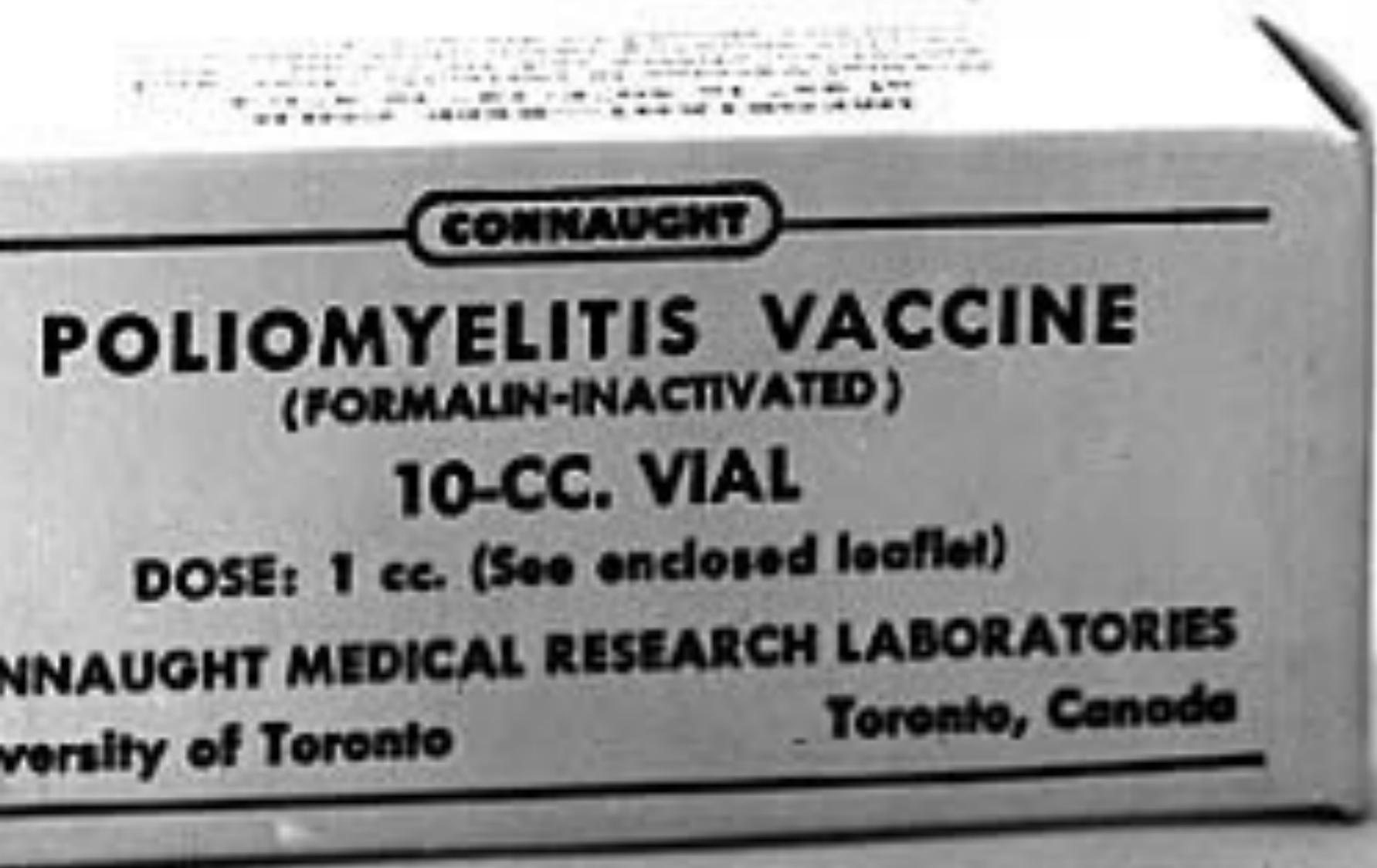


**IN PURSUIT OF ZERO:
health, human development and
the eradication of polio in the
Afghanistan-Pakistan borderlands**

Dr. Stephen Taylor
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**What technology has
changed the world?**



CONNAUGHT

POLIOMYELITIS VACCINE

(FORMALIN-INACTIVATED)

10-CC. VIAL

DOSE: 1 cc. (See enclosed leaflet)

CONNAUGHT MEDICAL RESEARCH LABORATORIES

University of Toronto

Toronto, Canada



CONNAUGHT

POLIOMYELITIS VACCINE

(Formalin-inactivated)

10 cc.

Dose: 1 cc.

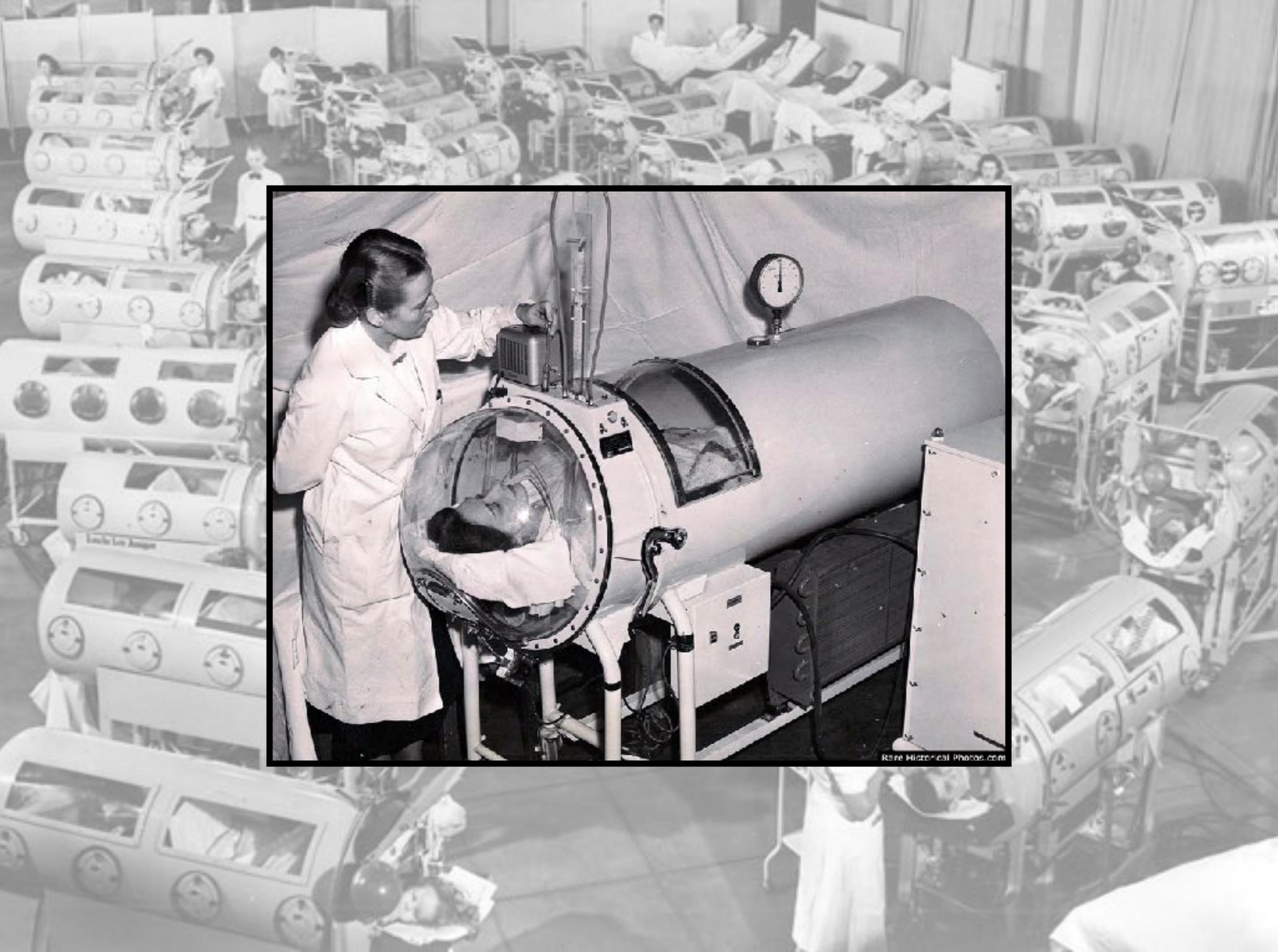
Lot 106-3

CONNAUGHT MEDICAL RESEARCH LABORATORIES

University of Toronto



“Iron lungs” in East London (1953)



