

POLIO GLOBAL ERADICATION INITIATIVE



SECURING A LASTING WORLD
FREE OF ALL POLIOVIRUSES



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GLOBAL POLIO ERADICATION INITIATIVE

Annual Report 2017



World Health
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Rotary



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CONTENTS

Acronyms	iii
Foreword	iv
Executive summary	vi
Interrupting remaining strains of poliovirus transmission	2
Afghanistan and Pakistan: The remaining WPV bastions in the Eastern Mediterranean	3
Nigeria: A public health emergency across the Lake Chad subregion	5
Syrian Arab Republic and Democratic Republic of the Congo: Stopping cVDPV2s	7
Protecting children in high-risk areas: Immunization and surveillance	9
Gender: A factor in polio immunization	10
Preparing for a lasting polio-free world	12
The identification of potential sources of re-emergence	13
The containment of polioviruses in research and manufacturing facilities	13
The phased removal of oral polio vaccines	15
Global certification – independent verification of a polio-free world	16
The Post-Certification Strategy and GPEI transition planning	16
The date of polio eradication	18
Financing the Polio Eradication & Endgame Strategic Plan	19

ACRONYMS

AFP	Acute flaccid paralysis
bOPV	Bivalent oral polio vaccine
cVDPV	Circulating vaccine-derived poliovirus
cVDPV2	Circulating vaccine-derived poliovirus type 2
GAPIII	Third edition of the WHO Global Action Plan to minimize poliovirus facility-associated risk after type-specific eradication of wild polioviruses and sequential cessation of oral polio vaccine use
GCC	Global Commission for the Certification of the Eradication of Poliomyelitis
GPEI	Global Polio Eradication Initiative
IPV	Inactivated polio vaccine
mOPV2	Monovalent oral polio vaccine type 2
NAC	National Authority for Containment
OPV	Oral polio vaccine
OPV2	Oral polio vaccine type 2
PCS	Post-Certification Strategy
PEF	Poliovirus-essential facility
SAGE	Strategic Advisory Group of Experts on immunization
SIA	Supplementary immunization activity
tOPV	Trivalent oral polio vaccine
UNICEF	United Nations Children's Fund
VAPP	Vaccine-associated paralytic polio
VDPV	Vaccine-derived poliovirus
VDPV2	Vaccine-derived poliovirus type 2
WHO	World Health Organization
WPV	Wild poliovirus
WPV1	Wild poliovirus type 1



FOREWORD

Together, let us achieve something historic.

© WHO Afghanistan/S. Ramo

Dear Stakeholder and partner in the global effort to eradicate polio,

The Global Polio Eradication Initiative (GPEI) aims to make polio the second-ever human disease, after smallpox, to be eradicated worldwide. GPEI's Polio Eradication & Endgame Strategic Plan 2013-2018 – or Endgame Plan¹ – is the current framework for achieving that goal.

At the time of GPEI's founding in 1988, polio was endemic in more than 125 countries and paralyzed 350,000 children every year. Since then, the Initiative has overseen a reduction of more than a 99 per cent in annual cases of polio. In 2017, there were only 22 reported wild polio cases – the lowest number ever. Today, just three countries remain endemic to wild poliovirus transmission, and the world is closer than ever before to being polio-free. And yet, our last steps are proving to be the most difficult.

The strategies outlined in the Endgame Plan and implemented at the country, regional and global levels have brought us to the brink of polio eradication and laid the groundwork for taking those final steps and sustaining a polio-free world in perpetuity. GPEI is further evaluating and refining these strategies in an extension of the strategic plan that will be finalized in early 2019. After the eradication of wild poliovirus has been certified, the Post-Certification Strategy, already presented to the World Health Assembly in May 2018, will guide the activities that need to be implemented and functions that must be sustained to keep the world free of polio.

¹ Extended through 2019, as per Polio Eradication & Endgame Midterm Review, July 2015. Available at http://polioeradication.org/wp-content/uploads/2016/07/GPEI-MTR_July2015.pdf.



Eradicating a disease is a remarkable achievement. Consider this: In the 20th century alone, smallpox killed more than 500 million people all over the world – more than the casualties caused by all the wars in recorded history combined (including World Wars I and II). But thanks to the global smallpox eradication effort, since 1977 not a single human being has been infected or died due to smallpox. What a perfect example of a sustainable and equitable global public good. In fact, it is often said that that no single human being in history has saved more lives than Dr Edward Jenner, the small-town English country doctor who, in 1796, developed the smallpox vaccine – the first vaccine ever developed.



Ali Maalin, last smallpox case, Somalia, 1977

This is precisely what the world is attempting to achieve with polio, and it may very well be the single most important endeavour that any of us will ever have the privilege and honour to join. But with this privilege comes the responsibility to succeed. And to meet that responsibility, we will need the unwavering commitment of every partner, every stakeholder, every donor, every political leader, every mother and father.

So today, we have two messages for you, our partners in this effort. First, thank you for what you have done already – for having brought the world so close to being polio-free. And second, please redouble your efforts for a final push to get us over the finish line. The Initiative needs the necessary political will and committed resources to fully implement these strategies in all areas. Together, let us achieve something historic. Let us ensure that no child, anywhere, will ever again know the pain of lifelong polio paralysis.

With sincerest warm wishes, and in anticipation of celebrating a polio-free world together with you very soon, we remain yours truly,

Tedros Adhanom Ghebreyesus
WHO Director-General

Barry Rassin
President, Rotary International

Chris Elias
President, Global Development,
Bill & Melinda Gates Foundation

Henrietta H. Fore
UNICEF Executive Director

Robert R. Redfield
CDC Director

EXECUTIVE SUMMARY

Working towards a polio-free future: 2017 in review

Global progress and renewed commitment in 2017 brought us closer than ever to a world without polio.

The year's end offered a chance to reflect on the polio programme's milestones and the fact that 2017 saw the fewest wild poliovirus (WPV) cases in history – a total of 22 – from the fewest areas of the fewest countries ever, with cases reported from just two countries: Afghanistan and Pakistan. Yet the need to reach every last child remained more important than ever, as demonstrated by ongoing vaccination and surveillance gaps in north-eastern Nigeria; although no cases were identified in this region in 2017, undetected circulation of the virus could not be ruled out, and the outbreak response across the Lake Chad subregion continued.

The detection of circulating vaccine-derived poliovirus type 2 (cVDPV2) in the Syrian Arab Republic and the Democratic Republic of the Congo were sobering reminders of the urgent need to not only eradicate all strains of WPV, but also to eliminate vaccine-derived poliovirus (VDPV) in the long term. Outbreak response was immediately launched in both countries. Genetic sequencing confirmed that the strains in both emerged prior to the globally-coordinated switch from trivalent oral polio vaccine (tOPV) to bivalent oral polio vaccine (bOPV) in 2016, thereby underscoring the appropriateness of that strategy.

Elsewhere, following the global switch in 2016, ongoing surveillance for oral polio vaccine type 2 (OPV2) continued to demonstrate this strain's rapid elimination. A global inactivated polio vaccine (IPV) supply constraint continued to be managed throughout 2017. It is anticipated to be largely alleviated by mid-2018, also thanks in part to countries adopting the fractional dose strategy recommended by the Strategic Advisory Group of Experts on immunization (SAGE).

Planning for a lasting polio-free world persisted throughout the year; global containment and certification activities were intensified and the Post-Certification Strategy (PCS) was developed in broad

stakeholder consultation, to ensure the functions needed for a polio-free world are sustained. Transition planning globally and at the country level also continued, to guarantee that the infrastructure built up to eradicate polio endures to benefit broader public health issues long after the disease is gone.

