

When Immunization Systems Fail

A Global Clinical Update on VPD Resurgence affecting
the most marginalized

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In August 2024, a 10-month-old, unvaccinated child in Gaza became the first confirmed case of polio in 25 years, but he was not the last. While he remained stable, he lost movement in his left lower leg, paralyzed from a virus that has been eradicated by vaccine in most of the world.

Other children in the region were found to have acute flaccid paralysis, a hallmark feature of Polio Virus

In your practice,
how often do
you care for
people who are
displaced, are
from conflict-
affected places,
or are in
impoverished
situations?

75-100% of the time

50-75% of the time

25-50% of the time

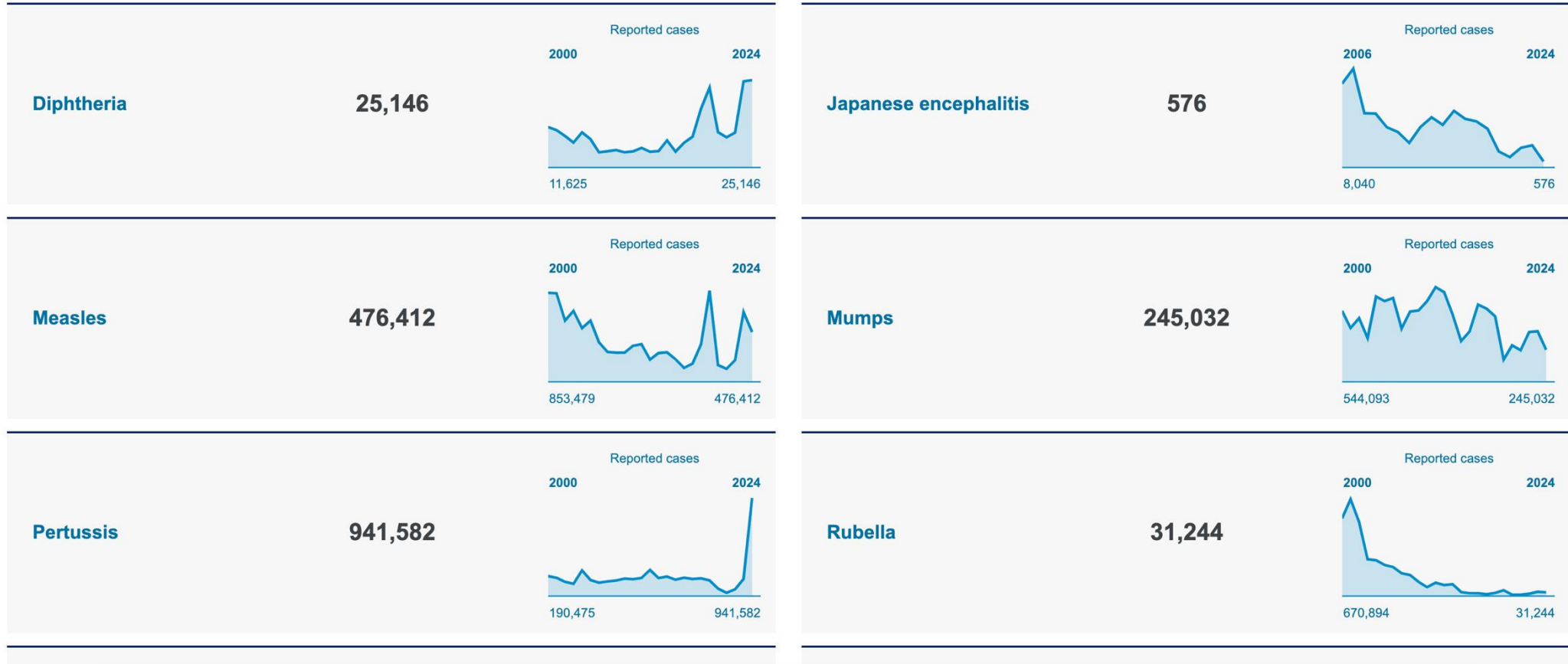
< 25% of the time

Rarely, Never, or N/A

When it comes to Vaccine-preventable diseases

- An estimated **14.3 million infants** worldwide missed all routine vaccine doses in 2025 (often referred to as "zero-dose" children). (cdc.gov)
- Nearly 50% of those children live in fragile or conflict-affected states.
- While only 1 in 4 infants globally live in fragile or conflict-affected countries, these regions account for half of all zero-dose children.
- Cases of Pertussis, Measles, Mpox, Yellow Fever, and Meningitis saw increases in 2025.

The Numbers don't lie...



The 2025 UNICEF show the world is currently off track for the SDG target to halve the number of 'zero dose' children and achieve at least 90% global immunization coverage.

Which VPD has seen the most dramatic global resurgence since 2021?

A. Polio

B. Measles 

C. Diphtheria

D. Cholera


E. I have no idea

Why Now? A Convergence of Crises...



Why Now?

A Convergence
of Crises...

- Armed Conflict
 - Population displacement
 - Increased Travel and People Movement
 - Famine/malnutrition
 - Post-COVID immunization gaps
 - Misinformation
 - Climate
 - Funding Cuts or reappropriation
- 