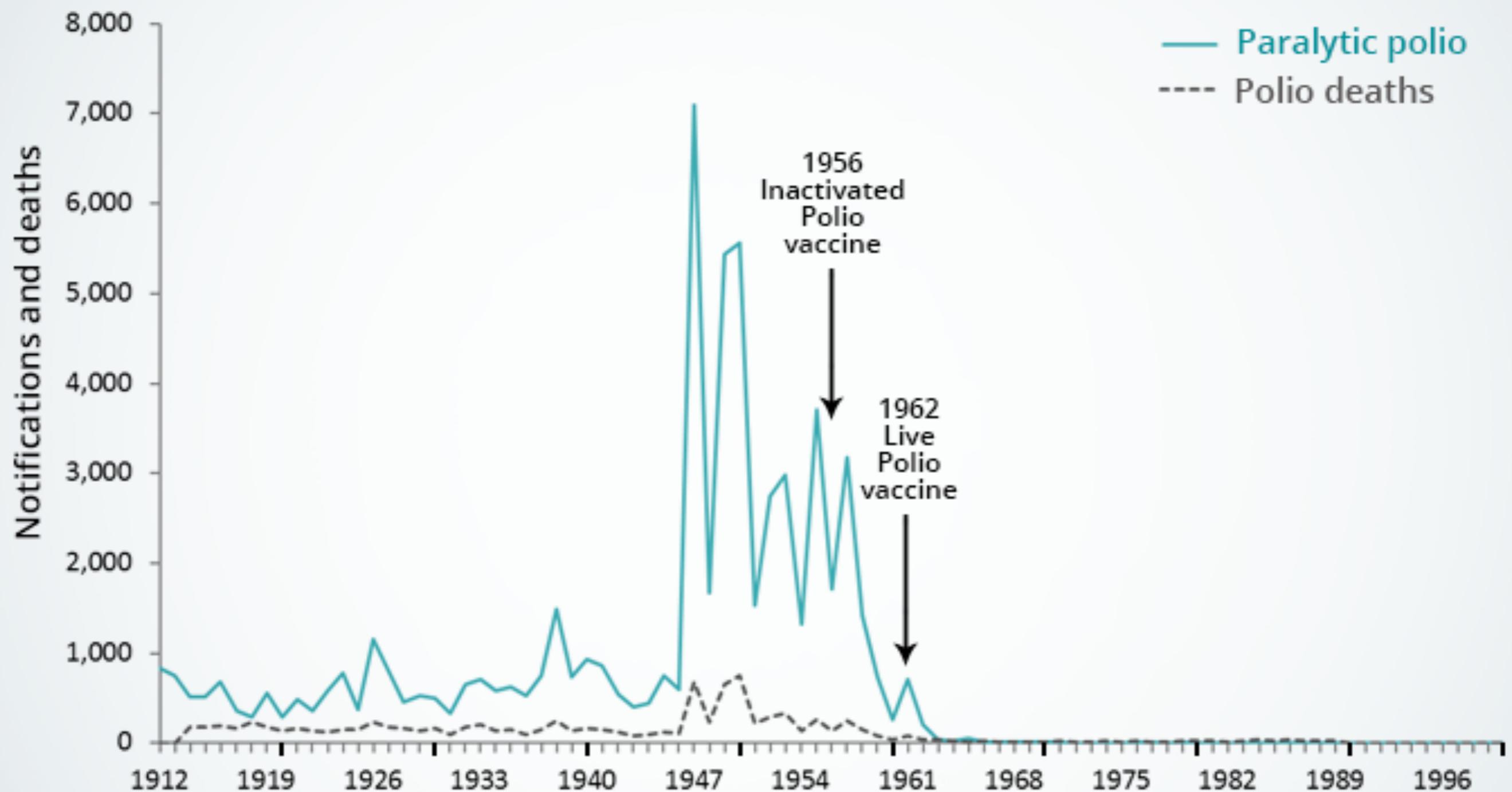
Rare Historical Photos.com



President Roosevelt launches the polio vaccine initiative and 20 years later in 1953 a vaccine was discovered by Jonas Salk



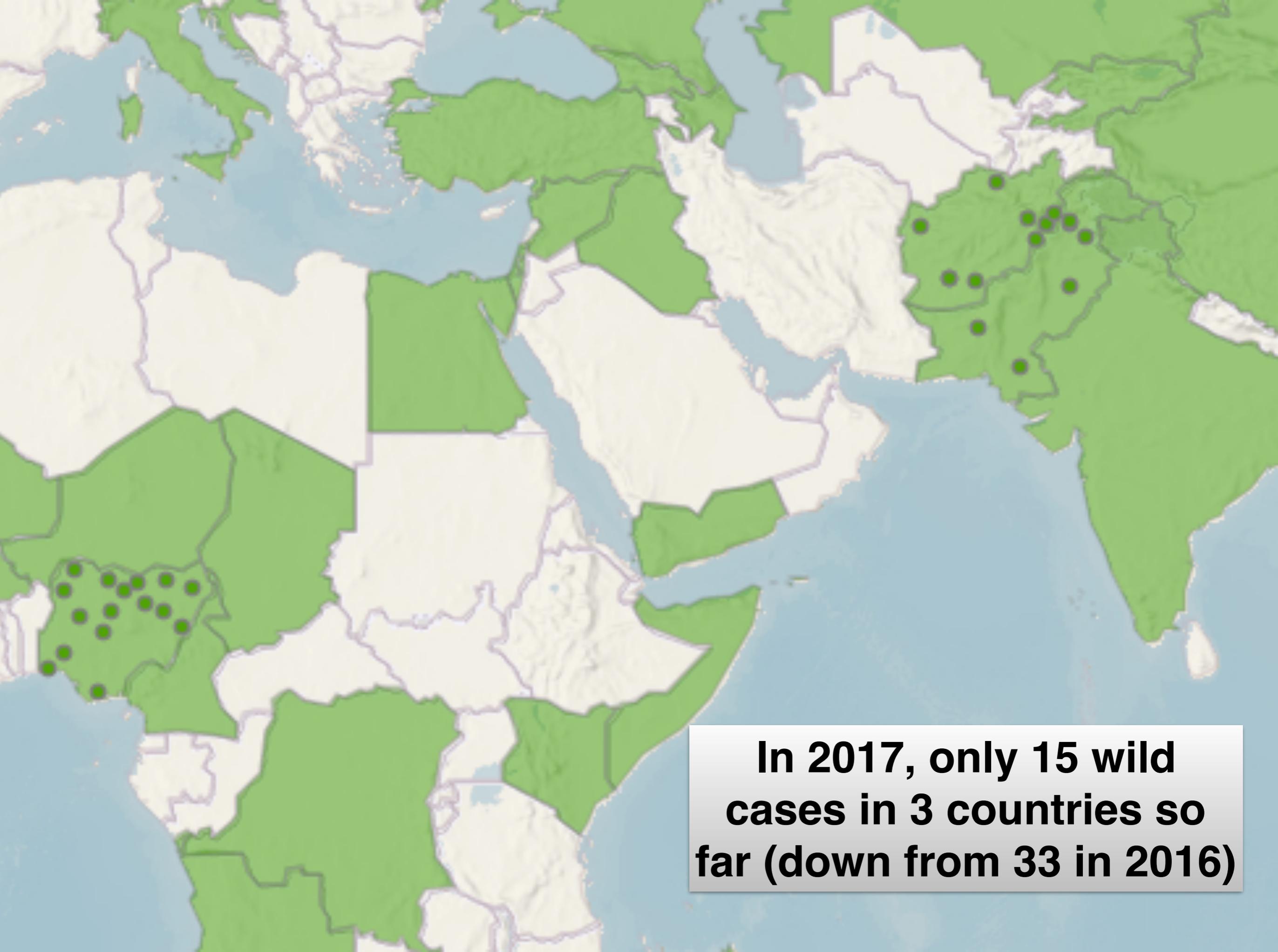
Paralytic Polio Notifications and Deaths in England and Wales (1912-2000)



Data source: Public Health England, Annual Corrected Notifications & Deaths, England & Wales 1912-2007 (<http://webarchive.nationalarchives.gov.uk/20140505192926/http://www.hpa.org.uk/Topics/InfectiousDiseases/InfectionsAZ/Polio/EpidemiologicalData/polioAccutePoliomyelitisAnnualNotifDeathsEW/>)
Compiled by @visualvaccines

A man with grey hair, wearing a dark suit, white shirt, and dark tie, is holding a microphone. He is looking slightly to the right of the camera with a neutral expression. The background is a dark blue stage with some out-of-focus lights. A speech bubble is overlaid on the right side of the image.