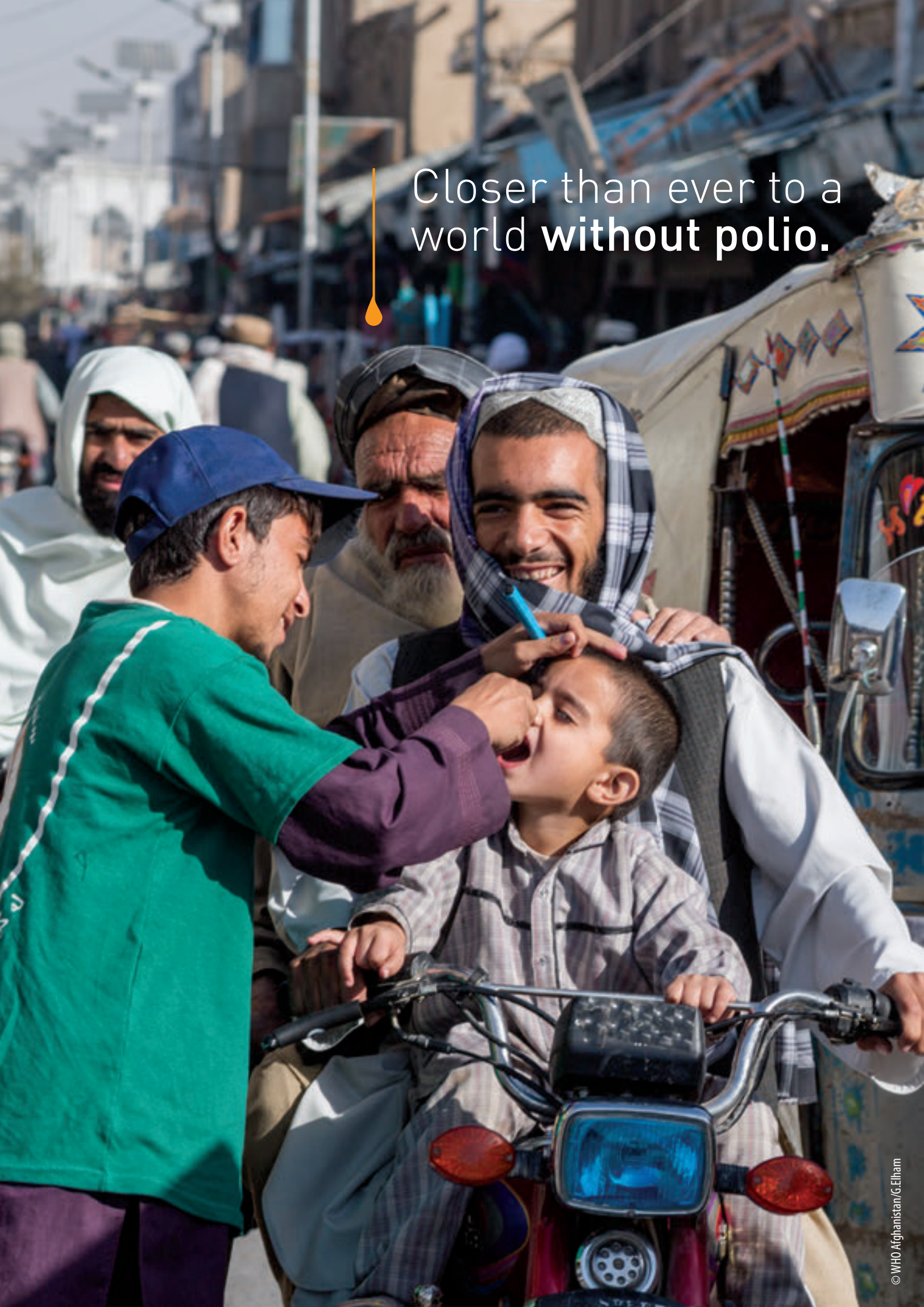
Complementing these programmatic innovations were political and financial commitments that highlighted polio eradication as a priority for global health leaders. These included:

- In May, the World Health Assembly reiterated the importance of eradicating polio and strategically transitioning the programme's assets, and the G20 health ministers during their first-ever meeting in Berlin recognized the contribution of the polio infrastructure to helping countries face health emergencies.
- Health leaders gathered at the Rotary International convention in June pledged US\$ 1.2 billion to end polio. Just months later, the United Kingdom demonstrated its own long-standing commitment to eradication with a US\$ 130 million pledge.
- At the G7 Health Ministers' Meeting in November, leaders once again affirmed their dedication to polio eradication as part of their broader responsibility to strengthen health systems.

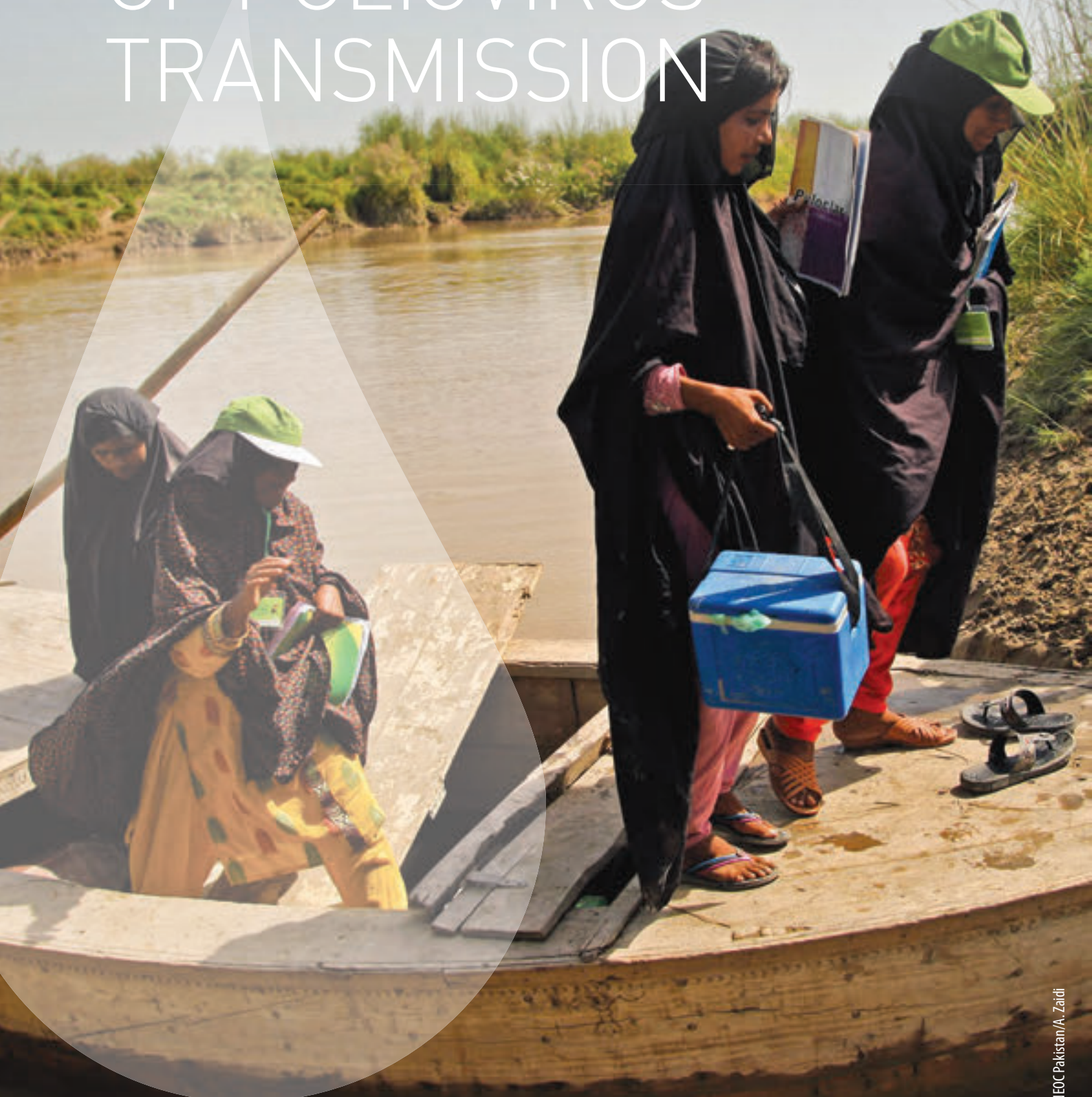
From programme strategies that helped to protect progress and overcome obstacles, to commitments from donors and partners, the resolve required to achieve a polio-free future was demonstrated in 2017. Accelerating progress in 2018 and ending polio for good will require maintaining these political and financial commitments as well as building upon the programme's efforts to find the virus wherever it exists.

If the remaining endemic countries continue to do all they can to stop the virus, and if the global community maintains the level of political and financial commitment needed to make and keep children everywhere polio-free, the world will soon celebrate being free of this disease once and for all.

Closer than ever to a world **without polio.**



INTERRUPTING REMAINING STRAINS OF POLIOVIRUS TRANSMISSION



Key points

Since the launch of the Global Polio Eradication Initiative (GPEI) in 1988, the incidence of polio has been reduced by more than 99%, from an estimated more than 350 000 cases every year in 125 endemic countries, to 22 cases in 2017 due to WPV reported from just two countries, and 96 cases due to cVDPV2 from a further two countries. Polio is now at its lowest levels in history, with fewer cases reported from fewer areas, and the world has a unique opportunity to eradicate a human pathogen, for only the second time in history after the eradication of smallpox in 1977.

