INTRODUCTION

Poliomyelitis is a debilitating disease caused by poliovirus (genus Enterovirus) types 1, 2 and 3 all of which can cause paralysis. Polio remains primarily a disease of infants and young children. In many polio-endemic countries, 70-80% of cases are less than 3 years of age and 80-90% of cases are less than 5 years of age. Clusters of susceptible persons, including groups that refuse immunization, minority populations, economic migrants and other unregistered children, nomads, refugees and urban poor are at high risk.

Poliomyelitis victims face serious problems with maintaining independent lives through adulthood, though support from the society and/or health care systems varies in different countries in different ways. A study by Dai et al from China shows that, 29.9% of 1707 handicapped polio victims aged 6 or over were not able to go to school, 44.2% could not perform daily activities, 36.2% could not play outside home or do shopping, and 2.6% had serious communication problems. 84.5% of 1487 handicapped victims caused by polio aged 15 or over wholly or partly lost their working ability (1). Farbu et al, however, showed that the employment rate and that polio patients are doing well in society; they have taken education, are working, and are generally self-supported (2). Another report from Norway points out that, 80% of 1449 polio victims were independent of help from others and 57% were still employed fully or part time (3).

GLOBAL SITUATION IN POLIOMYELITIS ERADICATION EFFORTS

WHO and UNICEF put as a target in 1974 to reach a coverage rate of 80% for the world’s children against the most common six childhood diseases: measles, tetanus, pertussis, poliomyelitis, diphtheria, and tuberculosis. When this target was reached around 1980’s, the programs were modified to eradication of polio, elimination of neonatal tetanus, and control of measles (4). The member states who convened in 1988 for the 41st World Health Assembly, agreed that all efforts should be mobilized for the global eradication of polio by the year 2000 (5). The rationale behind this decision was that polio can be eradicated because it only affects humans, there is no animal reservoir, an effective, inexpensive vaccine exists (OPV), immunity is life-long, there are no long-term carriers, and the virus can only survive for a very short time in the environment.
Some ethical discussions, however, about this program are being carried out. Taylor et al (6) state that financial benefits of polio eradication programs are greatest in rich countries, that limited resources in the developing world is directed toward a single target while there are many other priority health conditions present, and that building of sustainable health systems and infrastructure is more important. However, other authors argue mainly by stating that such concentrated efforts not only will result in the eradication of polio, but also will have positive contributions to the development of sustainable immunization programs and of strengthening the health system in general (7-9).

All efforts since 1988 resulted in a global increase of vaccination coverage from 67% in 1988 to 82% in 1995; and a decrease in reported polio cases of 88%, from 35252 in 1988 to 4074 in 1995 (10). Since the 1986’s, no polio cases have been reported from the 51 countries in the European Region of the WHO (11). The last paralytic polio case of the American continent was reported in 1991 from Peru (12). Two cases due to Type 1 Poliovirus were reported in May 1997, one from Pennsylvania, and one from Canada-Ontario (13). In the West Pacific, reported cases of polio decreased from 6000 in 1990 to 0 in 1998 (14), with the last case reported in March 1997 (15). In Europe and Central Asian Republics, number of cases went down to 7 in 1997, and to 2 in 1998 (16). More than a 90% decrease in the reported cases of polio was achieved in the Western Hemisphere since 1988 (17).

The most problematic regions about polio eradication have been Africa and South East Asia. Africa is still considered as a barrier to global polio eradication (18). As the most populous country in Africa, Nigeria still has problems with polio eradication goals. While reaching 94% coverage after the second round of 1997 NIDs, the routine vaccination coverage with three doses of OPV among infants aged less than one year was 25% and 327 confirmed cases of polio was reported in the same year (19). Nigeria and Western Africa are among the few remaining reservoirs of wild poliovirus transmission in the world (20). Polio is still an endemic disease in India and Pakistan with 3323 (1998) and 1147 (1997) reported cases of polio, respectively. This makes up more than half the world’s reported polio cases (21).

Overall, progress in polio eradication over the past 10 years has been remarkable. The following two maps show areas of known or probable circulation of wild poliovirus in 1988 and 1998. Countries are marked in red if the virus is still found or if surveillance is not reliable enough to exclude circulation.