But Bruce, where is polio still active? Because I thought it had been eradicated in the way that smallpox has been eradicated?



In 2017, only 15 wild cases in 3 countries so far (down from 33 in 2016)

**DRC 2010-11: 445
cases, 193 deaths**



**Tajikistan 2010: 457 cases,
29 deaths**



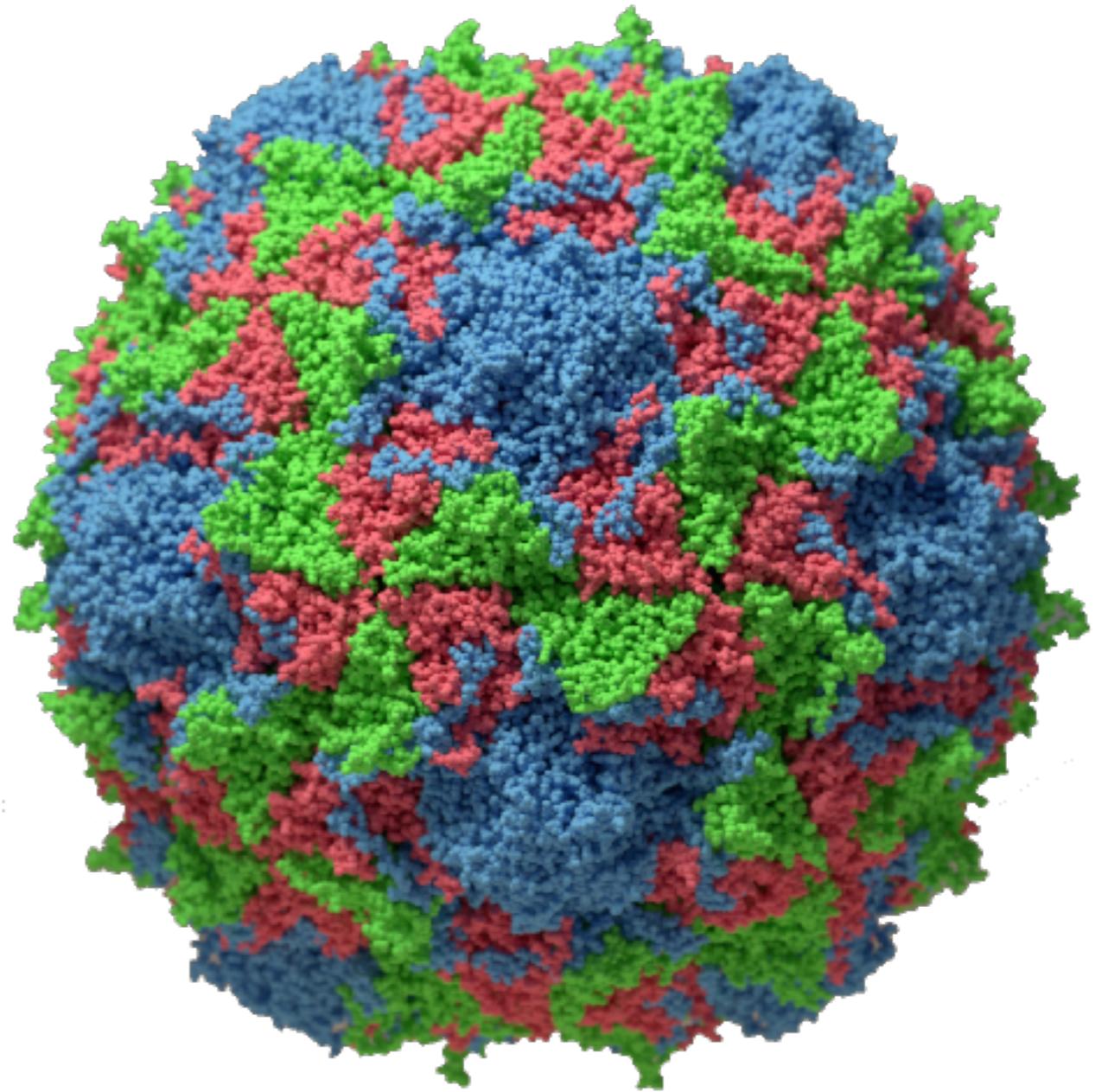


Meet the virus

Spread through faeces and saliva; unless it is permanently destroyed ('eradicated'), the wild virus risks flaring up again like a smouldering fire.

That's a big task, but fortunately:

- the virus can only survive in humans (unlike Ebola);
- it can live for a long time in the human body;
- it doesn't survive very long outside the human body;
- and ... there is an effective vaccine.

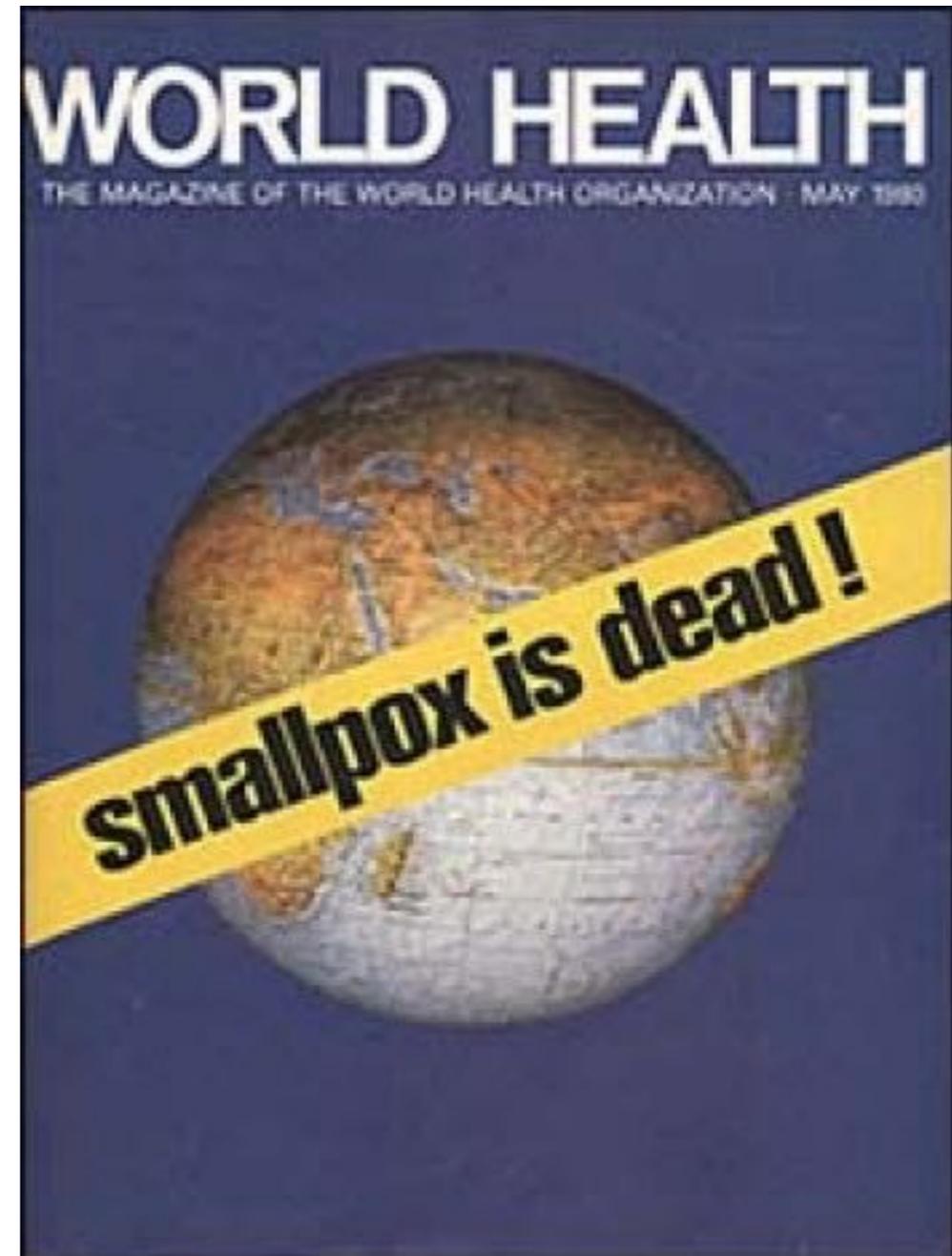


Eradication seems likely...?

