



PolioSTOP

AUGUST 2018

OFFICIAL NEWSLETTER OF THE NIGERIA NATIONAL POLIOPPLUS COMMITTEE

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CHAIRMAN'S ADDRESS

OPV, IPV AND THE PROSPECT OF A WORLD FREE FROM POLIO

Vaccines have been crucial to the progress that we have made in our fight to eradicate polio. From hundreds of thousands of cases per year and polio being ubiquitous in every part of the world, we have been able to limit the wild polio virus (WPV) to just 2 epidemiological belts in 3 countries and just 22 cases in the year 2017. The early part of the twentieth century was littered with sporadic outbreaks of polio even in the developed world. With massive industrialization and urbanization also came huge numbers of polio cases. Summer in Europe and North America came to be known as the polio season and the advent of summer caused panic in those parts of the world. That was until the vaccines against polio were found.

The first effective vaccine was derived through the work of a team of scientist led by Professor Jonas Salk and what was at the time the largest human vaccine trial in the history of the world involving about 1.8 million individual subjects. The development of the injectable Inactivated Polio Vaccine (IPV) containing a killed viral antigen and its deployment led to rapid advances in vaccine development and a rapid drop in the number of cases of the poliovirus being reported. For instance, in the United States, the number of cases dropped from over 20,000 cases in 1955 to just 2525 cases in 1961. 1961 was also the year that the product of the efforts of another team of scientists led by Professor Albert Bruce Sabin in the form of a vaccine which could be administered effectively and efficiently orally-the same route favoured by the poliovirus for infection, became available for extensive use. The Sabin vaccine, called the Oral Polio Vaccine (OPV), contained a live but attenuated form of the viral antigen which mimicked the virus in its ability to stimulate the production of antibodies and the development of immunity without the virulence necessary to cause the disease. By the year 1965, there were only 61 reported cases of the poliovirus in the United States and this was due majorly to these two vaccines.

The OPV produces local intestinal mucosal immunity against polio infection. It is less immunogenic and requires more doses than the IPV to confer immunity but once achieved, the immunity conferred is believed to be for the lifetime of the subject. It is administered orally and proliferates in the intestine thereby providing excellent local protection and when excreted in stools, is also able to promote herd immunity through the feco-oral route. It also exhibits no noticeable adverse effect in the child after its administration. It is however very temperature-sensitive and in rare cases able to mutate and cause paralysis in an unimmunized child. The IPV on the other hand provides serologic immunity by causing the production of antibodies in the blood. It is effective against all three types of the poliovirus. It confers 99 percent immunity by the third dose and there is no risk of vaccine derived polio paralysis. It is also less heat sensitive than the OPV and therefore more stable but unlike the OPV, it is incapable of conferring gut mucosal immunity in vaccinated individuals. The IPV is also more costly and less readily available than the OPV. The immunity conferred by the IPV is also not believed to be for life. The strategy for the global eradication of polio is based on increasing herd immunity through the administration of effective vaccines through qualitative routine immunization (RI), Supplemental Immunization Activities (SIAs) and mop up campaigns as well as the maintenance of a highly sensitive and effective AFP surveillance system. The Oral Polio Vaccine (OPV) was found to be cheaper, easier to administer rapidly and had the ability to confer immunity along the same route of infection favoured by the poliovirus and was therefore selected as the vaccine of choice for the first stage of the global polio eradication effort. As cases of the wild polio virus (WPV) reduce, cases of paralytic polio which occur as a result of the mutation of the live attenuated are becoming more significant. In fact, there are more cases of this type of paralytic polio in the world over the last two years than the wild virus. This was



DR. TUNJI FUNSHO

anticipated in the Polio Endgame Strategy which called for the gradual introduction of the IPV which contains killed antigen into the routine immunization schedules of countries and the cessation of OPV administration. Data also showed that more than 95 percent of vaccine derived paralytic polio was caused by the type 2 strain of the virus which has been eradicated in the wild which led to the coordinated an synchronized removal of this strain from the OPV in April 2016. The resulting bOPV continues to be used for campaigns while the mOPV is controlled and only made available for outbreak response on the authorization of the WHO Director General. The virus is capable of circulating undetected within the population for extended periods of time so the maintenance of a stock of the mOPV will remain essential for some time but the future of polio eradication is the large scale deployment of the IPV. Due to its route of delivery (intramuscular or subcutaneous), this can only be done through the routine immunization system. Therefore, for the entire world to be rid of the scourge of polio there is no circumventing the importance of effective routine immunization. The way forward particularly in the light of the recent outbreaks of vaccine derived polio cases is to strengthen our health system to be able to deliver effective routine immunization services. The onus is therefore on the governments and all the other stakeholders to make this the focus of our efforts going forward. While we will continue to carry out qualitative supplemental immunization activities, we must redouble our efforts to ensure that routine immunization coverage within our communities is increased because this is the only proven effective way to achieve lasting impregnable herd immunity against the poliovirus and it is what will ultimately ensure that we can give the next generation the present of a polio-free world.

