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Eradication of Poliomyelitis in Ethiopia: Virological and Acute Flaccid Paralysis Surveillance

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In Ethiopia, as in other Third World countries, poliomyelitis is a major public health problem affecting mainly preschool children (1).

A study conducted at a major pediatric hospital in Addis Ababa demonstrated an increase in new cases between 1971 and 1981. Eighty-nine percent of the cases with residual paralysis were 2-year-old children. There was no seasonal variation. A study in 1979 involving over a quarter of a million school age children in Addis Ababa indicated a prevalence of 2.7/1,000, with an estimated annual incidence of 7.8/100,000 (2). Another study, conducted from February to July in 1993, indicated that the prevalence among children aged 5-9 years was 7.3/1,000 (3). Other school and institutional based studies revealed a higher prevalence (4).

The key to evaluating the status of polio eradication is combining epidemiological and laboratory investigations of acute flaccid paralysis (AFP) among infants and children (5).

Table 1 shows AFP cases reported in 1998-2001 and

vaccination history. One important criterion of proper AFP surveillance is the minimum detection of at least one AFP case among 100,000 children under 15 years of age. Given that the corresponding population is about 30 million in Ethiopia, the number of expected AFP cases is 300.

The AFP surveillance indicators are shown in Table 2. From 1997 to 2001, Ethiopia made remarkable progress. However, the rate of collection of two stool specimens within 14 days after onset of paralysis remains unsatisfactorily low.

Table 3 shows the record of specimens sent to National

Table 1. Acute flaccid paralysis (AFP) cases reported in 1998-2001

Year	AFP cases	No. vaccination (%)
1998	66	8 (12.1)
1999	189	27 (22.7)
2000	346	49 (15.6)
2001	553	101 (18.5)

Reports from Amhara, Oromia, and Southern Nations nationalities were the majority due to their population size.

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Table 2. Acute flaccid paralysis (AFP) Surveillance indicators, Ethiopia

Parameter	Target	1997	1998	1999	2000	2001
Non polio AFP rate in children <15 y		0.1	0.3	0.28	0.7	1.6
Proportion of AFP cases with 2 stool specimens collected within 14 days of onset of paralysis	80%	14%	12%	23%	45%	47%
Proportion of districts making monthly reports including zero reports	100%	N.A.	N.A.	75%	73%	72%
Proportion of AFP cases investigated within 2 days of notification	80%	86%	91%	94%	84%	85%
Proportion of stool specimens arriving at national level within 3 days being sent	80%	80%	56%	94%	99%	96%
Proportion of stool specimens arriving at the lab in good condition	90%	60%	84%	64%	93%	87%
Proportion of stool specimens from which non polio enterovirus was isolated	10%	0%	11%	19%	13%	25%
Proportion of stool specimens for which lab results were sent within 28 days of receipt at the lab	80%	0%	4%	49%	81%	40%

N.A.: not applicable

Table 3. Laboratory data obtained in National Polio Laboratory, Ethiopian Health and Nutrition Research Institute in 1997-2001

Year	AFP cases*	Stool specimens	Wild type			Sabin type						NPEV**		
			W1	W2	W3	S1	S2	S3	S1+S2	S1+S3	S2+S3		S1+S2+S3	
1997	14	9	0	0	0	0	0	0	0	0	0	0	0	0
1998	66	65	0	0	0	1	1	1	0	0	0	0	0	3
1999	189	208	1	0	0	3	2	1	0	0	0	0	0	12
2000	344	623	3	0	0	14	8	15	4	2	4	1	1	36
2001	553	1086	1	0	0	40	26	47	6	20	12	6	6	130

* tested at laboratory

** Non-polio enteroviruses

Table 4. Cases with wild-type poliovirus isolates and vaccine history

EPID	Age (sex)	Onset of paralysis month/day/year	Interval (days) to investigation	Vaccine history	Type	Residual paralysis
ORD-ESH-99-079	11 m (F)	10/13/1999	18	Zero OPV	P1	Yes
SOU-SID-00-026	1.5 y (F)	3/14/2000	20	Zero OPV	P1	Yes
SOU-HAD-00-204	4.5 y (F)	10/28/2000	13	3 OPV	P1	Yes
AMH-NGN-00-217	12 y (M)	11/ 7/2000	11	Unknown	P1	No
SOU-KAT-01-006	2 y 8 m (F)	8/ 1/2001	15	2 OPV	P1	Yes

Polio Laboratory, Ethiopian Health and Nutrition Research Institute. In 1997, we received only nine stool specimens in total from the Oromia and Addis Ababa regions. In 1998, the stool specimen number increased to 65, owing to improved AFP surveillance. In 2001, we received 1,048 stool specimens derived from 553 AFP cases. The isolates were shipped to Johannesburg Regional Referral Laboratory for intra-typic differentiation by probe hybridization and ELISA.

Table 4 shows a detailed description of five cases from which wild-type polioviruses were isolated. The isolates were all type 1. Three of these patients had not received oral poliovirus vaccine (OPV). Residual paralysis was observed in four of the five patients. DNA sequencing at the Centers for Disease Control and Prevention, Atlanta, Ga., USA, revealed that the wild-type isolates in 1999-2001 were not related to other viruses isolated in neighboring countries or elsewhere. It is unlikely that the virus was imported from outside. The last case was a child in Muda Gerama Kebele in Kedida Gamela Woreda of the Kembata zone (southern part of Ethiopia).

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