Humanity has tried to eradicate six different diseases over the past 100 years, and only succeeded once (smallpox)

Eradication is the 'venture capital' of global health - there are big risks, but the pay-off (economic, social, inspirational) are MASSIVE:

- A US study claims that the billions of dollars spent on eradicating smallpox pays itself off every **26 days** through foregone treatment and vaccination costs.
- If polio were to be eradicated, the WHO claims that the poorest countries in the world would save **\$50 billion each over the next 25 years.**



Eradication seems likely...?

Smallpox eradication was hard, and polio eradication is even tougher:

- at the start of the polio eradication effort, 2x countries were infected and there were 10x people living with the virus (500 million:4 billion);
- smallpox is a single use vaccine, but the polio vaccine is very fragile - it deteriorates quickly in heat, so every vial has to be fitted with a special monitor to make sure it is safe to administer (children need multiple doses);
- in contrast to tell-tale scars of smallpox, it's hard to see polio and most show absolutely no symptoms of the disease.



A movement to end polio

The global movement to eradicate polio is one of the largest social movements in history:

- 20+ million volunteers vaccinate over 500 million children every year, largest peacetime coordinated operation ever;
- The vaccine drops are easy to administer, but getting to 500 million children is really difficult - esp. in dense urban areas and remote mountainous communities;
- They dodge bullets and operate within shaky ceasefires - “days of tranquility” - between warring factions.

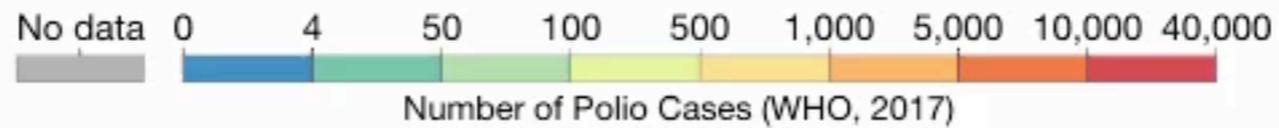
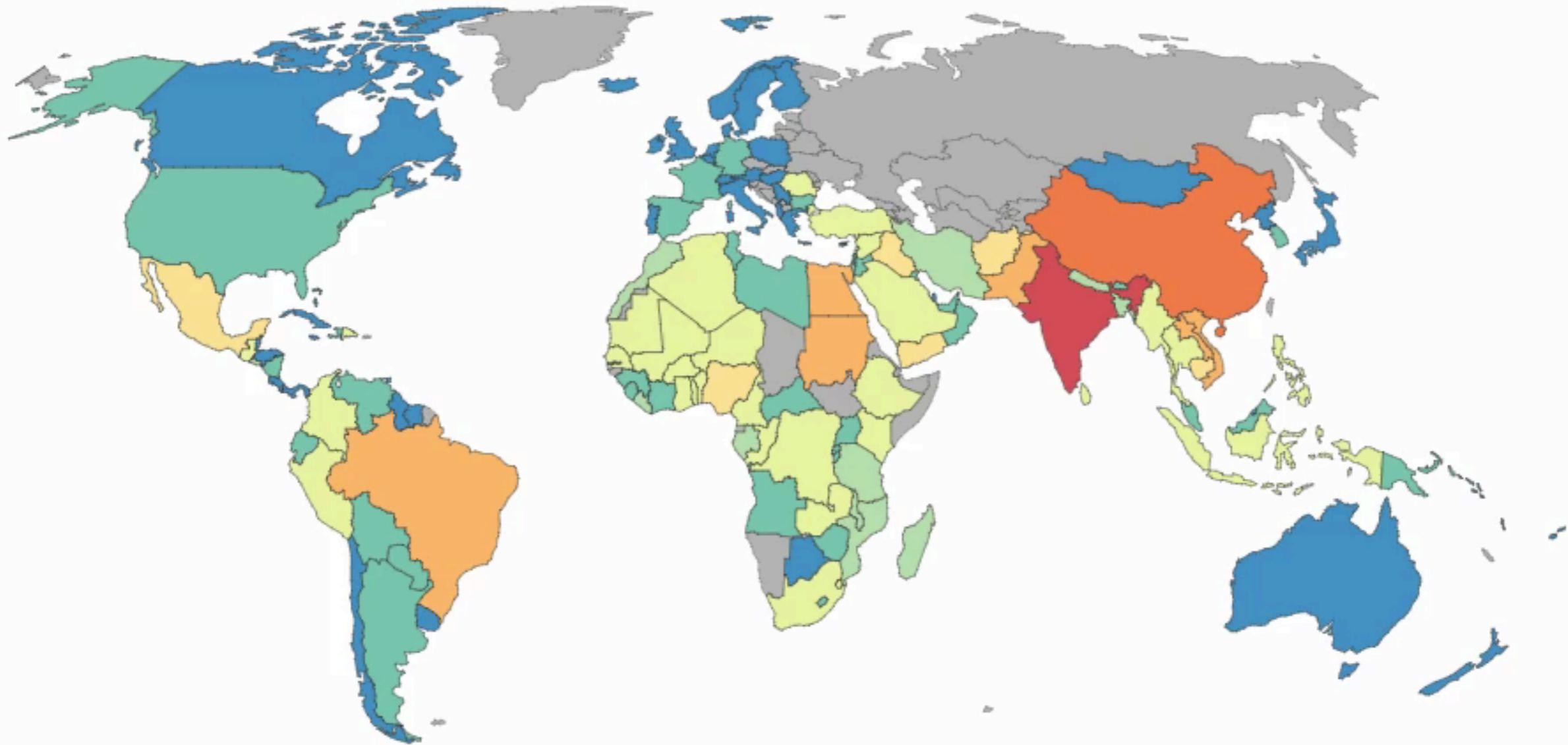


“This is foreign aid at its most heroic”



The number of reported polio cases, 1980

This includes the wild and vaccine (VAPP) type poliovirus (occurring indigenously and imported)



▶ 1980 ●

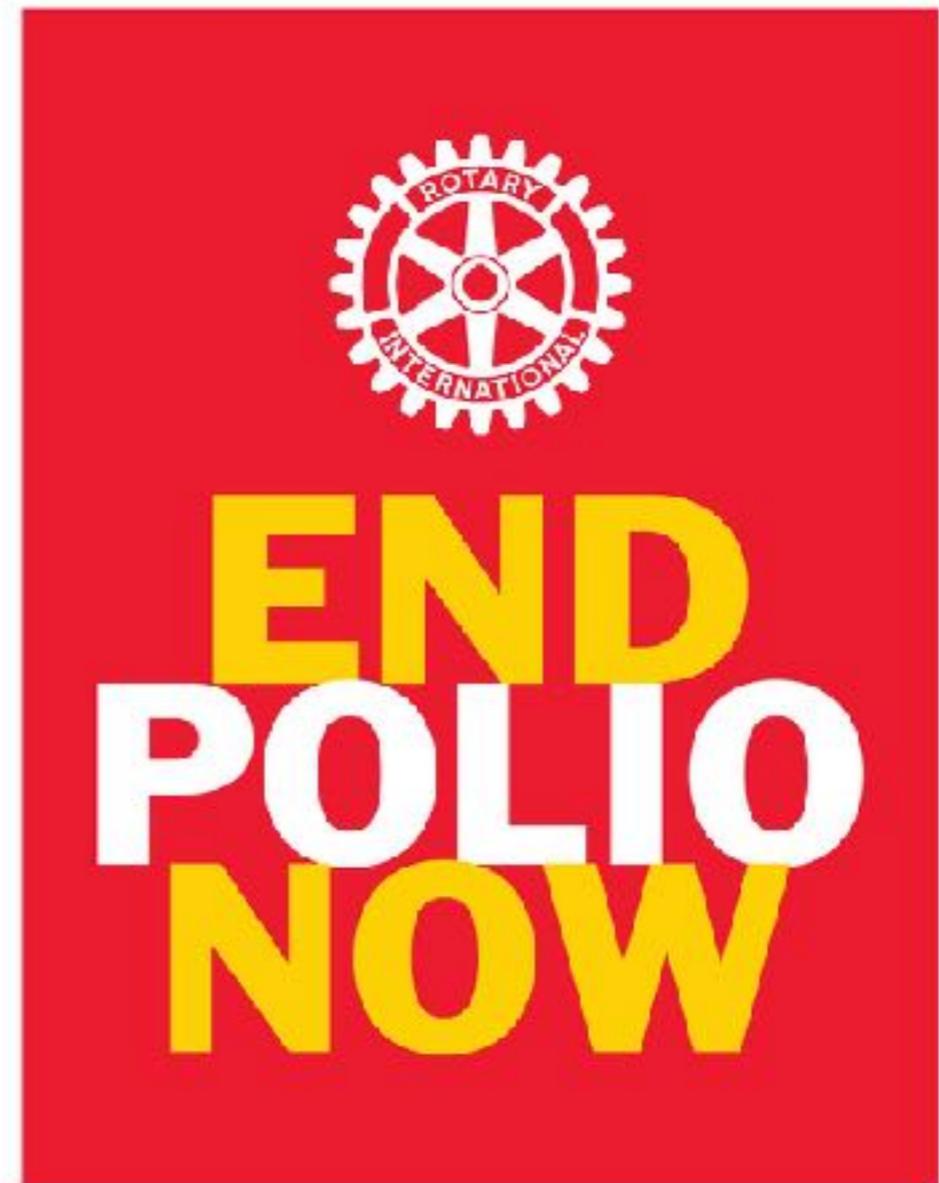
2016

Progress

It took 15 years to get the initiative off the ground, and within a couple of years most countries had eliminated all three wild strains of polio (except Nigeria, Pakistan, Afghanistan).

