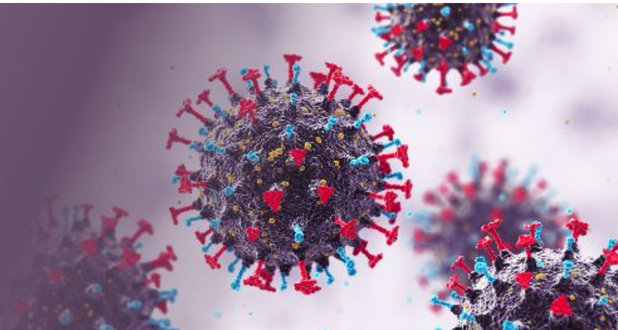
Dr Sarah McGuinness

Infectious Diseases Physician & Senior Research Fellow, Monash University & Alfred Health

IMMUNISATION COALITION

Global vaccine preventable disease trends and emerging vaccines: what Australian providers need to know

15:30



Global VPD trends and emerging vaccines: what Australian providers need to know

Dr Sarah McGuinness

sarah.mcguinness@monash.edu

9th Annual Immunisation Forum 2025

Disclosures

IMMUNISATION COALITION

Recipient of research funding from the National Health and Medical Research Council (NHMRC), Royal Australasian College of Physicians (RACP), International Society of Travel Medicine (ISTM)

Receive royalties for contributions to UpToDate (chapter author) and as author/editor of the Manual of Travel Medicine 4th Edition (Springer)

Co-facilitate a paid short course, the Travel Medicine Masterclass, at Monash University

No financial relationships with pharmaceutical companies

Vaccine history

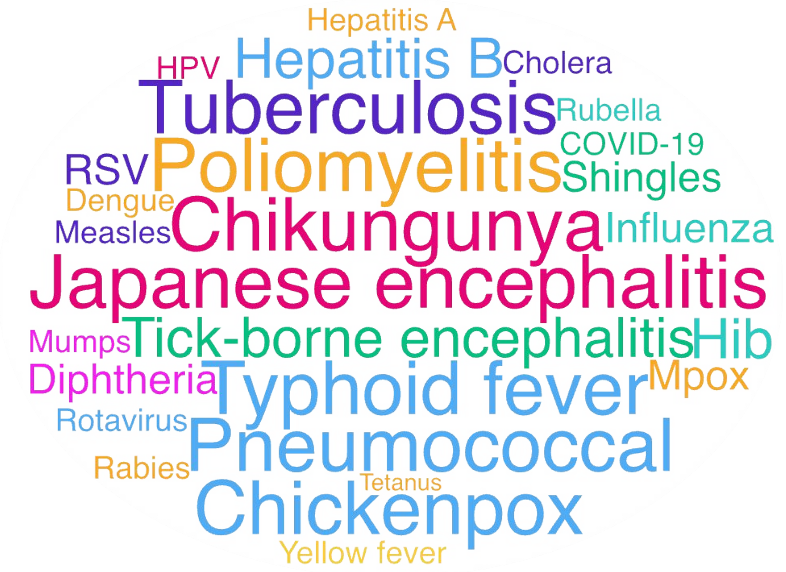
IMMUNISATION COALITION

Time

- 1796 – World's first successful vaccine (Smallpox, Edward Jenner)

- 1979 – Smallpox eradicated

- 2025 – Commercial vaccines against >25 diseases



https://www.who.int/news-room/spotlight/history-of-vaccination/a-brief-history-of-vaccination

Global VPD resurgence: challenges and innovations

Access to vaccines remains unequal

Vaccine hesitancy is on the rise

COVID-19 pandemic disrupted immunisation programs globally

New era of vaccine innovation: mRNA platforms, novel delivery systems

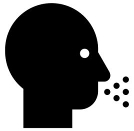
Today’s talk

Rapid-fire tour of nine VPDs relevant to travellers

- Influenza
- Measles
- Mpox

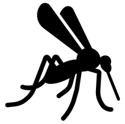
- Hepatitis A
- Typhoid
- Polio

- Dengue
- Chikungunya
- Tick-borne encephalitis



Person to person

Faecal-oral / environmental



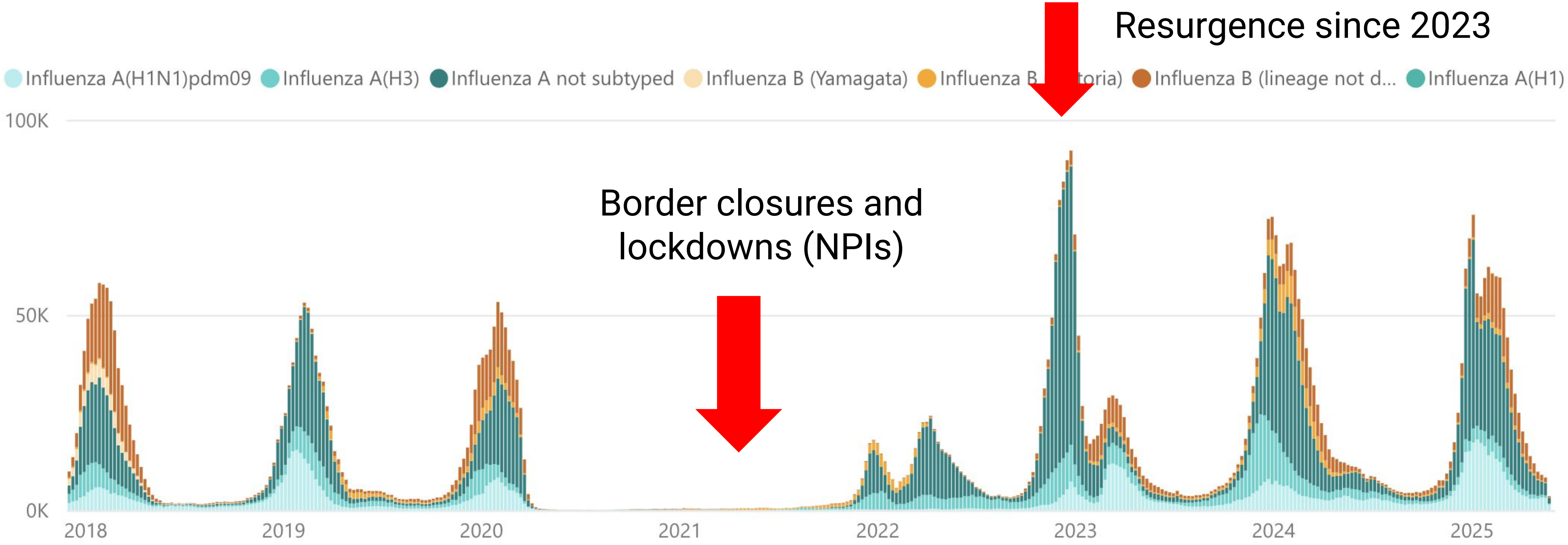
Vector-borne

Influenza epidemiology

World Health Organization

INFLUENZA LABORATORY SURVEILLANCE INFORMATION
Virus detections by subtype reported to FluNet

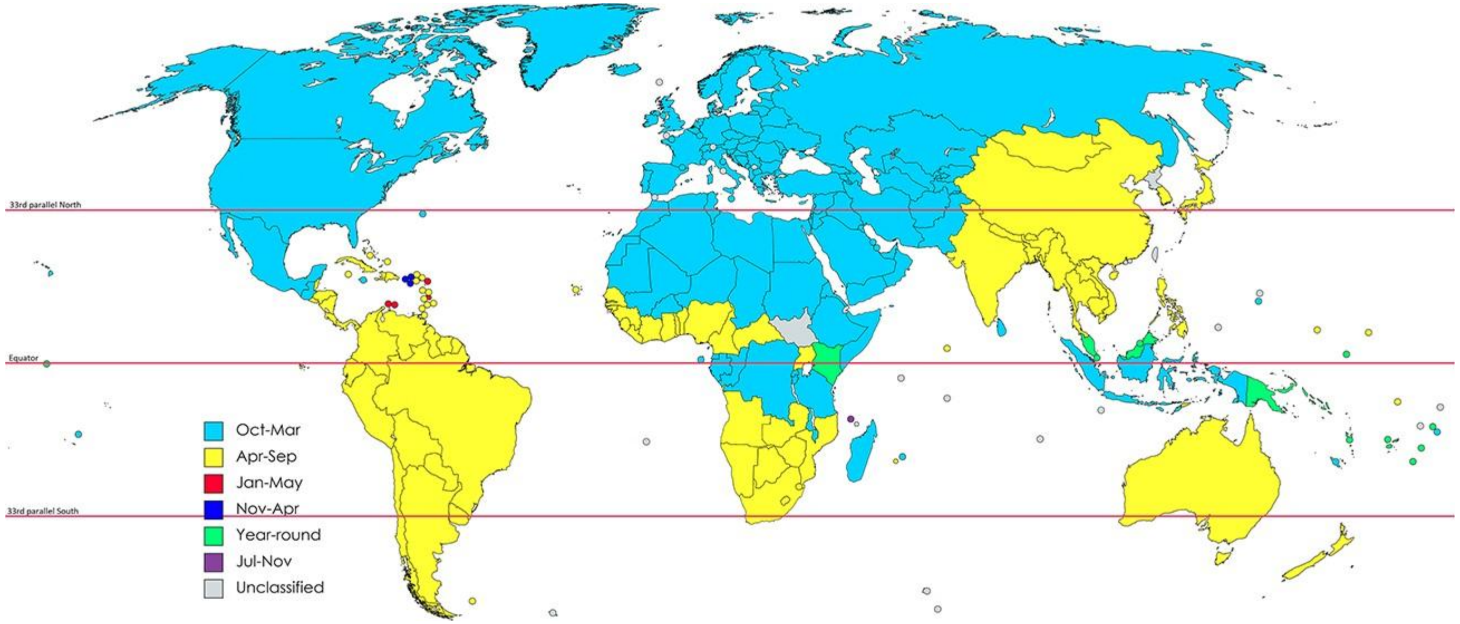
GISRS GLOBAL INFLUENZA SURVEILLANCE & RESPONSE SYSTEM



WHO Global Influenza Programme data:
https://www.who.int/teams/global-influenza-programme/surveillance-and-monitoring/influenza-surveillance-outputs

Influenza in travellers

Most common VPD in travellers: incidence ~1-3 per 100 travellers/month



Cruise ships

Mass gatherings

Influenza vaccine recommended for all people ≥6 months
Consider second dose if travelling late in season

