Re-Emerging Infectious Diseases and the Global Threat

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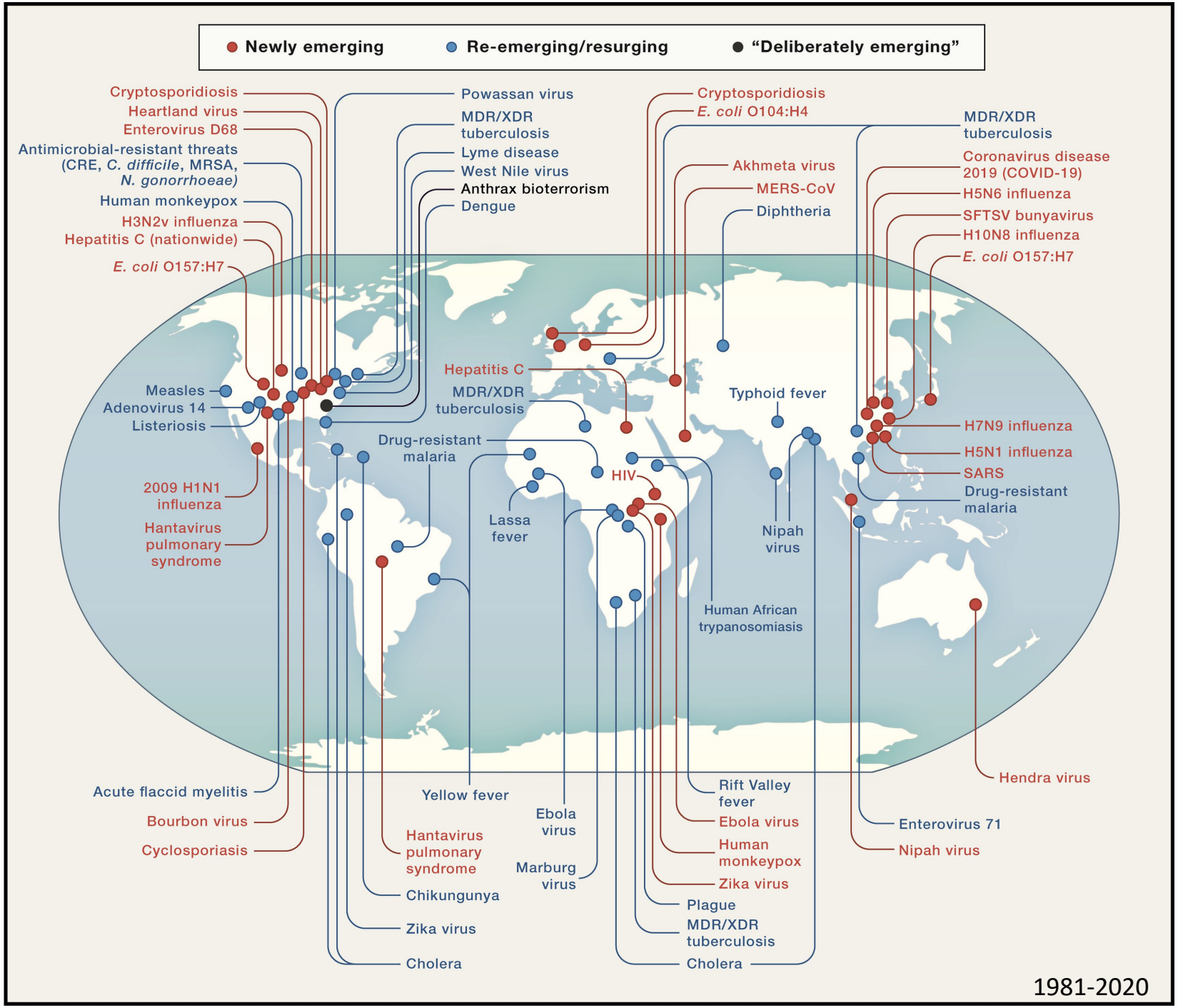
Disclosures