As great as the opportunity is, however, so are the stakes. Failure to eradicate polio would result in a drastic resurgence of the disease globally and, within the next 10 years, the world could again see 200 000 new cases, every single year. This would be a humanitarian catastrophe that must be averted at all costs, and that is why the Emergency Committee under the International Health Regulations maintains its position that the eradication of polio continues to represent a Public Health Emergency of International Concern.

The good news is that the eradication strategies outlined in the Endgame Plan, if fully financed and implemented, form the correct approach to achieve a lasting polio-free world. It is therefore in our own hands to achieve success, and to secure a world permanently free of polio for all generations to come.

Afghanistan and Pakistan: The remaining WPV bastions in the Eastern Mediterranean

Afghanistan and Pakistan continued to be treated as a single epidemiological block. In 2017, eight cases of paralytic poliomyelitis due to WPV type 1 (WPV1) were reported in Pakistan, compared to 20 in 2016. In Afghanistan, 14 cases were reported, compared to 13 in 2016. The two countries continued to demonstrate strong commitment, and independent technical advisory groups underscored the feasibility of rapidly interrupting the remaining strains of transmission. Realizing that goal, however, will depend on reaching all missed children. Both countries coordinated

activities closely, focusing their efforts on clearly identifying missed children, determining why they were missed and putting in place operational plans to overcome these challenges. In particular, emphasis was placed on reaching highly mobile population groups, travelling both internally within both countries and across the border. Virus transmission was shown to be primarily restricted to cross-border corridors linking eastern Afghanistan with Khyber Pakhtunkhwa and Federally Administered Tribal Areas in Pakistan, and southern Afghanistan (Kandahar and Helmand) with Quetta, Balochistan and Karachi, Sindh. Programme coordination improved in 2017 at the national and provincial/regional levels as well as among the bordering districts in the common corridors of transmission, focused on the vaccination of high-risk mobile populations and those living along the border. At the same time, polio-free areas of both



Countries must present a united front **for the virus to be eradicated.**

countries needed to maintain strong levels of immunity and surveillance.

Environmental surveillance in both countries confirmed the risk of ongoing virus transmission to polio-free areas, imported from remaining reservoir areas. Of particular concern was Karachi (Pakistan), given the ongoing detection of positive environmental samples and the confirmation of a case of paralytic poliomyelitis due to WPV in August 2017, the first in greater Karachi since January 2016.

Both Afghanistan and Pakistan adjusted and fine-tuned their national emergency action plans for polio eradication, building on the lessons learned, and concentrated on improving programme operations during the low-transmission season (October to May). The updated plans placed particular emphasis on the Quetta Block, Karachi and Rawalpindi/Islamabad in Pakistan, and southern and eastern Afghanistan. Consistently reaching and vaccinating high-risk mobile population groups remained essential for Afghanistan and Pakistan, in order to interrupt transmission over the coming months. Another factor critical to achieving success was sustaining continued effective leadership at all levels in both countries.

Nigeria: A public health emergency across the Lake Chad subregion

In Nigeria, no new case due to WPV1 was confirmed in 2017 after the detection of cases in July-August 2016 from Borno state (related to a strain last detected in Borno in 2011). The last WPV1 was isolated from samples collected in September 2016, from a healthy child residing in Borno. However, owing to ongoing surveillance gaps in high-risk and inaccessible areas, this strain's undetected and continued circulation could

not be ruled out. The Government of Nigeria continued an aggressive outbreak response, conducted in close coordination with neighbouring countries across the Lake Chad subregion, and within the context of the broader humanitarian emergency affecting the region. The lack of access and inability to conduct high-quality vaccination and surveillance in many areas of the state remained the primary challenge. A key objective was to prevent the outbreak from spreading to other areas of the region, and additional measures were implemented to both increase surveillance sensitivity and boost immunity levels. They included scaling up environmental surveillance; testing healthy individuals (including adults) as they exited inaccessible areas; establishing permanent vaccination posts to vaccinate children and older age groups at key crossing points to inaccessible areas; and rapidly conducting mop-up immunization campaigns as and when windows of opportunity arose or areas became accessible.

The regional response was coordinated through a joint partnership with the Lake Chad Coordination mechanism, based in N'Djamena, Chad. Bringing together all partners, notably the ministries of health and the implementing partners (WHO and UNICEF), this coordination aimed to support the planning, implementation and monitoring of efforts across the region, strengthen surveillance and improve the quality of supplementary immunization activities (SIAs). It facilitated cross-border collaboration and action, and helped to address specific challenges facing the programme, including reaching populations in difficult-to-access areas, displaced populations and populations on the move.

The focus was to maintain the multinational, regional outbreak response across the Lake Chad subregion, identify and fill remaining gaps, including on surveillance and SIA operations, and provide substantial epidemiological evidence of the current status of polio transmission (or its cessation).

ADDRESSING CROSS-BORDER CHALLENGES IN NIGERIA AND LAKE CHAD COUNTRIES, AND PAKISTAN AND AFGHANISTAN

Although the remaining challenges to eradicating endemic WPV transmission vary greatly from area to area, one issue common to Nigeria, Pakistan and Afghanistan is reaching children on the move across porous borders. When populations move between adjacent countries that are endemic or at risk of polio, it is crucial that the countries work together to protect against poliovirus spread from one side of a shared border to the other.

To reduce the risk of cross-border transmission, the GPEI aims to improve information sharing between countries, identify and address immunity gaps in migrant and hard-to-reach populations along borders, and plan for synchronized immunization campaigns.

Border areas are considered challenging places to work to eradicate poliovirus due to the difficulties in providing comprehensive vaccination coverage to a population migrating between two different states. To achieve eradication, it is important for neighbouring countries to coordinate activities, use similar data sharing systems and agree to a shared plan of action.

Porous cross-border environments often host various nomadic groups that move across borders, as well as migratory seasonal and economic workers and those crossing over for social, medical and religious reasons. People also move due to political insecurity and natural disasters, or for reasons related to other forms of forced migration.

Cross-border coordination aims to develop and maintain cooperation in the areas where polio remains endemic to identify missed children and find virus blind spots. The specific benefits of a coordinated approach across borders include:

- By coordinating SIA activities, poliovirus risk can be reduced in a large area simultaneously, decreasing the chances of reintroduction.
- Sharing data and monitoring information can allow both country programmes to make improvements to best practice.
- Strengthening capacity and communication networks through regular information exchanges heightens country teams' ability to respond to an outbreak situation.
- As poliovirus does not respect borders, tracking where the virus might be spreading is only possible by uniting epidemiological information from both sides of a border.

Methods have been developed since the GPEI was established to reduce the chance of a missed child or of the spread of poliovirus in cross-border areas. By coordinating action between countries, polio workers and country teams are able to accumulate more detailed knowledge of population movements and campaign coverage on both sides of a border.

These methods assure the GPEI can better reach and vaccinate every child against polio, preventing virus transmission and bringing the world closer to full eradication.

Coordinated cross-border polio eradication activities were implemented between Afghanistan and Pakistan along the south, south-east and east border regions. Poliovirus in 2017 was clustered along this shared border. The Lake Chad countries of Chad, Cameroon, the Central African Republic and Niger also cooperated to reduce the likelihood of cross-border poliovirus transmission after detecting poliovirus in Nigeria in 2016.

In certain zones, such as along the Pakistan and Afghanistan border, the GPEI continued to treat the area as a single epidemiological block, acknowledging poliovirus corridors that span the two countries. Cross-border coordination remained crucial in this setting, as part of the united front that the countries must present for the virus to be eradicated.



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Syrian Arab Republic and Democratic Republic of the Congo: Stopping cVDPV2s

In 2017, two countries were affected by cVDPV2: the Syrian Arab Republic and the Democratic Republic of the Congo, with 74 and 22 cases reported from these countries, respectively.

