

Controlling polio outbreak due to imported wild poliovirus in Indonesia: A success story

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Abstract

Background As a WHO member state, Indonesia is committed to Global Polio Eradication. The last indigenous polio case was found in 1995. However, we faced a big challenge with the occurrence of polio outbreak, beginning with a polio case caused by imported wild poliovirus (WPV) type 1 in Sukabumi in 2005. The virus was originated from Sudan and imported to Indonesia through Saudi Arabia. The outbreak ended with totally 305 cases throughout the country. The last one occurred on 20 February 2006 in Aceh Tenggara District, Nanggroe Aceh Darussalam Province. In addition and separated from the WPV type 1 outbreak, in August 2005, four Acute Flaccid Paralysis (AFP) cases with type 1 Vaccine Derived Poliovirus (VDPV) in stool samples were identified in Madura, East Java Province. The first case was on 9 June 2005 and ended with 45 cases in Madura and another case in Probolinggo District, East Java.

Objective To report a success of controlling outbreak of imported WPV in Indonesia.

Methods Outbreak Response Immunization (ORI) and mop up immunization were conducted immediately. To completely stop the transmission, three rounds of National Immunization Days (NIDs) were conducted in 2005 (August, September, and November). Some more Supplementary Immunization Activities (SIAs) were conducted in 2006 (mop up in January, NIDs in February and early April, mop ups in June and August 2006). For the VDPV outbreak, ORI of 18,880 children in 83 villages took place during the first week of August, beside three rounds of NIDs in 2005.

Results All activities resulted in satisfactorily coverage, where each round always exceeded 95%.

Conclusions Those activities were conducted successfully and proven to be effective to stop the outbreak. Then again, Indonesia can be a polio free country in the coming years. [Paediatr Indones. 2009;49:234-43].

Keywords: *polio outbreak, national immunization days, supplementary immunization activities, acute flaccid paralysis, outbreak response immunization, wild poliovirus*

In 1988, the World Health Assembly (WHA), the annual meeting of ministers of health of all states member of the World Health Organization, voted to launch a global goal to eradicate polio. As a result of the Global Polio Eradication Initiative - the single largest, internationally-coordinated public health project to date, by the end of 2006, only four countries which remained never had interrupted endemic transmission of wild poliovirus (Nigeria, India, Pakistan, and Afghanistan).¹ In 2006, fewer

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than 2000 cases were reported. Back when the Global Polio Eradication Initiative was launched, wild poliovirus was endemic in more than 125 countries on five continents, paralyzing more than 1000 children every day.^{1,2}

The Global Polio Eradication Initiative (GPEI), spearheaded by national governments, the World Health Organization (WHO), Rotary International, the United States Centers for Disease Control and Prevention (CDC), and UNICEF, is the single-largest, internationally-coordinated public health project the world has ever known. Since 1988, more than two billion children around the world have been immunized against polio due to the unprecedented cooperation of more than 200 countries and 20 million volunteers, backed by an international investment of more than US\$ 5 billion.²

However, beginning in 2002, 21 countries which were previously free from polio were affected by importations of wild poliovirus (WPV) type 1 from remaining endemic areas, many with major outbreaks. By the end of 2005, transmission in each of these countries was interrupted or markedly curtailed. Of 21 previously polio-free countries with importations since 2002, 11 countries in Africa detected WPV originating either directly from Nigeria or indirectly through neighbouring countries. WPV type of Nigeria origin was further transmitted into seven countries after virus from Chad outbreak spread to Sudan in mid-2004. WPV from Sudan spread to Saudi Arabia, Ethiopia, Yemen and Eritrea; it was then imported to Indonesia from Saudi Arabia, and to Somalia from Yemen.²

WPV importations from endemic countries into polio-free areas have occurred and will continue to occur until endemic WPV transmission is interrupted globally. The importation risk is highest for countries adjacent to endemic countries, but importations over long distances also occur. Globalization and international migration pose a risk for reintroduction of WPV for all countries. However, maintaining polio eradication strategies and preparedness can prevent WPV spread after importation. Response to a polio importation is very important to limit further spread of virus transmission and prevent reestablishment of WPV circulation. The following sections will describe how Indonesia successfully responded to a polio outbreak due to WPV importation.²