Kakoullis L et al. *J Travel Med* 2023 https://doi.org/10.1093/jtm/taad102; Steffen R et al. *J Travel Med* 2023 https://doi.org/10.1093/jtm/taad085
Doyon-Plourde P et al. *Vaccine* 2023 https://doi.org/10.1016/j.vaccine.2023.06.038

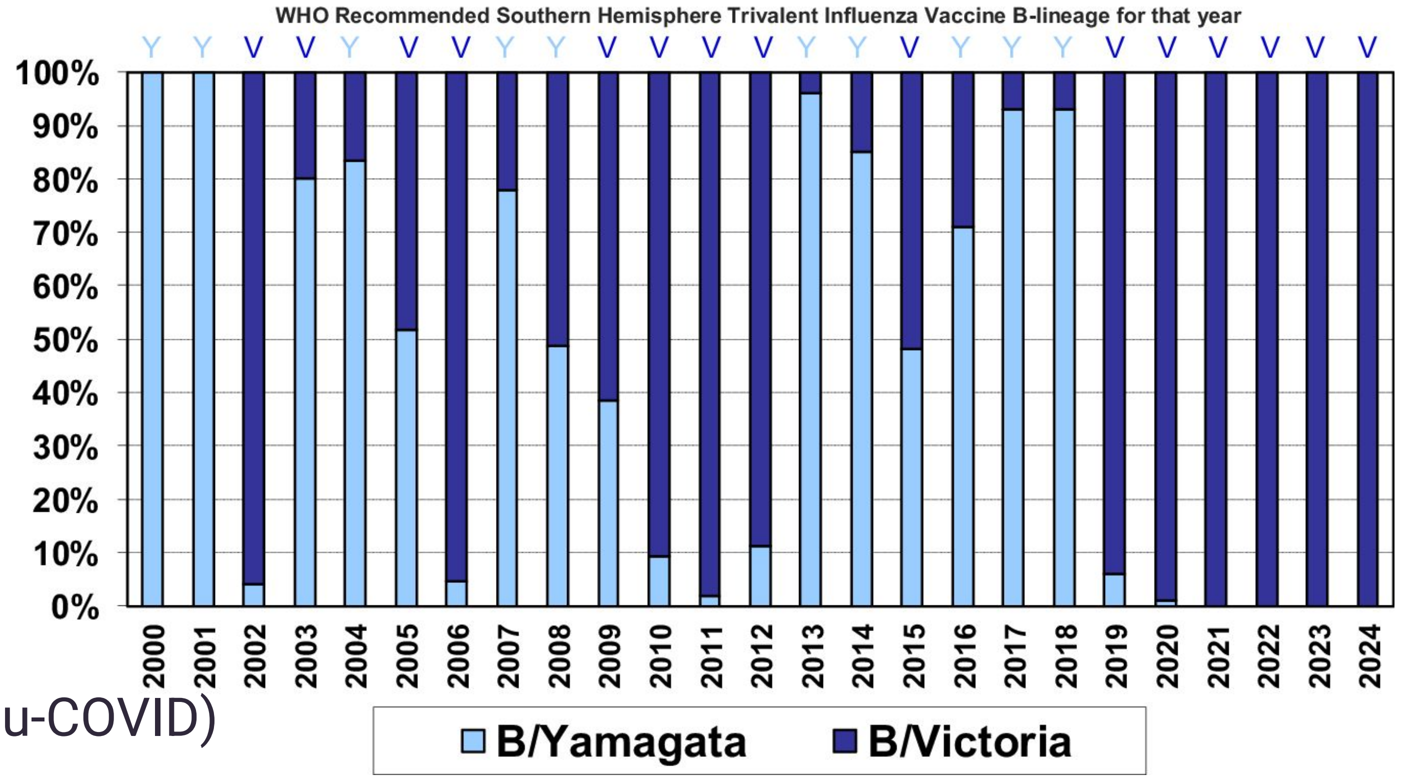
Influenza vaccination: what's new and what's next?

Transition to **trivalent** vaccines

Adjuvanted and high-dose vaccines for older adults

New vaccines in development (e.g. recombinant)

Future combination vaccines? (e.g. flu-COVID)

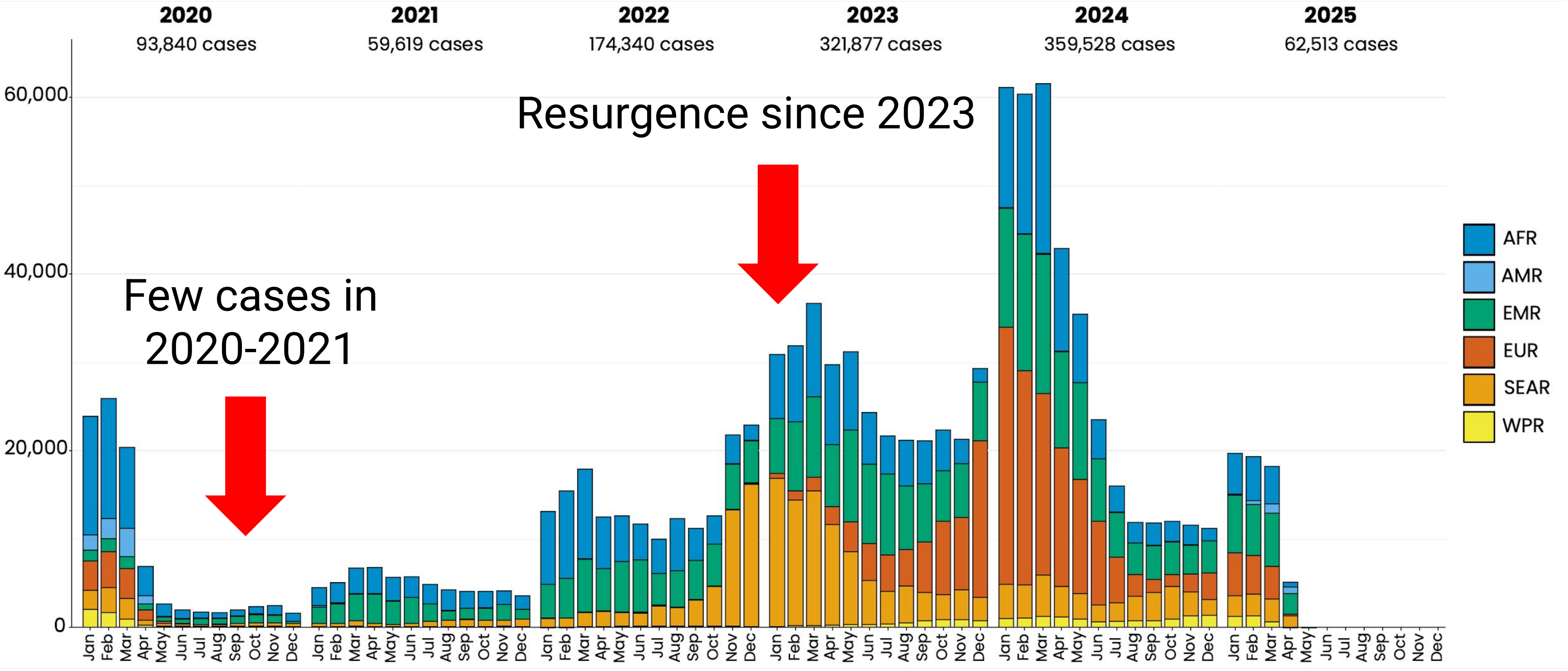


Barr IG et al. *npj Vaccines* 2024 https://doi.org/10.1038/s41541-024-01010-y ; Cheng AC https://theconversation.com/flu-vaccines-are-now-available-for-2025-whats-on-offer-and-which-one-should-i-get-252292; Taaffe J et al. *Vaccine* 2024 https://doi.org/10.1016/j.vaccine.2024.126408 ;

Measles epidemiology

IMMUNISATION COALITION

Monthly measles cases by WHO region, 2020-2025



>100,000 global deaths in 2023

Reported cases (last 6m)

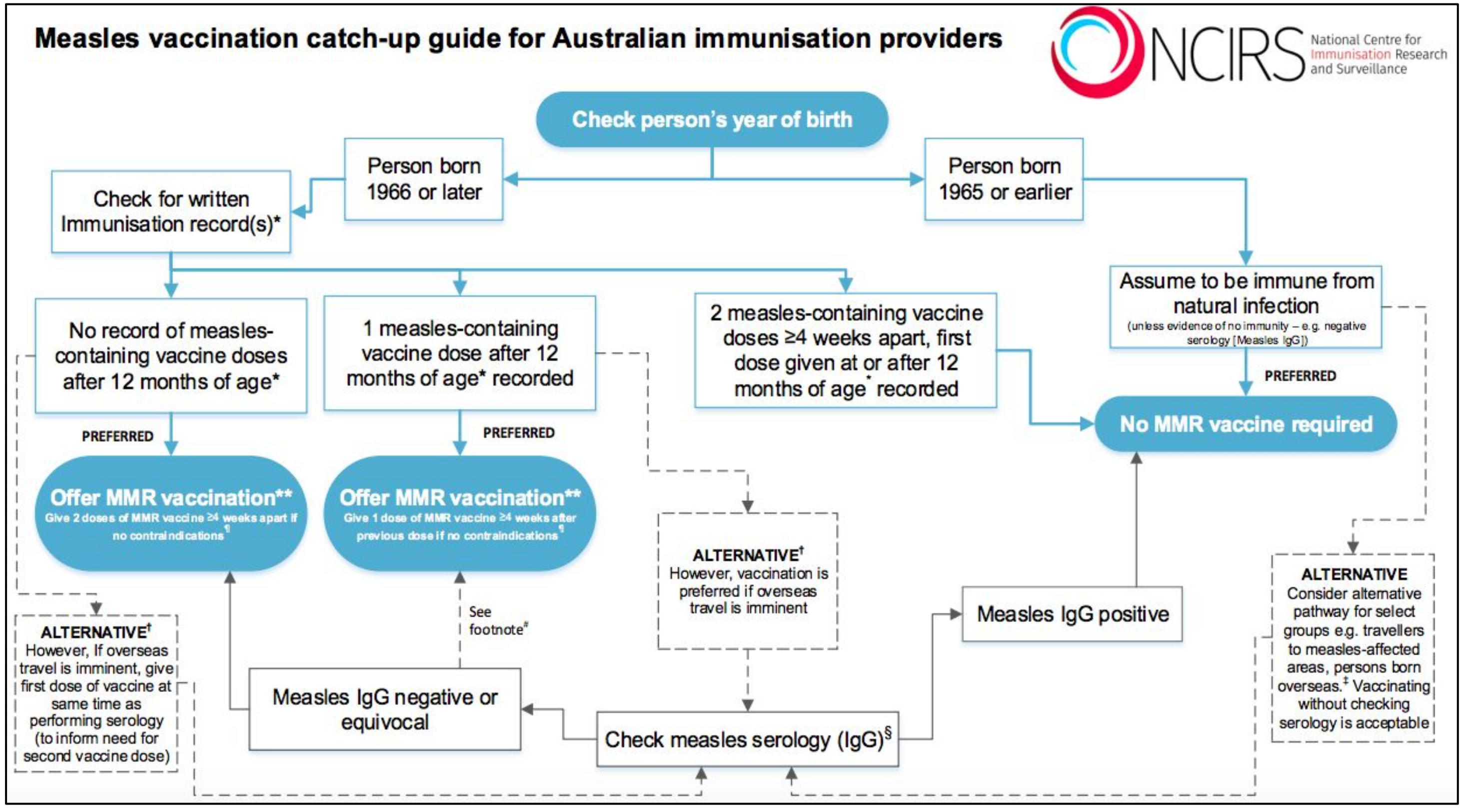
Country	Cases*
Yemen	10,487
Pakistan	8,895
India**	8,397
Afghanistan	6,255
Ethiopia	6,188
Kyrgyzstan	5,849
Romania	5,583
Thailand	3,675
Indonesia	3,322
Nigeria	2,482