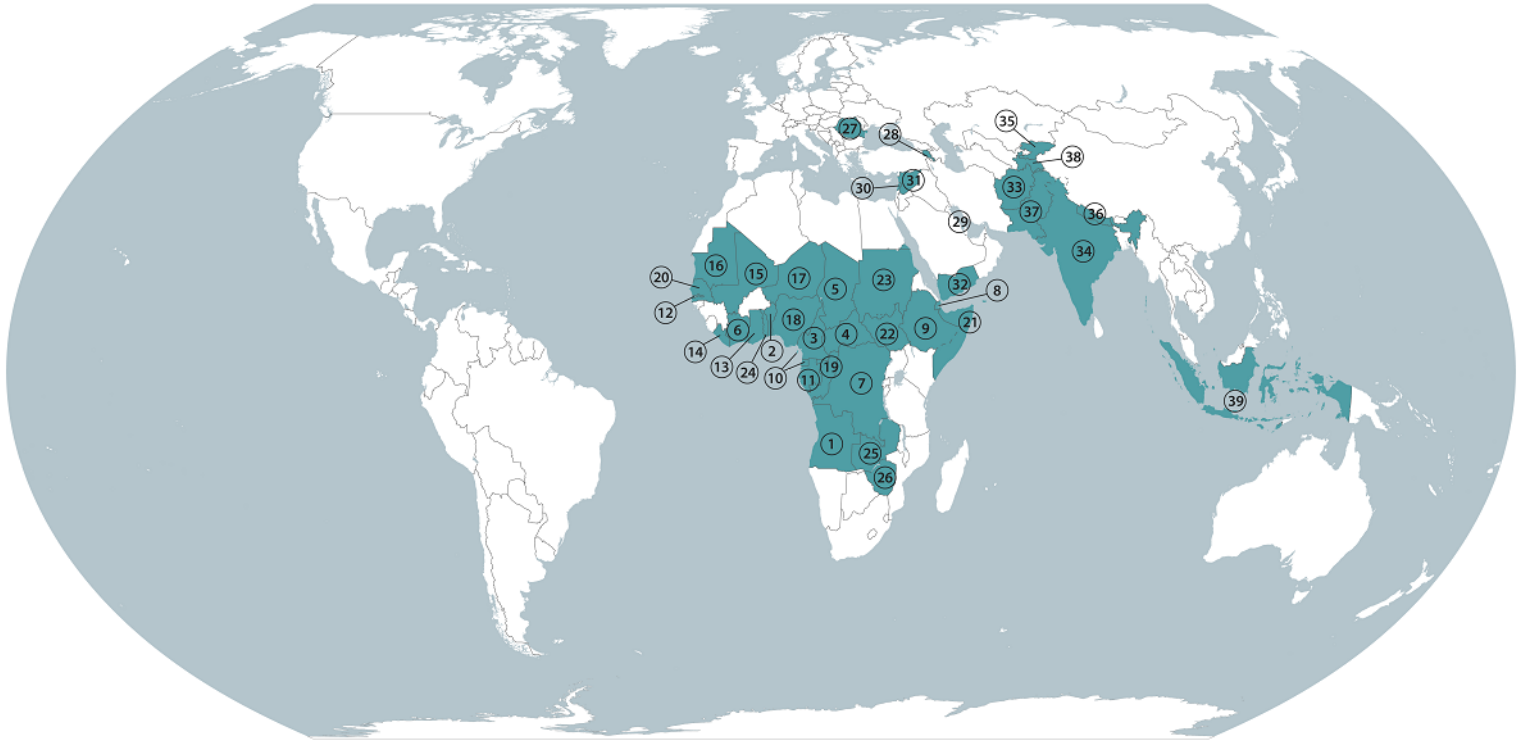
- I have no relevant financial relationships to disclose

Re-Emerging Infectious Diseases

- Infectious diseases that have reappeared after a decline in incidence, and have once again become health problems of major importance
- Can also be defined to include the re-appearance of pathogens in drug resistant forms


Newly emerging
Re-emerging/resurging
"Deliberately emerging"
Cryptosporidiosis
Heartland virus
Enterovirus D68
Antimicrobial-resistant threats (CRE, C. difficile, MRSA, N. gonorrhoeae)
Human monkeypox
H3N2v influenza
Hepatitis C (nationwide)
E. coli O157:H7
Powassan virus
MDR/XDR tuberculosis
Lyme disease
West Nile virus
Anthrax bioterrorism
Dengue
Cryptosporidiosis
E. coli O104:H4
Akhmeta virus
MERS-CoV
Diphtheria
MDR/XDR tuberculosis
Coronavirus disease 2019 (COVID-19)
H5N6 influenza
SFTSV bunyavirus
H10N8 influenza
E. coli O157:H7
Measles
Adenovirus 14
Listeriosis
2009 H1N1 influenza
Hantavirus pulmonary syndrome
Hepatitis C
MDR/XDR tuberculosis
Drug-resistant malaria
HIV
Lassa fever
Typhoid fever
Nipah virus
H7N9 influenza
H5N1 influenza
SARS
Drug-resistant malaria
Human African trypanosomiasis
Acute flaccid myelitis
Bourbon virus
Cyclosporiasis
Yellow fever
Ebola virus
Marburg virus
Hantavirus pulmonary syndrome
Chikungunya
Zika virus
Cholera
Rift Valley fever
Ebola virus
Human monkeypox
Zika virus
Plague
MDR/XDR tuberculosis
Cholera
Hendra virus
Enterovirus 71
Nipah virus
1981-2020

