India's last bastion of polio at "tipping point"

The world is on the brink of eradicating polio, but success depends largely on removing the pocket of wild poliovirus in the Indian state of Uttar Pradesh.

The most dangerous form of polio has reached a historic low in a stronghold in India. The single most important pocket of polio – Moradabad and surrounding districts in western Uttar Pradesh – has repeatedly exported wild poliovirus to other states in India and abroad. But epidemiologists there say they have reached a "tipping point" in the eradication campaign.

Polio remains endemic in just four countries – Afghanistan, India, Nigeria and Pakistan – down from 125 countries in 1988. Nine other countries reported importation of poliovirus in 2006. Polio is caused by poliovirus type-1, type-2 or type-3. Type-2 poliovirus was eliminated worldwide in 1999. In 2006 there were 338 cases of type-1 polio in the western part of Uttar Pradesh state. By the end of September 2007, the core endemic area of the western part of Uttar Pradesh state had been free of type-1 poliovirus for nine months. Never before has the most virulent and most dangerous form of the disease disappeared from its Indian heartland for such a long period. Only four type-1 polio cases had been identified in the whole of western Uttar Pradesh by the end of September 2007. In 2006, the key area had 338 cases.

"The real challenge to global polio eradication is the persistence of type-1 transmission in western Uttar Pradesh," said Dr Hamid Jafari, project manager of the World Health Organization's (WHO) National Polio Surveillance Project. "If type-1 can be eliminated here, we can definitively say the war on polio worldwide can be won".

Polio is so resistant to eradication in this part of India because of the combination of extreme poverty, poor sanitation and the high population density. Such conditions facilitate transmission of the virus and compromise the efficacy of the oral vaccine.

In 2005, India moved away from its exclusive reliance on traditional trivalent oral polio vaccine and started using monovalent oral vaccines, which target either of the remaining two serotypes – type-1 and type-3. These newer vaccines are more efficacious per dose and boost immunity faster than trivalent vaccines.

The following year, however, another outbreak of type-1 polio occurred in India, again in western Uttar Pradesh, following a decline in vaccination

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Volunteers mark houses with a "P" where children have been vaccinated. They mark houses with an "X", where the children living there were not available and where volunteers must return later to finish the job.

coverage. From there, it spread quickly throughout the state and beyond. By the end of the year, 648 confirmed cases of type-1 polio had been declared throughout India.

The government of India embarked on an intensified vaccination strategy in western Uttar Pradesh and the neighbouring Bihar state at the start of 2007. By mid-September Bihar had already conducted 10 vaccination campaigns – a higher level of polio vaccination activity than anywhere else in the world.

This September, the eighth vaccination round was conducted in Moradabad. On the first day of the campaign 604 294 children were immunized at 3445 booths across the Moradabad district. By the end of the round a week later, 946 082 children had been immunized through the district.

"This is definitely our make or break year," said Dr Vibhor Jain, sub-regional team leader for the National Polio Surveillance Project in Moradabad. "There's no room for complacency but, so far, the results are very encouraging."

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The logistical challenge of the anti-polio campaign was evident: 1729 vaccination teams visited the more than 700 000 homes of Moradabad district during the September round, covering rural and urban areas. Additional teams visited transit sites such as railway stations, bus and rickshaw stands, busy intersections, markets, doctors' clinics, even running trains. Some 30 "mobile" teams visited brick kilns, construction sites, sugar mills and factories where children live or accompany their parents.

The team that visited the Moradabad neighbourhood of Rehmat Nagar Society on 10 September comprised three female vaccinators (two of whom were volunteers paid 50 rupees, US$ 1.2 a day), a volunteer "influencer" (a prominent member of the community who helps persuade reluctant parents to have their child vaccinated) and a United Nations Children's Fund (UNICEF) community "mobilizer" who creates awareness within his, or her, community of the need for immunization. In the morning, they called on 115 families in the Muslim-dominated neighbourhood, categorized as a polio high-risk area. They vaccinated 19 children who had not been taken to one of five local booths the previous day, marking their houses with a "P" and marking with an "X" the dwellings of 24 young children not available for a variety of reasons. In the afternoon, they returned to those houses marked with an "X".

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Volunteer gives child oral polio vaccination while the father looks on.

Careful management of anxieties over the immunization programme, particularly among poorer communities and those under-served by the health services, has improved vaccination rates. "In earlier rounds, we encountered families refusing to allow us vaccinate their children because they feared it would cause sterility," said vaccinator Rita, an employee of the state's child labour department. "But this time, we've had not one family refusing us. The way things are going we feel we're now going to win the battle against polio." Follow-up has also improved. "A vaccination team will visit one house up to 10 times in one round if necessary," said Dr Kanwaljit Singh, a surveillance medical officer in Moradabad. "The follow-through on "X" houses has become so efficient that I'd say more than 95% of children are vaccinated by the end of each round in this district".

Other significant factors have been the improved identification and tracking of newborns since 2006; the increased emphasis on community involvement since 2006; and the introduction in 2007 of a comprehensive migrant vaccination strategy. This strategy targets children of migrant labourers who travel seasonally throughout northern India from Uttar Pradesh and neighbouring Bihar.

A perhaps inevitable consequence of using the monovalent vaccine against type-1 polio has been a resurgence of type-3 polio in India. Officials regard this situation as "manageable" and the priority remains the fight against the age-old enemy, type-1 polio.

"We know the world is watching what we're doing in western Uttar Pradesh," said Jafari. "If we can maintain the current level of success against type-1 polio till the end of the year, we'll be able to start breathing a bit easier. There's no margin for error. If we make a mistake, then we'll pay for it and the virus could come back roaring." ■

David Orr, *Moradabad*