

Report

Polio Eradication in Iran

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Introduction

Poliomyelitis or infantile paralysis, usually called “polio”, is a transmissible viral infection first described in 1840 by Jakob Heine. This does not mean that polio did not exist previously; rather, it could not be differentiated as a specific disease. In fact, pictures exist of patients with cases similar to polio in ancient Egypt. Polio has led to dreadful epidemics during the 19th and 20th centuries.

The causative agents are three types of polio viruses: type 1 (P1), type 2 (P2), and type 3 (P3). Most cases of wild polio paralysis are caused by P1. Immunity to one type does not give immunity to the other two. Infection in about 90% of cases is asymptomatic. About 9% of cases are mild and do not result in paralysis. Only in less than 1% of cases does the infection cause paralysis.

In 1955, Salk produced a killed injectable vaccine and a few years later in 1962, Sabine produced the oral polio vaccine (OPV). Both vaccines contain all three types of the virus. After production of vaccines that were very effective in the prevention of polio, in May 1988 the 41st World Health Assembly committed the member states of the World Health Organization (WHO) to globally eradicate polio by the year 2000. The WHO anticipated that polio would be the second human infection (the first was smallpox which was eradicated in the late 1970's) to be eradicated (Resolution WHA 4.28). The global polio eradication achieved a 99% reduction in polio incidence in the world between 1988 and 2000, but this achievement was followed by the lack of global progress for a decade.^{1,2}

Present situation of global polio eradication

During the past decade, polio eradication has stalled globally and even a re-emergence has been observed in some countries in which the disease had been eradicated. The re-emergence has been due to importation of the virus followed by local indigenous outbreaks. In early 2000, some religious leaders in northern Nigeria issued a fatwa against vaccination. Although they later changed this fatwa, the disease had spread to many countries in Africa, and via Saudi Arabia during Haj pilgrimage to countries as far as Yemen and Indonesia. At present, polio is regarded to be endemic in only four countries (Nigeria, India, Afghanistan, and Pakistan) but it seems that the disease has been re-established in a few other countries in Africa as well. Outbreaks have appeared in 2010 and 2011 in 14 countries where the disease had been eradicated.¹ Some of these countries are in Africa whereas others are located in other regions.

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Table 1. Routine polio immunization coverage by province (Iran, 2010). Coverage of infants with oral polio vaccine.

Province	Coverage (%)
Ardebil	98
Bushehr	100
Chaharmahal and Bakhtiari	100
East Azarbaijan	100
Esfahan	100
Fars	97
Gilan	100
Golestan	100
Hamedan	100
Hormozgan	100
Ilam	100
Kerman	99
Kermahshah	100
KhorasanRazavi	100
Khuzistan	100
Kohgiluyeh andBoyerahmad	96
Kordestan	100
Lorestan	100
Markazi	100
Mazanderan	100
North Khorasan	100
Qazvin	100
Qom	95
Semnan	98
Sistan and Baluchestan	97
South Khorasan	100
Tehran	100
West Azarbaijan	100
Yazd	100
Zanjan	100

The main reason for the re-emergence of polio in many high-risk countries is the absence of high quality campaigns for vaccination. These countries generally do not have the required infrastructure to establish vaccination campaigns. More important is the fact that policy makers and health managers in these countries have not comprehended the urgency and the necessity of preventing outbreaks. In short, there is neither the feasibility nor the intention to run vaccination campaigns in many high-risk countries.

Among the four countries where polio is endemic, India and Afghanistan have had considerable progress in preventing outbreaks. In Nigeria, the prevention programs have somehow been stalled because of political turmoil. Despite the commitment of policy makers at high levels in Nigeria, putting plans into practice is not feasible in some districts. Lastly, in Pakistan the situation is quite unacceptable; the number of cases in 2011 is more than in 2010.

Table 2. Performance of AFP surveillance by province (Iran, 2010). Rate per 100,000 population aged <15 years.