In the Syrian Arab Republic, the bulk of cases occurred in Mayadin district, Deir-Ez-Zor governorate, the epicentre of the outbreak, with Raqqa and Homs also affected. Two vaccination campaigns were conducted in mid-2017, using both monovalent oral polio vaccine type 2 (mOPV2) and IPV. To mitigate the risk of further spread from the outbreak zone to neighbouring areas and countries, the north-west of the Syrian Arab Republic, Turkey and Lebanon received additional IPV doses for targeted use in high-risk populations, and Iraq conducted immunization activities with IPV in vulnerable populations. The outbreak response was conducted in the context of the broader humanitarian emergency. During one of the campaigns, for example, water purification tablets were distributed to more than 400 000 persons. No new cases were detected in the country after September 2017.

In the Democratic Republic of the Congo, the 22 cVDPV2 cases were detected in two separate outbreaks: in Haut-

Lomami province (with spread to Tanganyika province) and in Maniema province. An outbreak response was launched that included the use of mOPV2 in line with internationally-agreed outbreak response protocols. However, operational gaps in quality hampered implementation, as high-risk populations remained under-immunized. The most recent case was identified in December 2017, strongly suggesting that outbreak response intensification in 2018 is urgently needed. In early 2018, the government declared cVDPV2s to be a national public health emergency, a clear statement of commitment to address and fill residual operational gaps in quality.

In Somalia, in late 2017, a vaccine-derived poliovirus type 2 (VDPV2) strain was isolated from environmental sampling and, although it did not meet all criteria to classify it as a “circulating” strain, an outbreak response was immediately launched. Further isolates from environmental samples were subsequently detected in early 2018, confirming this strain to be in fact circulating, and the outbreak response continued in the early part of the year. It is important to note that at the time of publication of this report, no cases of paralysis associated with this strain were detected, as the virus had been isolated from environmental samples only. As with the cVDPV2s in the Syrian Arab Republic and the Democratic Republic of the Congo, the emergence of this strain in Somalia also predated the switch from tOPV to bOPV in 2016.



Protecting children in high-risk areas: Immunization and surveillance

IMMUNIZATION...

It is not enough to vaccinate children in areas where the virus is known to circulate. Polio is a highly infectious disease that travels easily with population movements, carried by persons not displaying any symptoms at all who do not know they are infected by poliovirus.

Children living in areas with close sociocultural and economic ties to infected zones and connected through large-scale population movements are therefore at particular risk of polio reinfection or exposure to re-emergence of the virus. This is especially true in areas that have inadequate healthcare or sanitation infrastructure and vaccination coverage gaps, which facilitate the spread of the virus should it reappear.

The GPEI therefore conducts immunization activities in these areas in addition to fighting the disease in the remaining infected areas. To draw an analogy: the fire spreads easily from the latter to the former. This risk must be minimized.

In 2017, therefore, the GPEI conducted vaccination campaigns in 39 countries, reaching 438 million children aged under 5 years multiple times, using almost 1.8 billion doses of OPV.

...AND SURVEILLANCE

At the same time, the imperative is to continue looking for the virus not simply in those areas where it is known to be circulating, but indeed in all high-risk areas.

In a standard public health system, diseases are identified at the district level, and their details are communicated to the provincial authorities and subsequently to the national government on a quarterly or semi-annual basis. This aids public health systems in their planning and budgeting efforts.

During an eradication campaign, however, three to six months cannot go by before a polio case is revealed in a given area, or massive epidemics would occur. The information is needed immediately to implement an outbreak response.

In 2017, the GPEI therefore continued to maintain an active surveillance network, aiming to identify any polio case within a matter of weeks. The basis for this system was the active identification of children displaying symptoms of acute flaccid paralysis (AFP), triggered by a number of diseases or causes, including poliovirus. In an average population, regardless of whether poliovirus is circulating in a given area or not, AFP occurs at a rate of approximately 1 per 100 000 children aged under 15 years. It thus becomes the indicator of whether surveillance is strong or insufficient: the number of children living in a given area determines the number of AFP cases that should be detected over a given time frame. As long as the indicated number of AFP cases are identified (and investigated), it is possible to say with some amount of certainty that any poliovirus circulating in that area would be detected in a timely manner.

This AFP surveillance system is vast and extensive. Every year, more than 100 000 AFP cases are detected worldwide and investigated to determine whether they are caused by poliovirus or have a different origin. In 99.9% of instances, AFP is caused by something other than polio. But it is nevertheless necessary to identify and investigate every single AFP case to verify that polio has not reappeared in an area.

The AFP surveillance system is also intricate. One scenario exemplifies this point : in a remote village of South Sudan, a teacher from the local community notices one of his pupils displaying symptoms of AFP. The teacher has been trained by health authorities to look for the symptoms in children in his community. He knows what he must do: he calls the local health authorities and re-ports the AFP case. Immediately, a team of health workers is dispatched from the nearest health facility – often several days' journey away – to visit the child in question and collect two stool samples. The team informs the family of the basic rehabilitative exercises they should undertake to reduce the risk of paralysis in the early stage of the disease. The stool samples in a refrigerated cold-chain box are subsequently shipped to one of 146 accredited laboratories worldwide, where virologic testing will verify the presence or absence of poliovirus. And this happens more than 100 000 times per year, all over the world. This unique surveillance system is specifically set up to be the “eyes and ears” of polio eradication, and it also regularly detects other diseases of public health importance, such as measles, neonatal tetanus, yellow fever, cholera and even Ebola.

In high-risk, high-transit or inaccessible areas, where the ability to reliably detect all AFP cases is compromised, additional surveillance activities are increasingly being implemented. This may involve testing healthy individuals as they enter or exit inaccessible areas to determine if they are asymptotically infected with poliovirus, or scaling up environmental surveillance, including analysing sewage waters for the presence of poliovirus. In 2017, more than 2500 environmental samples were investigated from the endemic countries, all providing additional information on the dynamics of poliovirus circulation in those areas.

Gender: A factor in polio immunization

Gender roles and norms, and their underpinning relations, are powerful determinants of health outcomes. To reach every last child and achieve a polio-free world, the GPEI remained committed to identifying and addressing gender-related barriers to immunization and disease surveillance.

The GPEI recently conducted a thorough gender analysis (see <http://polioeradication.org/wp-content/uploads/2018/07/GPEI-Gender-Technical-Brief-2018.pdf>) that identified and measured gender-related elements in its immunization, communication and disease surveillance activities. The *Gender Technical Brief* analysed the ways in which the gender of the child, caregiver and front-line worker influenced the likelihood that a child is immunized against polio. Its specific focus was on the gendered determinants of immunization in the GPEI's 16 priority countries. More information about polio and gender can be accessed in the Gender section of the GPEI website at <http://polioeradication.org/gender-and-polio/gender-and-polio-eradication/>.

To ensure equal access to vaccinations and the engagement of women, four gender-sensitive indicators were developed to monitor progress, which will be reported on semi-annually:

1. Girls and boys reached in vaccination campaigns

The indicator compared the percentage of girls and boys vaccinated after an immunization campaign, recorded from lot quality assurance sampling and post-campaign monitoring data.

2. Total doses received

The total number of doses received was recorded for children aged 6–59 months in AFP case data. The dosage count is an additional measure to assess children's overall participation in vaccination campaigns or routine immunization. Gender comparisons were made for the median number of doses, the percentage of zero doses, and the percentage of three or more doses.

3. Disease surveillance timeliness

The AFP case data included information on the date of onset of paralysis and the date of notification by the caregiver(s). The notification delay was calculated from the difference in days between onset and notification. This measure showed whether the child's gender biased how quickly his or her disease was notified within the surveillance system. Timeliness was assessed by comparing median values and by the percentage of male and female cases notified within three days.

4. Women's participation in immunization activities

The indicator measured the percentage of women and men front-line workers, including all vaccinators and social mobilizers.

Data are now regularly published in the GPEI *Semi-Annual Status Report*, available at www.polioeradication.org.

A world without polio will result in savings of more than **US\$50 billion.**



PREPARING FOR A LASTING POLIO-FREE WORLD



Key points

The strategies to secure a lasting polio-free world outlined in the Polio Eradication & Endgame Strategic Plan 2013–2018 (Endgame Plan) have brought the world to the brink of being polio-free and are appropriate to achieve a world permanently free of both WPV and VDPV. The Polio Oversight Board in 2017 endorsed extending the Endgame Plan beyond 2018, to ensure ultimate and lasting success for all future generations. Strategies of the Endgame Plan must be fully financed and implemented.

Eradicating polio entails not only interrupting the chains of poliovirus transmission (both WPV and VDPV), but also ensuring that these gains are sustained in perpetuity.