Three Case Studies of Armed Conflict and Vaccine-Preventable Diseases

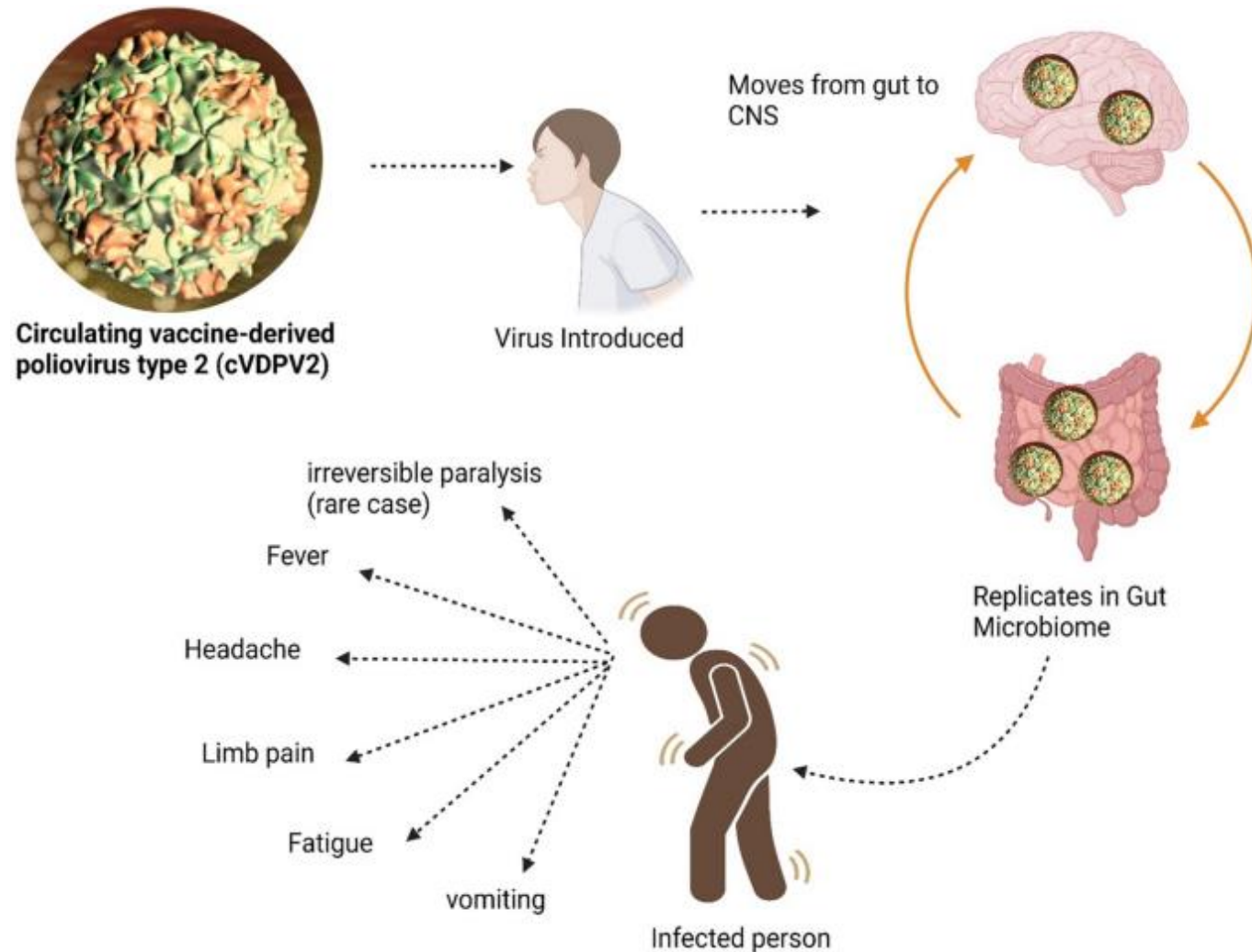


Healthcare Infrastructure Destruction

Gaza Strip



Case Study: Gaza and the Middle East

- Pre-Oct. 2023 – Polio/DTP coverage – 99%
- Early 2024 – Coverage drops below 90% (herd immunity threshold)
- June 2024 – Circulating vaccine-derived poliovirus 2 (cVPDPV2) detected in wastewater in Gaza.
- August 2024 – 10-month-old with poliovirus paralysis– First case in 25 years



Why Now?

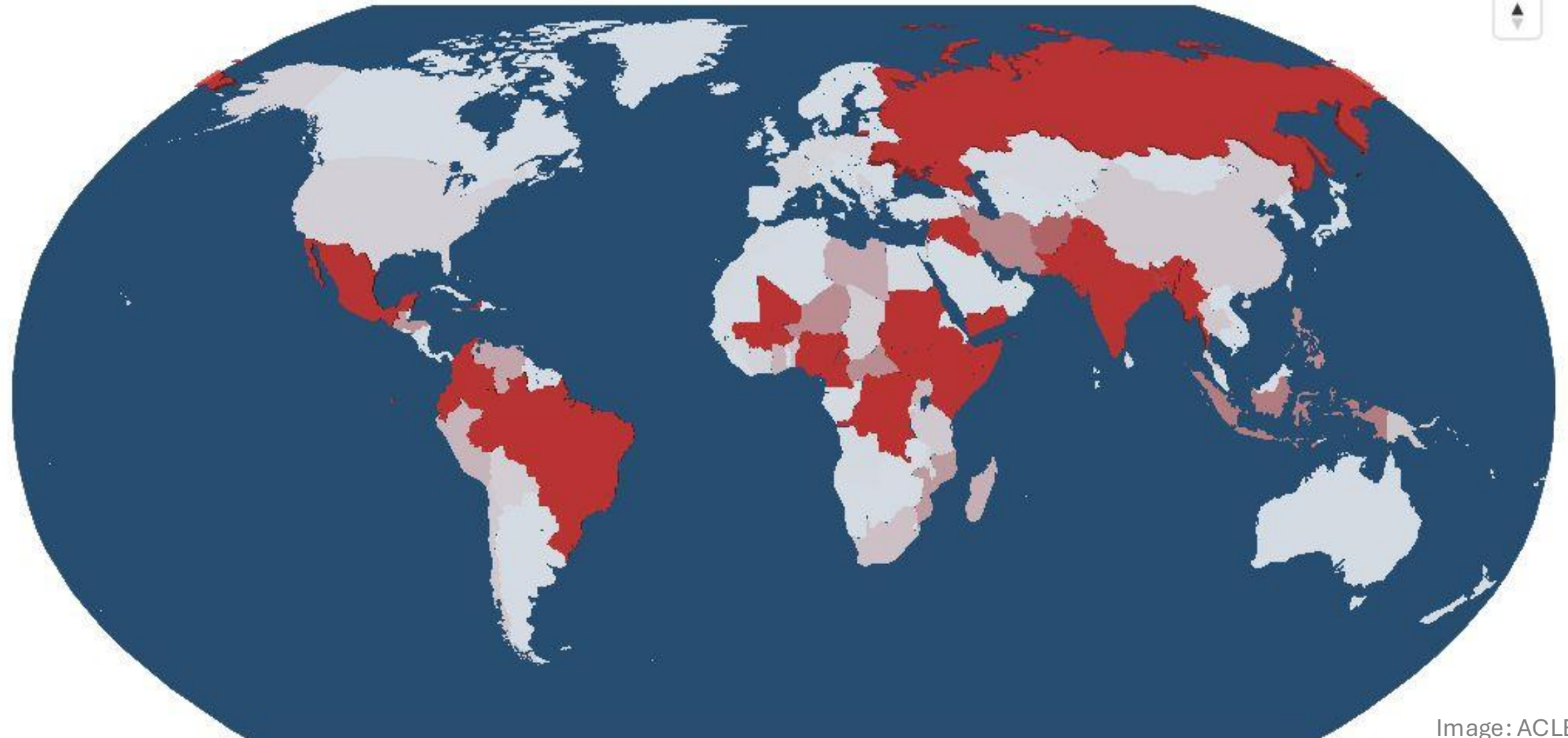
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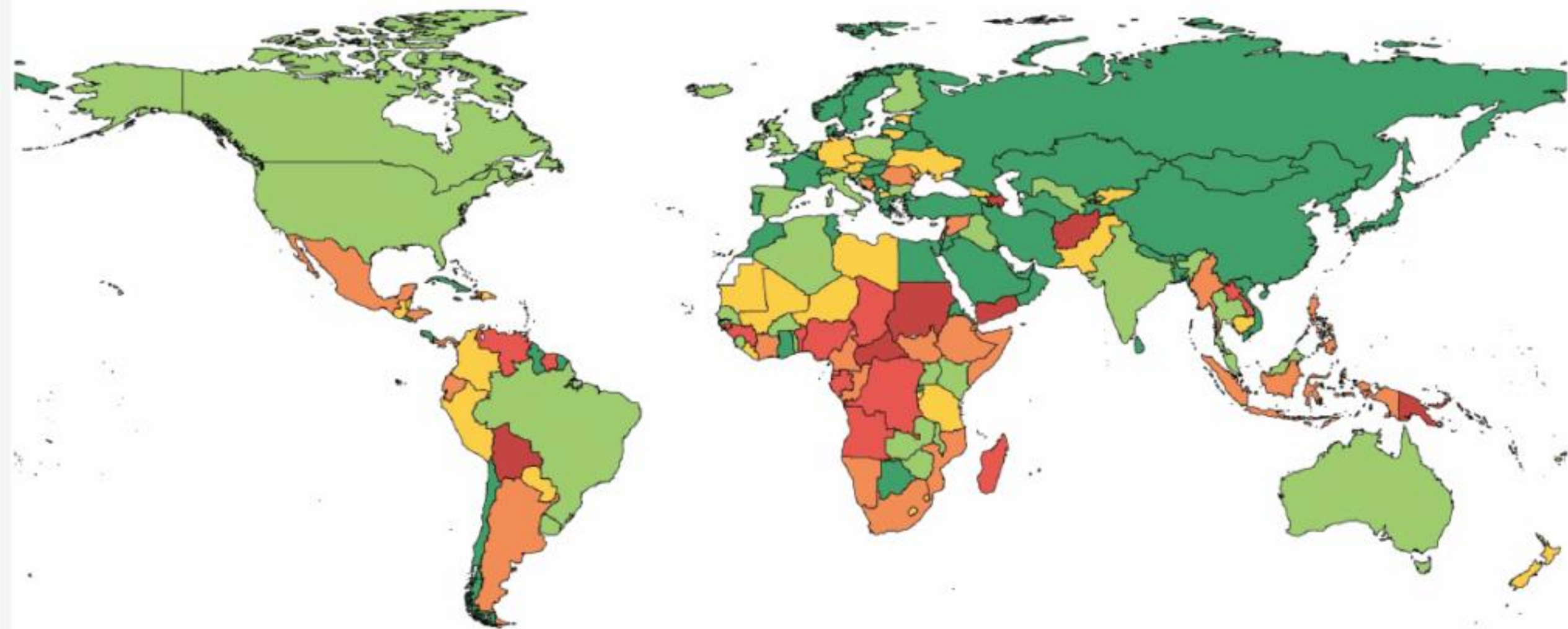
Political violence events by country