FROM EDITOR'S DESK

MISSED OPPORTUNITIES



For one month every 4 years, the best football players around the world come together to play in the FIFA World Cup of football. The process of getting there is usually long and tortuous. Some teams play almost 20 games over 2 years or more for the privilege to stand on the world's biggest stage, compete against the best in the world and win the biggest sporting prize of all. Of the 211 FIFA members and 20 associate territories, only 32 make it to the mundial and it is at this stage that you have the first level of disappointment and missed opportunity. Because football is a team sport and the best players do not always have the best team mates or play in the best teams, some of the world's biggest names do not make it. Indeed, some never make it over the course of their entire careers. For them winning the world cup will always be in the realm of their imaginations, never to come to pass. Great players like George Opong Weah, Ryan Giggs and Jari Litmanen will only ever be able to look back at great campaigns to get to the World Cup which were derailed at some point and led to missed opportunities and unfulfilled expectations.

The second level of disappointment occurs at the World Cup itself and that affects the 31 teams that do not eventually win it. From the first group stage to the Final match, teams compete with expectation of victory but for every contest there has to be a winner and a loser, hence an opportunity to achieve or to disappoint. From the first minute to the last minute of every match, the

players give their utmost and absolute best to achieve a victory but every match somehow seems to end in tears for certain players or group of players. To show us how big a sporting achievement it is, only 8 countries have ever won the World Cup in its 88 years of existence! That is to say that only 10 percent of the 79 teams that have ever participated in the World Cup have won it! 90 percent of teams have only ever gone home in tears or in massive disappointment. So many great players have played multiple tournaments and never won it. It is such a tough thing to achieve. Cristiano Ronaldo and Lionel Messi, two of the greatest players to ever play the game have never won it and may now most likely never win it in their careers. For these two superstars, the world cup will always represent a missed opportunity.

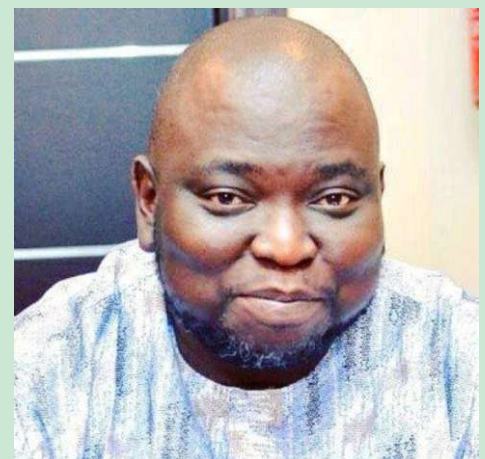
Talking of missed opportunities, going into 2018, we were highly optimistic that 2017 would be the last year of having polio cases in our world but with half of 2018 gone, we already have 12 cases as compared with 8 cases for the same period last year. For me, that represents a big missed opportunity. 2018 is supposed to be the start of our polio-free world but we have missed it. Every new case and every new child that is crippled or affected by polio represents another tragedy for me, another lost opportunity to protect a child. In this programme, every child missed child and every missed settlement is a missed opportunity with grave consequences because apart from having the potential to set us back in

our struggle to eradicate polio, it may mean a child that may never have the opportunity to run or play again and may never be able to fulfill a dream of playing at the World Cup. That is what this fight is about, protecting the right of a child to pursue opportunities and avoid the limitations that come with a life affected by polio. It is a fight to prevent missed opportunities and a lifetime of regrets. We fight to secure the future for our children, a future without regrets.

“An opportunity missed may never be regained” is a saying which holds true in many instances but sometimes we are given another opportunity, another chance to try again. Polio has no cure and that means that for a child who has been affected by polio, there will never be another chance to live a polio-free life. However, in the wider context of polio eradication, we still have an opportunity to make sure that no other child is infected with polio. We can still fight for a polio-free world. So let us spend the rest of 2018 making sure that the last cases of polio have already occurred and no other child ever comes down with polio again. Let us put every effort into this second half of 2018 to make sure that we do not have any other missed opportunities and 2019 is the start of a polio-free world.

**SEPTEMBER
2018 SIPDs**

**29TH SEPTEMBER
-
4th OCTOBER 2018**



Rotn Olugbenga Olayiwole
Editor Poliostop

NIGERIA POLIO UPDATE: JULY 2018

POLIO EPIDEMIOLOGY:

The last WPV1 case in Nigeria was isolated from a healthy child on 21st September 2016 in Monguno LGA of Borno State. In the past 6 months, a total of 10 VDPV2s have been isolated from environmental sites in Jigawa, Sokoto and Gombe States. Additionally, a new cVDPV2 was identified from the stool sample of a child in Gaedam Balle ward of Yobe State with onset on 16th June 2018. There is another positive isolate from a case in Kaugama LGA of Jigawa State. Suspected for the current VDPV2 isolation is the widespread use of mOPV2 across 18 states as part of an outbreak response in January 2017. There were 12 polio compatible classified cases in 2017 compared with 25 in 2016.

