Polio in the Asia Pacific

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WHO Emergency Committee on Polio
Global Polio Eradication Initiative

The global effort to eradicate polio is the largest public-private partnership for public health

In fact, it is the largest-ever internationally-coordinated public health effort in history. It is spearheaded by national governments, WHO, Rotary International, the US Centers for Disease Control and Prevention (CDC) and UNICEF, and is supported by key partners including the Bill and Melinda Gates Foundation. Underpinning the effort is a global network of more than 20 million volunteers worldwide who have collectively immunized nearly 3 billion children over the past 20 years.
<table>
<thead>
<tr>
<th>Region</th>
<th>Year certified polio-free</th>
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</thead>
<tbody>
<tr>
<td>WHO African Region</td>
<td></td>
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<tr>
<td>WHO Region of the Americas</td>
<td>1994</td>
</tr>
<tr>
<td>WHO South-East Asia Region</td>
<td>2014</td>
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<tr>
<td>WHO European Region</td>
<td>2002</td>
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<tr>
<td>WHO Eastern Mediterranean Region</td>
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<tr>
<td>WHO Western Pacific Region</td>
<td>2000</td>
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</table>
Africa advances toward a polio-free continent

August 2015

11 August 2015 marks 1 year since the last wild polio case was detected on the entire African continent. A polio-free Africa would leave only 2 countries where polio transmission has never been interrupted: Pakistan and Afghanistan.
Polio

- **86%** Global coverage of infants with three doses of polio vaccine in **2014**
- **76%** Global coverage of infants with three doses of polio vaccine in **1990**
- **414** Number of confirmed polio cases in **2014** (including 359 wild virus confirmed cases)\(^a\)
- **350,000** Estimated number of polio cases in **1988**
- **3** Number polio-endemic countries in **2014**
- **125** Number polio-endemic countries in **1998**
Critical Poliovaccine Problems
Unknown in 1988

• Polio vaccine associate paralytic polio (VAPP):
  – Under current vaccine policies estimated 250-500 cases per year

• Poliovaccine virus can be excreted for years (iVDPV)
  – More than 20 cases with excretion >1 year
  – One well studied case with 22 years excretion:
    • High titer
    • Resistant to antiviral therapies

• Poliovaccine virus can revert to virulence (cVDPV)
  – Several outbreaks of paralytic disease
    • Egypt, Hispanola, Madagascar, Philippines
  – Silent Spread for 2 to ? years
circulating Vaccine-Derived Poliovirus outbreaks (cVDPVs), 2000-2008*

* as of 10 August 2008
As world seeks to eradicate polio, Laos suffers vaccine-linked case

GENEVA/LONDON

Prosecutors target Valeant
Prosecutors demanded details from Valeant Pharmaceuticals on its patient assistance programs, drug pricing and distribution practices. Full Article »

Join Reuters and Harvard for a discussion on drug pricing on Oct. 23
Wild Poliovirus & cVDPV Cases\(^1\), 2015
01 January – 24 November

Data in WHO HQ as of 24 November 2015

\(^1\)Excludes viruses detected from environmental surveillance.
Federally Administered Tribal Areas
Taliban Assassins Target Pakistan’s Polio Vaccinators

A bomb attack on a polio vaccination team in Jamroud, Pakistan, claimed the lives of 12, including bystanders.
Fighting Polio Amid the Chaos of Syria’s Civil War

Courageous bands of volunteers are standing up to ISIS and the Assad regime to vaccinate their children.
Poliovirus spread, 2003-2006

26 countries, 71 events
Number of importations from Nigeria
- Viral origin: 59 (83%)

Number of importations from India
- Viral origin: 12 (17%)

Wild virus type 1
Wild virus type 3
Wild virus type 1 & 3
Endemic countries
Case or outbreak following importation (last 6 months)
Case or outbreak following importation (6 - 12 months)

Data in HQ as of 09 October 2006
WHO Declares Health Emergency on Polio

The World Health Organization declared polio an international health emergency on Monday as the rise in cases threatens eradication efforts and singled out the conflict zones of Syria, Cameroon and Pakistan as worrisome sources of its spread.
An ancient scourge triggers a modern emergency

WHO sounds alarm on spread of polio

By Ashley Hayes, CNN
May 5, 2014 – Updated 1818 GMT (0218 HKT)
Polio cases due to endemic vs imported cases (2000-2013)