1 Dec. 2024 - 28 Nov. 2025

Number of events 0 71,845

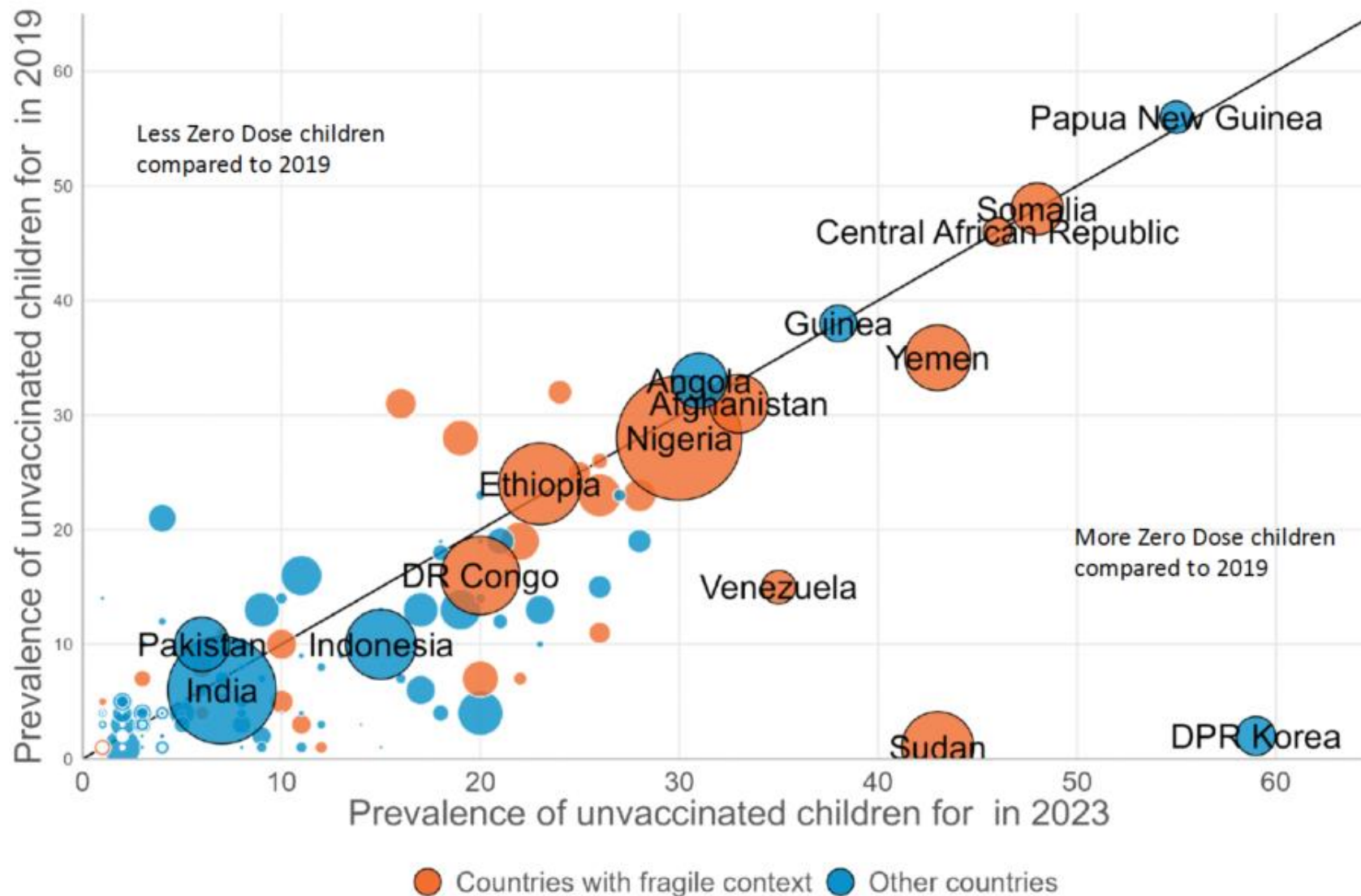


DTP3 Coverage (%), Global, 2024

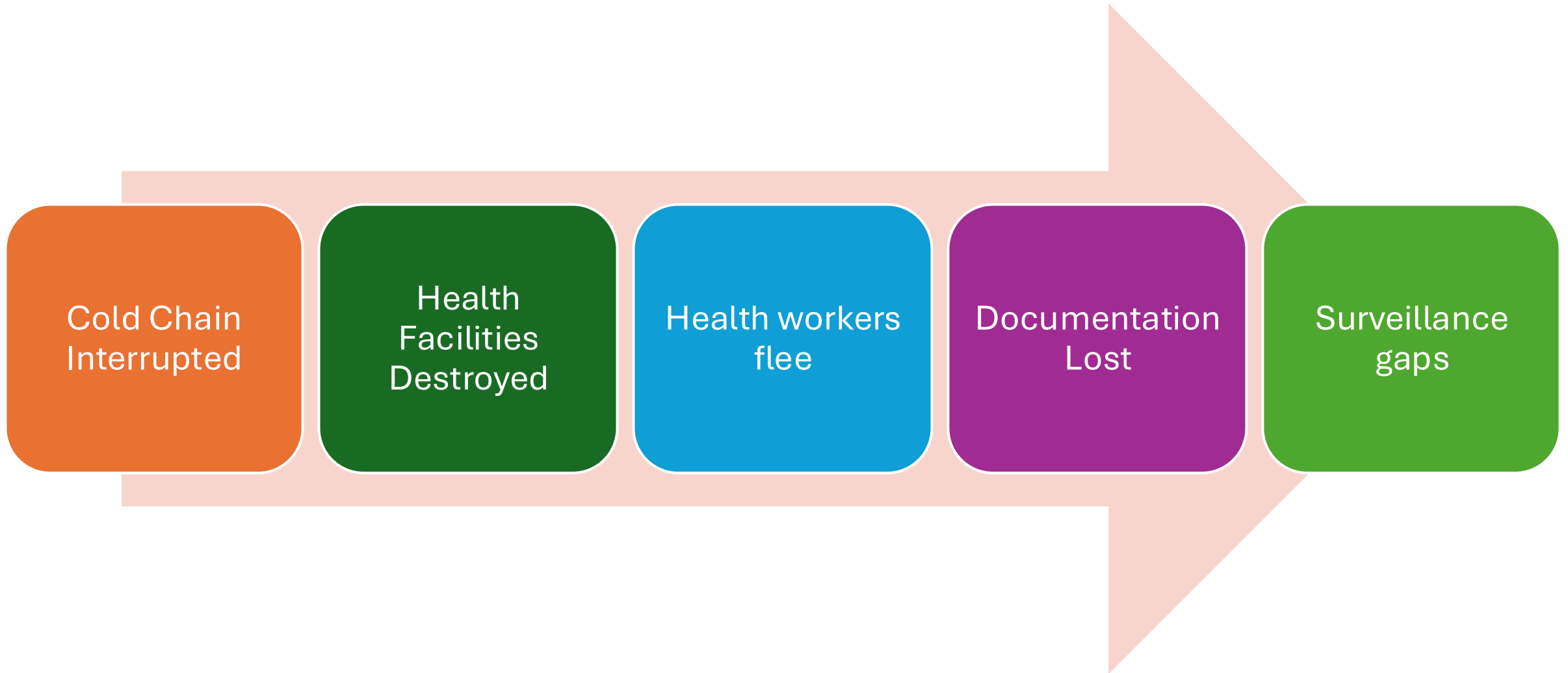


DTP3 coverage (%) ■ <60 ■ 60-69 ■ 70-79 ■ 80-89 ■ 90-94 ■ >=95

Zero dose children live disproportionately in countries and territories with fragile, conflict, and vulnerable (FCV) settings.