WHO Global Measles and Rubella Monthly Update:
https://www.who.int/teams/immunization-vaccines-and-biologicals/immunization-analysis-and-insights/surveillance/monitoring/provisional-monthly-measles-and-rubella-data

Measles vaccination

Key risk factor = under- or unvaccinated

IMMUNISATION
COALITION



Australians born from
1966 to mid-1990s
more likely to be at risk

(second MMR dose recommended from 1992)

Offer MMR vaccine to anyone born >1965 without evidence of 2 doses / immunity
Can be given down to 6 months of age

http://www.ncirs.org.au/measles-vaccination-catch-up-guide

Measles vaccination: what's new and what's next?

IMMUNISATION COALITION

Potential shift to earlier age (current schedule: 12, 18 months)

Potential new combination vaccines, e.g. MMR-Yellow fever

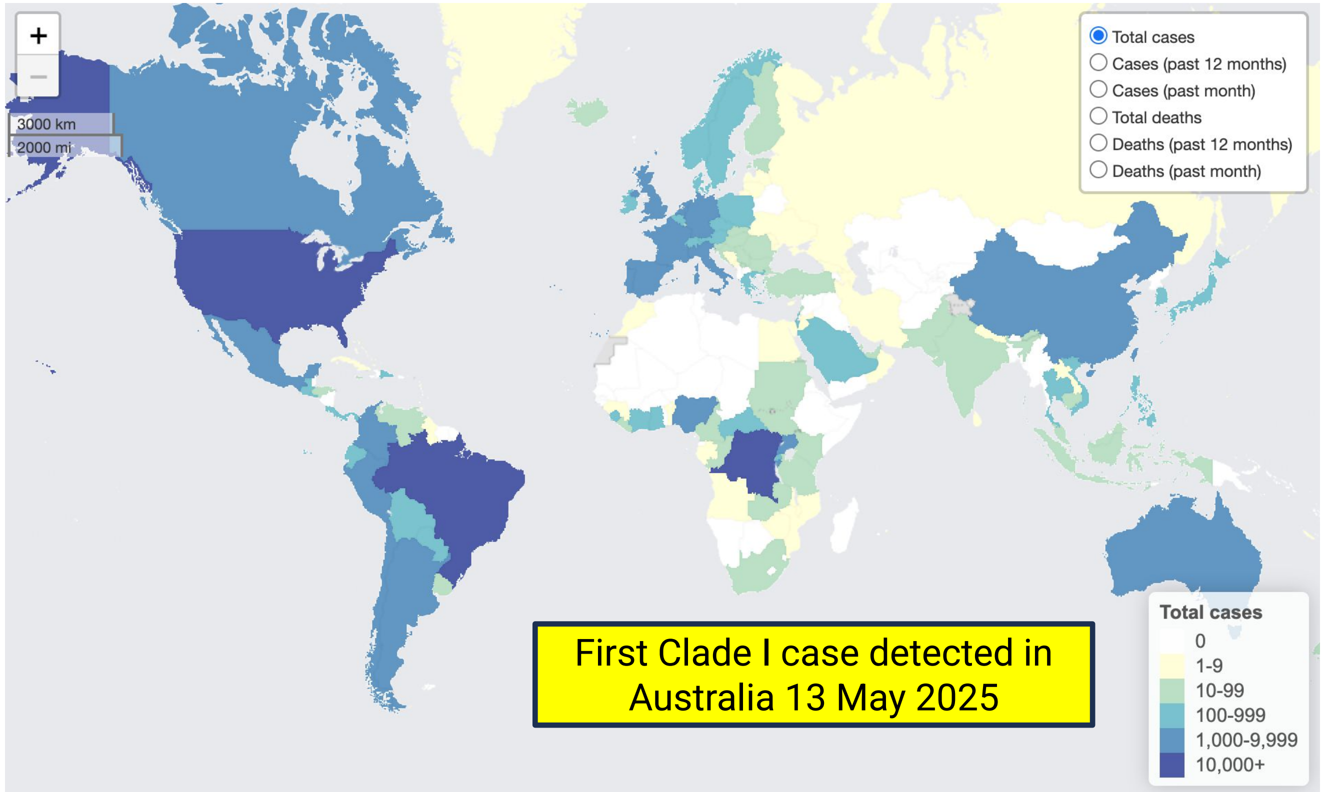
Microneedle patch vaccines, e.g. measles-rubella

Ong DS et al. *J Infect Dis* 2025 https://doi.org/10.1093/infdis/jiaf177; McGuinness SL et al. *J Travel Med* 2025 https://doi.org/10.1093/jtm/taaf033; Adigweme I et al. *Lancet* 2024 https://doi.org/10.1016/s0140-6736(24)00532-4 ; Photo credit: BBC https://www.bbc.com/news/health-68921897

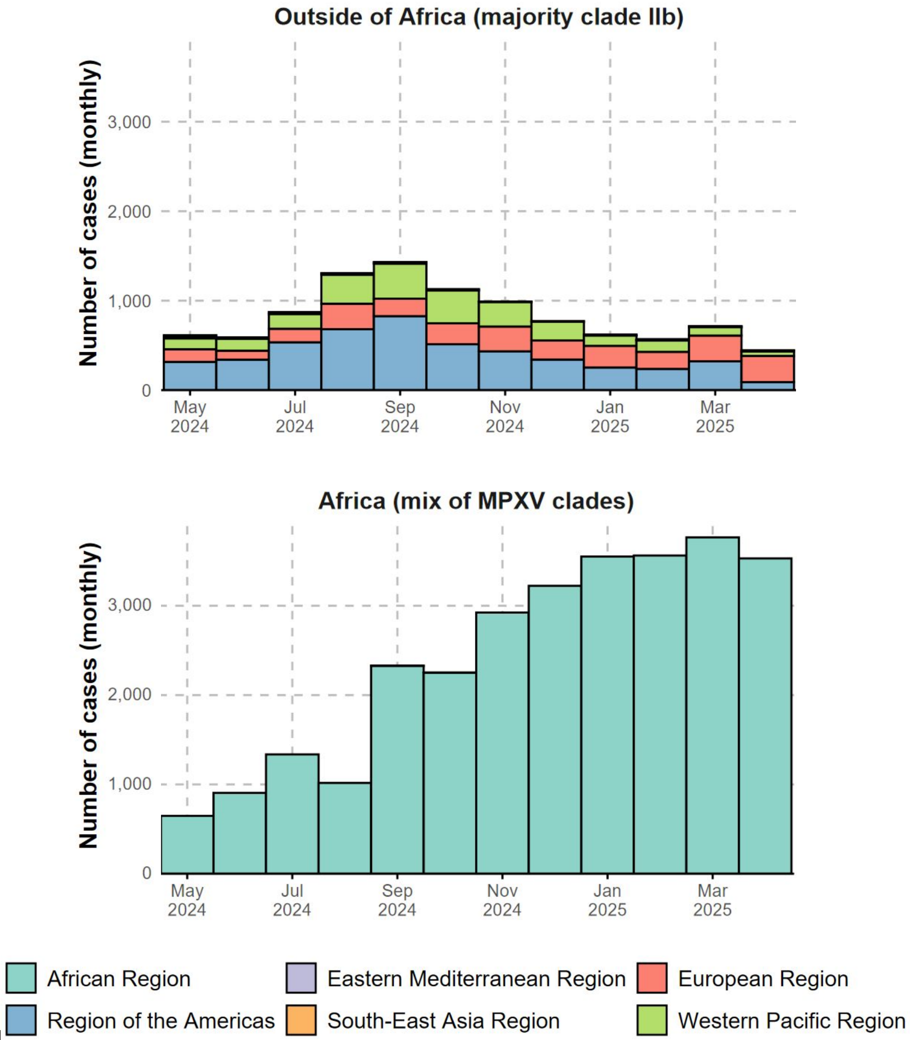
Global Mpox (formerly monkeypox) Epidemiology

IMMUNISATION COALITION

Total cases by country since 2022



Global cases by region, May 2024 –



Global Clade II outbreak since 2022, >100,000 cases

Clade I outbreak in Central Africa since Jan 2024

Source: WHO https://worldhealthorg.shinyapps.io/mpx_global/; https://www.cdc.gov.au/newsroom/news-and-articles/first-mpox-clade-ib-confirmed-australia

Mpox vaccination and advice for travellers

IMMUNISATION COALITION

Mpox vaccine: **Jynneos** (Imvanex/Imvamune):

- Non-replicating modified vaccinia Ankara vaccine for pre- and post-exposure
- 2 doses, 28 days apart (SC or ID)
- Funded for high-risk groups, incl. travellers engaged in **sexual risk activities** in Clade I areas