Measles



AFRICA
1. Angola
2. Benin
3. Cameroon
4. Central African Republic
5. Chad
6. Cote d'Ivoire
7. Dem. Rep. of the Congo
8. Djibouti
9. Ethiopia
10. Equatorial Guinea
11. Gabon
12. The Gambia
13. Ghana
14. Liberia
15. Mali
16. Mauritania
17. Niger
18. Nigeria
19. Rep. of the Congo
20. Senegal
21. Somalia
22. South Sudan
23. Sudan
24. Togo
25. Zambia
26. Zimbabwe

EUROPE
27. Romania

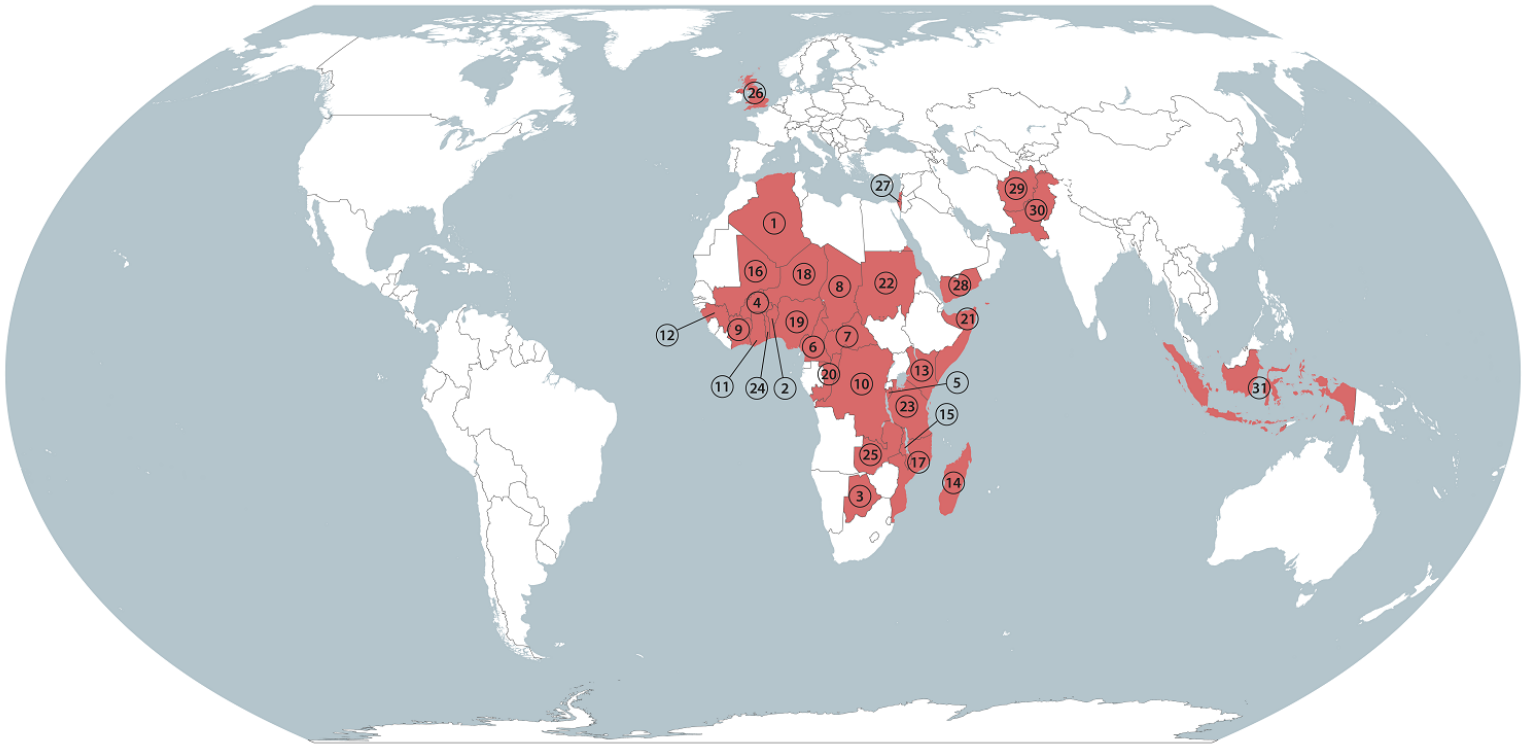
MIDDLE EAST
28. Armenia
29. Bahrain
30. Lebanon
31. Syria
32. Yemen