The eradication of smallpox, the only human pathogen to have been globally eradicated thus far, illustrates the importance of this point. The last known natural case of smallpox occurred in Somalia in 1977. However, in 1979 in the United Kingdom, two people succumbed as a result of the disease. Smallpox virus was accidentally released in a research laboratory, causing two deaths: one from direct infection of an individual with the released virus, and the other from the suicide of the laboratory director who mistakenly thought he had reintroduced smallpox into the human population.

As this tragic example indicates, the consequences of reintroducing an eradicated pathogen are potentially severe. The Endgame Plan ensures all efforts are made to minimize the risk and consequences of poliovirus reintroduction or re-emergence in a polio-free world.

The identification of potential sources of re-emergence

Poliovirus could re-emerge or be reintroduced from two primary sources:

- the accidental release of poliovirus from a research laboratory or vaccine manufacturing site due to a containment failure or breach; and
- the emergence of new VDPVs due to continued use of OPV.

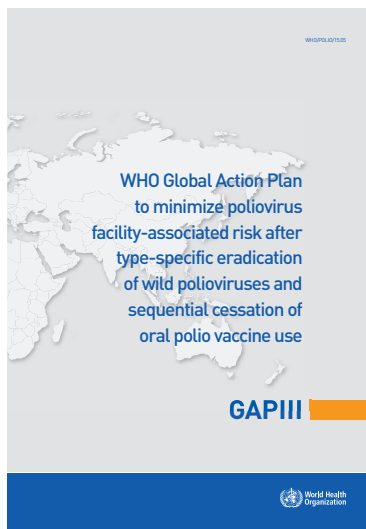
Risk mitigation strategies focus on addressing both of these risks.

The containment of polioviruses in research and manufacturing facilities

A minimum number of research and vaccine manufacturing facilities will continue to retain polioviruses to serve critical national and international functions, including the production of polio vaccine or research. It is crucial that this poliovirus material be appropriately contained under strict biosafety and biosecurity handling and storage conditions, to ensure that the virus is not accidentally or deliberately released into the environment, causing outbreaks of the disease in susceptible populations.

Implementation efforts to contain wild poliovirus type 2 in laboratories progressed in 2017, guided by the *WHO Global Action Plan to minimize poliovirus facility-associated risk after type-specific eradication of wild polioviruses and sequential cessation of oral polio vaccine use (GAPIII)* and its amendments. The Global Action Plan was developed to ensure the safe handling and containment of polioviruses in research laboratories and vaccine manufacturing facilities, starting with the type 2 strain that was declared eradicated in September 2015. A Containment Advisory Group was established to address technical issues related to GAPIII and amendments were recommended.

To implement GAPIII, countries around the world must identify which facilities store or handle polioviruses,



and decide which ones need to be designated as a poliovirus-essential facility (PEF) to exercise critical national and international functions. In the vast majority of cases, the poliovirus material has been or will be destroyed. Facilities that are designated to continue to work with polioviruses then undergo a certification process to ensure they are compliant with the containment requirements. The process remains a national responsibility performed by the National Authority for Containment (NAC) or any other national certification body officially nominated by the government of the PEF hosting country.

Additionally, poliovirus containment aims to address “hidden” potential risks. Some research and surveillance laboratories, such as facilities manipulating influenza, measles, rotavirus or other enterovirus specimens, do not specifically focus on working with polioviruses, but might unknowingly work with or store samples that could be contaminated with polioviruses. New guidance was published for these non-poliovirus facilities to minimize the risk associated with samples potentially containing polioviruses. This *Guidance for non-poliovirus facilities to minimize the risk of sample collections potentially infectious for polioviruses* and its accompanying *Annex 2: Country- and territory-specific poliovirus data* are being rolled out to non-poliovirus facilities across the world as part of the global containment effort.

In 2017, global containment efforts continued; Member States focused their efforts on identifying facilities retaining poliovirus type 2 materials and prioritizing the destruction of unneeded materials. Some countries moved to officially establish NACs and prepared to

initiate the containment certification process for their designated PEF.

The Global Commission for the Certification of the Eradication of Poliomyelitis (GCC) accepted responsibility for global containment oversight following the *Containment Certification Scheme to support the WHO Global Action Plan for Poliovirus Containment* (GAPIII-CCS).



In addition to developing documents, WHO provided technical support to Member States by offering them training opportunities to ensure the appropriate containment of polioviruses and thus to maintain eradication status. Numerous countries (30) declared hosting an excessive number of facilities (99) in which to retain poliovirus. These 30 countries represent 52% of the global birth cohort (2017).

The continued focus in 2017 was to:

- complete inventories of all poliovirus type 2 materials;
- prioritize the destruction of unneeded poliovirus type 2 materials;
- reduce the number of designated PEFs worldwide;
- train auditors and establish a roster of international experts on poliovirus containment;
- officially establish NACs as soon as possible and no later than end-December 2018, and initiate the containment certification process for all designated PEFs as soon as possible and no later than end-June 2019;
- sensitize non-polio facilities to the need for safe and secure handling and storage of samples potentially infectious for poliovirus;

- begin the inventories of poliovirus types 1 and 3 as soon as possible; and
- implement an ambitious communication strategy.

To further intensify global containment efforts, in May 2018, the World Health Assembly adopted a resolution on containment, demonstrating the clear commitment and international consensus to intensify this area of work.

For more information on containment, see:

- Poliovirus containment, at <http://polioeradication.org/polio-today/preparing-for-a-polio-free-world/containment/>
- GAPIII and GAPIII-Containment Certification Scheme (GAPIII-CCS), at <http://polioeradication.org/polio-today/preparing-for-a-polio-free-world/containment/containment-resources/>

The phased removal of oral polio vaccines

In a polio-free world, continued OPV use could result in cases of paralysis, due to vaccine-associated paralytic polio (VAPP) and the emergence of VDPVs. While OPV is the appropriate vaccine to achieve eradication because of its unique ability to interrupt the person-to-person spread of WPV, its continued use is incompatible with the achievement of a world permanently free of polio. The use of OPV in routine immunization programmes must therefore be stopped.

April 2016 saw the largest globally-synchronized vaccine roll-out in history, as vaccines were switched from tOPV to bOPV. In just two weeks, the type 2 component of OPV was removed in a total of 155 countries and territories. This can be considered one of the biggest achievements of the last two years. Following this, the phased removal of OPV globally progressed. Active surveillance also continued, looking for type 2 virus from any source, and data verified the almost complete disappearance of this strain worldwide. While two outbreaks of cVDPV2 continued in the Syrian Arab Republic and the Democratic Republic of the Congo, they were seeded prior to the switch.

To prepare for the switch to bOPV, all countries had committed to introducing at least one dose of IPV into their routine immunization programmes. A global supply constraint, which had emerged due to technical difficulties manufacturers had encountered to scale up production, resulted in some countries experiencing

delays in supply. Based on the manufacturers' current projections, all countries that previously experienced delays were due to receive supply by the first half of 2018. During the period of shortage, this vaccine's available supply was prioritized to routine immunization in areas at highest risk of VDPV2 outbreaks (Tier 1 and 2 countries). The GPEI continued to explore with Member States and WHO regional offices the feasibility of instituting dose-sparing strategies, such as using intradermal fractional dose IPV, as recommended by the SAGE. Member States were increasingly adopting this approach, notably Bangladesh, India, Sri Lanka and countries across the Region of the Americas. This approach helped to ensure that sufficient quantities of the vaccine were available for continued vaccination of the respective birth cohorts.

Following global certification of WPV eradication, bOPV will be withdrawn from routine immunization programmes, thereby eliminating the long-term risks of any VDPV or VAPP.

Global certification – independent verification of a polio-free world

The eradication of WPVs will be independently verified by the GCC. With fewer WPV cases reported from fewer countries than ever before, the GCC further accelerated its work to prepare for the eventual certification of WPV eradication worldwide.

As part of this process, the GCC faced two important and challenging tasks:

- obtaining and evaluating convincing evidence of the interruption of poliovirus transmission; and
- obtaining and evaluating evidence that polioviruses will be contained to a high level where held.

Discussions focused on reviewing regional progress in the remaining endemic regions of Africa and the Eastern Mediterranean; defining the parameters that will be used for certification; discussing surveillance requirements, including in settings requiring additional data such as conflict settings; and evaluating the requirements for safely containing polioviruses in laboratory settings.