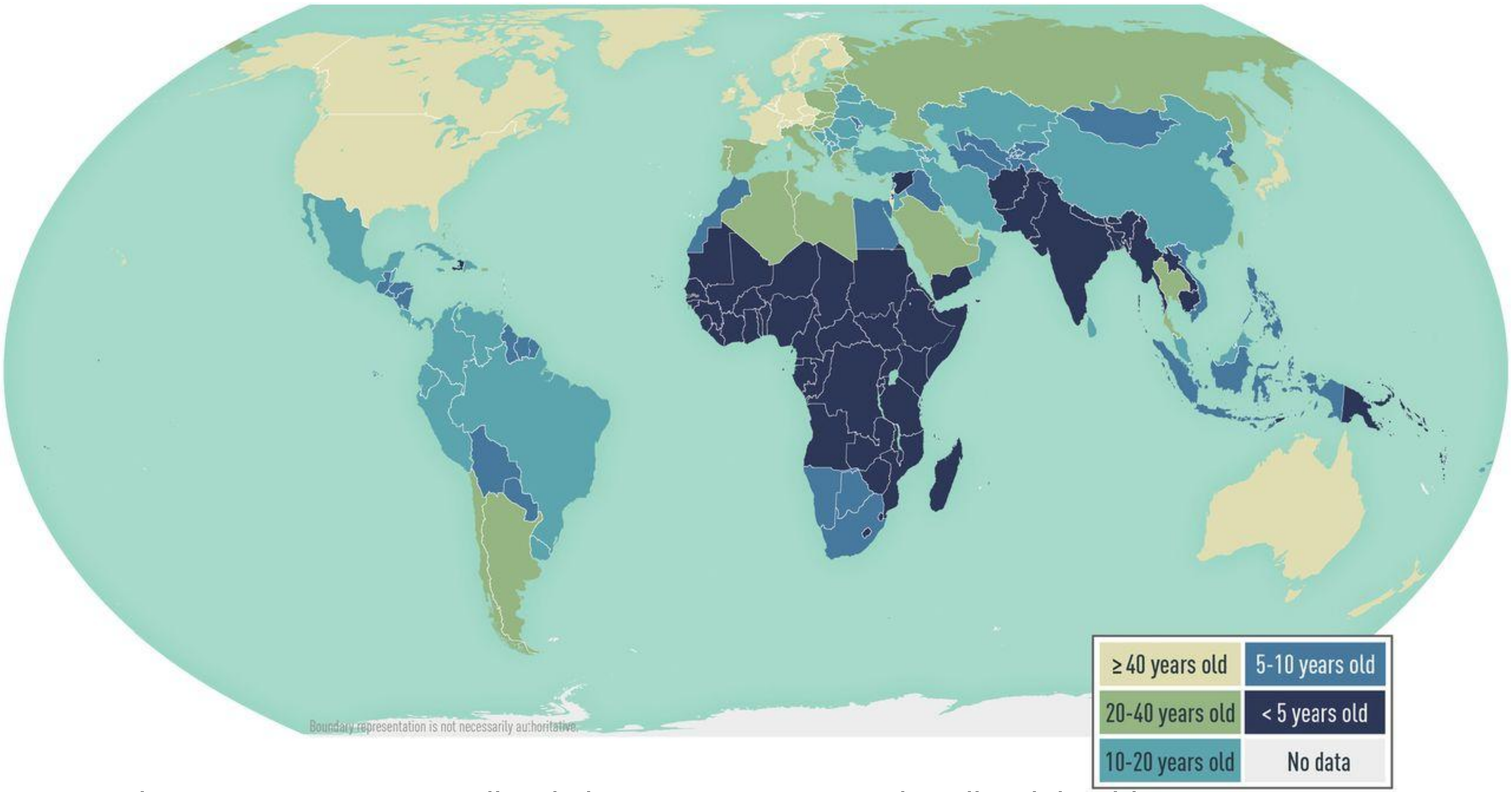
Travel advice for those visiting mpox-affected areas:

- Consider **pre-travel vaccination** if eligible
- Avoid **close physical contact** with symptomatic individuals
- Use **condoms** and maintain **good hand hygiene**
- Seek **post-exposure vaccination** promptly if exposed

AIH: https://immunisationhandbook.health.gov.au/contents/vaccine-preventable-diseases/mpox-previously-known-as-monkeypox

Hepatitis A epidemiology

Estimated age at mid-point of population immunity to hepatitis A, by country



GeoSentinel analysis top exposure countries:

- Morocco
- India
- Pakistan

Occasional cases in travellers to high-income countries (foodborne, MSM)

Australian Immunisation Handbook: https://immunisationhandbook.health.gov.au/contents/vaccine-preventable-diseases/hepatitis-a
Balogun O et al. *J Travel Med* 2022 https://doi.org/10.1093/jtm/taac013
CDC Yellow Book 2024 https://wwwnc.cdc.gov/travel/yellowbook/2024/infections-diseases/hepatitis-a

Hepatitis A vaccines

IMMUNISATION COALITION

Hepatitis A vaccination recommended for people aged **≥1 year** who **travel to endemic areas**

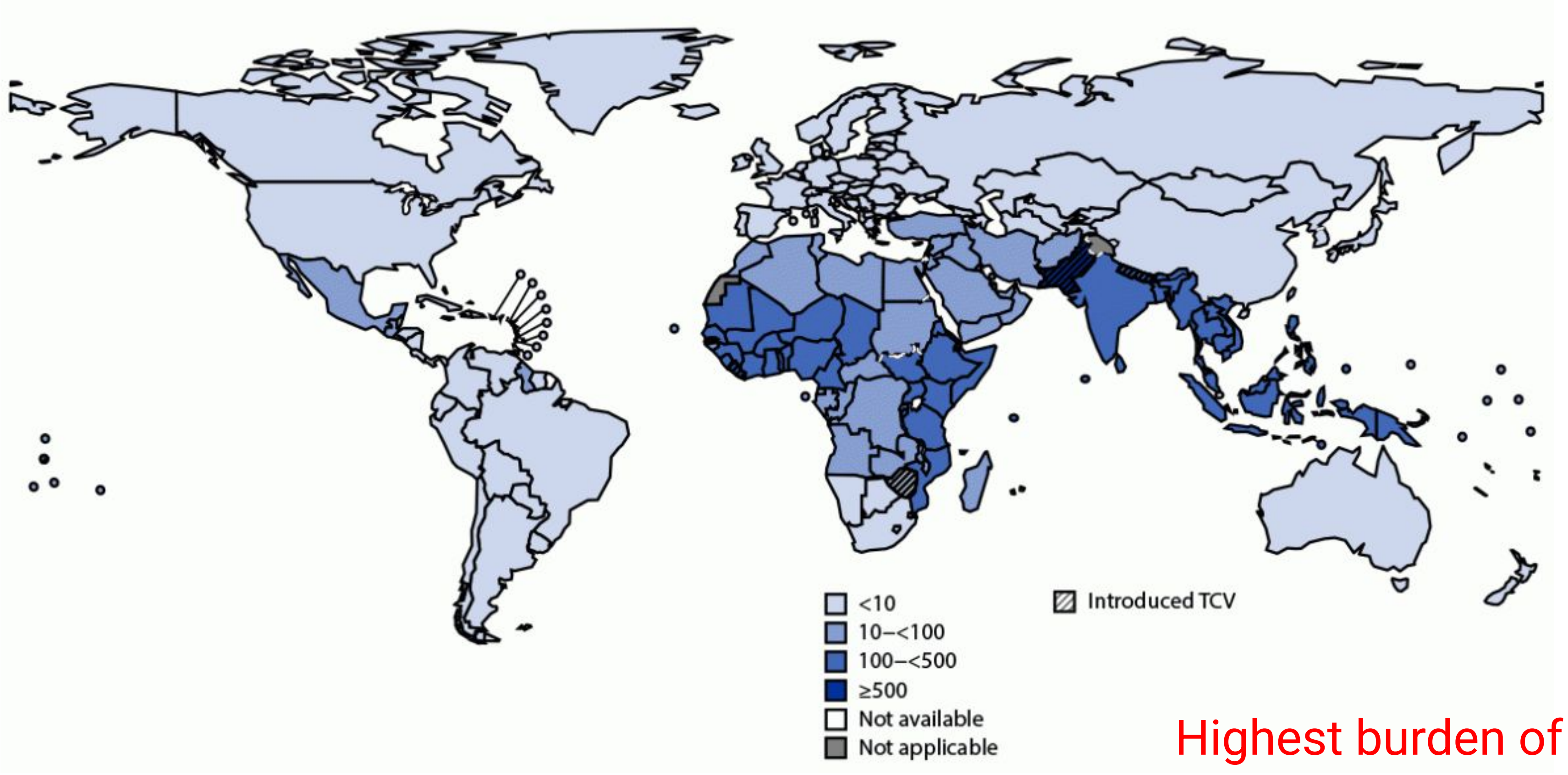
Brand (units)	Volume / route	Registered for use in	Schedule (doses/interval)
Monovalent hepatitis A vaccines (interchangeable)			
Avaxim (160U)	0.5 mL IM	≥2 years	Two doses at least 6m apart (no need for further boosters)
Havrix (1440U)	1.0 mL IM	≥16 years	
Havrix Junior (720U)	0.5 mL IM	2-16 years	
Vaqta adult (50U)	1.0 mL IM	≥18 years	
Vaqta paediatric (25U)	0.5 mL IM	1-18 years	
Combination hepatitis A/B (not interchangeable with monovalent vaccines)			
Twinrix Adult (720U/20µg)	1.0 mL IM	≥16 years	Three doses at 0, 1, 6m
Twinrix paediatric (360U/10µg)	0.5 mL IM	1-16 years	Rapid: 0, 7, 21 days + 12 m

Combination hepatitis A/typhoid vaccine **discontinued**

AIH: https://immunisationhandbook.health.gov.au/contents/vaccine-preventable-diseases/hepatitis-a