**POLIO ERADICATION STRATEGIES**

Building on the initial success in the Americas, WHO defined four principle strategies for global poliomyelitis eradication (10): 1) High Routine Immunization Coverage, 2) National Immunization Days, 3) Surveillance for Acute Flaccid Paralysis (AFP), and 4) Mopping-Up Campaigns.
1. HIGH ROUTINE IMMUNIZATION COVERAGE

A cornerstone of the polio eradication strategy is the need to ensure high levels of routine immunization coverage with three doses of OPV among children under one year of age, not just at the national level, but at regional and district levels as well. While routine immunization alone cannot eliminate or eradicate the disease, good routine OPV coverage reduces the incidence of polio and makes eradication feasible. WHO, through its Expanded Program on Immunization (EPI) has established a global target of at least 90% immunization coverage by the year 2000 against six diseases: diphtheria, tetanus, whooping cough, tuberculosis, measles and polio. During 1997, 82% children were fully immunized - a 22% increase over 1988 when the polio eradication initiative was launched (Fig. 1).

2. NATIONAL IMMUNIZATION DAYS

The second part of the four-pronged strategy involves mass immunization campaigns, known as national immunization days (NIDs). This supplementary immunization is intended to complement - not replace - routine immunization. The aim of mass campaigns is to interrupt circulation of poliovirus by immunizing every child under 5 years of age with two doses of OPV, regardless of previous immunization status. This way, every child in the most susceptible age group is protected against polio at the same time - instantly depriving the virus of the fertile seedbed on which its survival depends. NIDs are conducted in two rounds, one month apart. Since OPV does not require a needle and syringe, volunteers with minimal training can serve as vaccinators, increasing the number of vaccinators well beyond the existing staff of a country's Ministry of Health. For example, a recent NIDs in India deployed two million volunteers to immunize 130 million children in a single day.

3. SURVEILLANCE FOR ACUTE FLACCID PARALYSIS

The third part of the four-pronged eradication strategy is surveillance - the intelligence network that underpins the entire eradication initiative. Without this investigative framework, it would be impossible to pinpoint where and how wild poliovirus is still circulating or to verify when it has been eradicated.

WHO emphasizes that all cases of acute flaccid paralysis (AFP) should be reported. The number

![Fig. 1: Reported global coverage with 3 doses of oral polio vaccine (OPV3) among infants, 1980-1997.](image)
of cases reported each year is used as an indicator of a country's ability to detect polio — even in countries where the disease no longer occurs. A country's surveillance system should be sensitive enough to detect at least 1 case of AFP for every 100,000 children under 15, even in the absence of polio.

Because of the initial similarity with 'real' polio, all patients with the symptom of Acute Flaccid Paralysis, regardless of the initial clinical impression, must be reported and subjected to virological examination, even if doctors are confident on clinical grounds that the case is not polio.

4. MOPPING-UP

When very few or no cases of polio occur, the final strategy of the four-pronged approach is implemented. This involves door-to-door immunization (“mopping up”) in high-risk districts where the virus is known or suspected still to be circulating. Priority districts include those where polio has occurred over the previous three years and where access to health care is difficult. Other criteria include overcrowding, high population mobility, poor sanitation, and low routine immunization coverage.

CURRENT SITUATION IN POLIO ERADICATION STRATEGIES IN TURKEY (23)

1. ROUTINE IMMUNIZATION COVERAGE

During the last five years, reported routine oral polio vaccination (OPV3) coverage rates in Turkey among children aged one year or less ranged between 67% to 84%. In 1999, the OPV3 coverage rate was reported to be 77% (Fig. 2). Similar to the last five years, in 1999, the majority of the provinces reporting low OPV3 coverage was located in the Eastern and Southeastern
Regions of Turkey (Fig. 3). Thirty provinces (33% of the total population) reported coverage rates <80%.

2. NATIONAL IMMUNIZATION DAYS (NIDs)
NIDs have been conducted in Turkey since 1995. Reported coverage rates were >88% in all rounds. In 1999, reported NIDs coverage rates were 92% and 93% in the two rounds. However, as with the routine immunization, NIDs coverage rates varied between provinces. In 1999, 14 provinces (out of 80 total) reported coverage rates <80% in at least one round (Fig. 4). Also, all of these provinces reported routine OPV3 coverage <80% in 1999.