Background

Polio in industrialized and developing countries

Until the 1950s, polio crippled thousands of children every year in industrialized countries. Soon after the introduction of effective vaccines in the late 1950s (IPV) and early 1960s (OPV), polio was brought under control, and practically was not a public health problem in industrialized countries.¹

It took somewhat longer for polio to be recognized as a major problem in developing countries. However, 'lameness surveys' during the 1970s revealed that the disease was also frequent in developing countries, crippling thousands of children every year. As a result, during the 1970s, routine immunization with OPV as part of national immunization programmes (expanded programme on immunization, or EPI programmes) was introduced worldwide, helping to control the disease in many developing countries.

Today, the disease has been eliminated from most of the world, and only four countries worldwide remain polio-endemic. This represents the lowest number of countries with circulating WPV. At the same time, the areas of transmission are more concentrated than ever, 98% of all global cases are found in India, Nigeria and Pakistan.²

Polio history in Indonesia

Surveillance of polio has been in the health reporting system in Indonesia since the beginning. Previously, the polio surveillance was clinically-based, reported from health facilities without laboratory confirmation, until it moved to laboratory based in 1991.^{1,3} The number of reported polio cases since 1984 can be seen in **Figure 1**.

The figure shows that the number of reported polio cases decreased by time that there were only 24 cases and one case reported in 1994 and 1995 respectively. After that Indonesia experienced 10 years without any polio case reported, until a case of polio due to imported WPV was detected in early 2005 and became an outbreak.⁵

In 1995, Indonesia began implementing Acute Flaccid Paralysis (AFP) surveillance. With this system we found that the last case of poliomyelitis due to

indigenous WPV was found on 23 June 1995 in the district of Probolinggo, East Java province in a child, 27 months of age with unknown vaccination status and no information of travel prior to the onset of sickness. Identification in the laboratory showed that the specimen contained WPV type 1. Meanwhile, the last isolate of indigenous WPV was reported on 15 October 1995 in Medan, North Sumatera province, in a stool specimen from a person who was in contact with clinically diagnosed polio cases. Identification in the laboratory showed that the specimen contained WPV type 3. The year of 1995 was also the year where Indonesia began conducting National Immunization Days (NIDs). Two rounds of NIDs were conducted in August and September. These NIDs were repeated in the following two years (1996 and 1997).⁴

In 1997, Indonesia began with intensified AFP surveillance. In that year, a Joint National/International AFP Surveillance Review was conducted.

Recommendation from this evaluation stated that Indonesia did not need to conduct another NID. However, a number of sub-NIDs was conducted in some high risk areas each year from 1998 to 2001. Even though there is no more WPV isolated in Indonesia since 1995, due to some specific conditions, there are still some areas of which polio immunization coverage are still low and AFP surveillance performance are unsatisfactory. Therefore, the risk of WPV importation is high.⁴

In order to secure the goal of polio eradication in Indonesia after all the efforts so far, the Technical Consultative Group (TCG) meeting on 22- 25 October 2001 in New Delhi suggested Indonesia to once again conduct NID in 2002, with financial support from WHO for operational and UNICEF for logistics. Operational supports were also received from local government budget and donations such as from Rotary International, UNDP and private sectors.