Typhoid (enteric fever) epidemiology

Estimated national typhoid fever incidence (per 100,000) worldwide, 2019



Highest burden of disease in South Asia

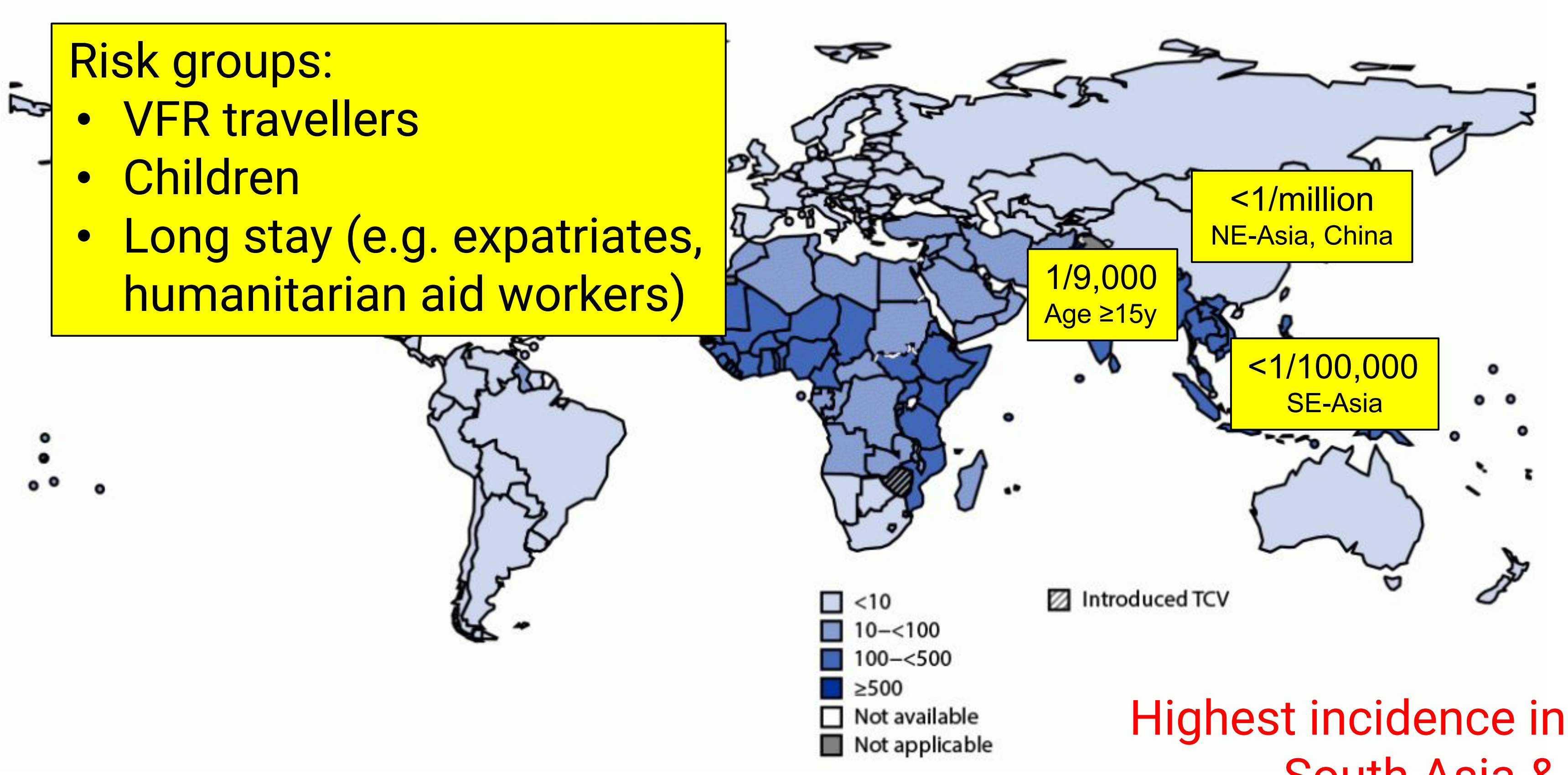
Hancuh M et al. *MMWR Morb Mortal Wkly Rep* 2023 http://dx.doi.org/10.15585/mmwr.mm7207a2;
Forster DP et al. J Travel Med 2021 https://doi.org/10.1093/jtm/taab150

Typhoid (enteric fever) epidemiology

IMMUNISATION COALITION

Estimated national typhoid fever incidence (per 100,000) worldwide, 2019

Risk groups:
- VFR travellers
- Children
- Long stay (e.g. expatriates, humanitarian aid workers)



<1/million
NE-Asia, China

1/9,000
Age ≥15y

<1/100,000
SE-Asia

1/3,500
Samoa

Highest incidence in Australian travellers visiting South Asia & some Pacific Islands

Hancuh M et al. *MMWR Morb Mortal Wkly Rep* 2023 http://dx.doi.org/10.15585/mmwr.mm7207a2
Forster DP et al. J Travel Med 2021 https://doi.org/10.1093/jtm/taab150

Typhoid vaccines: current and emerging options

Typhoid vaccination recommended for those aged **≥2 years** who **travel to endemic areas**

Brand (units)	**Volume / route**	**Registered for use in**	**Schedule (doses/interval)**	**Booster (if ongoing risk)**
Typhim Vi, inactivated	0.5 mL IM	≥2 years	Single dose	3 years
Vivotif oral, live-attenuated	Enteric-coated oral capsules*	≥6 years	3 doses, day 1, 3, 5 4 doses, day 1, 3, 5, 7	3 years 5 years

Typhoid conjugate vaccines (TCV)

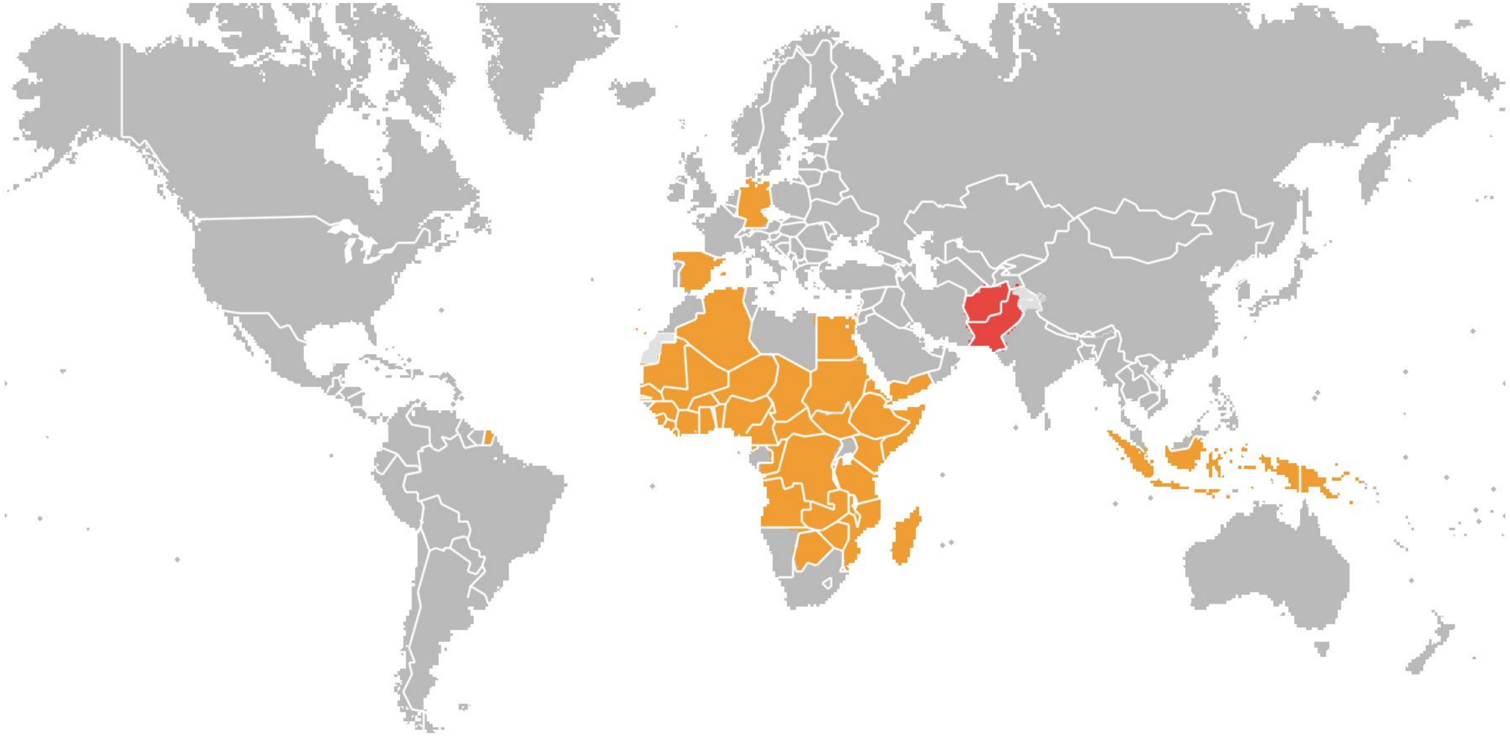
- Available in some endemic countries (not Australia)
- Single dose, from 6 months of age
- Improved efficacy and durability

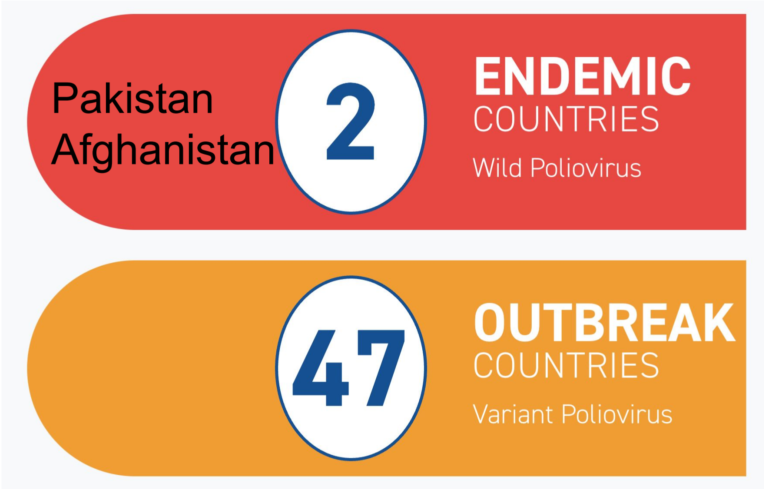
Photo credit: Coalition against typhoid: https://www.coalitionagainsttyphoid.org/the-issues/typhoid-vaccines/
AIH: https://immunisationhandbook.health.gov.au/contents/vaccine-preventable-diseases/typhoid-fever