ASIA
33. Afghanistan
34. India
35. Kyrgyzstan
36. Nepal
37. Pakistan
38. Tajikistan

OCEANIA
39. Indonesia

Measles Travel Health Notice

Polio



Poliovirus detected within the last 12 months

AFRICA
1. Algeria
2. Benin
3. Botswana
4. Burkina Faso
5. Burundi
6. Cameroon
7. Central African Republic
8. Chad
9. Côte d'Ivoire
10. Dem. Rep. of the Congo
11. Ghana
12. Guinea
13. Kenya
14. Madagascar
15. Malawi
16. Mali
17. Mozambique
18. Niger
19. Nigeria
20. Rep. of the Congo
21. Somalia
22. Sudan
23. Tanzania
24. Togo
25. Zambia

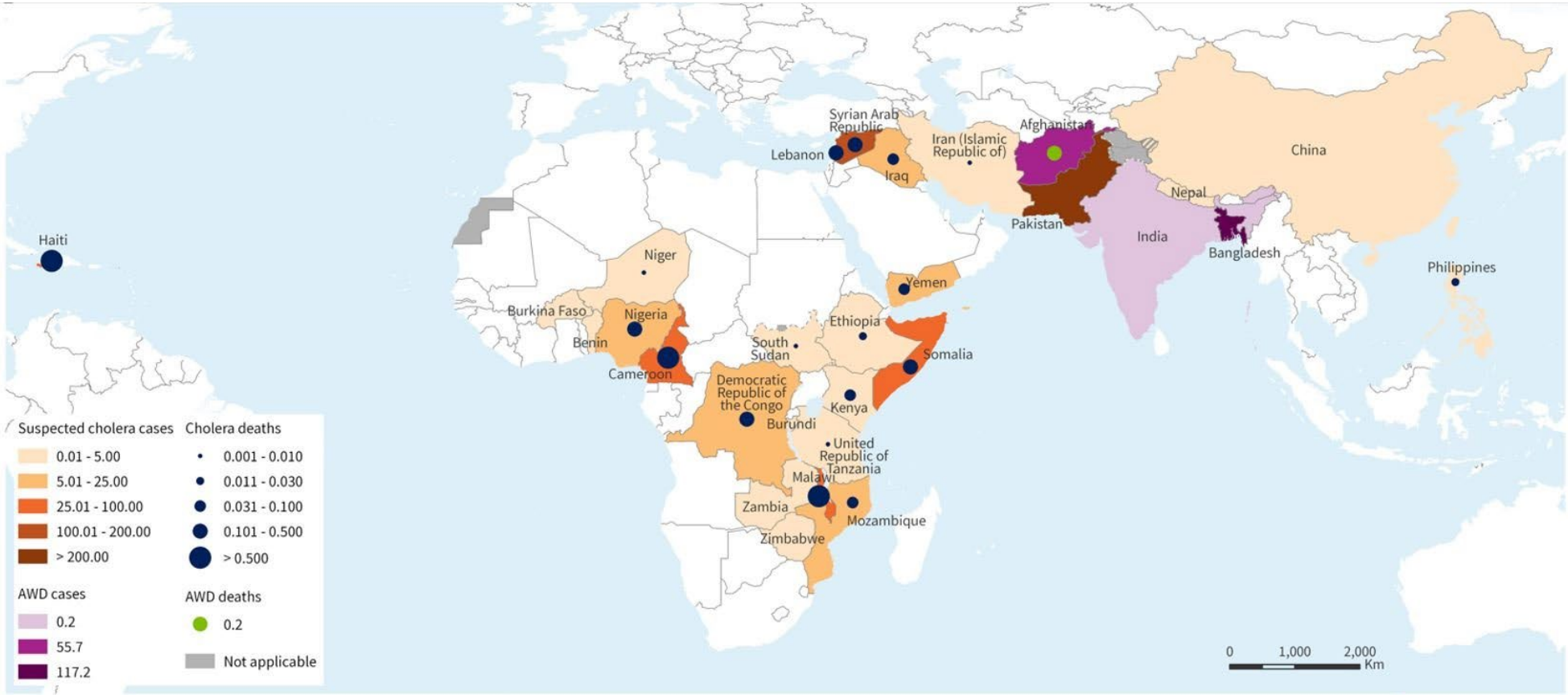
EUROPE
26. United Kingdom

MIDDLE EAST
27. Israel & occupied Palestinian territories
28. Yemen

ASIA
29. Afghanistan
30. Pakistan

OCEANIA
31. Indonesia

Cholera



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Data Source: World Health Organization, United Nations Population Division (population prospect 2021)
Map Production: WHO Health Emergencies Programme
Map Date: 9 December 2022