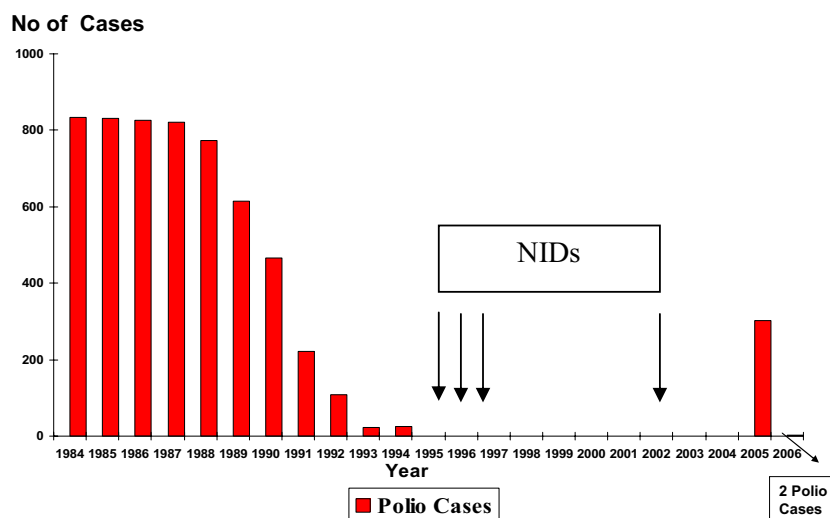


Figure 1. Polio cases in Indonesia, 1984 – 2006

Table 1. Summary of national and subnational OPV immunization days

| Year | NIDs/SNIDs (Specify) | Target age group (year) | Number of children targeted | Date of 1st round | Date of 2nd round | 1st round coverage (%) | 2nd round coverage |
|------|----------------------|-------------------------|-----------------------------|-------------------|-------------------|------------------------|--------------------|
| 1995 | NID | <5 | 21,747,958 | September | October | 101.8 | 106.4 |
| 1996 | NID | <5 | 21,870,299 | September | October | 105.5 | 107.7 |
| 1997 | NID | <5 | 22,345,581 | September | October | 104.9 | 106.8 |
| 1998 | SubNID | <5 | 410,984 | September | October | 90.4 | 92.0 |
| 1999 | SubNID | <5 | 4,056 | September | October | 88.9 | 79.9 |
| | BIAS* | 9 - 12 | 169,559 | November | - | 99 | - |
| 2000 | SubNID | <5 | 1,364,317 | September | October | 94.2 | 92.8 |
| 2001 | SubNID | <5 | 517,904 | September | October | 98.9 | 96.6 |
| 2002 | NID | <5 | 20,031,168 | September | October | 107.0 | 108.6 |

* BIAS: Bulan Imunisasi Anak Sekolah or School Children Immunization Month

The NID in 2002 was conducted in September for the first round and October for the second round. The program was combined with the distribution of Vitamin A and a Crash Program (CP) of measles in high risk areas. All supplementary immunization activities (SIAs) mentioned above always had good achievements, as can be seen in **Table 1**.⁴

With all those efforts, supported by a strong AFP surveillance system, Indonesia did not detect any WPV since the last polio case in 1995. In March 2005, an imported WPV entered Indonesia and caused an outbreak.

The reemergence of poliomyelitis in Indonesia

Ten years since the last clinically-confirmed polio case, and 2.5 years after the previous SIA, on 21 April 2005, the National Polio Laboratory in Bandung reported a

WPV type 1 isolate, from an AFP case identified by the national surveillance system in Sukabumi District, West Java. The date of onset of the case was 13 March 2005. In 3 May 2005, Global Special Laboratory from Mumbai and Atlanta later reported that the virus was imported from West Africa via the Middle East.⁶

An emergency meeting was conducted on 22 April 2005 between the Ministry of Health and WHO, to discuss actions to be taken. In the period of 24 April 2005 to 4 May 2005, field investigation was conducted, during which:

- Active search surrounding the case found 16 additional AFP cases; all of them were later confirmed positive for WPV.
- Contact specimens were collected from 163 persons, 32 of them were WPV positive.
- Hospital record reviews (HRR) conducted in 37 hospitals found 19 AFP cases missed.

Table 2. Summary of polio cases

| Date of onset | Location | Summary of additional investigations and conclusion |
|-------------------|-----------------------|---|
| 10 June 2005 | Cianjur, West Jawa | No other case was found surrounding the index case. The case has an epidemiological link with the index case in Sukabumi. |
| 10 June 2005 | Serang, Banten | Between 10 June 2005 to the end of June 2005, 23 other AFP cases were found: two patients died with diagnosis of bulbar type-Polio. Almost all cases occurred along a river. Eighteen cases occurred after the mop up campaign, but it seemed to be no correlation between the paralysis and the mop up campaign. |
| 21-24 June 2005 | Demak, Central Jawa | High population mobility. Good coverage of Polio routine immunization. Five other AFP cases in the district showed that none of them was polio case. A total of 92 contact specimens was collected and sent to laboratory, none was positive. ORI was conducted in Demak and its neighbouring district (Grobogan). |
| 2 - 3 July 2005 | Tanggamus, Lampung | High population mobility. There were five other AFP cases in the district: three were positive for WPV, and two were non-polio. Five contact specimens were taken, none were positive. Source of infection of the positive case remains unclear, probably related with the outbreak in Serang and Lebak. |
| 21 – 22 July 2005 | Madura, East Jawa | Case was diagnosed as VDPV. Very low coverage of routine immunization in the population. Bad community habit on disposing human waste disposal. Specimens were collected from nine contacts, one was positive for VDPV. |
| 27 July 2005 | Jakarta | Specimens were collected from 10 contacts and one additional AFP case. ORI was conducted within three days after notification in three sub-districts, covering 37,368 children. |
| 9 Sept. 2005 | Medan, North Sumatera | Forty-nine children met and interviewed. Three children missed in the recently conducted NID. No additional case found, no history of travel of the index case. Specimens were taken from the index case's siblings and two nearest neighbouring children. HRR conducted on one hospital did not find any AFP case missed in the last 8 months. Official report of routine immunization coverage in the subdistrict was good (93.6% in 2004). |