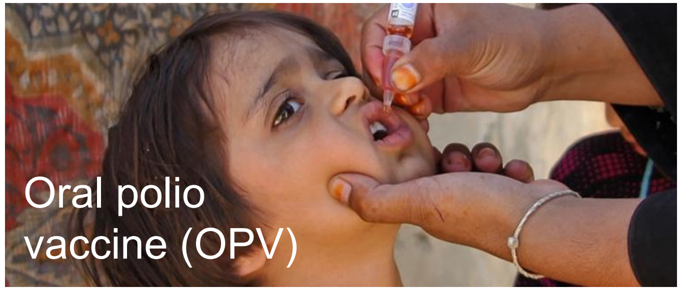
Poliomyelitis epidemiology

>99% drop in global polio cases since 1988; only 2 countries remain endemic

COVID-19 disruptions impacted immunisation efforts: cVDPV outbreaks rising







Global Polio Eradication Initiative: https://polioeradication.org/about-polio/where-we-work/
Australian Immunisation Handbook: https://immunisationhandbook.health.gov.au/contents/vaccine-preventable-diseases/poliomyelitis

Poliomyelitis vaccines: current options

IMMUNISATION COALITION

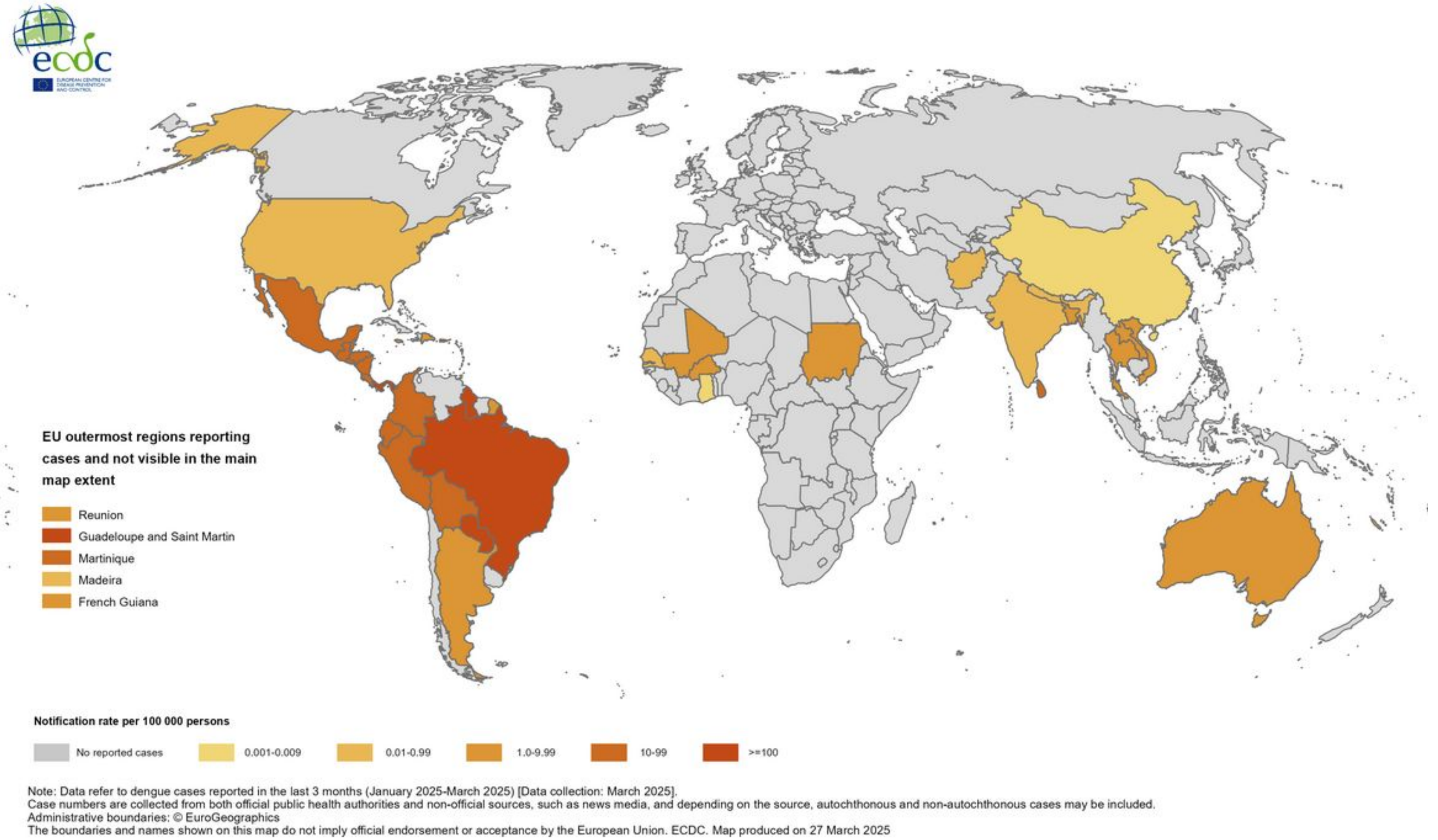
Polio booster (IPV) recommended **every 10 years** for **travellers to affected areas**

Brand (units)	Volume / route	Registered for use in	Components
Monovalent poliomyelitis vaccines			
IPOL	0.5 mL	≥2 years	IPV
Combination vaccines			
Adacel Polio	0.5 mL	≥4 years	dTpa-IPV
Boostrix-IPV	0.5 mL	≥4 years	dTpa-IPV

Global Polio Eradication Initiative: https://polioeradication.org/polio-today/polio-now/
Australian Immunisation Handbook: https://immunisationhandbook.health.gov.au/contents/vaccine-preventable-diseases/poliomyelitis

Dengue epidemiology

Wide distribution across the tropics; record 14.1 million cases reported globally in 2024



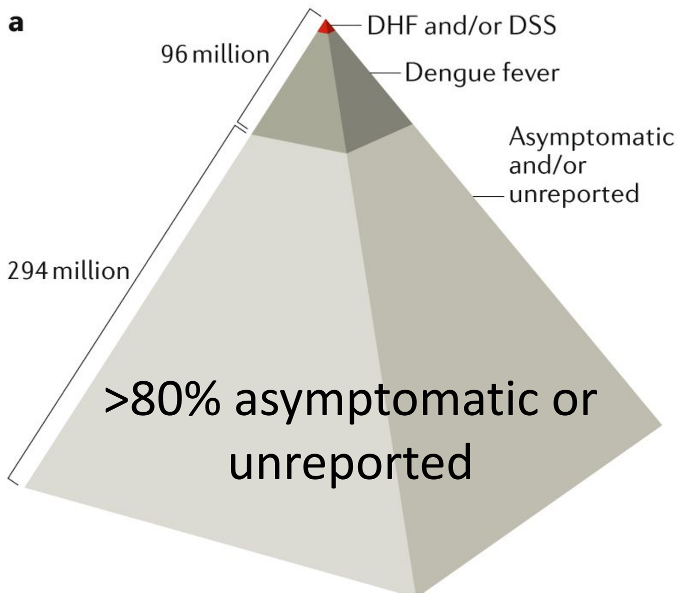
Risk in travellers: 0.3 to 6 per 1000 per month

NNDSS data: 971 cases YTD (2,374 in 2024), *>99% imported*

ECDC Map: https://www.ecdc.europa.eu/en/dengue-monthly; WHO map: https://www.who.int/emergencies/disease-outbreak-news/item/2024-DON518; Steffen R et al. J Travel Med 2023 https://doi.org/10.1093/jtm/taad085

Dengue epidemiology

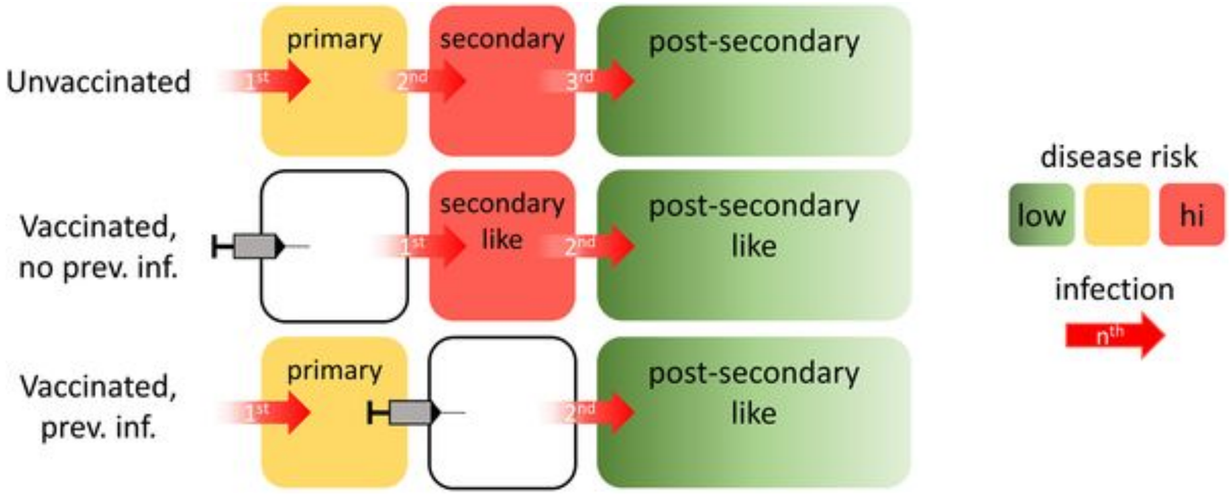
Among **symptomatic** cases, <5% severe



Risk of severe disease **2.3x higher** in secondary cf. primary

Flavivirus with 4 serotypes

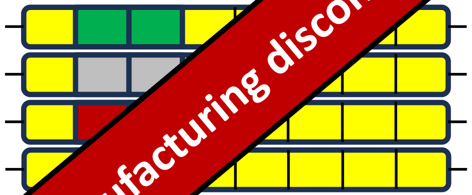
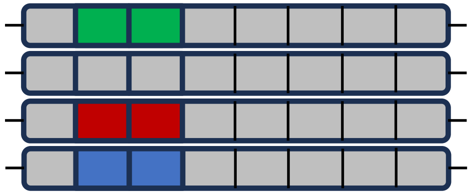
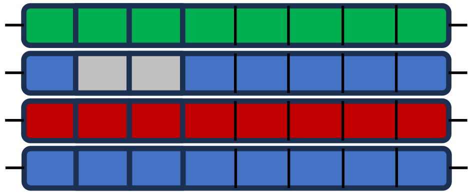
Primary infection: lifelong protection to infecting serotype; 1-2y cross-protection to others