Province	Population covered	Total non-polio AFP	Non-polio AFP rate
Ardebil	332794	13	3.9
Bushehr	241890	4	1.7
Chaharmahal and Bakhtiari	245583	5	2
East Azarbaijan	861639	36	4.1
Esfahan	1059371	28	2.6
Fars	1078806	23	2.1
Gilan	524026	12	2.3
Golestan	463038	8	1.7
Hamedan	419572	19	4.5
Hormozgan	475615	14	2.9
Ilam	144445	6	4.2
Kerman	815868	27	3.3
Kermahshah	470260	17	3.6
KhorasanRazavi	1612592	88	5.5
Khuzistan	1290451	41	3.1
Kohgiluyeh and Boyerahmad	195566	5	2.6
Kordestan	391035	19	4.8
Lorestan	469217	13	2.7
Markazi	325224	14	4.2
Mazanderan	647713	41	6.3
North Khorasan	248591	6	2.4
Qazvin	294583	8	2.7
Qom	296494	10	3.3
Semnan	140736	2	1.4
Sistan and Baluchestan	1047636	26	2.5
South Khorasan	191967	6	3.1
Tehran	3085950	86	2.7
West Azarbaijan	833127	26	3.1
Yazd	258258	11	4.2
Zanjan	252736	8	3.2
Total	18708449	622	3.3

Table 3. List of 27 cases of AFP reviewed and classified by the National Expert Committee in Iran, 2010.

Clinical Diagnosis	Number
Guillain Barre Syndrome	12
Cerebral infarction	1
Transverse myelitis	1
Myelopathy	1
Cerebral palsy	1
Peripheral neuropathy	2
ADEM	1
Metabolic disorders	1
Synovitis	1
Ischemic encephalopathy	1
ALL	1
Myositis	1
Seizure	1
Hereditary neuropathy	1
Mediastinal teratoma	1

In 14 other countries where the disease had been previously eradicated, outbreaks have occurred in 2010 and 2011. In most of these countries effective programs for eradication have been implemented, but the disease has re-emerged, notably in Angola, Chad, and the Democratic Republic of Congo.

In light of the above challenges, an Independent Monitoring Board (IMB) has been established by the WHO in November 2010 to monitor and guide the progress of the global eradication of polio. The goal of this Board is to interrupt transmission of polio globally by the end of 2012.

Situation in Iran and polio eradication activities in 2010

Methods of implementation

Within the Extended Program of Immunization (EPI) division in the Directorate General of Communicable Disease Management (CDC), there is a unit in charge of polio eradication activities. In each province, the Vice-chancellor of the University of Medical Sciences is responsible for implementation of polio eradication activities, which include routine polio immunization, Acute Flaccid Paralysis (AFP) surveillance, and supplementary immunization wherever necessary, and prevention of wild polio virus importation.

Collaboration with the National Polio Laboratory (NLP)

The laboratory activities for polio are performed by the National Polio Laboratory (NLP), located in the School of Public Health of Tehran University of Medical Sciences. If the cause of a case of AFP cannot be determined at the provincial level the case is referred to the National Expert Committee (NEC), which is responsible for the final diagnosis. Monitoring the situation of polio eradication is the duty of the National Certification Committee (NCC), which consists of eight experts (pediatrician, virologist, infectious diseases specialist, neurologist, and epidemiologist). NCC meets several times per year, contacts program officers, arranges field visits, reviews reports, interacts with the NLP, and prepares an annual report of the situation for the WHO Eastern Mediterranean Regional Office (EMRO). The final documentation for eradication in Iran was approved by the Regional Certification Committee of EMRO in April 2006.^{2,3}

Results of the activities in 2010

Routine immunization coverage is close to 100% (Table 1).⁴ AFP performance indicators are maintained (these indicators are determined by WHO polio-eradication programs); the completeness of routine AFP surveillance was 98% in 2009 and 98.5% in 2010. The number of detected cases was 622 (Table 2).⁴ Non-polio AFP has been maintained at over 1.7 per 100 000 (< 15 years age group) and it was 3.3 per 100 000 in 2010, when 27 cases were referred to the NEC. The result of their diagnoses is shown in Table 3.⁴ All of these cases were diagnosed as non-polio cases.