Figure 2. Importation of WPV, District of Sukabumi, West Java, Indonesia, March-April 2005

The importation of WPV in Sukabumi, West Java, from March to April 2005 is shown in **Figure 2**.

Since the detection of this index case, the number of affected children had rapidly increased and became an outbreak. Each time a new area reported a new polio case, additional investigation was conducted to analyze the situation.

Progress of the outbreak

By the time the first response SIA was conducted, targeting 6.4 million children aged less than 5 years in three provinces of Java island (25% of the national target population), 99 additional cases had occurred, two of them in two areas outside the target areas of the SIA. The outbreak had grown to 252 cases in seven provinces when the first of five full NIDs targeting 24 million children was conducted in August 2005. The outbreak ended up with 305 cases of polio due to WPV type 1, spread in 10 provinces and 47 districts. Onset of most recent wild polio cases was 20 February 2006, reported from Southeast Aceh district, Nanggroe Aceh Darussalam province. In addition, one contact case taken on 13 April 2006 was also positive for WPV type 1. Distribution of polio cases can be seen in **Figure 3**.⁴

Those polio cases affected mostly children under five years of age, equally distributed in both gender. Most of the cases (89%) were under immunized. Characteristics of those wild polio cases can more easily be seen in **Figure 4**.

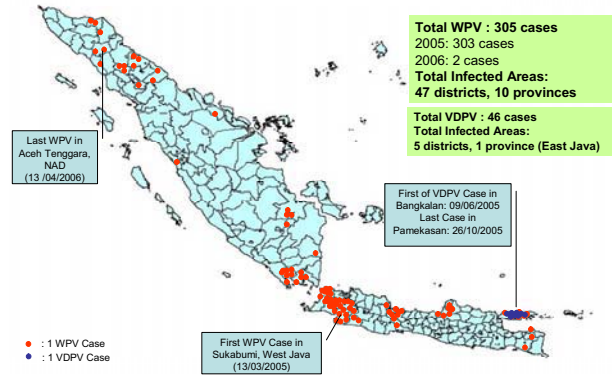


Figure 3. WPV and VDPV Cases, Indonesia 2005 - 2006

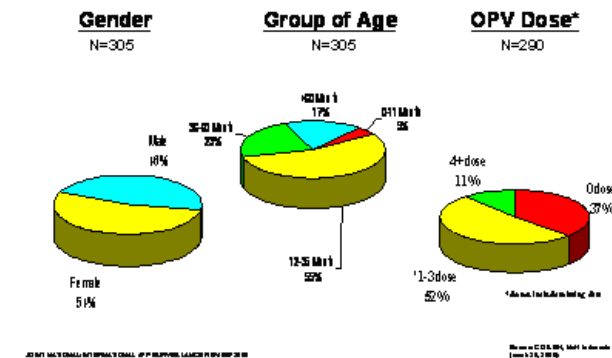


Figure 4. Characteristics of wild polio cases in Indonesia, 2005 - 2006

Outbreak of VDPV

In addition and separated from the WPV type 1 outbreak mentioned above, in August 2005, four AFP cases with type 1 vaccine derived polio virus (cVDPV) in stool samples were identified in Madura island, East Java province. The onset of the first case was on 9 June 2005. Outbreak response vaccinations of 18,880 children in 83 villages took place during the first week of August in Sampang (7258 children), Pamekasan (7921 children) and Bangkalan (3701 children). Furthermore, this island took part in the following rounds of nationwide NIDs.²