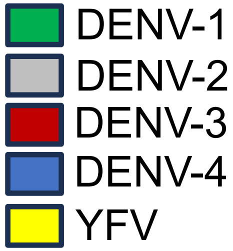


St John AL et al. *Nat Reviews Immunology* 2019 https://doi.org/10.1038/s41577-019-0123-x ; Flasche S et al. *PLoS Med*. 2016 https://doi.org/10.1371/journal.pmed.1002181; McGuinness SL et al. *J Travel Med* 2023 https://doi.org/10.1093/jtm/taad146

Dengue vaccines: current and emerging options

IMMUNISATION COALITION

	Dengvaxia (Sanofi)	Qdenga (TAK-003 Takeda)	TV003 (Butantan-DV)
Global status	Licensed (2015)	Licensed (2022)	Phase 3
In Australia	via SAS	via SAS	No
Number of doses	**3 doses** (0, 6, 12 mon… Manufacturing discontinued	**2 doses** (0, 3 months)	**Single dose**
Construct			
Use	…re-vaccination screening required	Only available vaccine at this point in time ~$900 for 2 doses	Even once approved, initially only in Brazil



Slide credit: Annelies Wilder-Smith
WHO position paper, May 2024: https://iris.who.int/bitstream/handle/10665/376641/WER9918-eng-fre.pdf

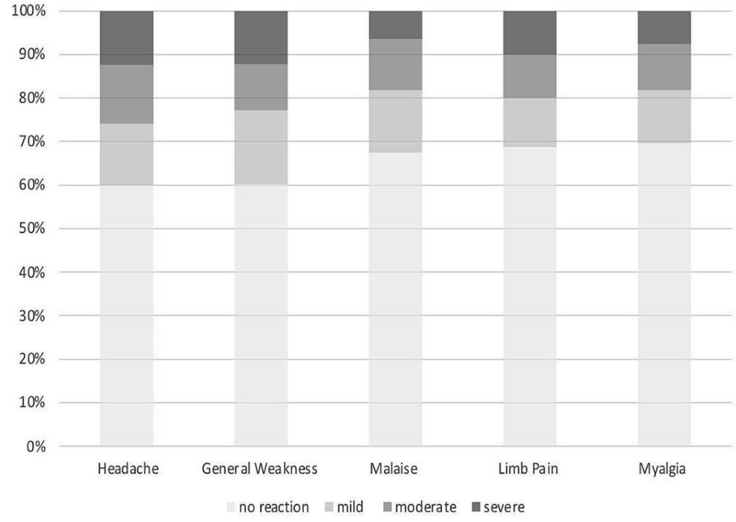
Qdenga vaccine: insights from use overseas

EMA approved (2022): recommendations vary by country

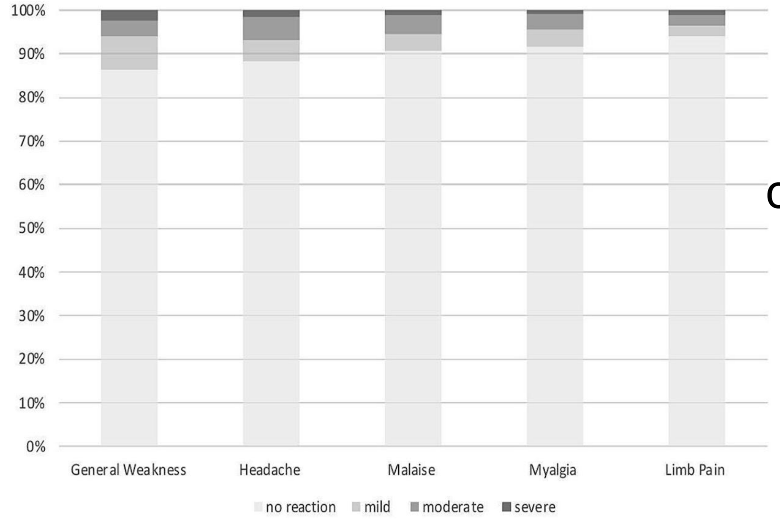
Mild-moderate reactions

No reaction

Dose 1 AEs



Dose 2 AEs



Reactions more common with first dose

Most pronounced 7-11 days post vaccine

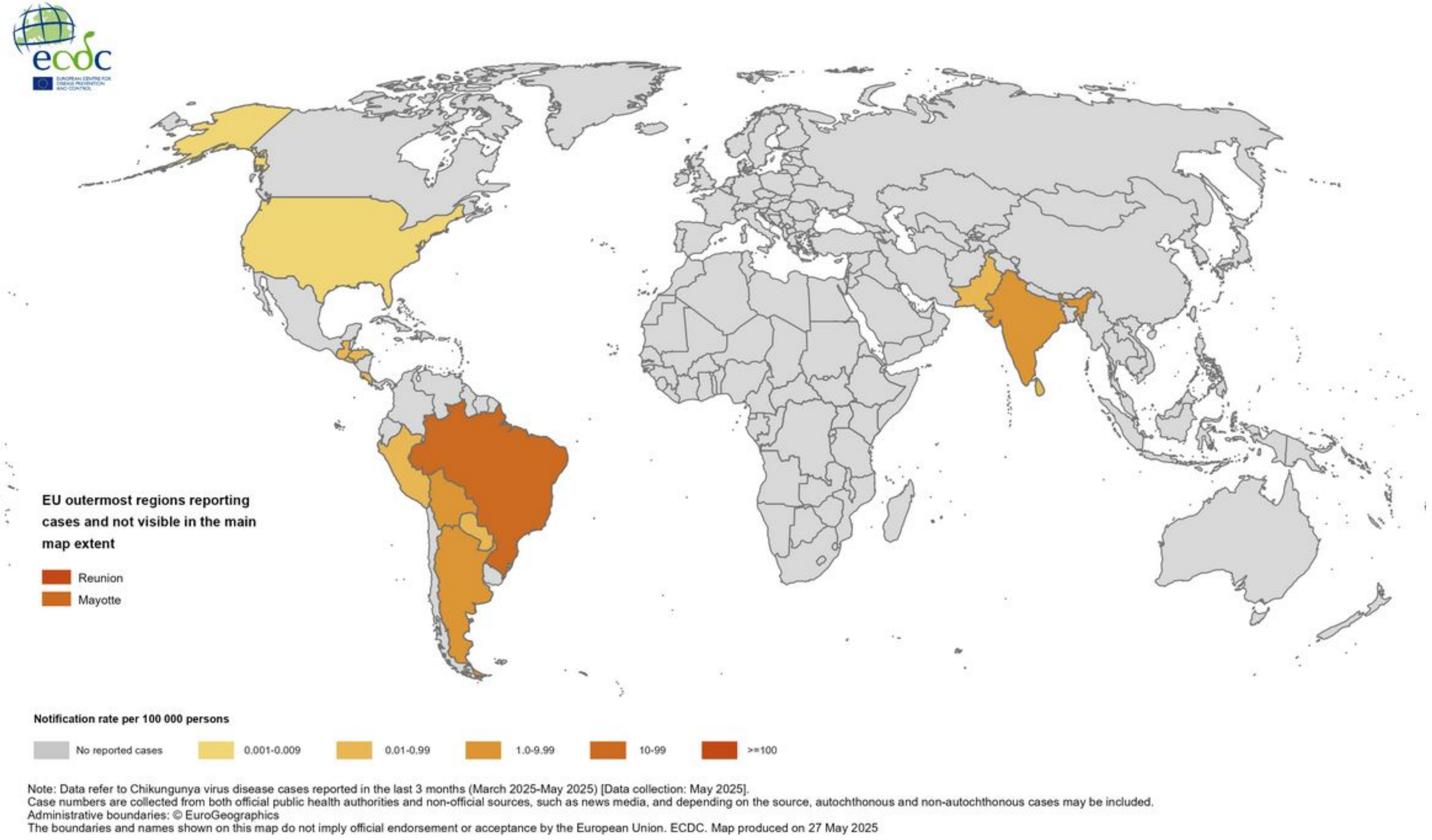
Breakthrough cases (n=31 in >1500 with vaccine history), lower hospitalisation rate

Increased frequency of anaphylaxis: 63 cases/million doses, median time 25min

Fletcher et al. *J Travel Med* 2025 https://doi.org/10.1093/jtm/taaf023; Klopke C et al. *J Travel Med* 2025 https://doi.org/10.1093/jtm/taaf004; Percio J et al. *Vaccine* 2024 https://doi.org/10.1016/j.vaccine.2024.126407

Chikungunya epidemiology

Wide distribution across the tropics: record 620,000 cases reported globally in 2024



Risk in travellers: incidence unknown, cases often related to outbreaks

Australia: 58 cases YTD
(70 in 2024)

Arthritogenic alphavirus, **long-term sequelae common**

Single serotype, infection thought to confer lifelong protection

ECDC Map: https://www.ecdc.europa.eu/en/chikungunya-monthly

Chikungunya vaccines: current and emerging options

IMMUNISATION COALITION

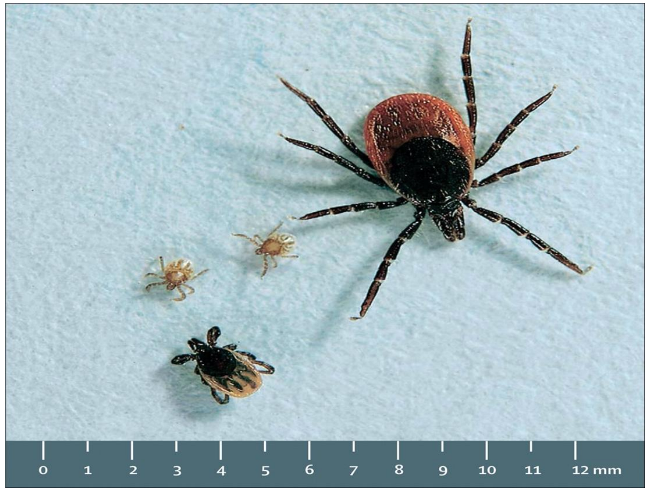
	Ixchiq (VLA1553 Valneva)	Vimkunya (Bavarian Nordic)
Status (US)	Licensed (Nov 2023), 18+ years	Licensed (Feb 2025), 12+ years
In Australia	No	No
No. of doses	Single dose	Single dose
Vaccine type	Live attenuated	Virus-like particle vaccine
Recommended for (US)	Those travelling to country or territory with **chikungunya outbreak** (Consider for extended travel to risk areas)	