Detailed analysis by the National Polio Emergency Operations Center has identified the following risk factors as the probable reasons for the current outbreak.

- Low routine immunization coverage
- History of large scale use of mOPV2 in 2017
- Highly mobile populations in the 3 affected states
- Dense populations coupled with poor sanitation in Hadejia, Gombe and Sokoto Metropolis
- Risky economic activities like

people fishing in contaminated water pools in Hadejia, Jigawa state which has since been stopped by the State Government

- The Presence of international nomads criss-crossing from Niger and Cameroon which are potential conduits of polio virus transmission.

SIA and Efforts to Improve SIA Quality:

From January 2017 to date, a total of 9 supplemental immunization activities (3 NIPDs, and 4 SNIPDs) have been implemented. Additionally, two outbreak response activities were conducted in response to VDPV2s in 2018. The SIAs utilized the bOPV while mOPV2 was utilized in 54 LGAs in Sokoto, Jigawa, Bauchi and Gombe States in May 2018.

The programme has also used several innovative strategies aimed at improving team performance during the SIAs. This has resulted in an improvement in the quality of SIAs as depicted by an improving trend in LQAs over the last 18 months in the 14 high risk LGAs. The percentage of LGAs achieving immunization coverage of over 90% has increased from 80% in January 2017 to 83% during outbreak response rounds in May 2018. It is important to note that

the greatest improvement has been reported in the northeastern states and areas where outbreak responses to VDPV2s have been conducted in 2018

Surveillance: In the period January –May 2018, Nigeria has met both key surveillance indicators with 97% stool adequacy and NPAFP rate of 8.4. Nationally, all LGAs have reported at least one AFP case in 2018 including two LGAs of Borno (Abadam and Marte) that have been totally inaccessible due to insurgency. These LGAs have reported two AFP cases each through an innovative process of informants in inaccessible areas

Routine Immunization:

Based on the 2018 RI LQAs Immunization coverage survey, there is clear evidence of low routine immunization which cannot sustain the gains made through SIAs. With this dismal situation, the national authorities created a national emergency routine immunization coordination center (NERICC) and identified 18 priority States for immediate redress. State Emergency RI coordination centers (SERICCs) have so far similarly been inaugurated in 11 high priority states: Sokoto, Borno, Kebbi, Nassarawa, Kano, FCT, Kaduna, Bauchi, Yobe, Bayelsa and Osun. These coordination centers have since embarked on the race to rapidly address challenges identified. Vaccine accountability is being strengthened through implementation of a comprehensive SOP on vaccine management; retrieval of all used, unused and unusable vials and additional verification of retrieval of all vials (with special focus on type 2 containing vaccines). Attention is also being given to accurate forecasting with consideration of needs for special interventions in high risk areas.

Global Wild Poliovirus 2013 - 2018

Country or territory ¹	Wild virus confirmed cases								Wild virus reported from other sources ²							
	Full year total								Full year total							
	2013	2014	2015	2016	2017	2017	2018	Date of most recent type 3	Date of most recent type 1	2013	2014	2015	2016	2017	2018	Date of most recent virus
Pakistan	93	306	54	20	8	3	3	18-Apr-12	18-May-18	99	129	88	62	198	48	27-Jun-18
Afghanistan	14	28	20	13	14	5	9	11-Apr-10	01-Jun-18		17	28	2	42	23	25-Jun-18
Nigeria	53	5	0	4	0	0	0	10-Nov-12	21-Aug-16	3	1		1 ³			27-Sep-18
Brazil	159	5						NA	11-Aug-14							
Cameroon	4	5						15-Oct-09	05-Jul-14							
Equatorial Guinea		5						NA	03-May-14							
Iraq		2						NA	07-Apr-14							
Iran ⁴								NA	NA	138	14					30-Mar-14
Uganda Arab Republic	35	1						NA	21-Jan-14							
West Bank and Gaza								NA	NA	7	1					05-Jan-14
Chad	3	1						NA	05-Jun-14							
Kyrgyz	14							NA	14-Jul-13	1						12-Oct-13
Total	498	328	76	37	22		12			292	148	88	64	182	48	
Total wild virus type 1	416	309	74	37	22		12									
Total wild virus type 2																
Total to non-endemic countries	158	348	74	37	22		12									
Total to non-endemic countries	259	19														
No. of non-endemic countries	8	9	2	3	3	2	2									
No. of non-endemic countries	3	3	3 ⁵	3 ⁵	3 ⁵	3	3									

