supervisory machinery. In tribal areas of Beed district, people first visit folk doctors & traditional healers after the onset of paralysis. And turn to the modern medical facilities very late. So these traditional healers can serve as reporting units. Stool samples need to be transported in cold chain for viral culture. Survival of non polio enteroviruses ensures that this cold chain is intact.

**References**

1. Marcello MD’Errico, Pamela Barbadoro, Sonia Bacelli, Elisabetta Esposto, Vania Moroni, Federica Scaccia, Luana Tantucci, Emilia Prospero, and the AFP Study Group Surveillance of acute flaccid

- 
- paralysis in the Marches region (Italy): 1997–2007; 135-143.
  2. Capacity strengthening for surveillance and response WHO Meeting of Interested Parties Geneva, 3-7 November 2003; 1-2.
  3. AFP alert vol. 12 No 2 July- Sep 2008; 132-137.
  4. Field guide Surveillance of acute flaccid paralysis, Third edition, Sep 2005; 33-51.
  5. Nsubuga P, McDonnell S, Perkins B, Sutter R, Quick L, White M, Cochi S, Otten M. Polio eradication initiative in Africa: influence on other infectious disease surveillance development, BMC Public Health. 2002 Dec 27; 2:27. Epub 2002 Dec 27; 1471-1476.
  6. RMK Lam, THF Tsang, KY Chan, YL Lau, WL Lim, TH Lam, NK Leung. Surveillance of acute flaccid paralysis in Hong Kong: 1997 to 2002; 164-173.
  7. L. Fiore, F. Novello, P. Simeoni, C. Amato, L. Vellucci, D. De Stefano, Surveillance of acute flaccid paralysis in Italy, 1996-97, European Journal of Epidemiology Volume 15, Number 8, 757-763.
  8. Acute Flaccid Paralysis Surveillance Systems for Expansion to Other Diseases, 2003—2004 December 3, 2004 / 53(47); 1113-1116.
  9. TS Saraswathy, NS Khairullah, M Sinniah, MK Fauziah, MY Apani and M Shamsuddin, Laboratory acute flaccid paralysis surveillance In Malasia: A decade of commitment to the WHO Global polio eradication initiative, *Southeast Asian J Trop Med Public Health*. 2004 Jun; 35(2): 421-424.

---

*\*Corresponding Author: Dr. Swapnil Vishnu Lale, District Immunization Officer, Zilla Parishad, Beed-431122, (Maharashtra), India, Phone- 9421958419, E mail- [swsipn@gmail.com](mailto:swsipn@gmail.com)*