There has now been a >99% drop in infections. When started in 1988, 1,000 children were paralysed everyday; now only 15 cases this year.

Additional benefits include: measles immunisation, vitamin A drops, and bed nets against malaria



Vaccine teams reach children in remote areas of Afghanistan with donkeys and cool boxes



Challenges

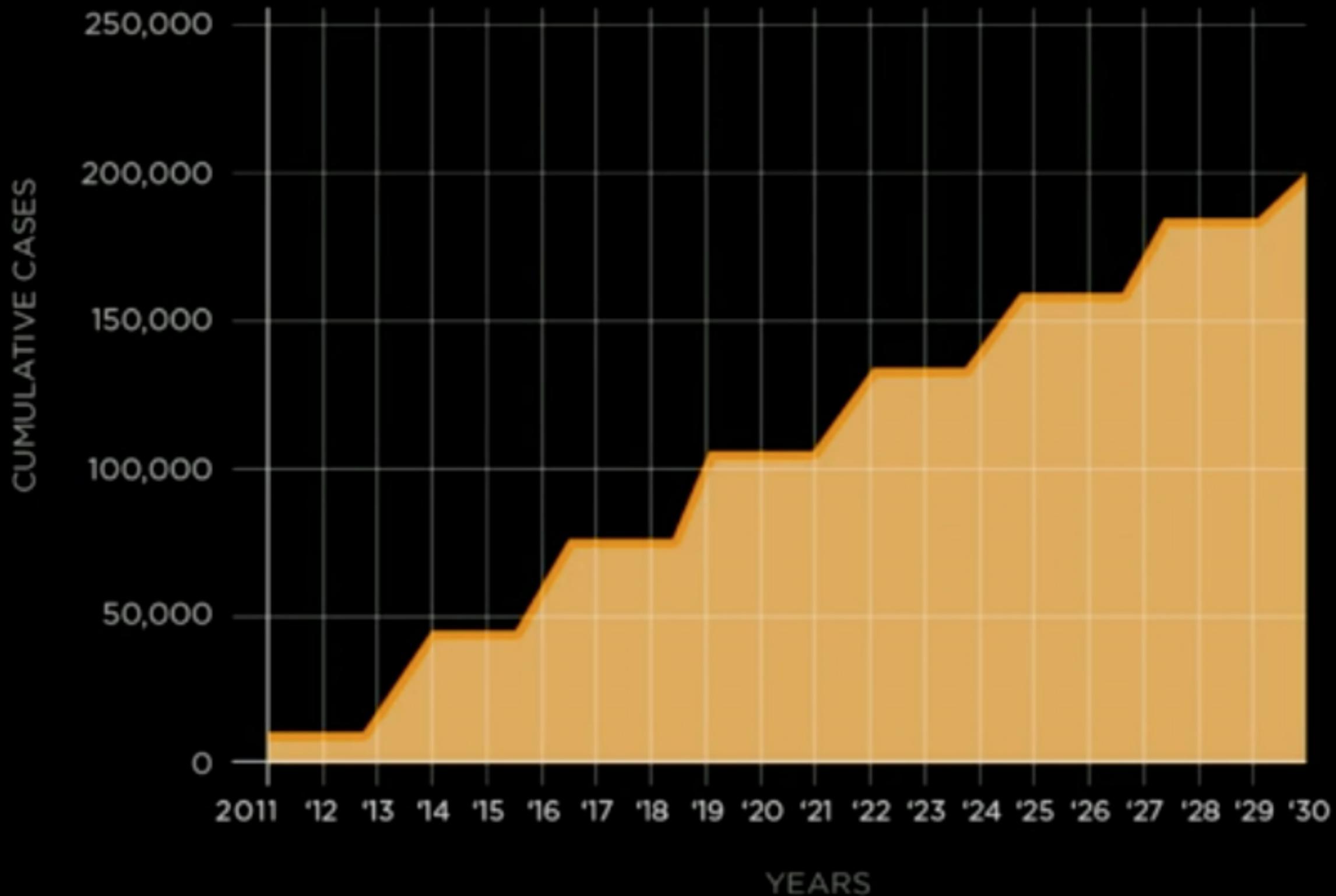
But then the virus fought back:

- The virus is stubborn in the three countries in which it remains, spreading to new areas too (Syria, Ukraine);
- The vaccine was also found to be working less well and could not gain traction in the human body.

This led many influential world leaders and donors to question the idea of eradication (favouring careful control instead)