¹Countries in yellow are endemic. ²Data reported to WHO HQ as of 17 July 2018 for 2017 data and 17 July for 2018 data. ³Wild viruses from environmental samples, selected contacts, healthy children and other sources. ⁴In March 2014, a serotype 1 wild poliovirus was detected in an environmental specimen from Brazil; further investigation indicates this is an isolated event without evidence of circulation. ⁵Results are based on L20B positive culture. Prior to reporting week 16, 2014, results were based on a combination of direct qRT-PCR on RNA from concentrated sewage and L20B positive culture. ⁶Between 27 Sep 2015 and 27 Sep 2016, Nigeria was not classified as endemic NA-III as recent case had onset prior to 1989. ⁷Exceptionally reporting case/contact of a positive index case given the date of collection is later than the onset date of the most recent WPV.



AMINU MUHAMMAD
NATIONAL PROGRAMME COORDINATOR

UNICEF: Immunisation Powerful Tool to End Preventable Child Deaths



The United Nations Children's Fund (UNICEF) has taken the message of immunization to the grassroots in Borno State, insisting that immunization remains one of the most powerful tools to end preventable child deaths. The UNICEF Nigeria's Emergency Manager for Borno Field Office Gillian Walker gave the message to spouses of local government authorities, secretaries and voluntary community workers in the state during an orientation session recently.

The orientation was aimed at providing the women with information on the benefits of immunization, to encourage mothers to attend ante-natal clinics and to emphasize the importance of taking children to the clinic for routine immunization. Walker said: "I urge each and every one of you to be a vaccine champion. Advocate for vaccines and encourage your families, neighbours, and friends to ensure that their vaccinations are up to date. Every child in the North-east must have access to vaccines because vaccines work. Vaccines save lives."

The UNICEF Emergency Manager said almost one third of deaths among children under the age of five are preventable by vaccine.

She said UNICEF and its partners are working to ensure that the lives of all children are successfully protected with vaccines, adding that: "If immunization is not prioritized, the most marginalized children will not get vaccines, which could mean the difference between life and death."

UNICEF also appreciated the role of the state government in ensuring the availability of vaccines for all children including those affected by the conflict.

Representing the Commissioner for Health, Ministerial Secretary, Dr. Ibrahim Kida, said the orientation was timely and targets an important audience in the community. He said: "You have a key role to play at grassroots level to encourage your communities to get all the required vaccinations. We specifically need to focus on the non-compliant households to give them the necessary push to access vaccines."

The participants, from all the local councils, were asked to support the awareness creation for uptake of immunization services and other health interventions to sustain and support Borno's polio eradication efforts.

Borno State has not reported a single case of wild polio virus since August 2016, which is a great milestone towards achieving the goal of polio eradication in Nigeria.

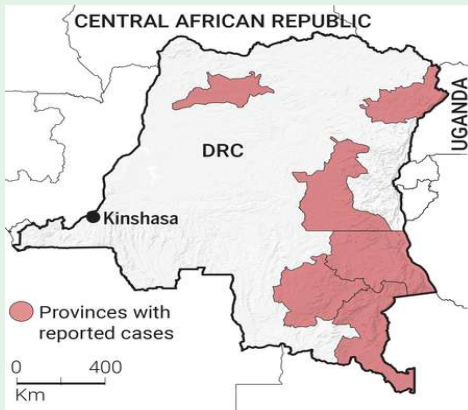
Adapted from the reporting of Michael Olugbode for thisdaylive.com

Calabar Rotarians support Polio Immunization

The Second round of the National Immunization Days have come and gone. In Cross Rivers State, the immunization campaign was flagged off at the Assemblies of God Church, Calabar South by His Excellency, the Deputy Governor of Cross River State Prof. Ejemot Ivara. He was supported by the Honourable Commissioner for Health, Cross River State Dr. Inyang Asibong, the Director General Primary Health Care, Dr. Betta Edu, other state government officials and partners including WHO, UNICEF and members of Rotary International. Rotarians in District 9142 from Cross Rivers State, led by the State Polio Representative, Asst. Governor Rtn. Regina Udobong displayed their commitment to polio eradication by being well represented at the event. Goodwill messages were presented by partners urging the members of the public to take advantage of the 4 days exercise to immunize their children against the poliovirus. The State Government appreciated the efforts of the partners in the fight to eradicate polio which has led to there being no recorded case of polio in Nigeria in almost 2 years. The Deputy Governor thereafter led partners, including Rotarians in immunizing the children with 2 drops of the Oral Polio Vaccine. Members of the Rotary Club of Calabar-Tinapa were in the field for the 4 day exercise in Calabar Cross Rivers State. Led by the Club President, Rotn. Aniekanabasi Ben Assam and the Club Secretary Rotn. Lillian Oyama facilitated the immunization of about 150 children at The Brook Church, Asim Oko Street, Calabar Municipality Cross Rivers State



ALARMING POLIO OUTBREAK SPREADS IN CONGO, THREATENING GLOBAL ERADICATION EFFORTS



Overshadowed by the Ebola outbreak in the Democratic Republic of the Congo (DRC), another frightening virus is on the loose in that vast, country: polio. Public health experts have worked for months to stamp out the virus, but it keeps spreading. It has already paralyzed 29 children, and on 21 June a case was reported on the border with Uganda, far outside the known outbreak zone, heightening fears that the virus will sweep across Africa. The DRC is “absolutely” the most worrisome polio outbreak today, says Michel Zaffran, who heads the Global Polio Eradication Initiative (GPEI) at the World Health Organization (WHO) in Geneva, Switzerland.