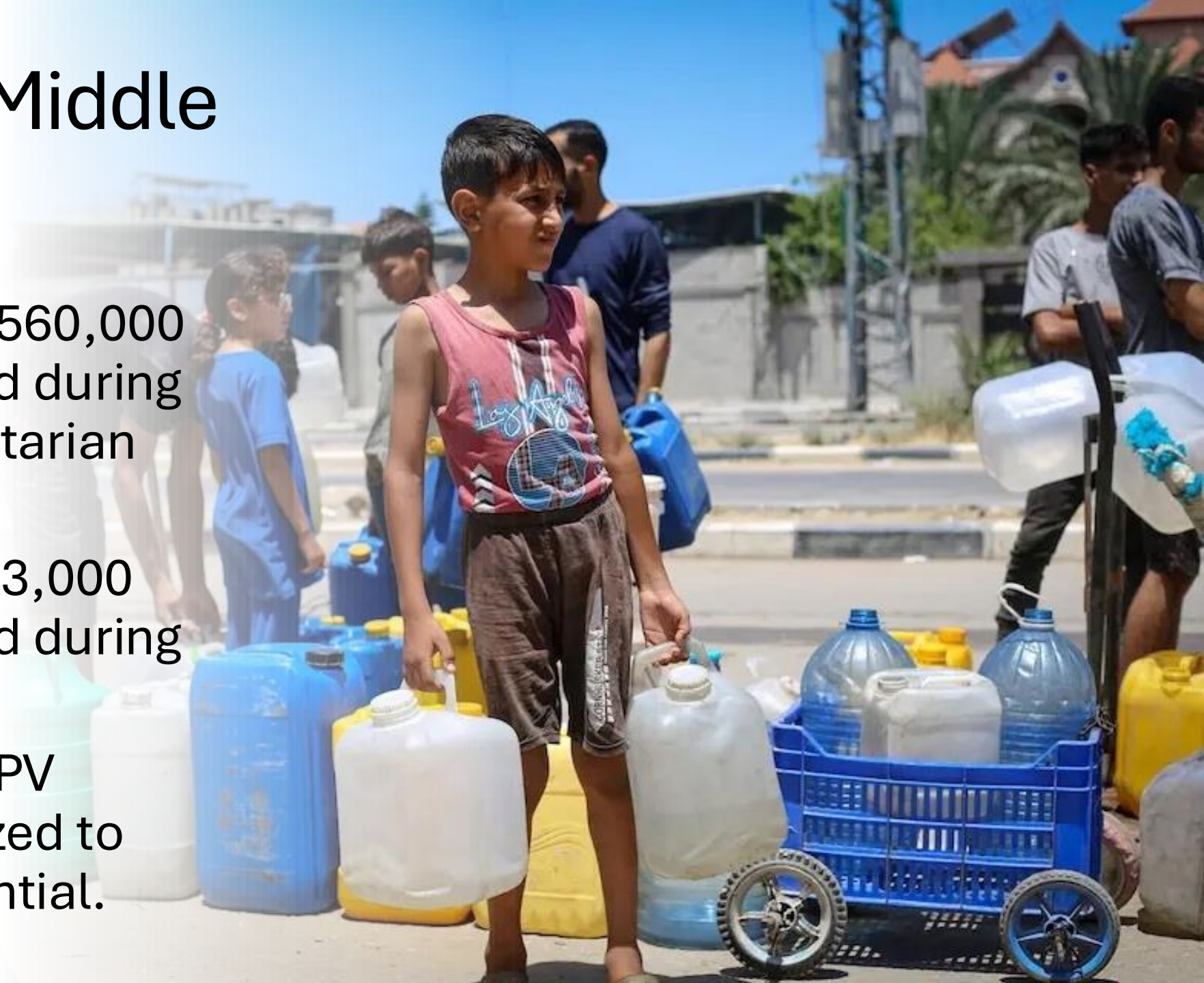


The Immunization Cascade Collapse



Gaza and the Middle East

- September 2024 – 560,000 children vaccinated during negotiated humanitarian pause.
- February 2025 – 603,000 children vaccinated during ceasefire.
- Multi-dose OPV + IPV combinations utilized to end outbreak potential.



Gaza and the Middle East

- Access is one concern, but infrastructure breakdowns in WASH lead to even more VPDs.
- Safe Water access is down 95% since the conflict began
- Waste Management has gone from 98% controlled to ~20%.

ISRAEL'S WAR ON GAZA

How will Gaza's polio vaccine rollout work?

The United Nations launched a campaign to vaccinate about 640,000 children under the age of 10 in the Gaza Strip after the first polio case in 25 years was detected in August. Israel has damaged or destroyed most of Gaza's healthcare facilities.



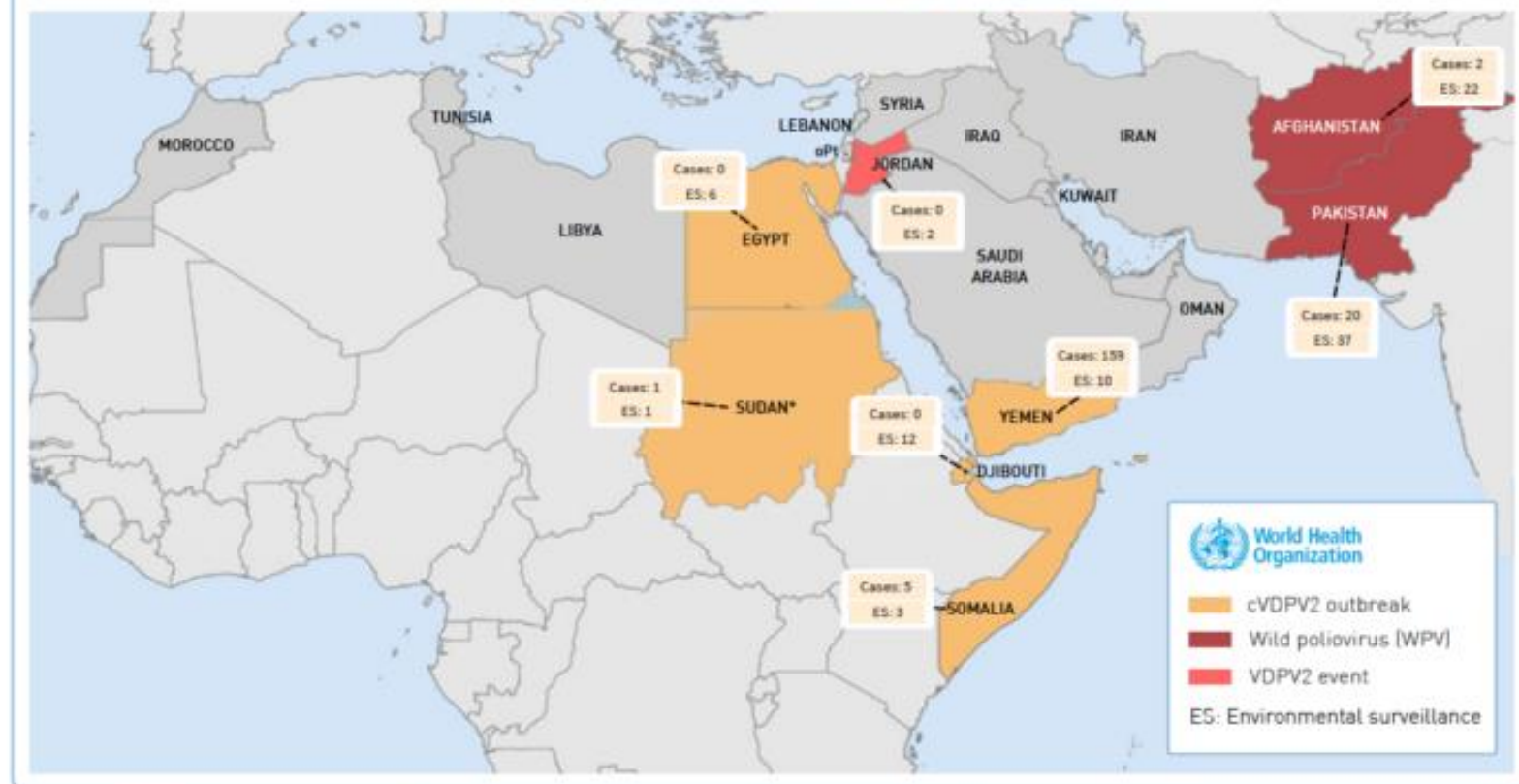


Broader MENA Context

- cVDPV2 risk linked to Egypt
- Yemen DTP coverage: 70% to 53% from 2022-2024
- Yemen Diphtheria outbreak 2017-2018 – 2203 cases, 116 deaths, ongoing low vaccination coverage.
- Syria – repeated Measles and Polio resurgences across decades of civil war.