A team from the Centers for Disease Control and Prevention (CDC) Atlanta departed to Indonesia on 29 September 2005. In Jakarta and Surabaya (capital of East Java province), they conducted several meetings with public health officers and epidemiologists from

WHO South East Asia Regional Office (SEARO), Indonesian Central Ministry of Health (MOH), and East Java province, to discuss the objectives and methodology to investigate the outbreak. A team with CDC/WHO epidemiologist, central government and provincial government public health officials departed for Madura Island on 2 October 2005, to conduct the field investigation.

The conclusions of the investigation were as follow:

1. This outbreak is the largest virologically confirmed VDPV outbreak globally to date. The presence of residual flaccid paralysis/paresis after 60 days in 12 out of 13 examined children with laboratory-confirmed VDPV demonstrates the neurovirulence of this VDPV strain.
2. Genetic sequencing data indicates replication and circulation of this VDPV for about 2 years (%VP1 divergence range 1.1 to 2.2). The cocirculation of multiple lineages is consistent with the widespread transmission and observed geographical distribution of the isolates. Enhanced AFP surveillance with the wild polio outbreak in other areas of the island may have facilitated the identification of VDPV cases this year.

3. Low routine OPV coverage, resulting in a high number of susceptible children and coupled with suboptimal sanitary conditions, appears to be the major predisposing factors for appearance and transmission of VDPV in Madura. Other risk factors, such as intramuscular injections or clinical history suggestive of severe immunodeficiency are not identified.
4. Routine OPV coverage is low in Madura, with 64% of VDPV cases and half of the children in our survey having zero doses. Coverage is especially low in rural areas where most VDPV cases have occurred. In rural areas, reasons given for non-vaccination included lack of knowledge about need for vaccine, concern about vaccine causing illness, and difficult access to vaccine (“site too far away”). In urban areas, the most important barrier for routine immunization is concern about vaccine causing illness. Resistance to vaccination or lack of trust in OPV vaccine is not a significant barrier for immunization in Madura.
5. NID coverage in areas on Madura (~85% in a convenience survey and by independent monitoring) was higher than routine coverage, demonstrating the feasibility of reaching a

Vaccine Derived Polio Virus (VDPV) Cases in East Java, Indonesia, 2005

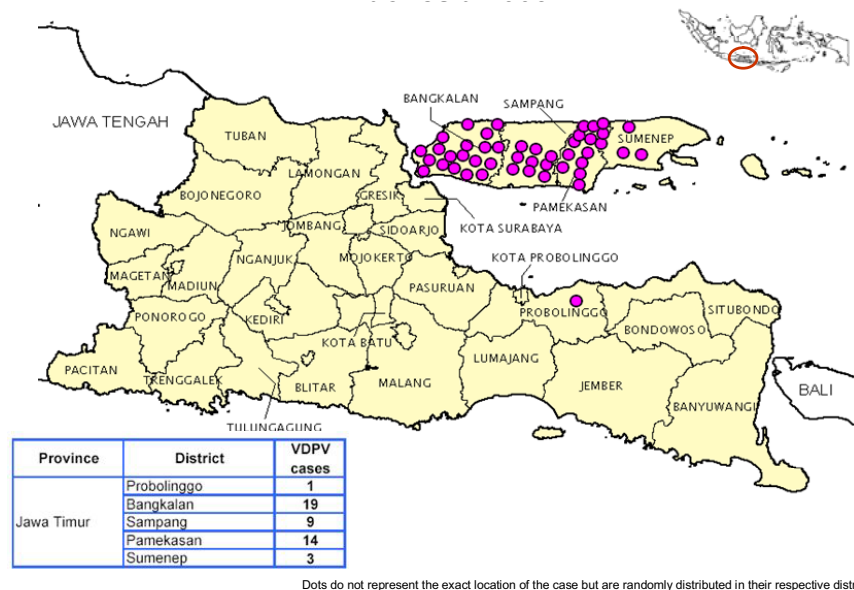


Figure 5. Vaccine Derived Polio Virus (VDPV) Cases in East Java, Indonesia, 2005

large percentage of children. A house-to-house approach in high risk areas could further improve coverage

6. The sensitivity of AFP surveillance in Madura has increased in 2005 (non-polio AFP rate = 3.6 per 100,000 children <15), but the high percentage of cases with inadequate stool specimens (32%), the low NPEV rate (1%), delays in AFP reporting after onset and delays in stool transport to the laboratory (especially in Bangkalan) and discovery of an unreported AFP case in Bangkalan hospital suggests that VDPV or WPV cases may have been missed.