3. SURVEILLANCE FOR ACUTE FLACCID PARALYSIS
Since 1997, AFP surveillance has improved substantially in Turkey (Fig. 5). In 1998, the rate...
Among children <15 years

In 1999, the highest rate was reported in the Southeastern Region (Fig. 6). Rates for all regions are high, except the Marmara Region (0.45 per 100,000).

Fig. 5.: Non-polio AFP rate* in Turkey, 1994-1999

Fig. 6.: Non-polio AFP rate by region in Turkey, 1999
The AFP rate is low, particularly in Istanbul (Marmara Region). With a population of approximately 10 million and presence of significant immigration, improvement in AFP surveillance in Istanbul is critical for the Polio Eradication Program in Turkey.

In Turkey, adequate stool specimen collection rate, another indicator of AFP surveillance, has improved significantly in recent years, reaching the global target of 80% in 1999 (Fig. 7). Adequate stool specimen collection is defined as obtaining two stool specimens from a reported AFP case in the first 14 days after the onset of paralysis.

Polio Laboratory:
Refik Saydam polio laboratory is an essential part of the Turkish Polio Eradication Program. Refik Saydam Laboratory tests stool specimens and simultaneously sends an aliquot to the reference laboratory in the Netherlands (RIVM) on a regular basis. Results from Refik Saydam Laboratory are sent to the Provincial Health Directorate where the cases reside and shared with the Infectious Diseases Section of the MOH. Meanwhile, since the fact that the polio laboratory in Izmir has started testing specimens from AFP cases reported in the nearby provinces has reduced the workload of Refik Saydam Laboratory in Ankara and simplified transportation of the specimens from provinces in Western Turkey. Both laboratories are now accredited.

Polio Cases:
Between May 1995 and 1997 no laboratory-confirmed polio cases were reported in Turkey, when AFP surveillance was inadequate. With the improvement of AFP surveillance in 1997, six cases of laboratory-confirmed polio were reported in Mardin. In 1998, the number of laboratory-confirmed polio cases increased to 26; all were in Southeastern Turkey. Twenty-four isolates were of polio type 1 and two were of type 3. Type 3 isolates were from Batman and Sanliurfa provinces. The same year, five additional cases without adequate stool samples were considered as clinically polio by the Expert Committee.

All 26 laboratory-confirmed cases were aged <5 years. Twenty laboratory-confirmed cases (85%) were aged <2 years. The majority (62%) of the cases had received less than 3 doses. The last confirmed poliomyelitis case of Turkey was in November 1998.

4. MOPPING-UP CAMPAIGNS
The first round of mopping-up campaign in 1999 took place in 22 southeastern and eastern provinces in Turkey.
provinces between October 4-10. The objective was to visit every household in the area and to vaccinate all children under 5 years of age with OPV. The target population was 1.8 million children, roughly one third of Turkey's population of children at that age. The second round of mopping-up campaign took place between November 8-14.

**CONCLUSION**

Turkey adopted the goal of eliminating polio by 2000 in 1989; since then, substantial progress has been made toward achieving this objective. Turkey is a priority country for the global polio eradication initiative because of its large size (60 million in 1996), strategic geographical location between Europe and Asia, and proximity to countries with endemic polio (24). OPV has been in use in Turkey since 1963, and National Immunization Days have been organized since 1995 as part of operation MECACAR (Mediterranean, Caucasian, and Central Asian Republics), in which 18 geographically contiguous countries in Asia, the Middle East, and Europe synchronized NIDs. However, Turkey is the only country in the European continent where paralytic polio is still reported. In 1997, a year with a historically low number of reported cases in the European Region of WHO, Turkey was the only country in which wild poliovirus transmission was detected (25). Out of the 236 reported AFP cases in 1998, wild poliovirus was isolated from 26 (26). All of these cases were from the Eastern or South-Eastern Turkey. There has been significant improvement in AFP surveillance efforts. However, Turkey still has some time to declare total eradication of polio.

**REFERENCES**