The following polio events and outbreaks occurred/were ongoing in the Eastern Mediterranean Region (EMR) in 2022.

Polio events and outbreaks in the EMR, 2022



In the EMR, Afghanistan, Pakistan, and parts of Somalia and Yemen are known as 'consequential geographies'. These are locations that have major consequences for polio transmission – where the risk of spread of polio to other countries is high. The Global Polio Eradication Initiative (GPEI) is making every effort to address transmission in these locations.

*A new case of circulating vaccine-derived poliovirus type 2 (cVDPV2) was detected on 16 December 2022, sparking a new outbreak. This is unrelated to the poliovirus variant that affected Sudan in 2020 and was closed in August 2022.

HIGHLIGHTS

IRAN

Poliovirus event



closed in August 2022 after more than 18 months without cVDPV2 detection from any source (AFP, contact or ES)

SOMALIA

Over 200 000



children reached for the first time in security-compromised areas

SUDAN*

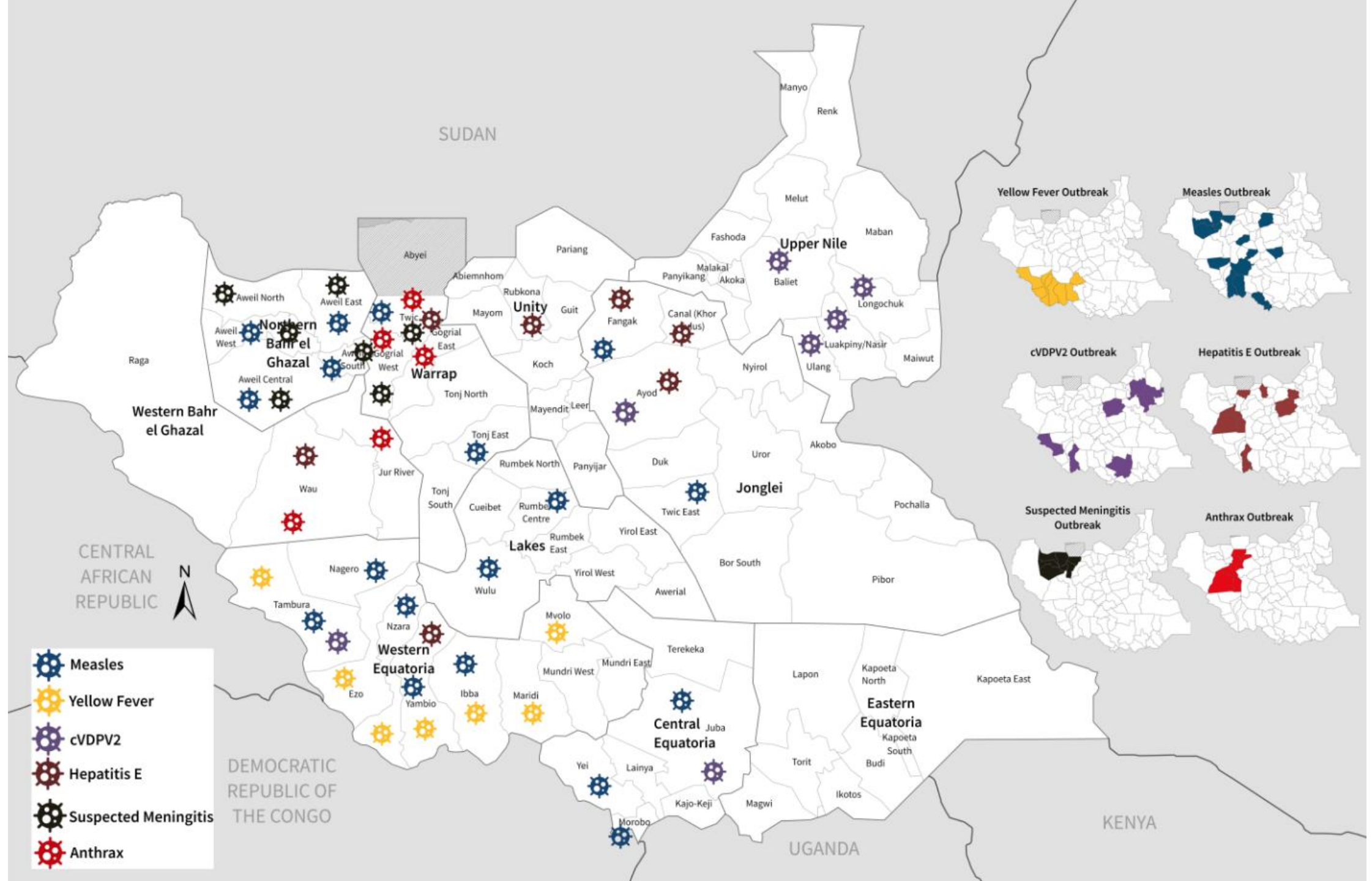
Outbreak of cVDPV2



closed in August 2022

Case Study: Sudan and Sub-Saharan Africa

- Sudan – The world’s worst immunization collapse
 - DTP1 Coverage 2022: 94% → 2024: 48% (now the lowest in the world and the lowest percent since 1987).
 - ~880,000 infants missed their first-ever vaccine dose in a single year.
 - Large Zero-dose Crisis
 - Conflict erupted in April 2023, causing immediate collapse in health infrastructure systems; worst in Darfur.
 - Sudan and other sub-Saharan African countries have experienced multiple vaccine-preventable disease outbreaks, including: Meningitis, Measles, Polio, Hepatitis E, Yellow Fever, and Cholera