While global certification continued to apply mainly to WPV eradication, it was agreed that a process to verify the elimination of VDPVs was also needed. Discussions



Global Commission for the Certification of the Eradication of Poliomyelitis

Left to Right: Dr Supamit Chunsuttiwat, Chair, South-East Asia Regional Commission Certification for Polio Eradication (SEA-RCCPE); Dr Nobuhiko Okabe, Chair, Western Pacific RCC; Dr Arlene King, Chair, American RCC for the Polio Endgame and Chair, GCC-Containment Working Group (GCC-CWG), Professor David Salisbury, Chair, GCC and Chair, European RCC; Professor Rose Leke, Chair, African RCC and Professor Yagoub Al-Mazrou, Chair, Eastern Mediterranean RCC.

of what that process will look like are ongoing. VDPV elimination will occur after the global withdrawal of all OPV, which should be completed one to two years after global certification of WPV eradication.

The GCC stayed independent of WHO and of involvement in national polio vaccination implementation or polio surveillance programmes. WHO regions are eligible for certification following the absence of WPV from any country and any population source in each region in the presence of certification-standard surveillance. Regional certification is conducted by Regional Certification Commissions. Global certification will follow the successful certification of all six WHO regions, and will be conducted by the GCC.

To date, four regions have been certified as free of WPVs: the Region of the Americas (1994), the Western Pacific Region (2000), the European Region (2002) and the South-East Asia Region (2014).

The Post-Certification Strategy and GPEI transition planning

With WPV transmission at its lowest levels ever, WHO Member States and partners continued to discuss measures needed not only to achieve eradication but to sustain it in the long term. The strategic functions that must be sustained to ensure that once polio is eradicated it will remain eradicated are outlined in the draft Post-Certification Strategy (PCS). At the same time, Member States continued to review progress towards transition planning, aimed at ensuring that the infrastructure established to eradicate polio will continue to benefit broader public health and development goals, even after the disease is gone. A strategic action plan, including estimated costs of what is needed to keep the world polio-free and sustain progress in other areas, such as immunization, emergency preparedness and response capacity, was developed based on guidance from the Executive Board and presented to the World Health Assembly in May 2018.

POST-CERTIFICATION STRATEGY

Based on guidance and requests from Member States, the GPEI partnership developed the PCS to define the technical standards and guidance for the essential functions required to sustain a polio-free world. The three goals of the PCS are:

1. to contain polioviruses
2. to protect populations
3. to detect and respond to polioviruses.

To achieve these objectives, essential functions must be upheld, including the ongoing ability to maintain population immunity, conduct disease surveillance, enable outbreak response should it be needed and contain polioviruses in facilities retaining stock.

The PCS was developed in broad consultation and presented to the World Health Assembly in May 2018.

TRANSITION PLANNING

The polio eradication infrastructure has always contributed to broader public health and humanitarian goals, including routine immunization strengthening, the surveillance of other vaccine-preventable diseases, outbreak response support, as well as humanitarian emergency response support. It is critical to sustain these gains and ensure that the infrastructure established to eradicate polio contribute to broader health goals.

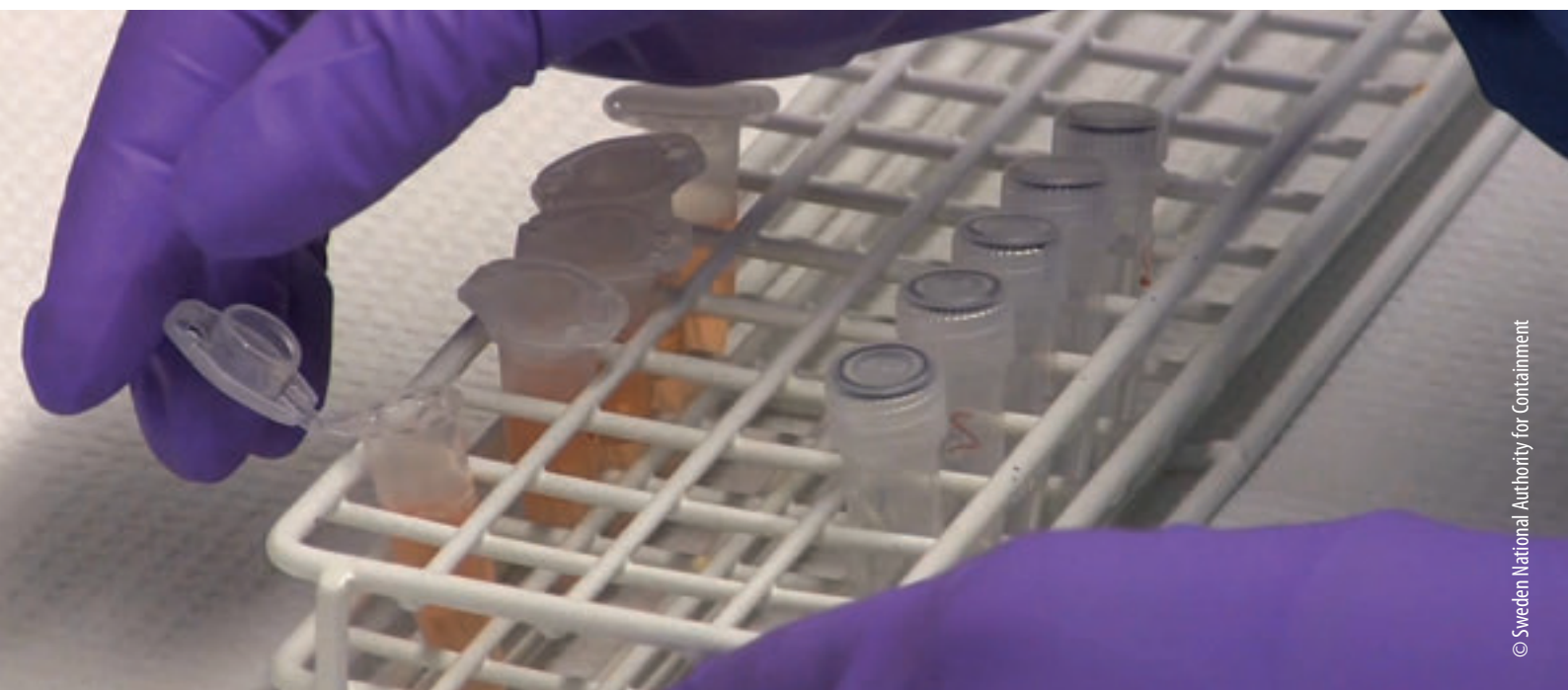
Most resources, staff and infrastructure remained concentrated in the 16 priority countries in sub-Saharan Africa, the Middle East and South-East Asia, which were the main focus of country-level planning. Of 19.5 million infants worldwide not immunized through routine services, 60% live in these 16 countries and almost 90% of deaths from measles globally occur in them. Ten of these 16 countries continue to be prone to regular outbreaks or complex health emergencies. The risks therefore are significant, unless the world maintains investment in strengthening these countries' immunization systems.

Of the 16 countries, 12 developed draft national transition plans. The plans clearly indicate in which national health priorities governments want to integrate their polio assets. They also lay out the governments' capacity to take over. In almost all countries, strengthening immunization systems and vaccine-preventable disease surveillance were top priorities.

Polio transition remained a key priority for WHO at its three levels. WHO's vision for polio transition consists of three closely interlinked pillars:

1. to ensure a polio-free world will be sustained
2. to invest in strengthening immunization systems
3. to strengthen emergency preparedness and response capacity.

It remained critical that specific funding requirements to sustain these three pillars be aligned with WHO's Global Programme of Work as of 2020/2021.



The date of polio eradication

The exact date when polio will be eradicated, or indeed when it will be certified as such, is difficult to assign. However, the timeline below summarized from the Endgame Plan illustrates the major milestones that need to be met to achieve a lasting polio-free world, free of transmission of any strain of poliovirus (whether wild or vaccine-derived).

“Day zero”, the day that polio is fully eradicated, is anxiously awaited. It is important, however, to recall what has already been achieved.