This VDPV outbreak ended up with 45 VDPV cases identified in Madura, and another case in the district of Probolinggo, in the mainland of the same East Jawa Province (Figure 5).⁵

Responses taken

1. ORI

As a response to the localized outbreak in West Java in April-May 2005, the government conducted Outbreak Response Immunization (ORI) in four villages within the immediate area of the first case (as WHO and UNICEF recommendations for polio outbreak response). More than 11,000 children were immunized with trivalent OPV during this ORI. While waiting for further larger actions of mop ups, if new cases occurred in new areas, ORIs were also conducted in several areas, as can be seen in Table 3.⁴

Table 3. Results of ORI

| Areas | Target pop | Coverage | |
|-------------------------------------|------------|----------|-------|
| | | # | % |
| Cidahu, Sukabumi, West Java | 4.073 | 4055 | 99.5 |
| B. Genteng, Sukabumi | 1814 | 1715 | 94.5 |
| Cidahu, Cisaat, Sukabumi, West Java | 6.066 | 5869 | 96.0 |
| Sawah Besar, Jakarta | 6.397 | 6571 | 102.7 |
| Cipanas, Sajira, Lebak, Banten | 11.777 | 11.866 | 100.8 |
| Demak, Central Java | 72.283 | 71.583 | 99 |
| Tanggamus, Lampung | 64.932 | 39.920 | 69 |

2. Mop up

To further prevent transmission, following a meeting on 29 April 2005 with the Minister of Health and senior members of the team, also the immunization

and surveillance teams, in collaboration with partner agencies, including WHO and UNICEF, two rounds of mopping-up immunization for all children aged less than 5 years in West Java, Banten and Jakarta Provinces were conducted. This was to ensure that any transmission of WPV was rapidly interrupted, and to rapidly improve population immunity over a wide area of Java. The rounds were conducted in the end of May 2005 and June 2005, targeting about 6 million children.⁴

The mop-up rounds were, under the circumstances, of good quality but negative media reports which incorrectly blamed polio vaccination for a number of coincidental adverse events during the first round caused misunderstanding and suspicion among public. These reports affected the second round coverage rate. Yet, despite operational challenges and the negative media reporting, the first round achieved over 90% coverage and the second round over 80%.

During the mopping up, a team from SEARO was conducting a rapid assessment for how high is the risk of the virus to spread to six provinces, which represent various geographic distribution of Indonesia. The result of assessment revealed that the probability is high to spread the poliovirus to the other areas. This justified the two rounds of mop up immunization conducted.^{4,6}

As an impact, in three mop-up provinces of West Java, Jakarta and Banten; the outbreak became under control. Early, large-scale mop-ups in these three provinces were instrumental in reducing the size of outbreak in these provinces and to slow down the spread into other areas.

3. NID

On 8 July 2005 the government together with partners held an Immunization Coordinating Committee (ICC) meeting to discuss the outbreak and plan for an appropriate response. The ICC recommended, based on the experience of the outbreak, the mop-up response as well as the experience of outbreaks following importations in other polio-free countries, that National Immunization Days (NIDs) should be held. The target for each round was to immunize 24.4 million children under the age of five. Two rounds of NIDs were conducted in 2005 (August and September), all with satisfactory coverage (95% and 97.7% respectively).⁴

The importation of WPV in Indonesia was detected early and the response had been appropriate. The two rounds of mop-ups and the two rounds of NIDs in the three provinces (West Java, Jakarta and Banten) surrounding the initial case is likely to bring the outbreak in these provinces under control. However, the remaining provinces, especially the high risk ones in Java and Sumatra have completed just two rounds. Based on the risk assessment and immunity gaps in the children in these provinces, some WPV, transmission is likely to remain even after the second round. This would not only lengthen the Indonesian polio outbreak resulting in more children being paralyzed but would also threaten neighbouring countries with the spread of poliovirus. Countries like the Philippines and Malaysia have already voiced their concerns and have also started strengthening surveillance and immunization.