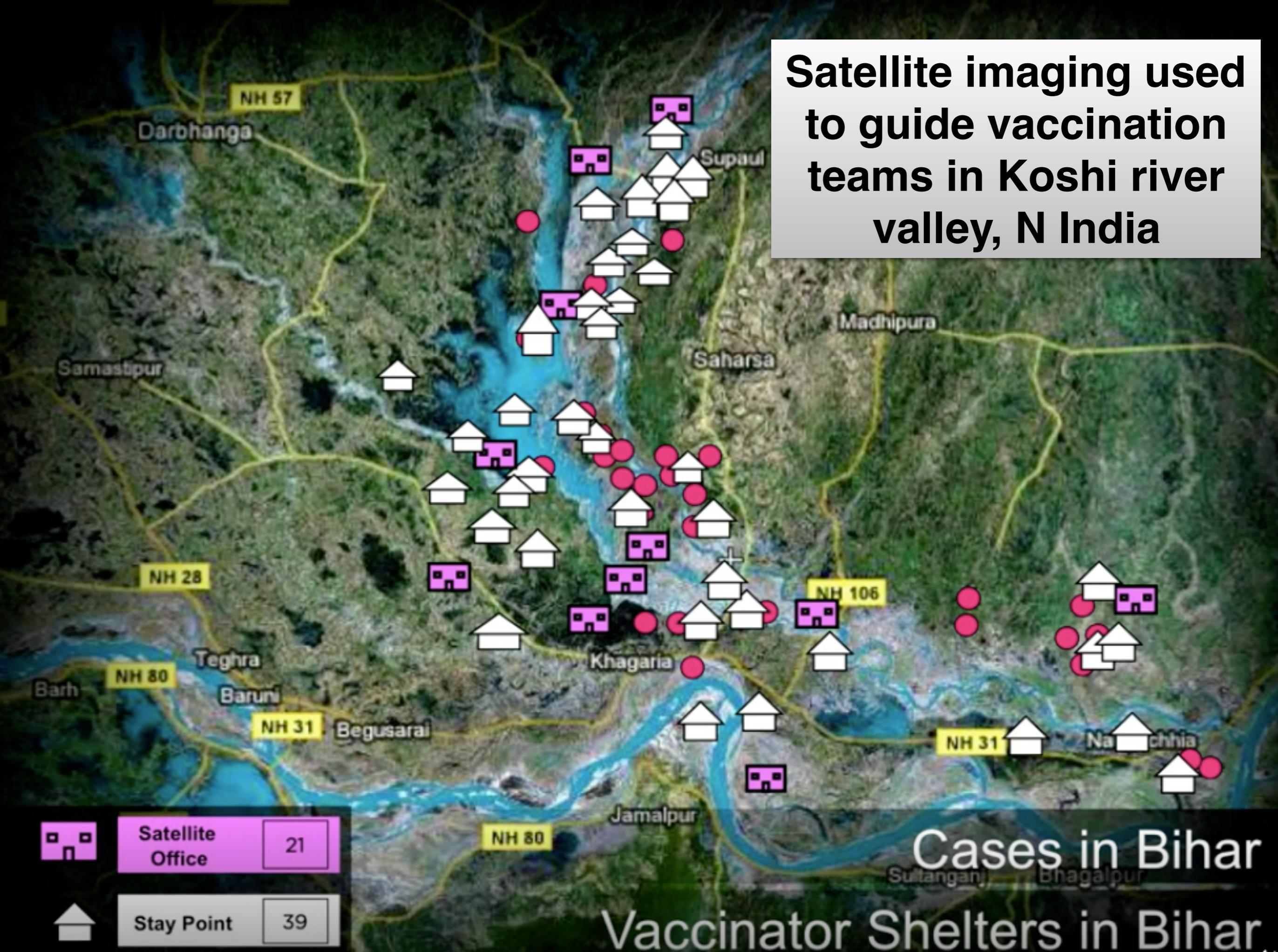


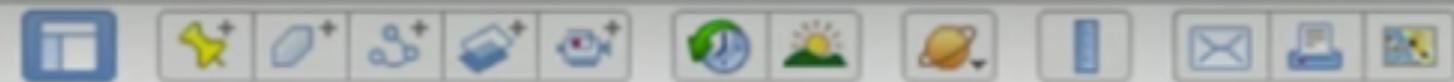
IF WE **DON'T** ERADICATE





Satellite imaging used to guide vaccination teams in Koshi river valley, N India





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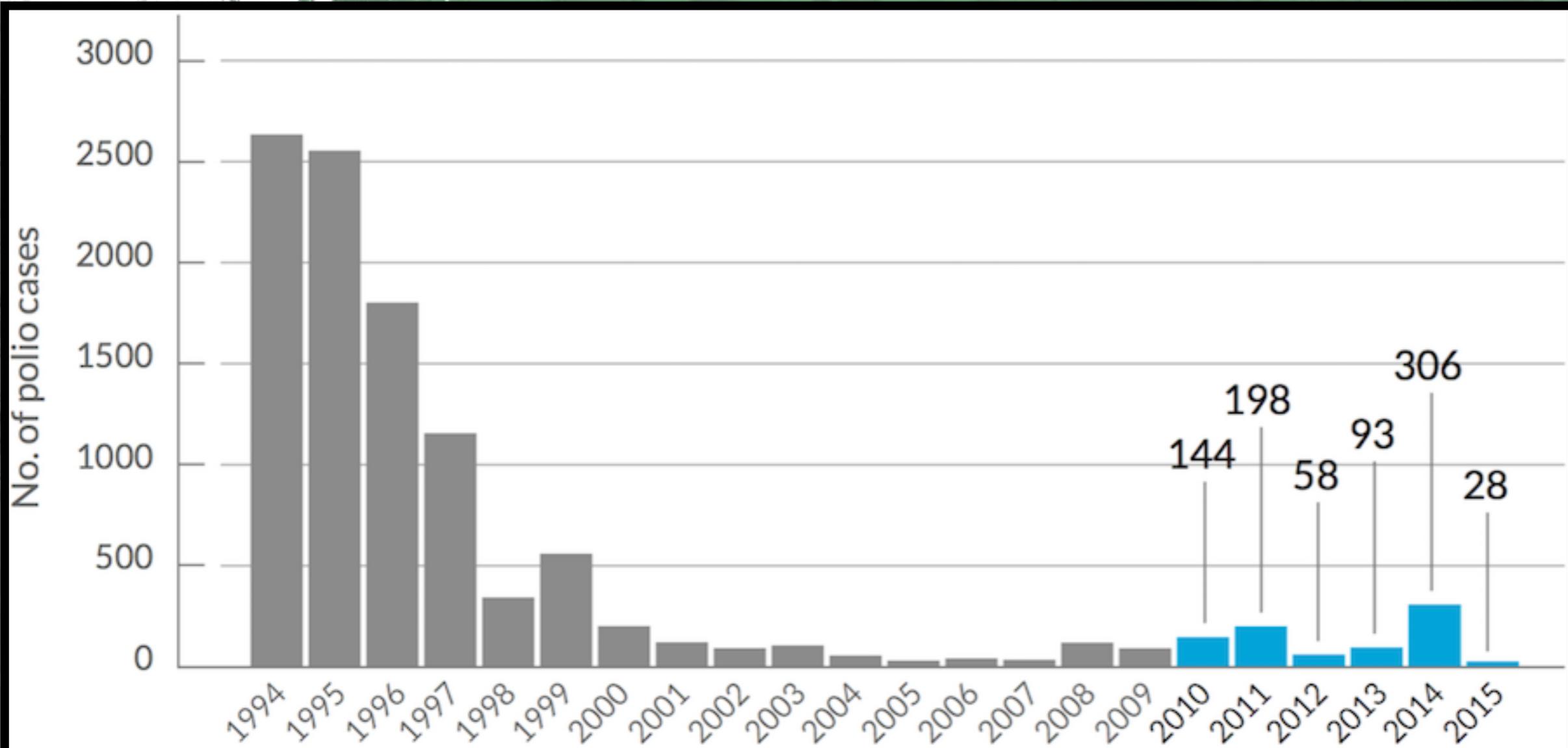
☰ 📶

Earth Gallery >>



GIS tracking technology in action in Lahore





Data source: National Polio Control Room data 2015 (data as of 14 July 2015).

“No one whom the IMB spoke to had anything but gloomy predictions about polio eradication in Pakistan. It is clear that the level of political commitment, the extent of engagement of regional and local leaders, the quality of public health leadership and management, and the involvement of civil society are totally inadequate. Pakistan puts the entire global goal [of polio eradication] in jeopardy ... Nothing short of bold, transformative action will bring this Marie Celeste of a programme to life” (GPEI 2014)

The Pakistan campaign

Pakistan is one of the most strategic sites in the war on polio. Population of 188.9 million, including 24.7 million children under the age of 5.

Immunisation is delivered by 10,000 vaccination staff supported by 100,000 Lady Health Workers. There are 6,000 vaccination centres, but these are unevenly distributed.

Most of the work is funded by WHO, UNICEF, and Gates Foundation

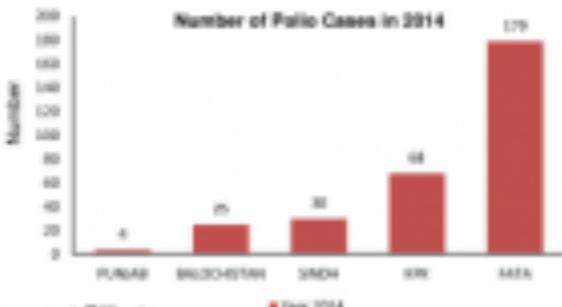


Poliomyelitis High Risk Area in Pakistan

The Battle Against Polio

Pakistan is one of the two remaining countries in the world where poliomyelitis (polio) is still categorized as an endemic viral infection, the other being Afghanistan. As of October 2015, there have been 58 documented cases of wild poliovirus in Pakistan in the past year. Though the polio immunization campaign in the country started in 1974, the efforts for eradication officially started in 1994. The infection remains endemic despite over 100 rounds of vaccination being carried out in the past decade.

Pakistan had the world's highest number of polio cases in 2014, and as of October 2015, it has maintained this record. However, the number of cases in 2015 is a fraction of those recorded in 2014. The country has announced a goal of eradication by 2016.

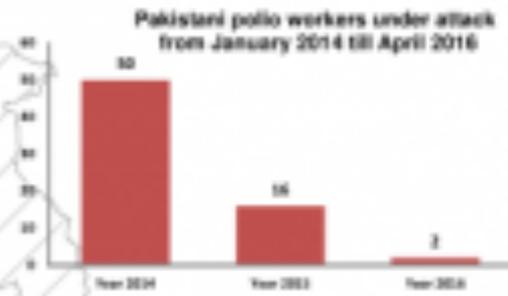


Recent Government Efforts

In 2015, the Khyber Pakhtunkhwa government issued arrest warrants for 1,200 parents and guardians for refusing to administer vaccine to their children. 512 people were arrested on the charge but were later freed after signing an undertaking that they would not oppose vaccination. By 2015, new cases of polio had dropped by 70% as compared to 2014, due to increased vaccination in parts of the northwest Pakistan that had previously been under the control of militants. These areas were secured by Pakistani forces in the Zarb-e-Aziz Campaign against Taliban militants. Previously, vaccination teams were forbidden by militants from vaccinating children in the area.