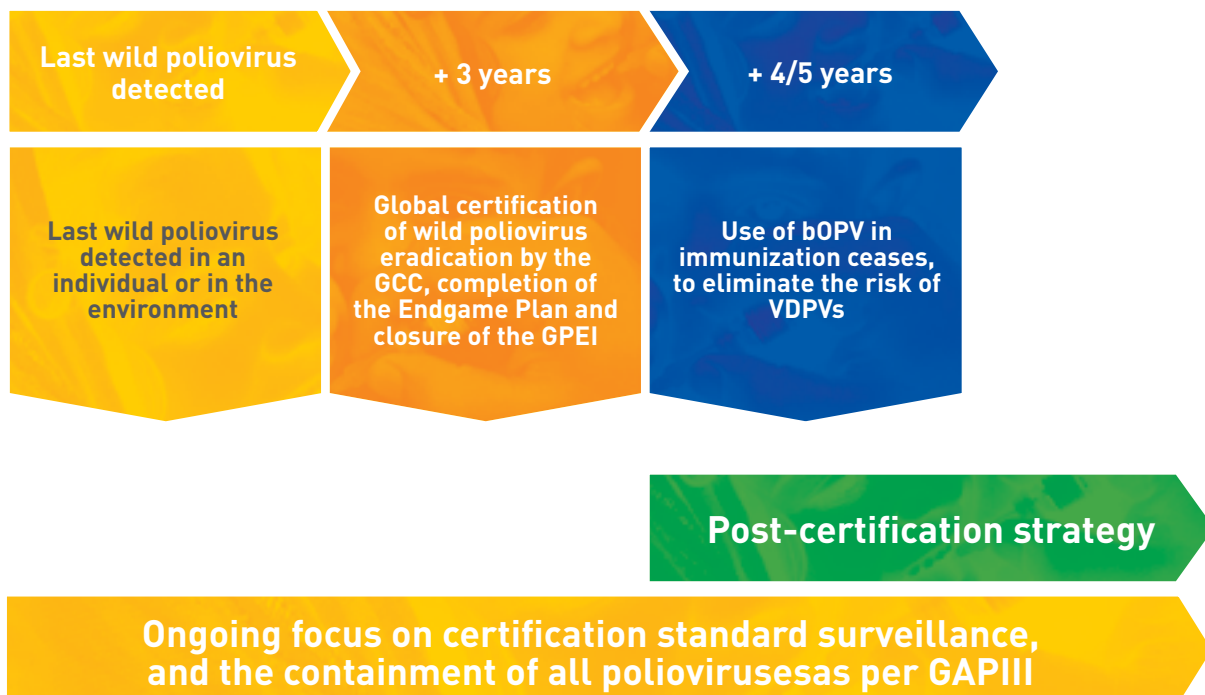
Thanks to the GPEI, more than 17 million people are walking today who otherwise would have been paralysed. More than 1.5 million childhood deaths have been prevented through the administration of

vitamin A during polio immunization activities. The GPEI infrastructure contributes significantly to broader public health issues.

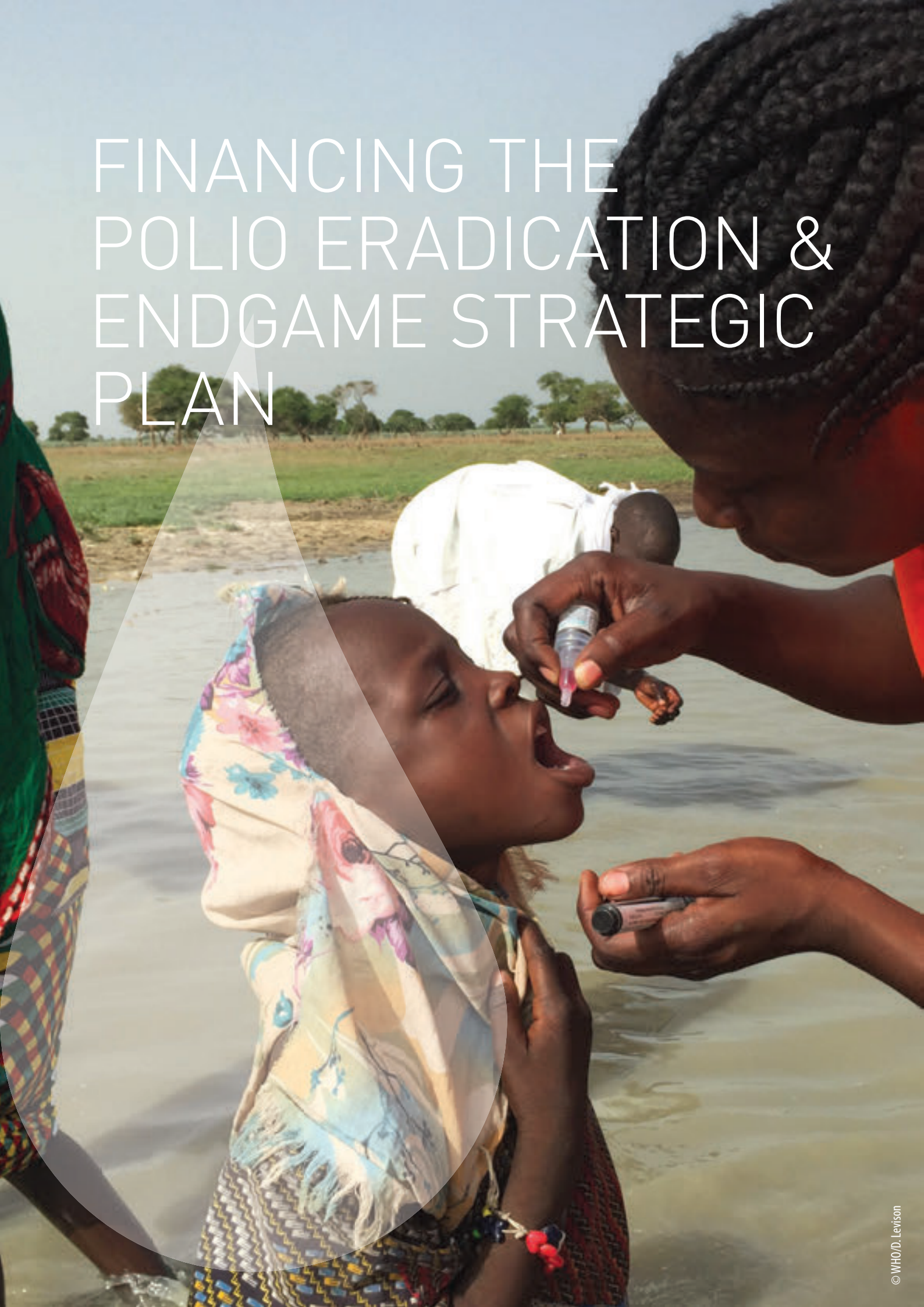
Most importantly, the world stands on the brink of a historic public health success. The day when polio will be eradicated is extremely near, and the feat will be associated with significant humanitarian and economic benefits. Globally, a polio-free world will reap savings of over US\$ 50 billion, funds that can be used to address other pressing public health needs. Most importantly, no child will ever again be paralysed by this terrible disease.

Even if it has taken longer and cost more than all had anticipated, the goal of a polio-free world – so near at hand – is worth pursuing, for the benefit of all generations of children to come.

Timeline following the detection of the last poliovirus



FINANCING THE POLIO ERADICATION & ENDGAME STRATEGIC PLAN



Thanks to the strong and continued support of GPEI partners and donors, and to the commitment of endemic countries, the 2017 GPEI budgetary requirements were fully met.

In addition to the significant humanitarian benefits associated with polio eradication, the effort is also associated with substantial economic benefits. A world free of polio will result in savings of more than US\$ 50 billion, which can be used to address other critical public health and development needs.

In 2017, the GPEI released its updated *Investment Case* for polio eradication, providing the economic and humanitarian rationale for continued investment in the GPEI. It is available on the GPEI website at www.polioeradication.org.

At an extraordinary pledging event at the Rotary International Convention in June 2017 in Atlanta, USA, numerous public- and private-sector partners from around the world joined Rotary in announcing new commitments, bringing total pledges against the additional US\$ 1.5 billion budget to US\$ 1.2 billion. Major new pledges announced in Atlanta included US\$ 450 million from the Bill & Melinda Gates Foundation, US\$ 150 million from Rotary International, Can\$ 100 million from the Government of Canada, €55 million from the European Commission, US\$ 30 million from the United Arab Emirates and AUS\$ 18 million from Australia. Since the pledging moment in June 2017, the global community made significant additional pledges, commitments and contributions, including by the United Kingdom, Germany, Japan, the United States, New Zealand and Liechtenstein.

To ensure achieving and maintaining a polio-free world, the GPEI will continue to mobilize additional commitments. In the second half of 2018, the GPEI will evaluate various budget scenarios to ascertain the impact of ongoing poliovirus transmission on the financial requirements to achieve global certification. WHO, Rotary International, the US Centers for Disease Control and Prevention, UNICEF, the Bill & Melinda Gates Foundation and Gavi, the Vaccine Alliance, stand ready to continue to support Member States in their efforts to fully implement the Endgame Plan, thereby securing a lasting polio-free world for generations to come.