Taking this into consideration, Indonesian government conducted a third NIDs round on 30 November 2005. Based on the experience of India, Egypt and now Yemen, in order to optimize the response and limit the spread, Indonesia used monovalent OPV type 1 (mOPV1) in selected highest risk provinces during the November round.

As a few cases were still reported after the November round, the fourth round of NID was conducted on 27 February 2006, and another round was on 12 April 2006. These last two rounds could also achieve satisfactorily coverage of more than 95% on each round.

WHO stated that it needs at least six months without any case to consider a country as polio free, supported by highly sensitive surveillance system, and that there are at least 3 rounds of campaign after the last evidence of virus transmission. Therefore, one round of sub-NID was conducted in 39 districts in the province of Aceh, North Sumatra and East Java on 27 June 2006. Coverage of this round was 90.9%. Beginning on 29 August 2006, eight provinces in Sumatra and the province of Nusa Tenggara Timur conducted measles immunization crash program campaign, where children under five years of age receive measles immunization. This opportunity was also taken to give oral polio vaccine to increase population immunity against polio. The target population was 6,045,438 children and coverage achieved was 92.3%.^{2,4}

Impact of those rounds of SIAs to the outbreak can be seen in **Figure 6**.

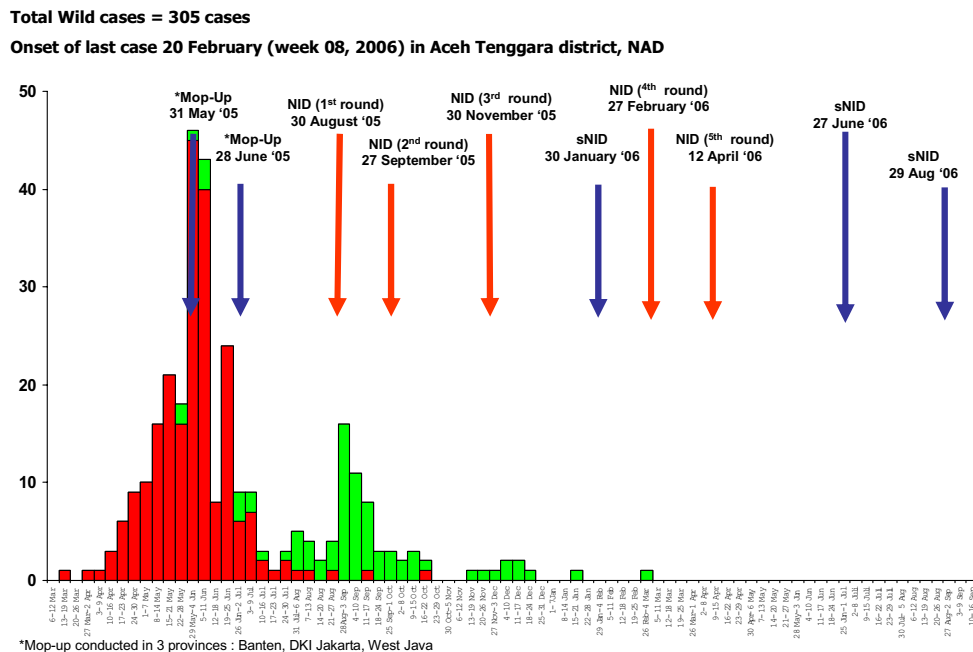


Figure 6. Wild polio cases by week of onset in Indonesia, 2005 - 2006

4. AFP surveillance

Maintaining polio eradication strategies and preparedness can prevent WPV spread after importation. All polio-free countries are advised to maintain sensitive, efficient AFP surveillance system in all areas to rapidly detect importations.