<table>
<thead>
<tr>
<th>Year</th>
<th>Proportion Imported</th>
<th>Imported Virus Cases</th>
<th>Endemic Virus Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>2%</td>
<td>17</td>
<td>702</td>
</tr>
<tr>
<td>2001</td>
<td>2%</td>
<td>8</td>
<td>475</td>
</tr>
<tr>
<td>2002</td>
<td>0%</td>
<td>3</td>
<td>1915</td>
</tr>
<tr>
<td>2003</td>
<td>7%</td>
<td>52</td>
<td>732</td>
</tr>
<tr>
<td>2004</td>
<td>20%</td>
<td>256</td>
<td>999</td>
</tr>
<tr>
<td>2005</td>
<td>53%</td>
<td>1045</td>
<td>934</td>
</tr>
<tr>
<td>2006</td>
<td>6%</td>
<td>128</td>
<td>1869</td>
</tr>
<tr>
<td>2007</td>
<td>8%</td>
<td>107</td>
<td>1208</td>
</tr>
<tr>
<td>2008</td>
<td>9%</td>
<td>146</td>
<td>1505</td>
</tr>
<tr>
<td>2009</td>
<td>22%</td>
<td>348</td>
<td>1256</td>
</tr>
<tr>
<td>2010</td>
<td>83%</td>
<td>1120</td>
<td>232</td>
</tr>
<tr>
<td>2011</td>
<td>48%</td>
<td>309</td>
<td>341</td>
</tr>
<tr>
<td>2012</td>
<td>3%</td>
<td>6</td>
<td>217</td>
</tr>
<tr>
<td>2013</td>
<td>62%</td>
<td>256</td>
<td>160</td>
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<tr>
<td>Exporting countries*</td>
<td>Recommendations</td>
<td></td>
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<td>---------------------------</td>
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<tr>
<td>Cameroon</td>
<td>Countries which are currently exporting wild poliovirus should ensure that all</td>
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<tr>
<td>Pakistan</td>
<td>residents and long-term visitors (of over 4 weeks) receive a dose of oral</td>
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<tr>
<td>Syria</td>
<td>polio vaccine (OPV) or inactivated poliovirus vaccine (IPV) between 4 weeks</td>
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<tr>
<td></td>
<td>and 12 months before international travel; and should ensure that such</td>
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<td></td>
<td>travellers are provided with proof of vaccination.</td>
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<tr>
<td>Full recommendations</td>
<td></td>
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</tbody>
</table>

| Other polio-affected      | Recommendations                                                                 |
| countries*                | Other polio-affected countries are encouraged to vaccinate residents and long- |
|                           | term visitors before international travel.                                    |
|                           |                                                                                |
| Afghanistan               |                                                                                |
| Equatorial Guinea         |                                                                                |
| Ethiopia                  |                                                                                |
| Iraq                      |                                                                                |
| Israel                    |                                                                                |
| Nigeria                   |                                                                                |
| Somalia                   |                                                                                |
| Full recommendations      |                                                                                |

*These recommendations came into effect from 5 May 2014 and will be reviewed in 3 months*
Countries with visa entry requirements for polio vaccination

• Saudi Arabia: for Hajj and Umrah pilgrims from polio-infected countries
Potential for international spread of wild poliovirus via travelers

Annelies Wilder-Smith¹,²*, Wei-Yee Leong¹, Luis Fernandez Lopez³,⁸, Marcos Amaku⁴, Mikkel Quam⁵, Kamran Khan⁶,⁷ and Eduardo Massad⁸,⁹

Results: Our model estimated 665 polio exportations (>99 % of which were asymptomatic) from nine polio-infected countries in 2014, of which 78.3 % originated from Pakistan. Our model also estimated 21 importations of poliovirus into Saudi Arabia via Hajj pilgrims and 20 poliovirus infections imported to India in the same year.
## Situation in November 2015

### States currently exporting wild poliovirus or cVDPV
- Afghanistan
- Pakistan

### States infected with wild poliovirus or cVDPV but not currently exporting
- Guinea
- Lao People's Democratic Republic
- Madagascar
- Nigeria
- Ukraine

### States no longer infected by wild poliovirus or cVDPV, but which remain vulnerable to international spread, and states that are vulnerable to the emergence and circulation of VDPV
- Cameroon
- Equatorial Guinea
- Ethiopia
- Iraq
- Israel
- Somalia
- South Sudan
- Syrian Arab Republic
Polio situation in the Asia Pacific Region
Major Developments: The Post-Eradication Timeline

<table>
<thead>
<tr>
<th>Priority Activities</th>
<th>WPV Containment &amp; Certification</th>
<th>VAPP/VDPV Elim. &amp; Verification</th>
<th>'Post OPV' Era</th>
</tr>
</thead>
</table>
Failure to vaccine

