

Laboratory and Epidemiology Communications

Polio and Other Enterovirus Isolation by Region in Ethiopia, 2000 - 2002

Berhane Beyene Mentaye*, Mebratu Zelalem, Angelo Asha, Yosef Tiruneh, Aklog Afework, Menberu Tedela, Tsion Bezuneh, AlmazG/senbet¹, Femi Oyewole², Almaz Abebe³, Tilahun Woldemichael⁴ and Oyewale Tomori⁵

Polio Laboratory and ³*Virology and Ricketisiology Team,* ⁴*Ethiopian Health and Nutrition Research Institute,*

¹*Disease Prevention and Control Department, Ministry of Health of Ethiopia,*

²*World Health Organization /EPI, Addis Ababa, Ethiopia and*

⁵*World Health Organization Africa Office, Harare, Zimbabwe*

Communicated by Hiroshi Yoshikura

(Accepted June 26, 2003)

Ethiopia is divided administratively into 11 regional states, 71 zones, and 528 woredas (equivalent to districts). There are 91 hospitals, 257 health centers, 1,108 health posts, and 2,992 health stations.

Regional states have different National Immunization Days (NIDs), and routine oral poliovirus vaccine (OPV) coverage varies among regions due to differences in the health infrastructures among regions. Regions on the periphery of the country that need special attention are Somali, Afar, Gambella, and Benishangul (Fig. 1). According to an estimate by the Ministry of Health of Ethiopia, approximately 50% of the Ethiopian population has no access to health services mainly due to their geographical location.

Polio eradication is an international project launched by World Health Organization. Ethiopia conducted the first sub-NIDs (sNIDs) in 1996, followed by two rounds of NIDs every year thereafter. House-to-house immunization started in 1999, and contributed to increase immunization rates. In parallel, surveillance of acute flaccid paralysis (AFP) and laboratory diagnosis of stool specimens of AFP cases were conducted. This paper reports the laboratory results obtained in 2000-2002 with special reference to different regions of Ethiopia.

Table 1 shows the isolation rates of polio and non-polio enteroviruses (NPEV). The isolated polioviruses were all of the Sabin type except one wild poliovirus type I identified from KAT Zone in SNNP Region in 2001. The viruses were isolated at high frequencies from all regions where stool specimens were available. For the entire country of Ethiopia, poliovirus was isolated in 9-18% of AFP cases, and NPEV in 13-23%. For the remote regions, including Somali, Afar, Gambella, and Benishangul, total poliovirus isolation rates were 13, 23, and 23%, and NPEV isolation rates were 13, 30, and 8%, in 2000, 2001, and 2002, respectively. Given that the isolation rates in these regions were generally similar to those for the entire country of Ethiopia, the composition of stool specimens from these regions was considered comparable to that of those from other regions. Isolated polioviruses were all of the Sabin type, and Sabin types I, II, and III were represented (Table 2) except one wild poliovirus from SNNP Region in the year 2001. Table 3 shows the vaccine histories of the AFP cases from which the stool specimens derived. For the entire country of Ethiopia, 28-34% of cases had an unknown history of vaccination, and 11-18% had not received OPV. For the remote regions, Somali, Afar, Gambella, and Benishangul combined, the percentages of AFP patients with an unknown history of vaccination were 67, 39, and 43%, and those of patients who had not received OPV were 7, 21, and 12%, in 2000, 2001, and 2002, respectively.

Overall, there was essentially no difference in stool specimens with respect to polio or NPEV isolation rates, types of

*Corresponding author: Mailing address: Polio Laboratory, Ethiopian Health and Nutrition Research Institute, P.O.Box1242, Addis Ababa, Ethiopia. Fax: +251-1- 752277, E-mail: Berhane12@yahoo.com