The outbreak also underscores the latest complication on the bumpy road toward polio eradication. It is caused not by the wild virus hanging on by a thread in Afghanistan, Pakistan, and perhaps Nigeria, but by a rare mutant derived from the weakened live virus in the oral polio vaccine (OPV), which has regained its neurovirulence and the ability to spread. As OPV campaigns have driven the wild virus to near-extinction, these circulating vaccine-derived polioviruses (cVDPVs) have emerged as the greatest threat to polio eradication. If the outbreaks are not stopped quickly, polio scientists warn, they could spiral out of control, setting eradication efforts back years.

Safe and effective, OPV has long been the workhorse of the eradication effort. But a feature that makes the vaccine so powerful can also be a serious downside. For a short time after vaccination, the weakened live virus can spread from person to person, boosting immunity even in those who didn't receive the polio drops. But in rare instances, in poor countries such as the DRC where many children have not been vaccinated, the virus can continue circulating for years, accumulating mutations until it reverts to its dangerous form. The vast majority of

cVDPVs are caused by serotype 2, one of three variants of the virus.

Almost as soon as cVDPVs were discovered in 2000, the World Health Assembly in Geneva declared that all use of OPV must stop when the wild virus was gone. In 2016, with the threat of cVDPVs looming larger—they now cause more cases of paralysis than the wild virus—GPEI decided waiting was no longer an option. By then, poliovirus type 2 had been eradicated in the wild, which meant that every type 2 virus originated from the vaccine itself. In April of that year, the 155 countries still using the trivalent vaccine, which targets all three polio variants, replaced it with a bivalent vaccine with the type 2 component removed. No one knew exactly how this experiment would play out. It was clear, however, that for a few years some type 2 outbreaks would still occur—either those that had started before “the switch,” as it is called, but had not been detected or those caused by the last use of trivalent OPV.

In a virological catch 22, the only way to stop type 2 outbreaks is with a version of the same vaccine that gave rise to them in the first place—somehow without seeding another one. The virus in the inactivated polio vaccine cannot revert, but it simply does not pack enough punch to stop an outbreak.



To fight these outbreaks, GPEI created a closely guarded stockpile of a new monovalent OPV type 2 (mOPV2), which can only be released with the approval of the director-general of WHO. If mOPV2 is used judiciously and sparingly, it can stop an outbreak without starting a future one, Zaffran says. Speed is essential because population immunity to the type 2 virus is waning now that it has been removed from the vaccine, setting the stage for an explosive outbreak.

The type 2 vaccine has been released to fight outbreaks in 10 countries, and so far the strategy seems to be working, although a type 2 outbreak in Syria paralyzed 74 children before coming under control last year. The outlier is the DRC.

The outbreak was first detected in June 2017 in Maniema province in the middle of the country. Within days, another case was reported about 900 kilometers away in Haut-Lomami province in the southeast. Genetic analysis revealed it wasn't the same strain as in Maniema, but a type 2 cVDPV that had emerged independently. Even worse, the sequences indicated both had been circulating undetected for at least 2 years.

The country and its international partners targeted mOPV2 campaigns to eight health districts deemed at highest risk—the minimum, experts thought, to get the maximum effect. But vaccination campaigns in the DRC, with its remote villages, crumbling infrastructure, and weak health system, are tough. They failed to reach enough children. The Haut-Lomami virus broke through, spreading south to Tanganyika and then Haut-Katanga.

Then in the first week of June, officials confirmed another case on the other side of the country, not far from the Ebola outbreak, where health workers are already stretched thin. This strain, too, emerged independently, an indication of just how weak surveillance is in the country. More alarming still, about 2 weeks later a polio case was reported in the northeast, close to the Uganda border. The Haut-Lomami virus had made the big jump northward, to an area where no mOPV2 campaigns were underway. “This really increases the risk of international spread,” says Oliver Rosenbauer, spokesperson for polio eradication at WHO. And insecurity in parts of the province “makes everything more dangerous and more complicated.”