Case Study: Sudan and Sub-Saharan Africa

- Famine and malnutrition act as amplifiers of vaccine-preventable diseases.
- M

The crisis erupted in April 2023 with clashes between

SAF

Sudanese Armed Forces



RSF

Rapid Support Forces

12.7M

Forcibly displaced

8.6M

NEW internally displaced persons

3.8M

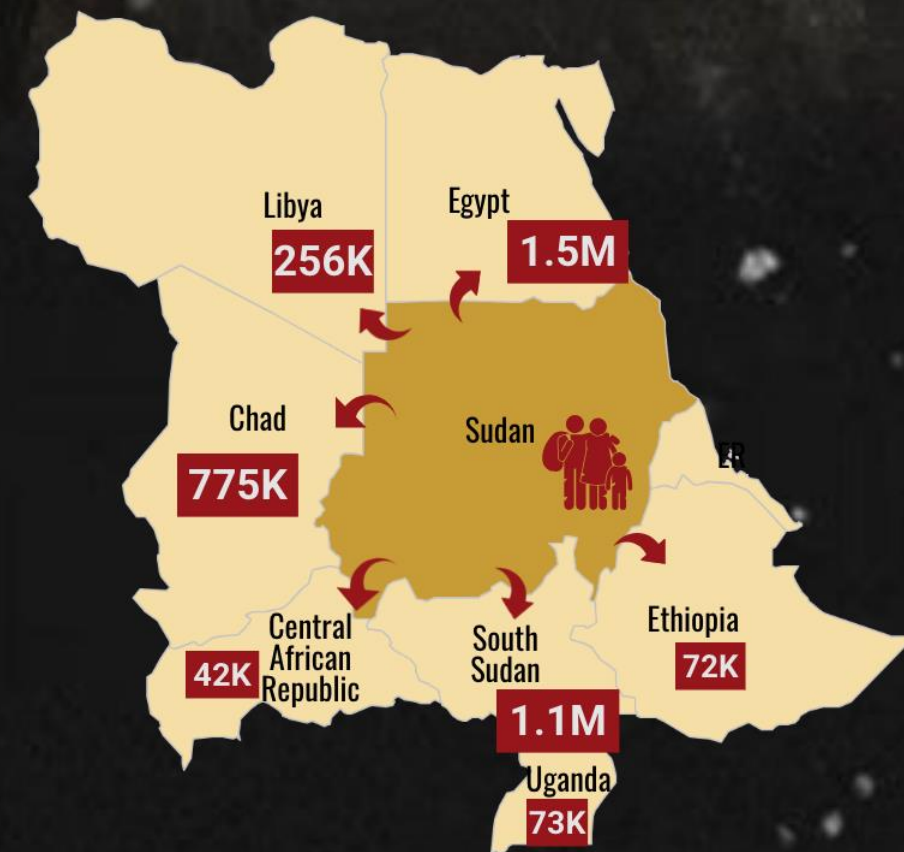
Refugees, Asylum Seekers, Returnees

SUDAN

SITUATION IN



Data as of 15 April 2025

Population movements from Sudan



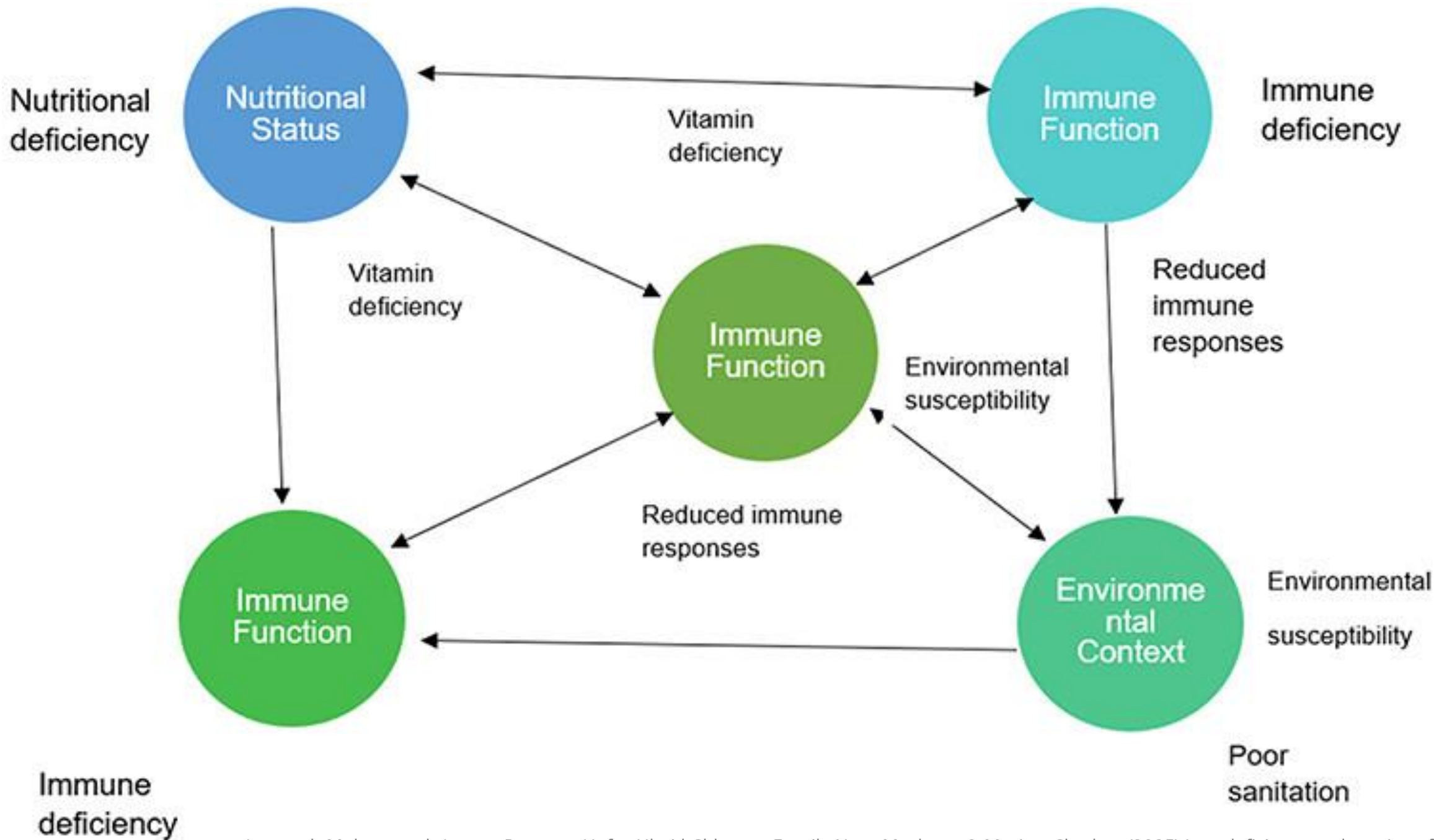
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How does malnutrition contribute to disease?

1. Immune suppression and heightened susceptibility
 1. Damaged mucosal barriers
 2. Impaired Cell activities
2. Diminished Vaccine Efficacy
 1. Reduced antibody production
 2. Variable response to vaccine
3. Bi-directional destructive cycle
 1. Depleted nutrient reserves
 2. Secondary infection escalates to fatality
4. Poor sanitation from humanitarian and environmental crises
 1. Overcrowding and poor sanitation
 2. Disruptions in routine care



Case Study: Ukraine and Europe

- VPD's still exist in higher-income conflict settings, but with a different kind of vulnerability.
- Pre-war Ukraine had suboptimal COVID-19 vaccine rates and measles below herd immunity in some regions.
- Post-invasion – health infrastructures were targeted; 18 million+ are internally/externally displaced.
- Active cVDPV outbreaks 2021-2022





Case Study: Ukraine and Europe

- 6-8 Million Ukrainian refugees in EU countries in 2022-2023.
- Syrian refugees arrive to surrounding countries—only 24.5% fully immunized in Jordan and 12.5% fully immunized in Lebanon.
- Poliovirus detected in wastewater samples across multiple EU countries during this timeframe.
- IDP's cause health and infrastructure challenges, oftentimes to surrounding countries with already fragile systems.