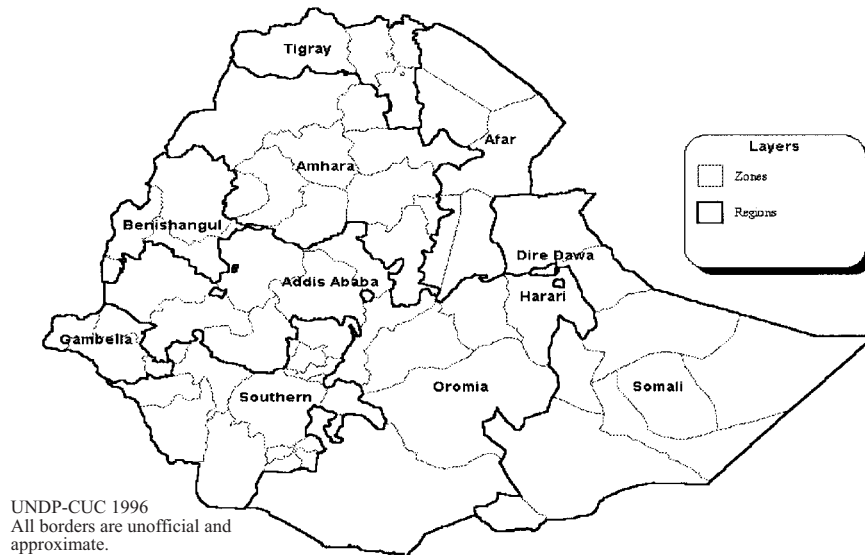


Fig. 1. Map of Ethiopia showing 11 regional states and of zones.

Table 1. Isolation rate of polio and non-polio enteroviruses (NPEV) by region

Region	2000			2001			2002		
	Polio (%)	NPEV (%)	AFP*	Polio (%)	NPEV (%)	AFP*	Polio (%)	NPEV (%)	AFP*
Afar	0(0.0)	0(0.0)	0	4(57.0)	1(14.3)	7	0(0.0)	1(12.5)	8
Benishangul	0(0.0)	0(0.0)	2	1(25.0)	0(0.0)	4	1(14.3)	0(0.0)	7
Gambella	0(0.0)	1(25.0)	4	0(0.0)	4(50.0)	8	0(0.0)	2(28.6)	7
Somali	2(22.0)	1(11.0)	9	5(20.0)	8(32.0)	25	13(33.3)	2(5.0)	39
Subtotal of remote regions	2(13.0)	2(13.0)	15	10(22.7)	13(29.5)	44	14(22.9)	5(8.2)	61
Addis Ababa	1(4.5)	2(9.0)	22	3(11.0)	8(29.6)	27	1(3.0)	7(22.0)	32
Amhara	12(13.3)	15(17.0)	90	15(12.3)	27(22.0)	121	5(4.3)	30(25.6)	117
Dire Dawa	0(0.0)	1(50.0)	2	0(0.0)	0(0.0)	2	0(0.0)	0(0.0)	4
Harari	0(0.0)	0(0.0)	0	1(50.0)	1(50.0)	2	0(0.0)	1(100.0)	1
Oromia	16(16.0)	10(10.0)	102	40(22.0)	37(20.0)	180	13(8.3)	37(23.7)	156
SNNP	13(21.0)	9(14.5)	61	23(18.5)	32(25.8)	124	15(16.0)	14(15.0)	94
Tigray	4(22.0)	2(11.0)	18	6(12.5)	12(25.0)	48	2(2.7)	23(31.5)	73
Subtotal of other regions	46(15.6)	39(13.3)	295	88(17.4)	117(23.1)	504	36(7.5)	112(23.5)	477
Total	48(16.0)	41(13.0)	310	98(18.0)	130(23.5)	548	50(9.3)	117(22.0)	538

*AFP: acute flaccid paralysis. Total AFP cases examined.

Table 2. Polio isolation result by region

Region	2000								2001								2002							
	Polio isolation result types								Polio isolation result types								Polio isolation result types							
	1	2	3	1+2	1+3	2+3	1+2+3	AFP*	1	2	3	1+2	1+3	2+3	1+2+3	AFP*	1	2	3	1+2	1+3	2+3	1+2+3	AFP*
Afar	0	0	0	0	0	0	0	0	3	0	1	0	1	0	0	7	0	0	0	0	0	0	0	8
Benishangul	0	0	0	0	0	0	2	0	0	0	1	0	0	0	0	4	0	0	1	0	0	0	0	7
Gambella	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	7
Somali	0	0	0	1	0	0	1	9	1	2	0	1	1	1	1	25	5	4	7	0	4	2	2	39
Subtotal of remote regions	0	0	0	1	0	0	15	4	2	2	1	2	1	1	44	5	4	8	0	4	2	2	61	
Addis Ababa	0	0	1	0	0	0	22	0	2	1	0	0	0	0	27	0	0	1	0	0	0	0	32	
Amhara	5	1	3	1	1	1	90	5	4	2	1	1	1	2	121	2	5	4	0	0	0	0	117	
Dire Dawa	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	4	
Harari	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2	0	0	0	0	0	0	0	1	
Oromia	3	5	5	1	0	2	102	9	7	11	1	8	6	1	180	1	3	11	2	1	3	4	156	
SNNP	4	1	5	1	1	1	61	12	5	7	0	2	3	0	124	6	4	12	0	5	0	0	94	
Tigray	1	1	2	0	0	0	18	0	4	1	0	0	0	1	48	1	0	2	0	1	0	0	73	
Subtotal of other regions	13	8	16	3	2	4	295	26	23	22	2	11	10	4	504	10	12	30	2	7	3	4	477	
Total	13	8	16	4	2	4	310	30	25	24	3	13	11	5	548	15	16	38	2	11	5	6	538	