In the worst case—if type 2 explodes across Africa, or if case numbers shoot up exponentially—the only option would be to reintroduce OPV2 into routine immunization, says Mark Pallansch, a molecular virologist at the U.S. Centers for Disease Control and Prevention in Atlanta. The switch will have failed, turning back the eradication clock years and ratcheting up costs, which now run about \$1 billion a year, to the dismay of tapped-out funders.

But that scenario is years away, Zaffran says. Pallansch agrees. “At present, I truly believe [type 2] cVDPVs can be managed. The only question is for how much longer,” he says. I have yet to see anything that makes me think eradication is not possible. But the endgame is proving to be much more complicated than eradicating the wild virus.

THE 'CHICKEN AND EGG' REASON WHY POLIO OUTBREAKS STILL HAPPEN



Recently, a polio outbreak was confirmed in Papua New Guinea, which had been certified as polio-free in 2000, along with the rest of WHO's Western Pacific Region. Last year, two separate outbreaks of polio were reported in remote parts of the Democratic Republic of Congo. Another outbreak was confirmed in Syria.

These outbreaks all involved circulating vaccine-derived polioviruses.

Symptoms of polio, or poliomyelitis, include fever, fatigue, headache, vomiting, stiffness in the neck, pain in the limbs and, in a very small percentage of cases, paralysis, which is often permanent. There is no cure for polio, and it can be prevented only by immunization.

Vaccine-derived polioviruses circulating have been rapidly stopped in the past with two to three rounds of immunization campaigns, according to WHO. So, for all polio outbreaks - from a vaccine-derived virus or not - the solution has been to immunize every child several times with the oral vaccine to stop transmission.

"The eradication of the wild poliovirus is on track because we only have three countries where the wild virus still fights for survival: Pakistan, Afghanistan and Nigeria. I believe that we could very well eradicate the virus very soon," Zaffran said.

"In terms of these outbreaks caused by the vaccine-derived viruses, this can only be stopped when we stop altogether using the vaccine, and we will not stop using the vaccine until we have eradicated the wild virus. So it's a chicken and egg situation," he said. "But we first need to eradicate the wild virus. After that, we will actually withdraw globally the use of the oral polio vaccine."

Vaccine-derived polioviruses circulate when routine immunization efforts are poorly conducted, leaving

a community susceptible to any poliovirus, whether vaccine-derived or wild.

Experts agree that the problem is not with the vaccine itself but rather low vaccination coverage, as a fully immunized community would be protected against both vaccine-derived and wild polioviruses, according to WHO.

"That's why the world needs to continue its efforts until the very end," Zaffran said. "We cannot stop our efforts now."

In 1988, there were an estimated 350,000 cases of polio in more than 125 endemic countries worldwide. Last year, there were only 22 reported cases in two endemic countries: Pakistan and Afghanistan

Since 2000, more than 10 billion doses of the oral polio vaccine have been administered to nearly 3 billion children worldwide, preventing more than 13 million cases of polio, according to WHO.

"The countries that have had problems have been the countries where the vaccination levels are extremely low, either because of ongoing infrastructure issues or, more commonly now, because areas of conflict don't have the necessary infrastructure to vaccinate," said Dr. Yvonne Maldonado, a professor of pediatrics at the Stanford University School of Medicine and chief of pediatric infectious diseases at Lucile Packard Children's Hospital at Stanford, who has studied poliovirus.

"We're almost ready to declare that we have eliminated wild polio, and these other cases, the vaccine-derived cases, are viruses that have been sitting around for months and years," she said. "If we continue to keep our vaccination levels high in all countries until we know polioviruses are all gone, then we should not see more cases."

Some countries no longer use the oral vaccine and have switched to what's called the inactivated polio vaccine, developed by Dr. Jonas Salk and made

If polio is near extinction, why do outbreaks still pop up in places where the disease was thought to be long gone? The answer is complicated.

Global efforts to destroy disease-causing polioviruses have been quite a success story. Cases caused by the wild poliovirus have dropped by more than 99% since 1988, thanks to vaccination efforts and a public-private partnership launched that year called the Global Polio Eradication Initiative.

Yet some immunization efforts carry the very rare risk of causing polioviruses to circulate in areas where many people might not yet be vaccinated or areas that were poorly vaccinated - an event that could lead to new cases of disease while trying to demolish it.

It turns out that live strains of poliovirus that are used in the oral poliovirus vaccine can mutate, spread and, in rare cases, even trigger an outbreak, representing a catch-22 in ongoing polio eradication endeavors.

These vaccine-derived viruses continue to haunt certain regions of the world.

"Why do we see outbreaks? First, we need to make a distinction between the wild poliovirus -- which is the virus we're trying to eradicate -- and the vaccine-derived polioviruses, which are causing some of the outbreaks that we are now seeing in the Democratic Republic of Congo, as well as in Papua New Guinea," said Michel Zaffran, director of the polio eradication program at the World Health Organization in Geneva, Switzerland.

available in the United States in 1955. The inactivated vaccine contains killed versions of wild-type poliovirus strains, doesn't pose the small risk of an outbreak and can be administered with a shot in the arm or leg. The inactivated vaccine is the only polio vaccine given in the US since 2000.