OR

Vaccine Failure?
Comparison -- Smallpox and Polio

**Smallpox**

- **Surveillance-Containment**
  - Visible rash – all cases
  - Readily diagnosed
  - Minimal demand for lab
  - Targeted containment

- **Epidemiology**
  - Transmission only by cases
  - Moderately contagious

**Polio**

- 1/200 with paralysis
- Flaccid paralysis problem
- Heavy lab demand
- Area-wide campaigns

- Primarily by asymptomatic
- Very contagious

- Vaccine problems: VAPP and cVDPV
• Oral polio vaccine (OPV)
• Monovalent oral polio vaccines (mOPV1 and mOPV3)
• Bivalent oral polio vaccine (bOPV)
• Inactivated polio vaccine (IPV)
Protective efficacy of a monovalent oral type 1 poliovirus vaccine: a case-control study

Nicholas C Grassly, Jay Wenger, Sunita Durrani, Sunil Bahl, Jagadish M Deshpande, Roland W Sutter, David L Heymann, R Bruce Aylward

Summary

Background A high-potency monovalent oral type 1 poliovirus vaccine (mOPV1) was developed in 2005 to tackle persistent poliovirus transmission in the last remaining infected countries. Our aim was to assess the efficacy of this vaccine in India.

Methods We estimated the efficacy of mOPV1 used in supplementary immunisation activities from 2076 matched case-control pairs of confirmed cases of poliomyelitis caused by type 1 wild poliovirus and cases of non-polio acute flaccid paralysis in India. The effect of the introduction of mOPV1 on population immunity was calculated on the basis of estimates of vaccination coverage from data for non-polio acute flaccid paralysis.

Findings In areas of persistent poliovirus transmission in Uttar Pradesh, the protective efficacy of mOPV1 was estimated to be 30% (95% CI 19–41) per dose against type 1 paralytic disease, compared with 11% (7–14) for the trivalent oral vaccine. 76–82% of children aged 0–23 months were estimated to be protected by vaccination against type 1 poliovirus at the end of 2006, compared with 59% at the end of 2004, before the introduction of mOPV1.

Interpretation Under conditions where the efficacy of live-attenuated oral poliovirus vaccines is compromised by a high prevalence of diarrhoea and other infections, a dose of high-potency mOPV1 is almost three times more effective against type 1 poliomyelitis disease than is trivalent vaccine. Achieving high coverage with this new vaccine in areas of persistent poliovirus transmission should substantially improve the probability of rapidly eliminating transmission of the disease.
Post-Eradication

• Developing an affordable inactivated polio vaccine

• Managing risk associated with vaccine derived polio virus (cVDPV) and polio vaccine associated paralytic polio

• Antivirals
Eradication of polio virus type 2

- The last case of type 2 was reported in 1999 and its eradication was declared in September 2015;
- the most recent case of type 3 dates to November 2012
- Polio virus type 1: ongoing
## Surveillance indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Minimum levels for certification standard surveillance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completeness of reporting</td>
<td>At least 80% of expected routine (weekly or monthly) AFP surveillance reports should be received on time, including zero reports where no AFP cases are seen. The distribution of reporting sites should be representative of the geography and demography of the country.</td>
</tr>
<tr>
<td>Sensitivity of surveillance</td>
<td>At least one case of non-polio AFP should be detected annually per 100,000 population aged less than 15 years. In endemic regions, to ensure even higher sensitivity, this rate should be two per 100,000.</td>
</tr>
<tr>
<td>Completeness of case investigation</td>
<td>All AFP cases should have a full clinical and virological investigation with at least 80% of AFP cases having ‘adequate’ stool specimens collected. ‘Adequate’ stool specimens are two stool specimens of sufficient quantity for laboratory analysis, collected at least 24 hours apart, within 14 days after the onset of paralysis, and arriving in the laboratory by reverse cold chain and with proper documentation.</td>
</tr>
<tr>
<td>Completeness of follow-up</td>
<td>At least 80% of AFP cases should have a follow-up examination for residual paralysis at 60 days after the onset of paralysis.</td>
</tr>
<tr>
<td>Laboratory performance</td>
<td>All AFP case specimens must be processed in a WHO-accredited laboratory within the Global Polio Laboratory Network (GPLN).</td>
</tr>
</tbody>
</table>
Establishing affordable options for IPV use in any setting -

- dose-reduction strategy using intradermal administration of fractional IPV doses
- schedule requiring fewer doses (for example, two doses given six months apart)
- adjuvant use to reduce the quantity of antigen required in the vaccine
- IPV production processes to facilitate manufacture in low-cost sites.
time

costs of program

eradication

control

evolution

increment costs

savings