AFP surveillance in Indonesia, in relation with the polio outbreak, has strengthened tremendously. Accepting the 2005 TCG recommendation, the surveillance system was intensified and made much more sensitive. The target non-polio AFP rate was increased to 2 per 100,000 children less than 15 years. In 2006, the non-polio AFP rate achieved was 2.45. All provinces had achieved the non-polio AFP rate of more than one and 28 provinces of the 33 provinces had achieved the rate of two and more. This rate is equally high almost every month throughout the year. The increase in the AFP cases reporting has unfortunately reduced the adequate specimen rate to below the expected standard of 80% to 79.4 In 2007 this rate of above two can still be maintained.⁴

Following the recent outbreak, surveillance has now become the guiding factor that will indicate if the country has once again eradicated polio. The country is now taking great efforts to strengthen their AFP surveillance. Some new policies were added to strengthen the system, such as:²

1. Contact specimens of AFP hot case

To increase the sensitivity of any possibility of virus transmission, cases which show symptoms that very much similar to those with paralytic poliomyelitis, which are found within six months after paralysis, and have no adequate specimen, are considered as “hot case”. To those cases, beginning in September 2006, we have their contact specimens collected. Five close contacts of each hot case will have their specimens collected. If any of the contact specimens shows positive result, the case is classified as positive polio.

In 2006, there have been five cases which had their contact specimens collected but none of them showed positive result.

2. Immunization status survey

If an AFP case occurs to a child aged 6 months to 5 years and the child is under

immunized (has less than three doses of polio immunization), a question might arise whether this under immunized status represents an under immunized population in the area where the child resides. Therefore, a simple survey is conducted by asking 20 – 50 children aged less than 5 years old surrounding the area on their polio immunization status.

Table 4. History of poliomyelitis eradication in Indonesia

| | |
|------|--|
| 1973 | Immunization programme introduced in Indonesia with BCG |
| 1974 | Immunization expanded to include TT |
| 1976 | DTP added to the immunization schedule |
| 1977 | EPI Programme initiated using WHO global immunization guidelines in 55 health centers |
| 1977 | EPI Basic Guidelines developed for Indonesia |
| 1981 | OPV was added to the EPI Programme list of antigens |
| 1982 | Measles vaccine was added to the EPI Programme |
| 1988 | World Health Assembly and Indonesia committed to eradicate polio |
| 1991 | Polio Eradication Programme started and “suspect polio” surveillance initiated |
| 1995 | First National Immunization Days (NIDs) was initiated |
| 1995 | Last indigenous WPV type 1 reported from Probolinggo, East Jawa |
| 1997 | Polio Eradication program expanded to AFP Surveillance |
| 1997 | Three national polio laboratories accredited |
| 1997 | 1st International AFP Surveillance Review December 1997 |
| 1997 | National Committee for Certification of Polio Eradication established |
| 1997 | National Expert Review Committee established |
| 1998 | PT Biofarma laboratory begins ITD testing |
| 2001 | National Task Force on Laboratory Containment formed |
| 2002 | WHO supported Surveillance Officer system initiated |
| 2002 | National Polio laboratory in Bandung upgraded for ITD testing |
| 2003 | The Integrated VPD Surveillance Field Guide updated to include measles and NT |
| 2003 | 2nd International AFP Surveillance Review completed in June 2003 |
| 2004 | AFP, Measles, NT Integrated Surveillance |
| 2004 | Environmental sampling for poliovirus started in Yogyakarta Province |
| 2005 | Wild poliovirus type 1 reported from Sukabumi on 21 April 2005 |
| 2005 | Vaccine derived polio virus outbreak (VDPV) detected on the island of Madura |
| 2006 | Last wild polio type 1 reported from Aceh Tenggara, 20 February 2006 and the last positive contact on 12 April 2007 from the same district |
| 2006 | Joint National/International AFP Surveillance Review 21 July – 3 August 2006 |
| 2007 | A SEARO consultant visited Indonesia in June 2007 to follow up the review’s recommendations. |

In 2006, there were 20 surveys conducted. Results showed that some areas were pockets of low immunization coverage and those areas were given as feedback to the local authorities for necessary actions.

A Joint National/International AFP Surveillance Review was conducted in Indonesia in mid-2006. Sixteen teams were deployed in the fields to review the AFP surveillance activities. In the conclusion they stated that at that time, the Joint National/International AFP surveillance Review Team can not conclude with confident that WPV transmission has been interrupted in Indonesia.⁶

Overall, the history of poliomyelitis eradication in Indonesia is summarized in **Table 4**.

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