The oral poliovirus vaccine -- which contains live weakened versions of the virus and can be administered through liquid in the mouth -- is the predominant vaccine used in many countries to eradicate polio. Unlike the Salk vaccine, it's the only one that can both protect individuals and block person-to-person transmission of the virus.

The vaccine was developed by Dr. Albert Sabin and approved for use in the US in 1961.

The inactivated vaccine is more than five times more expensive than the oral vaccine, which could cost a country only about 12 to 18 cents per dose when procured through UNICEF. The inactivated vaccine can cost about \$1 per dose for a 10-dose vial or \$1.90 per dose for a five-dose vial, according to a 2014 UNICEF document.

The inactivated vaccine induces lower levels of immunity specifically in the intestines, where the poliovirus resides in most cases, compared with the oral vaccine. This type of immunity is called mucosal immunity.

As a result, when a person immunized with the inactivated vaccine is infected with wild poliovirus, the virus could still multiply inside the intestines and spread to other people through that person's feces -- even though the person shows no signs of infection.

The typical route of infection is by ingesting the virus, for instance if a person touches an object contaminated with feces and then touches their mouth.

The virus can live in an infected person and be excreted in feces for many weeks and contaminate food and water in unsanitary conditions, according to

the US Centers for Disease Control and Prevention.

"If I get this inactivated polio vaccine and somehow I get infected, I would not know that I got infected because I am completely protected, but I will act as a vector, transmitting this virus almost at the same rate as if I had no vaccination," said Raul Andino, professor of microbiology and immunology at the University of California, San Francisco, whose lab has been studying poliovirus.

"It's very effective to prevent disease, but it's not effective to prevent spread from people to people," he said of the inactivated vaccine.

On the other hand, Andino pointed out that with the oral vaccine, you risk seeing live vaccine-derived viruses circulating in under-vaccinated communities.

"So what do we need? Another vaccine," he said. "A vaccine that induces mucosal immunity and at the same time is safe."

Andino led a study published last year in the journal *Cell* that described exactly how vaccine-derived polioviruses replicate, regain virulence and lead to outbreaks.

This new insight into the specific pathway in which vaccine-derived polio outbreaks occur could help in the development of improved vaccines.

"We need to improve the technology, because clearly, this is a problem," Andino said. "Hopefully, this is going to be happening in the next few years."

From the reporting of Jacqueline Howard for CNN

ENSURING THE END OF POLIO MEANS NEW MILESTONES FOR PUBLIC HEALTH -JOHN HEWKO



Rotn. Tayyaba Gul of RC Islamabad supports an immunization team in Pakistan

In 1796, in Gloucestershire, England, Edward Jenner developed the smallpox vaccine, and inoculated an 8-year-old boy, James Phipps, using matter from a cowpox patient. Two centuries later, in 1980, smallpox was successfully eradicated. It had once been a major killer, claiming more than 500 million victims all over the world in the 20th century alone. It was the first human disease to be successfully eradicated — a major achievement for global health.

Despite this triumph, the World Health Organization is well aware of the failure, in the aftermath of this success, to retain the infrastructure built up to eradicate smallpox, and is determined that the same will not occur once polio is finally vanquished.

The Global Polio Eradication Initiative hopes to make polio the second disease ever eradicated, and, at the time of writing, only 12 cases have been recorded so far this year — the lowest ever — and just three polio-endemic countries remain: Pakistan, Afghanistan, and Nigeria. GPEI is taking lessons from the aftermath of the smallpox eradication program to ensure that we get over the finish line, and the assets and knowledge accrued by the effort are not squandered once polio is finally defeated.

1. Maintain infrastructure assets

We now have a global network of 145 laboratories established by GPEI, which also tracks measles, rubella, yellow fever, meningitis, and other deadly infectious diseases. It is imperative that this infrastructure is maintained and repurposed to counter emerging health threats. To do this, GPEI has developed the Post Certification Strategy, which will mobilize the transition plan once polio is officially certified as eradicated by WHO.

The transition plans will be specific to each country, depending on its given infrastructure. For example, in some countries, the polio infrastructure will be fully integrated into their public health systems. This is the case for India, which was certified polio-free in 2014.

For other countries, the responsibility may be shared between national governments and the international development community, while in the least developed countries, international actors may need to fully support national governments — both technically and financially — to maintain the polio eradication infrastructure.

2. Repurpose the assets

One of the best ways to maintain the infrastructure built up by GPEI is to immediately put it to good use in fighting other diseases or health threats. In fact, this is already happening.

Since its inception in 1988, GPEI has supported a wider range of health initiatives, such as the delivery of measles vaccines, surveillance for vaccine-preventable diseases, responses to infectious disease outbreaks including Ebola and the plague, and the delivery of anti-malarial

bed-nets, vitamin A supplements, and humanitarian aid.