Pakistani polio workers under attack from January 2016 till April 2016
Efforts to eliminate polio in Pakistan have been complicated in recent years, as polio workers have faced attacks by militants who say the health teams are Western spies, or that the vaccines they administer are intended to sterilize children. On January 13, 2016, at least 15 people were killed and several injured after a bomb had exploded near a polio centre near Quetta. And now on April 20, 2016, or just 10 days after the World Health Organisation had expressed hope that polio was in its dying days and could be eradicated from Afghanistan and Pakistan within 12 months, seven police personnel, providing security to anti polio teams, were shot dead in Karachi.

Date	Polio Workers Attack
January 13, 2016	At least 15 people were killed and several injured after a bomb had exploded near a polio centre near Quetta.
April 20, 2016	Seven police personnel, providing security to anti polio teams, were shot dead in Karachi.



Province	2009	2010	2011	2012	2013	2014	2015	2016
PUNJAB	11	7	5	2	1	4	2	1
SINDH	11	27	22	4	10	20	12	4
AKH	20	36	25	27	11	66	13	4
ISLAMI	20	5	10	20	20	170	14	1
BALUCHISTAN	11	0	25	4	4	25	7	1
FATA	0	0	1	1	0	1	1	1
TOTAL	74	14	106	56	55	336	54	11

Province	District	Polio Cases
AKH	Prothman	1
	Nowshera	1
	Rang	1
Sindh	Karachi	1
	Iskandrud	1
Baluchistan	Shikarpur	1
	Quetta	1

Anti-Polio Drive in Pakistan January to April

Date	Anti-Polio Drive
January 31, 2016	An anti-polio drive has been carried out in FATA, Khyber Pakhtunkhwa, Gilgit Baltistan & Punjab for 3 days.
February 15, 2016	Anti-polio drive in 15 districts of Balochistan, Khyber Pakhtunkhwa, Federally Administered Tribal Areas and Karachi started for 5 days.
March 14, 2016	Anti-polio drive in Khyber Pakhtunkhwa, Balochistan, Punjab for three-days drive. Meanwhile, four-day anti-polio drive also started in FATA.
April 18, 2016	Dera Ismail Khan, Federally Administered Tribal Area (FATA), Frontier Regions and three cities of Sindh and three days anti-polio campaign carried out from 25 April 2016 in 12 districts of Balochistan.

Arabian Sea

Creation Date: April 28, 2016
Projection/Datum: WGS 84 Geographic AD
Page Size: 100x100mm

Legend
Polio Risky Area in Pakistan

- High (Red)
- Medium (Orange)
- Low (Yellow)

Legend
No. of Polio Cases 2016

- No. Polio Found (White)
- 1 (Yellow)
- 4 (Orange)
- Provincial Boundary (Green)



Data Source(s): End Polio Pakistan/Polio Statistics
DISCLAIMER: ALL RIGHTS RESERVED
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Poor management

<2% of GNP is spent on healthcare, and adequate infrastructure is lacking in many parts of the country. Campaign is well-funded but lacks transparency

Frequent power outages, lack of running water, food insecurity and activity insurgencies mean polio is often not top priority

Immunisation cover is uneven: 75% in Punjab, 45% in FATA, Balochistan. High levels of false compliance (low salaries, delayed payment), poor digitised records, last census in 2000.



Vaccine hesitancy

Basic adult literacy is 60%. Illiteracy, socioeconomic, cultural and religious factors lead to hesitancy.

Parental refusal is driven by misconceptions about the vaccine - claims it is sterilising children, or contains forbidden monkey- or pork-products. Parents can be prosecuted.

Cultural issues: all-male vaccinator teams, lack of community/elder consent, lack of basic public health awareness



Conflict and militancy

Taliban insurgency since 2006 has fuelled polio as populations are displaced (91 cases in 2013 to 300 in 2014).

Negative propaganda about vaccination: connections to Western plots, unpopular CIA drone programme. Only 25% trusted vaccinators in FATA (61% in low-conflict areas).

CIA operation to capture Osama bin Laden in Abbottabad was conducted behind the ruse of a vaccine campaign.





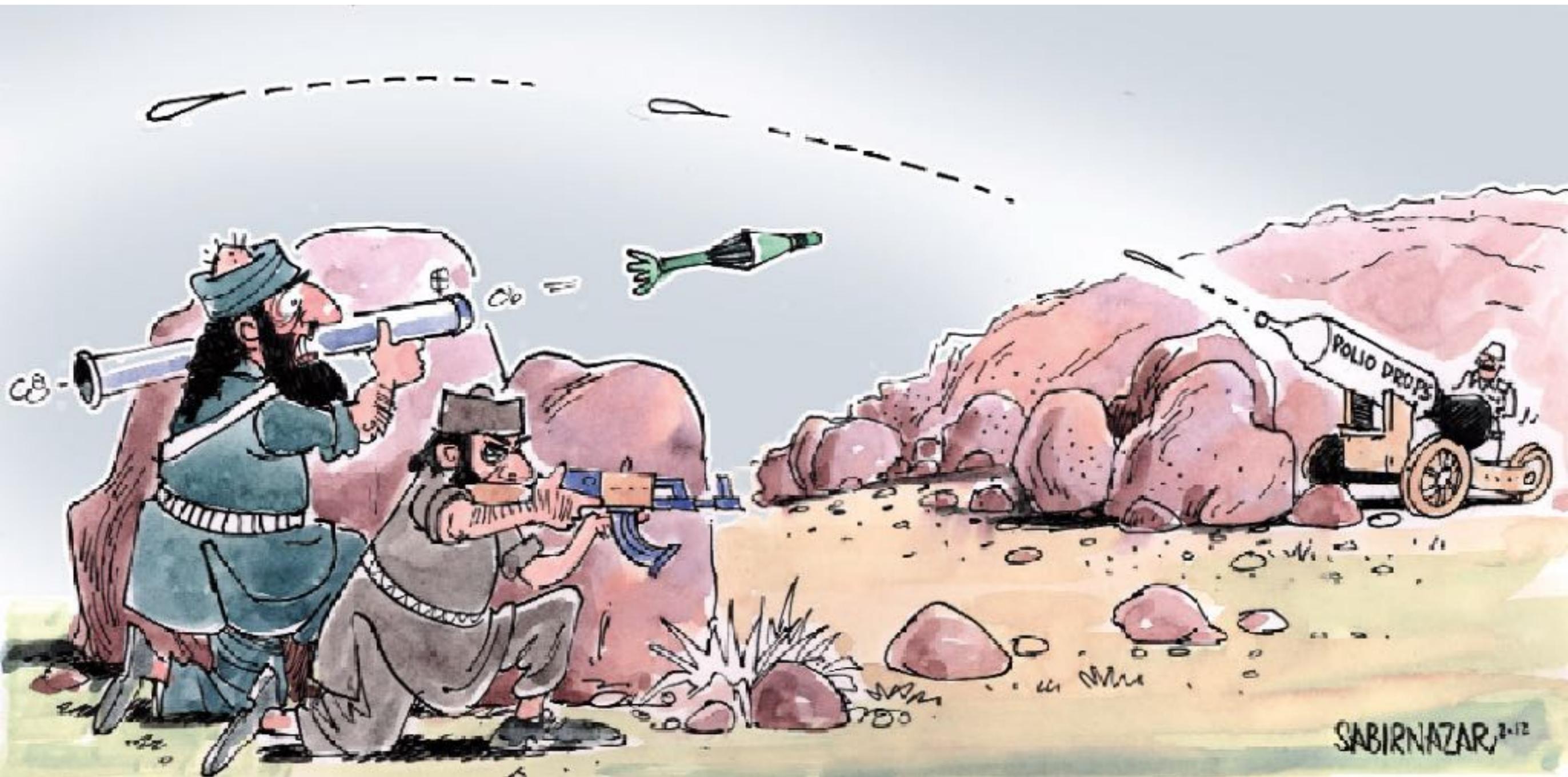
Conflict and militancy

Taliban imposed a ban on vaccination in 2012. This means that 350,000 children in FATA have gone unvaccinated over several years.

Targeted attacks on health workers since 2012 have left hundreds of volunteers dead, curtailing house-to-house visits and leading to shortages in volunteers.

Fighting between military and insurgents is key connection to polio transmission. Wild poliovirus cases connected to IDPs in FATA and KP. Military 'surge' led to 80% decrease in new polio cases in 2015.





Improvements?

National Emergency Action Plan 2015 acknowledged that 80% of under 2's had been missed in 2014 campaigns. Plan prioritised:

- increasing accountability and transparency;
- improving volunteer security and morale;
- utilising technology and tracking.