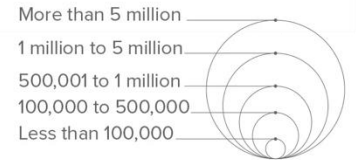
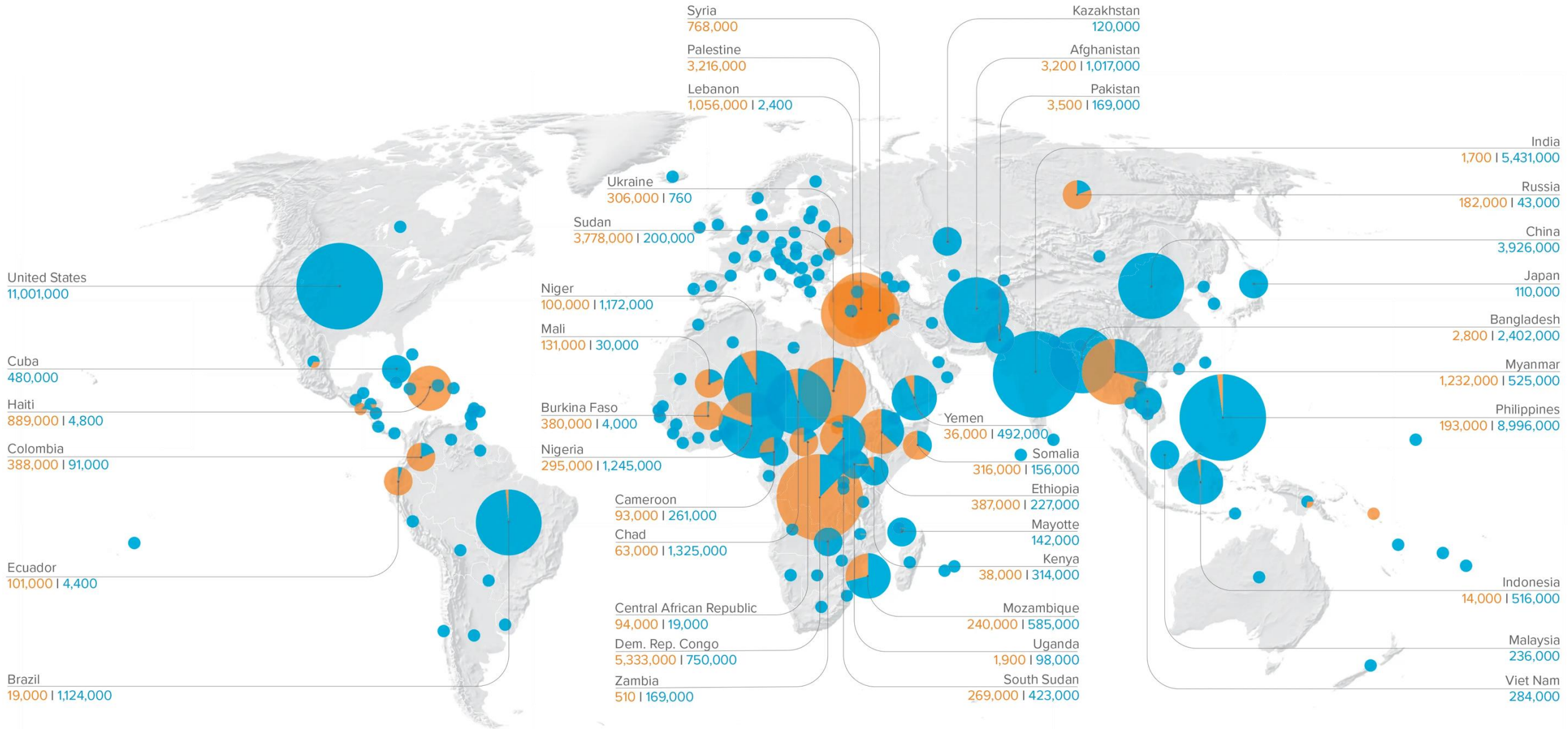
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"Internal displacement is where conflict, poverty and climate collide, hitting the most vulnerable the hardest. These latest numbers prove that internal displacement is not just a humanitarian crisis; it's a clear development and political challenge that requires far more attention than it currently receives."

- Alexandra Bilak, IDMC director



The Comeback Kids – Measles

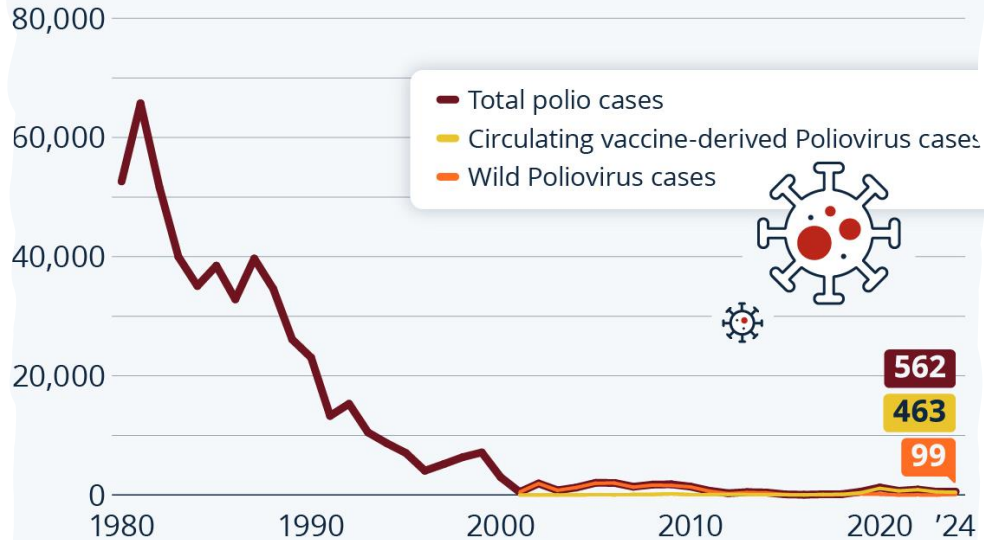


- **High Transmission Risk:** One infected patient airborne-infects 90% of susceptible contacts; Airborne isolation.
- **Classic Clinical Triad:** Suspect measles if high fever, descending maculopapular rash, Koplik spots, and "3 Cs" (Cough, Coryza, Conjunctivitis). Diagnose clinically, bypass expensive lab tests.
- **Low-Resource Intervention:** Administer two daily oral doses of Vitamin A immediately to reduce pediatric mortality and blindness risks by up to 50%.
- **Contagion Timeline:** Enforce strict isolation from 4 days before through 4 days after the rash breaks out to halt community spread.
- **Epidemic Control:** Track patient contacts to deliver the MMR vaccine within 72 hours of exposure as an affordable, highly effective outbreak barrier.
- **Prevention:** 2-dose MMR required, verify history

The Comeback Kids – Polio

More Vaccine-Derived Cases as Fight Against Polio Progresses

Total, wild and circulating vaccine-derived cases of polio in the world (1980-2024)



Source: WHO via Our World in Data



- **Reversion Mutation:** Sabin type 2 vaccine virus mutates in under-vaccinated populations, regaining neurovirulence.
- **Fecal-Oral Spread:** Transmits silently via contaminated water/food; amplifies rapidly in poor sanitation zones.
- **Asymmetric Paralysis:** ~95% of cases are asymptomatic, but 1 in 200 causes acute flaccid paralysis (AFP).
- **Stool Diagnostics:** Requires two stool specimens collected 24–48 hours apart within 14 days of paralysis onset.
- **Outbreak Control:** Managed using novel OPV2 (nOPV2), which halts gut shedding with lower reversion risk.

The Comeback Kids – Diphtheria



- **Transmission:** Spreads via respiratory droplets, airborne particles, and direct contact with infected skin lesions.
- **The Diagnostic Trap:** Extremely rare in modern clinical practice, highly susceptible to misdiagnosis as severe strep throat or mononucleosis.
- **Signs:** Characterized by thick, adherent gray pseudomembrane over the tonsils/pharynx that bleeds if brushed or scraped during an exam.
- **Systemic Toxicity:** The *Corynebacterium diphtheriae* exotoxin damages local tissue and can cause fatal myocarditis, acute kidney injury, and cranial nerve palsies.
- **Critical Supply Crisis:** Treatment relies on Diphtheria Antitoxin (DAT), which faces a severe global shortage; clinicians must initiate DAT immediately based on clinical suspicion alone, without waiting for lab confirmation.

The Comeback Kids – Pertussis



- **Transmission:** Highly contagious respiratory droplet transmission; creates prolonged aerosolization via the signature "whooping" paroxysmal cough.
- **The Diagnostic Trap:** Early "catarrhal" stage mimics a common cold, which is the exact phase when the patient is most infectious to others.
- **Waning Immunity Risk:** Vaccine-induced immunity from childhood DTaP/Tdap doses fade within 4–10 years, leaving adolescents and adults highly vulnerable to infection and subsequent transmission.
- **High-Risk Vulnerability:** Severe morbidity and mortality are concentrated in young infants under 6 months old who are too young to have completed their primary vaccine series.
- **Clinical Pearl:** Prioritize maternal Tdap vaccination during the third trimester of *every* pregnancy to provide critical transplacental antibody protection to the newborn.

Clinical Pearls in History Taking

- Countries of origin or residence - active conflict, fragile state?
- Displacement History – camp living? Duration? Wash Access?
- Vaccination history – written documentation? Serologic testing can fill the gaps.
- Zero-dose status – especially < 5 yrs of age
- Nutritional Status – malnutrition
- Recent illness – household contacts, outbreak exposure, recent transit or travel?
- Unvaccinated family members?

Catch-up guidance for vaccines

- No documentation – assume unvaccinated and restart series
 - Catch-up priorities: MMR, IPV, diphtheria-tetanus, Hep A/B, and Typhoid if endemic.
- Written documentation: assume correct if dates are provided. Serologic testing can fill in the gaps.