Evaluations show that 90.2% of the adequate specimens were sent to the laboratory. Well-organized supplementary immunization in two rounds with 100% coverage has continued in 2010. Immunization campaigns cover the border areas with Afghanistan and Pakistan (30 provinces) and some high-risk areas throughout the country. All necessary activities for prevention of the importation of polio virus into the country have been carried out. NLP has continued its activities in 2010. The main results are shown in

Table 4. Summary of laboratory activities for polio eradication (Iran, 2010).

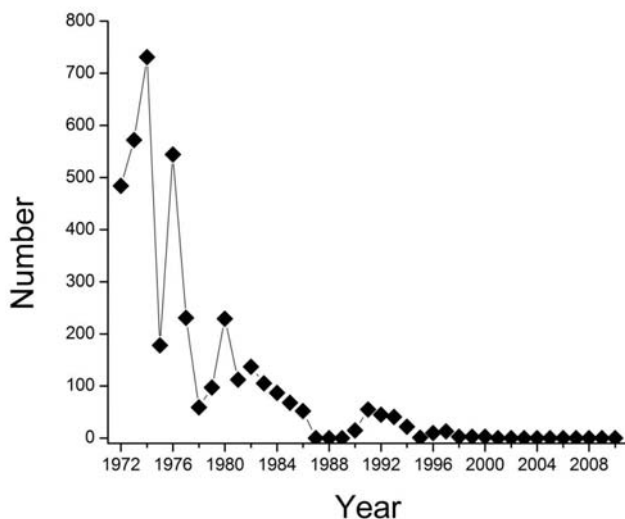
Date last accredited	Score of onsite review	Proficiency test score (%)	NPEV isolation rate (%)	Annual no. of specimens processed	Correct polio typing results (%)	Results reported on time (%)	Fully accredited (yes/no)
May 2010	99	100 ¹ 100 ² 100 ³	2	1581	100	100	Yes

¹Virus isolation; ²rRT-PCR VDPV screening; ³rRT-PCR ITD

Table 5. Summary of polio virus isolated and processed for intratypic differentiation, NLP (Iran, 2010).

Year	Total polio virus isolated	Source of polio virus isolates			Intratypic differentiation results			
		AFP cases	Other (specify*)	No. of isolates sent for intratypic differentiation	Sabin-like (SL)	Wild (W)	Mixed (W+SL)	Vaccine-Derived Poliovirus (VDPV)
2010	24	5 ¹	9 + 3 Contacts	ITD is being done in NLP	24	0	0	0

*9 from contacts, 3 from others (other nationalities hospitalized in Iran); ¹Each AFP case had two positive specimens. Mixtures of two serotypes of polioviruses were isolated from an AFP case (total viruses from AFP cases = 12).

**Figure 1.** Polio incidence in Iran (1972–2010).

Tables 4 and 5.⁴ It is now over ten years that no polio virus case has been found in Iran (Figure 1).^{4,5}

It is anticipated that the renewed activities of the global IMB will be successful and the disease will be globally eradicated.

It is now over ten years that no polio virus case has been found in Iran; however, certain issues must be taken into consideration.⁵ First, vaccination programs should be designed with considerable

caution in Eastern provinces as two out of the four endemic countries in the world (Pakistan and Afghanistan) are our neighbors in the east and the situation in Pakistan is a matter of concern. Second, the continuation of supplementary immunization in Eastern border provinces is becoming more and more unacceptable due to its heavy financial burden on the country. It is the responsibility of health managers and policy makers to weigh the advantages and disadvantages of supplementary immunization in these provinces.

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