Additional steps taken to fund more vaccine hubs, tackle corruption, and integrate polio work with other health projects (e.g. measles, DPT)

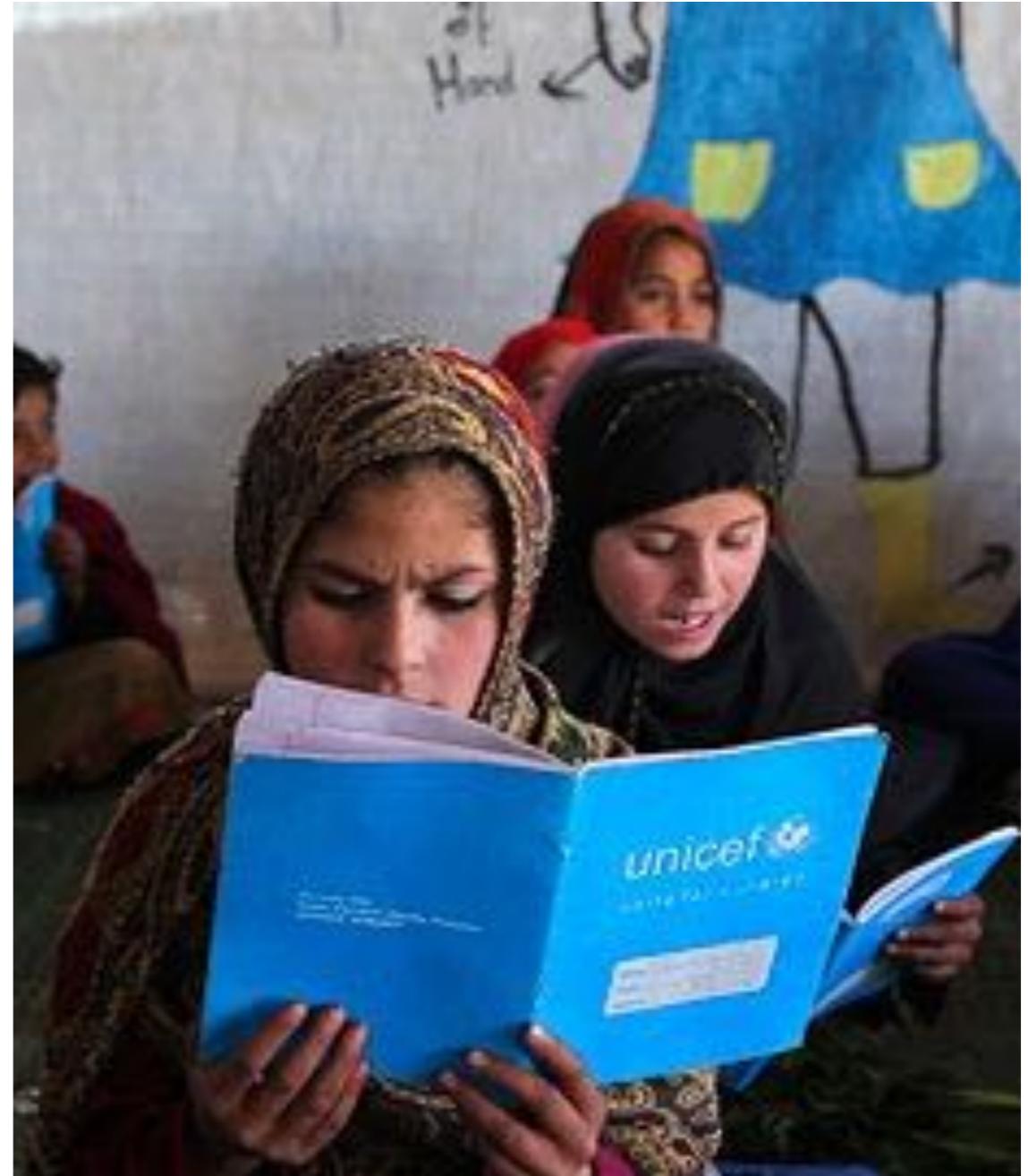


Improvements?

Community engagement and education: new partnerships with religious authorities, with Islamic scholars releasing *fatwas* endorsing polio

Gaining support from other influential public figures and organisations around basic public health. UNICEF now works in schools and madrassas across the county.

Prioritising vaccination: 'reservoir districts' and 'high-risk districts' flooded with vaccinators during immunisation campaigns.

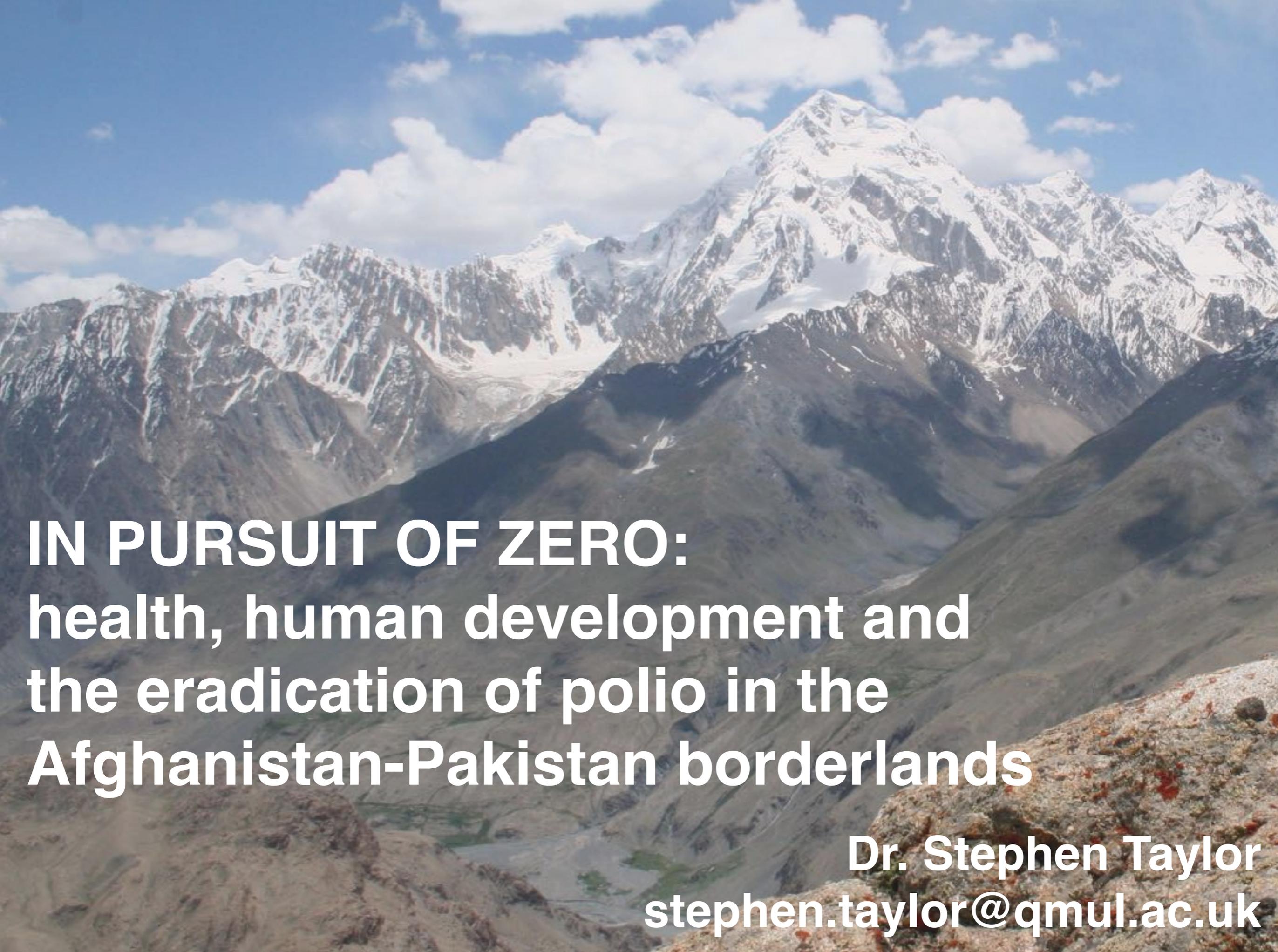


Conclusions

Pakistan faces many challenges in overcoming polio: poor health infrastructure, operational deficits, inequality. Conflict and militancy are real concerns.

BUT there is hope for 'zero'. More concerted community engagement and education, mass-media to address hesitancy, and strengthening collaboration with religious and political leaders.





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