*Total AFP cases examined.

Table 3. History of oral poliovirus vaccine (OPV) for AFP cases by region

Region	2000				2001				2002			
	Vaccination Status		Total AFP cases	NID coverage (%)	Vaccination Status		Total AFP cases	NID coverage (%)	Vaccination Status		Total AFP cases	NID* coverage (%)
	Unknown (%)	Zero OPV (%)			Unknown (%)	Zero OPV (%)			Unknown (%)	Zero OPV (%)		
Afar	0(0.0)	0(0.0)	0	105.0	0(0.0)	3(42.9)	7	96.0	2(25.0)	4(50.0)	8	98.1
Benishangul	2(100.0)	0(0.0)	2	140.0	0(0.0)	1(25.0)	4	102.0	3(43.0)	0(0.0)	7	100.1
Gambella	1(25.0)	1(25.0)	4	109.0	4(50.0)	1(12.5)	8	84.0	2(28.6)	1(14.3)	7	81.1
Somali	7(77.8)	0(0.0)	9	93.0	13(52.0)	4(16.0)	25	70.0	19(49.0)	2(5.0)	39	113.8
Subtotal of remote regions	10(67.0)	1(6.7)	15	111.8	17(38.6)	9(20.5)	44	88.0	26(42.6)	7(11.5)	61	98.3
Addis Ababa	3(13.6)	1(4.5)	22	44.0	3(11.1)	0(0.0)	27	38.0	4 (12.5)	1 (3.0)	32	92.6
Amhara	28(31.0)	14(15.6)	90	112.0	34(27.9)	21(17.2)	121	93.0	37 (32.0)	11 (9.4)	117	92.0
Dire Dawa	1(50.0)	0(0.0)	2	43.0	0(0.0)	0(0.0)	2	77.0	1 (25.0)	0 (0.0)	4	78.3
Harari	0(0.0)	0(0.0)	0	98.0	0(0.0)	0(0.0)	2	91.0	1(100.0)	0 (5.0)	1	85.9
Oromia	40(40.0)	14(14.0)	102	117.0	54(29.7)	33(18.1)	180	120.0	58 (37.0)	24 (15.4)	156	96.3
SNNP	19(30.6)	17(27.4)	61	127.0	33(26.2)	30(23.8)	124	110.0	30 (32.0)	10 (10.6)	94	98.6
Tigray	6(33.3)	3(16.7)	18	104.0	16(33.3)	7(14.6)	48	93.0	14 (19.0)	5 (7.0)	73	101.1
Subtotal of other regions	97(33.0)	49(16.7)	295	92.1	140(27.5)	91(17.9)	504	88.9	145(30.5)	51(10.7)	477	92.1
Total	107(34.6)	50(16.2)	310	107.0	157(28.4)	100(18.0)	548	102.0	171(32.0)	58(11.0)	538	94.4

*Data not yet completed

Sabin strains and OPV history of AFP patients whose stool specimens were examined. From these criteria, it is considered that polio laboratory diagnosis in Ethiopia is conducted remarkably well despite of the geographic difficulties.

The authors thank Mr. Tesfaye Bedada, WHO data manager, the surveillance officers of the Disease Prevention and Control Department of the Ministry of Health, the surveillance officers under WHO, and personnel from the 11

regions and 71 zones in Ethiopia, who are part of the polio surveillance system and provided us with the original surveillance information. The authors would also like to thank Dr. Hiroshi Yamamoto of the Japanese International Cooperation Agency, project leader of the Japanese Technical Cooperation for the Laboratory Support for Polio Eradication Project, for his advice on the laboratory work conducted in the Polio Laboratory, Ethiopian Health and Nutrition Research Institute, since 2001.