THE INSIGHT
HUB

**Global Immunization
Campaign Helps 18 Million
Children Catch Up On
Missed Vaccinations**

Case Studies

Rapid Cases – discuss with someone next to you for 60 seconds.

No wrong answers

Clinical reasoning is the goal.

Case #1

- 3-year-old boy presents with his mother, a Sudanese refugee who arrived to your area 6 weeks ago. He has fever, cough, runny/stuffy nose, and a blotchy rash that started to his head/face yesterday.
- His mother has no vaccine card, but reports he had some shots before they were displaced.



Case #1

1. What is your leading diagnosis?
2. What do you do in the next 30 minutes?
3. What steps do you need to take to protect others from this illness?



The Comeback Kids – Measles



Image: MSF

- Classic measles presentation
- Isolate immediately
- Notify public health authorities
- Examine for Koplik spots
- Provide supportive cares
- All unvaccinated contacts are at risk.
- Utilize post-exposure prophylaxis protocol. (MMR within 72 hrs., OR IG within 6 days).

Case #2

- A 14-month-old child from Gaza has had progressive leg weakening on one side for 5 days. She is afebrile. She has not received vaccines as she was born after the war started.
- Neurologic exam reveals asymmetric flaccid paralysis with preserved sensation.



Case #2

- What syndrome does this represent?
- What is on your differential?
- What is the most urgent notification you need to make?



The Comeback Kids – Polio



- Acute flaccid paralysis (AFP) – this is polio until proven otherwise, especially in an unvaccinated person. 1 in 200 has this risk.
- Mandatory public health reporting in most jurisdictions.
- Stool samples for poliovirus isolation should be sent (2 samples, 24 hours apart).
- No treatment exists – supportive care.

Innovations that can work

- Negotiated vaccine pauses
 - Gaza 2024 “Days of Tranquility”
- Mobile vaccination teams: reaching populations outside of fixed facilities
 - Consider the most sustainable option
 - Integrate vaccination stations into food distribution or camp check-in points.
- nOPV2 – more genetically stable OPV; deployed successfully in Gaza.
- Environmental surveillance can detect wastewater cases before they emerge clinically.

What is the clinician's role?

- Take an exposure history on all new patients.
- Know your local/national refugee or IDP immunization protocols.
- Know the reporting process and structure for communicable diseases.
- Combat vaccine misinformation with evidence-based communication and listening.
- Advocate for protection of health infrastructure under international humanitarian law.
- Support global entities promoting vaccination.
- Assume unvaccinated without documentation and catch up aggressively.

#VaccinesWork



**VACCINES PROTECT
AGAINST MORE THAN
20 DISEASES**



**TALK TO YOUR HEALTH WORKER TO
ENSURE VACCINATION IS UP TO DATE
FOR YOU AND YOUR FAMILY.**

1.

Listen with empathy

And acknowledge how they're feeling.

I'm a bit worried about the vaccine...

It's okay to have questions or want more information.



2.

Ask open-ended questions

To help you understand their concerns



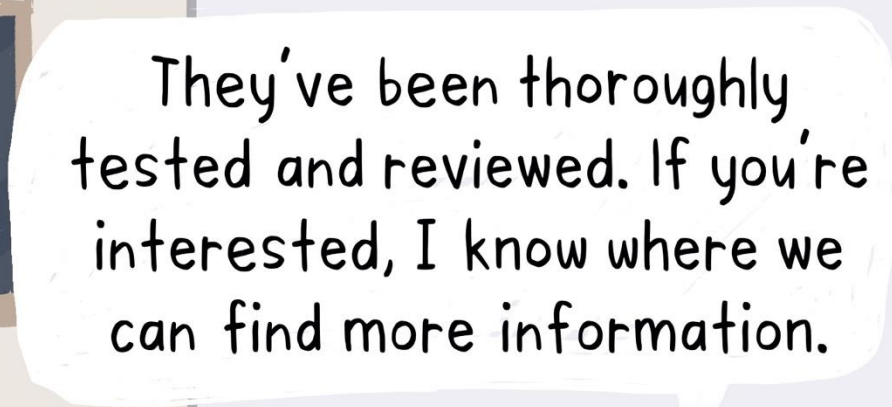
Could you tell me more about why you feel that way?



3.

Share trusted information

Visit the WHO website or chat to your doctor or nurse to find answers to common questions



4.

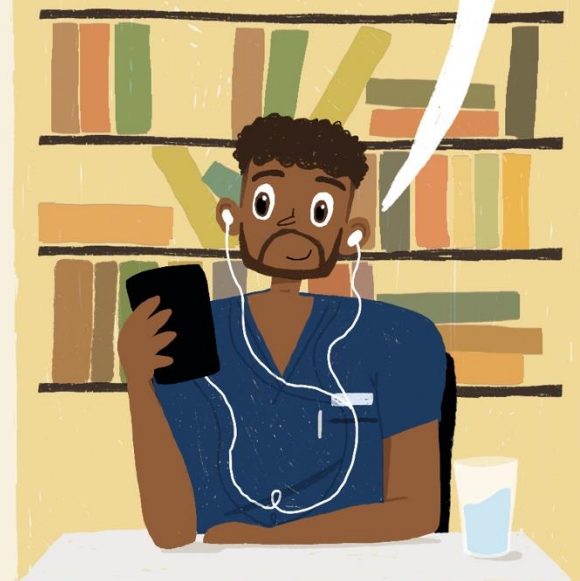
Explore reasons for wanting to get vaccinated

Share your motivations and what helped you overcome any concerns.

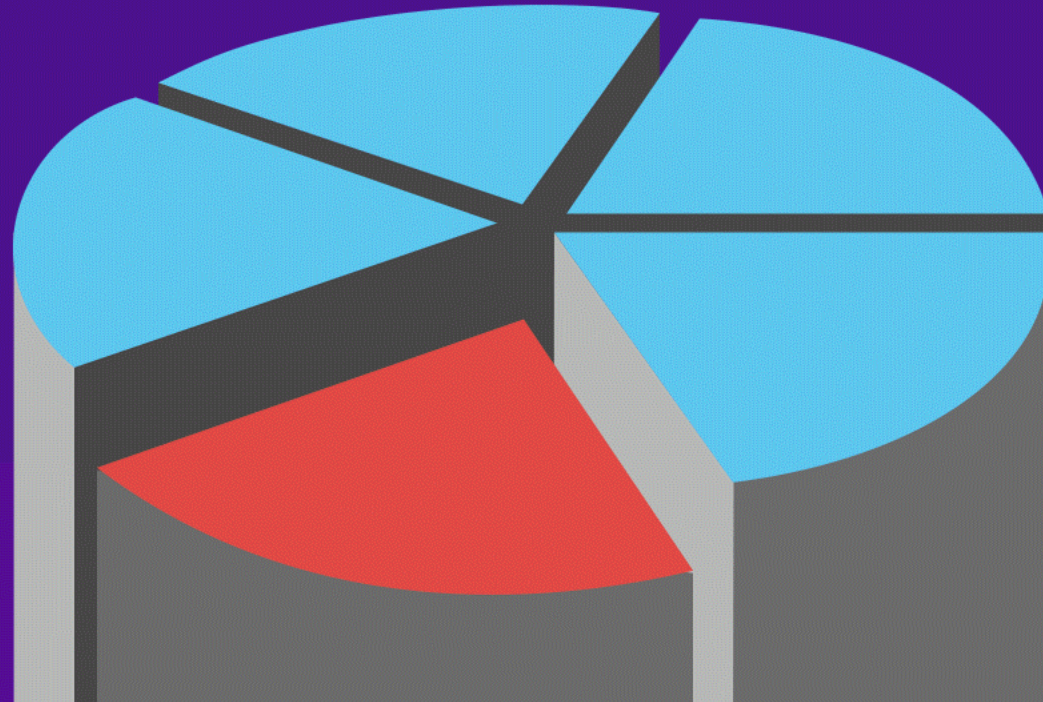
I hope my grandparents and I get vaccinated so we can see each other again.



I got vaccinated to feel safer at work.



**1 IN 5 CHILDREN
GLOBALLY DO NOT
HAVE ACCESS TO
LIFESAVING
VACCINES.**



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