2017 GPEI contributors

The GPEI thanks the following donors for their generous contributions to the initiative in 2017, which helped ensure that the activities described in this Annual Report were implemented during the year. The long-standing support by the international development community is critical in bringing the world to the threshold of being polio-free. The GPEI is grateful for the extraordinary commitment of over US\$ 1.15 billion to polio eradication by generous donors across the world, listed below.

In advance of the Rotary International Convention in June 2017, the **Government of Australia** pledged an additional AUS\$ 18 million, bringing its total pledged support to AUS\$ 105 million until 2020. During 2017, Australia disbursed US\$ 2.35 million to support polio eradication efforts.

The **Bill & Melinda Gates Foundation** provided US\$ 367.3 million in 2017 and continued to match funds raised by Rotarians two to one as part of the ongoing partnership between the two organizations. Their combined funding supports activities in Pakistan, Afghanistan, Nigeria, the African and Eastern Mediterranean regions, and worldwide.

At the Rotary International Convention, Minister Bibeau pledged an additional Can\$ 100 million – the single largest donor government pledge at the event. In 2017, the **Government of Canada** disbursed approximately US\$ 25.67 million for global polio eradication. Canada has committed over Can\$ 450 million until 2020,

making it the third largest contributor after the United States and the United Kingdom.

His Highness Sheikh Mohamed bin Zayed Al Nahyan, **Crown Prince of Abu Dhabi**, disbursed US\$ 12 million in 2017 towards polio eradication activities through WHO and UNICEF as well as through the **UAE Pakistan Assistance Program**, completing the pledge made at the 2013 Global Vaccine Summit. On top of this commitment, His Highness pledged an additional US\$ 30 million towards polio eradication. In total, the Crown Prince and the UAE have contributed US\$ 167.8 million since 2011 to help end polio, with direct support to Pakistan, Afghanistan, Somalia, Ethiopia, Kenya and Sudan.

Passengers on **EasyJet** flights contributed generously to polio eradication, with a total of US\$ 2.38 million raised through a partnership with UNICEF. This is part of the EasyJet US\$ 5 million pledge in Atlanta. The onboard collections took place on flights throughout Europe, including the United Kingdom, Switzerland, France, Italy, Portugal, the Netherlands, Germany and Spain.

The **European Commission** contributed US\$ 16.11 million to polio eradication efforts in 2017. As part of its pledge of €55 million announced in Atlanta, the **European Union** and the **Federal Government of Nigeria** signed a partnership agreement for polio eradication and health systems strengthening, providing €15 million for critical polio immunization activities until 2019.

The **Government of Germany** continued its strong support to polio eradication, contributing US\$ 69.82 million, including €29.9 million above its 2013–2018 multi-year commitment to support critical activities in Nigeria and Pakistan. Germany is a long-standing partner to the GPEI, having contributed more than US\$ 550 million.

The **Islamic Development Bank** alongside the **Government of Pakistan** generously contributed US\$ 74 million in 2017 to support eradication efforts in the country.

The **Government of Italy** fulfilled its commitment at the Atlanta global pledging event, providing a combined grant totalling US\$ 5.42 million to WHO and UNICEF for polio activities in Afghanistan and Pakistan.

The **Government of Japan** continued to demonstrate its leadership and strong commitment to polio eradication

in 2017, providing more than US\$ 47.8 million to the effort for the three endemic countries and the Lake Chad region. This brought its total contribution over the years to more than US\$ 224 million. In addition, an agreement between the **Japan International Cooperation Agency (JICA)** and the **Government of Pakistan** availed US\$ 54.7 million to the polio eradication programme in Pakistan in 2017/2018.

The **Government of Korea** provided US\$ 4 million from the Disease Eradication Fund to WHO and UNICEF for critical polio outbreak response activities, including surveillance in 2017.

Through its partnership with the **Community Chest of Korea**, the **Korea Foundation for International Healthcare (KOFIH)**, a specialized organization under the South Korean Ministry of Health and Welfare, remained fully engaged in polio eradication efforts. In 2017, KOFIH made a grant of US\$ 1 million to strengthen surveillance in Nigeria, bringing total contributions to US\$ 5 million.

As part of its continued support to polio eradication, **LDS Charities** provided US\$ 300 000 to UNICEF for the 2017 Polio Immunization Campaign in Guinea.

The **Government of Liechtenstein** renewed its support to global polio eradication, contributing Sw.fr. 30 000. Part of this contribution was a Sw.fr. 15 000 commitment to Rotary International for global polio eradication activities, which was matched by the Bill & Melinda Gates Foundation, bringing the total amount donated to Sw.fr. 45 000.

As part of its long-term multi-year commitment to the global effort to eradicate polio, the **Government of Luxembourg** disbursed US\$ 540 000 in support of polio eradication operations worldwide. The Prime Minister of Luxembourg also received Rotary's Polio Champion Award.

WHO received US\$ 10 000 in support for polio eradication activities worldwide from the **Government of Malta**, as part of the €30 000 pledge announced by Maltese Prime Minister Joseph Muscat at the Global Citizen Festival on 24 September 2016.

The **Government of Monaco** contributed US\$ 170 000 in 2017 for Niger, continuing its long-term commitment to a polio-free Africa and bringing its support to over US\$ 1.1 million over the 2013–2018 period.

Private philanthropists provided a total of US\$ 120.73 million in 2017, through the **National Philanthropic Trust**. Almost US\$ 489 million has now been contributed by private philanthropists worldwide through this mechanism.

The **Government of New Zealand** renewed its support for the global effort to eradicate polio and contributed US\$ 3.65 million. These funds were provided via a long-standing partnership with Rotary International.

The **Government of Norway** continued to provide critical contributions to the GPEI as part of its multi-year commitment. The 2017 contribution amounted to US\$ 32.14 million for global eradication activities and for IPV introduction, bringing Norway's total contribution to more than US\$ 291 million.

Rotary International, in addition to being a spearheading partner of the GPEI, is also the second largest private-sector donor. More than 1.2 million Rotarians worldwide have personally contributed US\$ 1.5 billion to the effort; they disbursed more than US\$ 120.9 million in 2017 alone. Additionally, Rotarians leveraged their influence with both donor governments and governments of countries that remain affected or at high risk of polio to secure political and financial support for polio eradication at all levels. Thank you Rotary!



Rotarians in Michigan, USA, jumping out of a small airplane to raise funds and awareness about polio eradication. They raised US\$43,000 for the cause, from donations by generous family and friends who agree that no more children should ever be paralysed by this terrible disease.

WHO received Sw.fr. 500 000 from the **Government of Switzerland** for polio transition operations, bringing Switzerland's contribution to polio transition to Sw.fr. 1 million.

Since 2008, the **Government of Turkey** has offered annual support to eradicate polio, and in 2017 provided an additional US\$ 60 000.

In 2017, the spearheading partner **UNICEF** provided significant funding to its country offices, and in total contributed more than US\$ 6.6 million for polio eradication activities from core funding and UNICEF National Committees.

In 2017, the **UK Department for International Development (DFID)** announced an additional £100 million pledge, bringing its total current commitment to £400 million until 2019. In 2017, DFID disbursed US\$ 88.73 million to the GPEI for global activities and IPV introduction. The United Kingdom is the second largest public-sector contributor with total commitments of US\$ 1.6 billion until 2019.

The **United Nations Foundation**, as part of its Shot@Life campaign, continued its critical support by providing an additional US\$ 1.26 million to the global effort. The United Nations Foundation is an important and long-standing partner, having contributed more than US\$ 46 million over the years.

The **Government of the United States of America** remained the largest public-sector donor to the GPEI. The US Congress allocated more than US\$ 2.85 billion to the effort, US\$ 228 million in 2017, through the US Centers for Disease Control and Prevention and USAID, both of whom provide crucial technical and management assistance for eradication in priority countries. In 2017, US\$ 116.75 million was disbursed to the GPEI.

The **Government of Nigeria**, through a Loan Agreement with the **World Bank**, disbursed US\$ 34.35 million to WHO and UNICEF in support of Nigeria's Emergency Action Plan in 2017.

The GPEI provides regular updates on the status of pledged funds and new commitments through its website, www.polioeradication.org.



www.polioeradication.org