Do not give to age 60+ (17 serious AEs in people aged 62-89 incl. 2 deaths)

ACIP vaccine recommendations: https://www.cdc.gov/acip/vaccine-recommendations/index.html
CDC page: https://www.cdc.gov/chikungunya/vaccines/index.html
EMA review: https://www.ema.europa.eu/en/news/ema-starts-review-ixchiq-live-attenuated-chikungunya-vaccine

Tick-borne encephalitis (TBE) epidemiology

Focally endemic from western/northern Europe to northern/eastern Asia, ~10,000 cases/yr

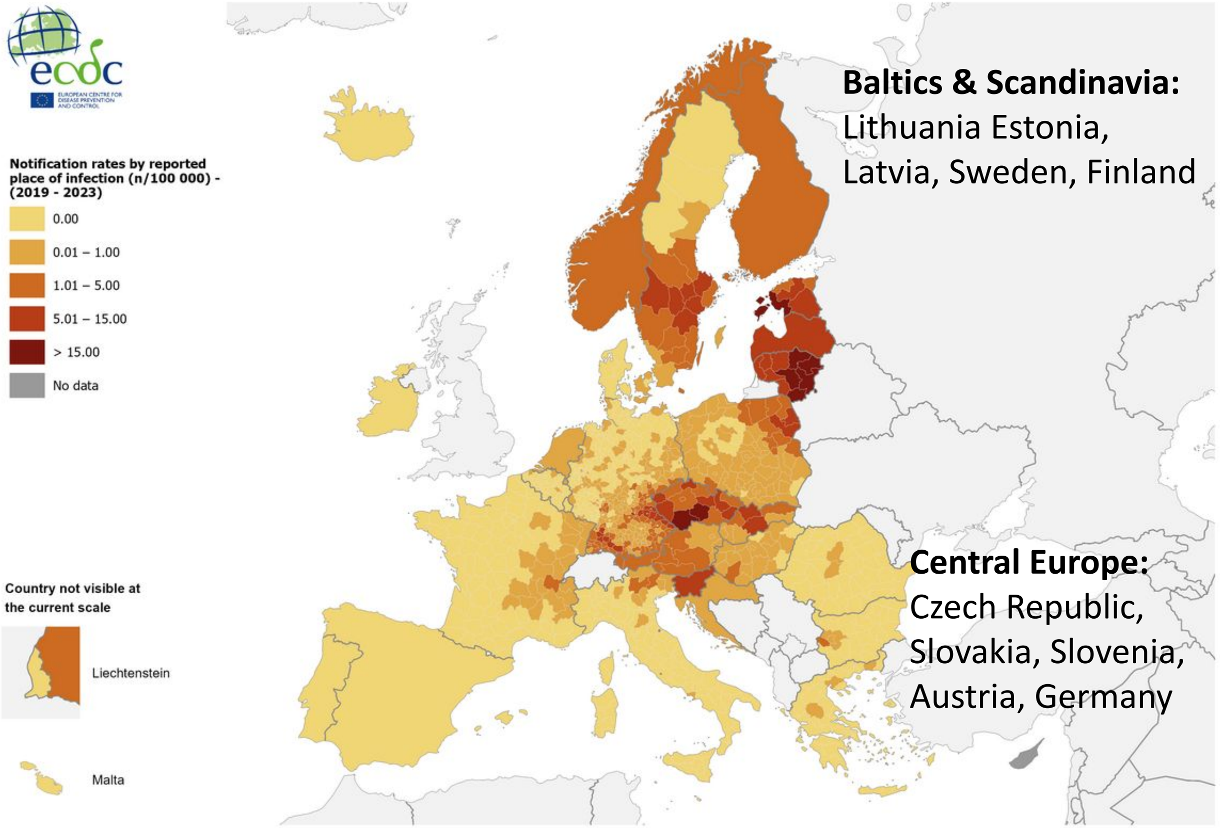


Stages of *Ixodes ricinus* ticks

Most infections asymptomatic; can cause acute meningoencephalitis with or without myelitis

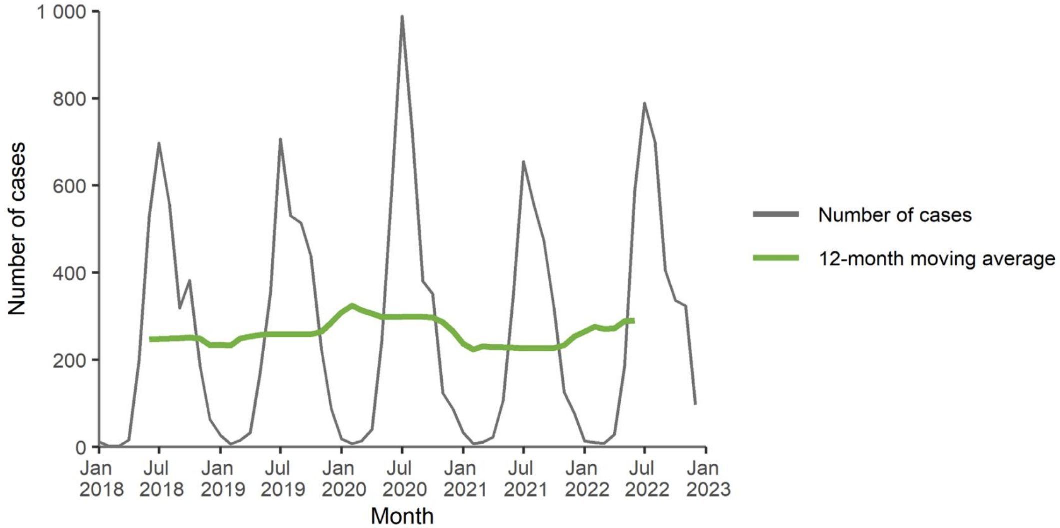
CDC country-specific information: https://www.cdc.gov/tick-borne-encephalitis/data-maps/
Lindquist L, Vapalahti O. Lancet 2008 https://doi.org/10.1016/S0140-6736(08)60800-4

Tick-borne encephalitis (TBE) epidemiology



Administrative boundaries: ©EuroGeographics ©UN-FAO. The boundaries and names shown on this map do not imply official endorsement or acceptance by the European Union. Map produced by ECDC on 09 April 2025.

Figure 2. Number of confirmed tick-borne encephalitis cases by month, EU/EEA, 2018–2022



Seasonal: 95% in **May-Nov** (peak July)

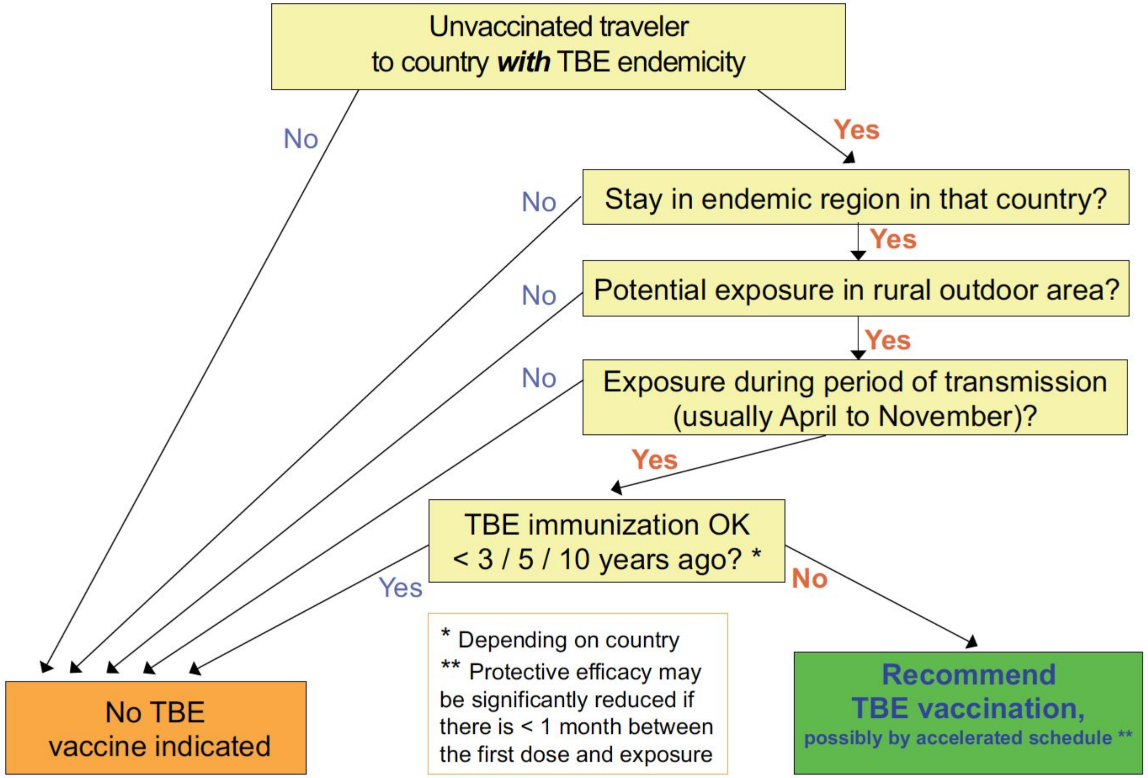
Risk in travellers: 0.5-1.3 per 100,000 pm; higher in travellers to rural Baltics

Risk areas expanding

ECDC: https://www.ecdc.europa.eu/en/publications-data/notification-rates-locally-acquired-cases-reported-2019-2023

TBE vaccination: what's available?

Consider for travellers hiking or camping in forested endemic areas during peak season



Vaccine not registered in Australia; SAS only

Primary schedule 3 doses: 0, 1-3, 5-12 months

2 doses at 0, 14 days >90% seroconversion in adults

Steffen R. J Travel Med. 2016; 23(4) https://doi.org/10.1093/jtm/taw018
Loew-Baselli et al. Vaccine 2011: 29 (43):7307-7219 https://doi.org/10.1016/j.vaccine.2011.07.089

Take home messages

- VPDs cause a substantial health burden in travellers
- Resurgence of many VPDs globally
- Risk varies by disease and destination
- Ensure travellers are up-to-date with routine vaccines (e.g. measles) and recommended ‘travel’ vaccines (especially those at higher risk)

Q & A