Nigeria managed to thwart the deadliest Ebola virus outbreak in history in 2014 by repurposing its polio eradication infrastructure and technology to track all cases, and implementing a rapid and effective outbreak response. The polio infrastructure is also currently being used to support the Ebola outbreak response in the Democratic Republic of the Congo.

Table 1.
Estimated Time Allocation of Staff Funded by the Global Polio Eradication Initiative, 2014–2015 Survey

Activity	Percentage of Time
Polio eradication	46
Routine immunization	22
Measles and rubella prevention	8
New vaccine introduction	4
Child health days or weeks	4
Maternal, newborn, and child health and nutrition	5
Health systems strengthening	4
Sanitation and hygiene	2
Natural disasters and humanitarian crises	1
Other diseases or program areas	4

3. Recognize the value of trained health workers

Hundreds of thousands of health workers have carried and delivered the polio vaccine to more than 2.5 billion children. In countries such as Pakistan, this is predominantly a female workforce, and since 2013, thousands more women have joined the effort.

According to data from WHO, in India, more than 98 percent of frontline vaccinators and social mobilizers are women, and they are instrumental to the success of continued immunization campaigns, which reached up to 97 percent of children in the country in 2017.

A recent study attests to the high demand for female vaccinators from local communities who can gain the trust of their neighbors and access households in order to provide vaccinations.

These workers have been trained to provide health services beyond polio vaccination in their communities as part of their work, including the delivery of other vaccines, birth registration, counseling on breastfeeding, and other critical initiatives. The knowledge and skills gained by this workforce will be transferred to support broader health services after polio is gone.

As the table above shows, more than 50 percent of the time spent by GPEI health workers is already dedicated to diseases and threats beyond polio.

Health workers have valuable skills that are imperative to strengthening routine immunization. Countries and multilateral partners are planning carefully to ensure that their talents will continue to be utilized to support other health services after polio is gone.

4. Prioritize

GPEI's transition plan already anticipates which countries will be the main focus of activity after the last case of polio. As WHO requires at least three years with no new polio cases before eradication is official, this time is in effect a deadline for preparing health and routine immunization systems after polio in certain regions.

A total of 16 priority countries in sub-Saharan Africa, the Middle East, and Southeast Asia have been identified — where the bulk of the polio eradication infrastructure is located. If the infrastructure, assets, and health workers acquired by the polio eradication effort are maintained, they will provide an unmatched platform for taking on the health and development goals of the 21st century.

Once polio is wiped off the face of the earth, we will mark a major step forward in pursuit of the third Sustainable Development Goal, to “ensure healthy lives and promote well-being for all at all ages.”

John Hewko is the General Secretary of Rotary International and the Rotary Foundation. He was writing for devex.com



Vaccination exercise in Kaduna South Local Government Area...



The National Programme Coordinator immunising children



Some Rotarians from Jos Plateue state(in yellow aprons) at the evening review meeting of July SIPDS



Senator Ganiyu Solomon immunising in Lagos



Rotarians and Vaccinators during the last NIPDS in Ijebu Ode



Kaduna Rotarians taking Polio Vaccines to schools...



Jos Rotarians giving helping hands at the IDP Camp



Team of Vaccinators also took Polio Vaccines to Otu Omu Community in Epe, Lagos State



Rotn Grace Sadiku checking the finger marking of children in Kaduna



Baale of Isheri Oke community immunising during the Outreach organised by R.C. Gbagada



Immunisation in Cross River State.



even under the rain, Teams of Vaccinators & Volunteers strive to reach every child with polio vaccines.



Community Leader of Otu Omu Community in Epe, Lagos State with vaccination team



Cross-sectional View of Cross River State Rotarians with the Deputy Governor of Cross River State, Prof Evara Esu during the NIPDS Flag Off Ceremony



Immunisation of zero dose child in Isheri, Lagos state



DG Kola Sodipo (D9110) immunising a child at Isheri Lagos state



Immunisation in cross River State



Ishaya Audu, Vaccination Team Supervisor, going the extra mile to reach children in a riverine community in Ikulu Ward, Zangon Kataf LGA, Kaduna State, Nigeria. Thank You Ishaya



Anambra Rotarians during the July IPDs

ENDGAME STRATEGIC PLAN

1



DETECT AND INTERRUPT ALL POLIOVIRUS TRANSMISSION

2



STRENGTHEN IMMUNIZATION SYSTEMS AND WITHDRAW ORAL POLIO VACCINE

3



CONTAIN POLIOVIRUS AND CERTIFY INTERRUPTION OF TRANSMISSION

4



TRANSITION PLANNING FOR POLIO'S LEGACY



Nigeria National Polio Plus Committee (NNPPC)

www.polioplusng.org