

## No vaccine for the scaremongers

Millions of deaths are prevented by vaccination every year, yet public anxieties and vaccine scares that ignore rigorous science continue to hamper immunization programmes. Jane Parry reports.

For most children in the developed world, immunization against a range of infectious diseases is a form of health protection often taken for granted. These children benefit from vaccines against more than 20 diseases, while new vaccines continue to be developed, most recently for rotavirus and human papillomavirus.

In developing countries, however, getting routine vaccinations to the people who need them remains a key public health challenge, with the lack of health-care infrastructure, high costs and delays between their introduction in developed countries and their rollout in the developing world cited as the main barriers.

Despite these barriers, global vaccination has evolved as a result of rigorous scientific research. According to the World Health Organization (WHO) and the United Nations Children's Fund's (UNICEF) 2007 *Immunization Summary*, more than 2.5 million deaths a year are prevented in all age groups owing to vaccination against four diseases – diphtheria, tetanus, pertussis (DTP) and measles. Global coverage of infants with the DTP vaccine reached 79% in 2006, up from 20% in 1980, while the uptake of several under-used vaccines, including hepatitis B, rubella and yellow fever, is increasing.

Smallpox has long been hailed as the ultimate vaccination success. It was declared eradicated in 1979, the only disease affecting humans to be eliminated deliberately. Polio has been eradicated in WHO's American, European and Western Pacific Regions,

while the number of countries where polio is deemed a serious public health problem has dropped from 125 in 1988, when the eradication drive was launched, to only four – Afghanistan, India, Nigeria and Pakistan – where the disease remains endemic.

There have been many other successes, such as the 99% reduction in the incidence of bacterial meningitis caused by *Haemophilus influenzae* in the United States of America (USA) which introduced vaccination against the disease in 1988, according to its Centers for Disease Control and Prevention. The Republic of Korea, with 99% vaccination coverage for measles, declared the killer disease eradicated in 2006.

Despite these successes, vaccine anxieties continue to periodically impede this highly effective public health measure. In certain industrialized countries, most notably the USA, public concern has shifted its focus from the diseases vaccination can prevent, to the risks of the vaccines themselves. The Internet has become a significant channel for anti-vaccination views. The popular video-sharing web site YouTube offers a plethora of anti-vaccination clips. The Internet has also become a forum for alternative medicine practitioners to present their anti-vaccination ideas and promote alternative products.

While parents in developing countries have, for example, first-hand experience of measles and welcome vaccination against it, the uptake by parents for the combined measles, mumps and rubella vaccine in many developed countries has yet to recover



WHO

Dr Jonas E Salk, who developed the first vaccine against poliomyelitis in 1955, gives a boy a polio vaccine shot during the mass inoculation trial in Pittsburg, Pennsylvania, in the United States of America (USA). Salk developed his successful vaccine around the time of the Cutter incident, when thousands of people in the USA developed polio after being given vaccine containing live virulent polio virus from Cutter Laboratories.

almost 10 years after a study linking it to autism, even though the original study has long since been discredited and there is overwhelming scientific evidence that refutes the link.

A similar scare linking the mercury compound vaccine, thiomersal, to autism led to its elimination from most USA and European vaccines that contained it, despite the lack of scientific evidence to support this measure. Indeed, five large-scale studies failed to find a link between thiomersal and autism, and, according to some studies, the incidence of autism has risen after discontinuation of thiomersal use in vaccines.

Anti-vaccination scares can have lasting, harmful effects. Pertussis (or whooping cough) vaccination was

halted in Japan in the mid-1970s owing to public concerns over adverse neurological effects. At that point, Japan had brought the disease under control after introducing immunization in 1947. Pertussis is a highly contagious respiratory disease and one of the leading causes of vaccine-preventable deaths worldwide, causing 300 000 deaths a year, predominantly among unvaccinated or partially vaccinated infants, who go on to suffer vomiting, dehydration and malnutrition.

Dr David Sniadack, medical officer with the Expanded Programme on Immunization in WHO's Western Pacific Regional Office, says: "With less than 10% coverage among infants in 1976, [there] followed a resurgence of pertussis cases. A pertussis epidemic involving 13 000 cases and 41 deaths occurred in 1979. Pertussis incidence returned to very low levels with the introduction of DTP vaccinations in 1981."

France still has low rates of hepatitis B vaccination compared with other countries in Europe as a result largely of misinformed public opposition to the vaccine. Dr Patrick Zuber, group leader of the WHO vaccine safety team, says: "From all the data we have, hepatitis B is as benign as any other vaccine but it has been associated in rumours with autism, multiple sclerosis and leukaemia. All the solid epidemiological studies have not been able to confirm any hint of an association."

An 11-month hiatus in the immunization campaign in Kano and other northern Nigerian states in August 2003 resulted in a resurgence of polio, which then spread to 13 other African countries, and from the Sudan to Saudi Arabia and Yemen, and then on to Indonesia.

Dr Bardan Jung Rana, medical officer with WHO's Expanded Programme on Immunization in Jakarta, says: "After a 10-year interval of no polio cases, on 21 April 2005, the National Polio Laboratory in Bandung reported a wild poliovirus isolate. Genetic analysis of the virus showed it to be similar to recently isolated viruses in Saudi Arabia and Yemen. After the detection of the case, Indonesia conducted two rounds of mop-up in the three provinces surrounding the case and followed it up



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with five National Immunization Days (NIDs) and three Synchro-NIDs."

While most anti-vaccination scares are not supported by scientific evidence, public concern about the safety of new vaccines is understandable. American infectious diseases expert and vaccinologist Dr Paul Offit traces public distrust of vaccines to the so-called Cutter incident during the 1950s, when thousands of people in the USA developed vaccine-induced polio as a result of being given vaccine containing live polio virus from Cutter Laboratories. In his 2007 book entitled *The Cutter Incident*, Offit recalls that of 220 000 people infected – including about 100 000 children – 70 000 developed muscle weakness, 164 were severely paralysed and 10 died.

Dealing with vaccine anxieties requires a multi-pronged approach, including engagement with governments in affected countries and disseminating scientific evidence on vaccine safety, Zuber says. He cites the successful response to opposition to vaccines in Nigeria. "WHO met with the national authorities and other local leaders. They listened to their concerns, which were based on a fear about vaccine safety." However, the authorities were eventually reassured and acceptance of the vaccine was re-established following intensive dialogue.

As with disease itself, the prevention of anxieties about vaccines is better than cure. It is the task of WHO's Global Advisory Committee on Vaccine Safety to address the misinformation that undermines vaccination efforts by constantly monitoring and reviewing vaccine safety and providing accurate information on any adverse events. The committee's 14 members, recruited for three-year terms to offer expertise in a range of related fields, including epidemiology, pharmacology, infectious disease and drug regulation and safety, are also charged with providing scientific recommendations on vaccination. The committee, along with other members of the health and development community, have played a major role in tipping the balance in favour of reliable information. WHO's Vaccine Safety Net lists web sites that contain vaccine safety information and are considered credible.

Zuber says: "Immunization programmes are already extremely successful but the potential impact is even greater. It would be technically possible to prevent a further four million deaths each year due to influenza, pneumococcus, rotavirus, rabies, cholera, typhoid, epidemic meningitis and Japanese encephalitis. All of these diseases are significant health issues but they all have safe, effective vaccines." ■