World Health Organization

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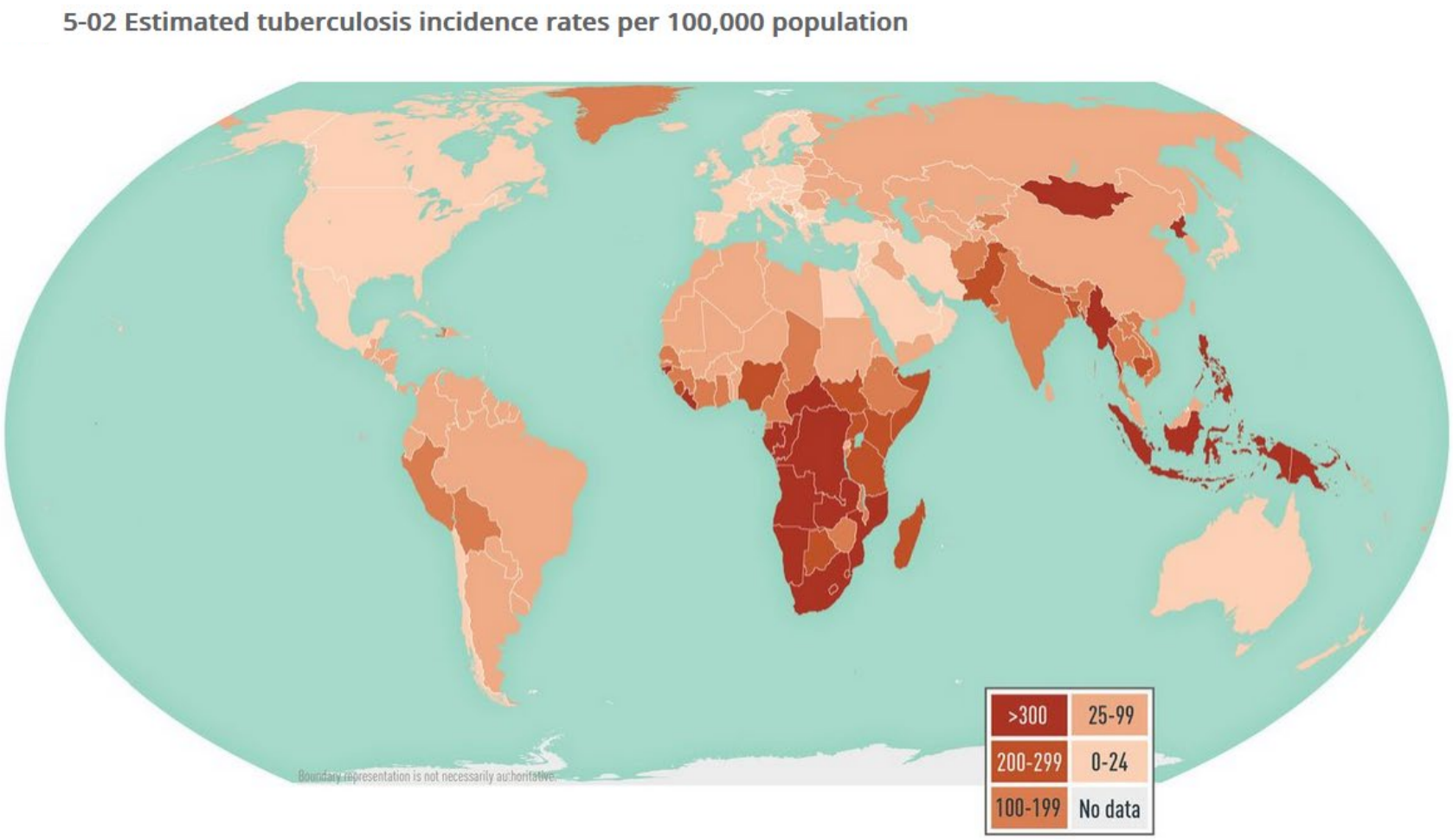
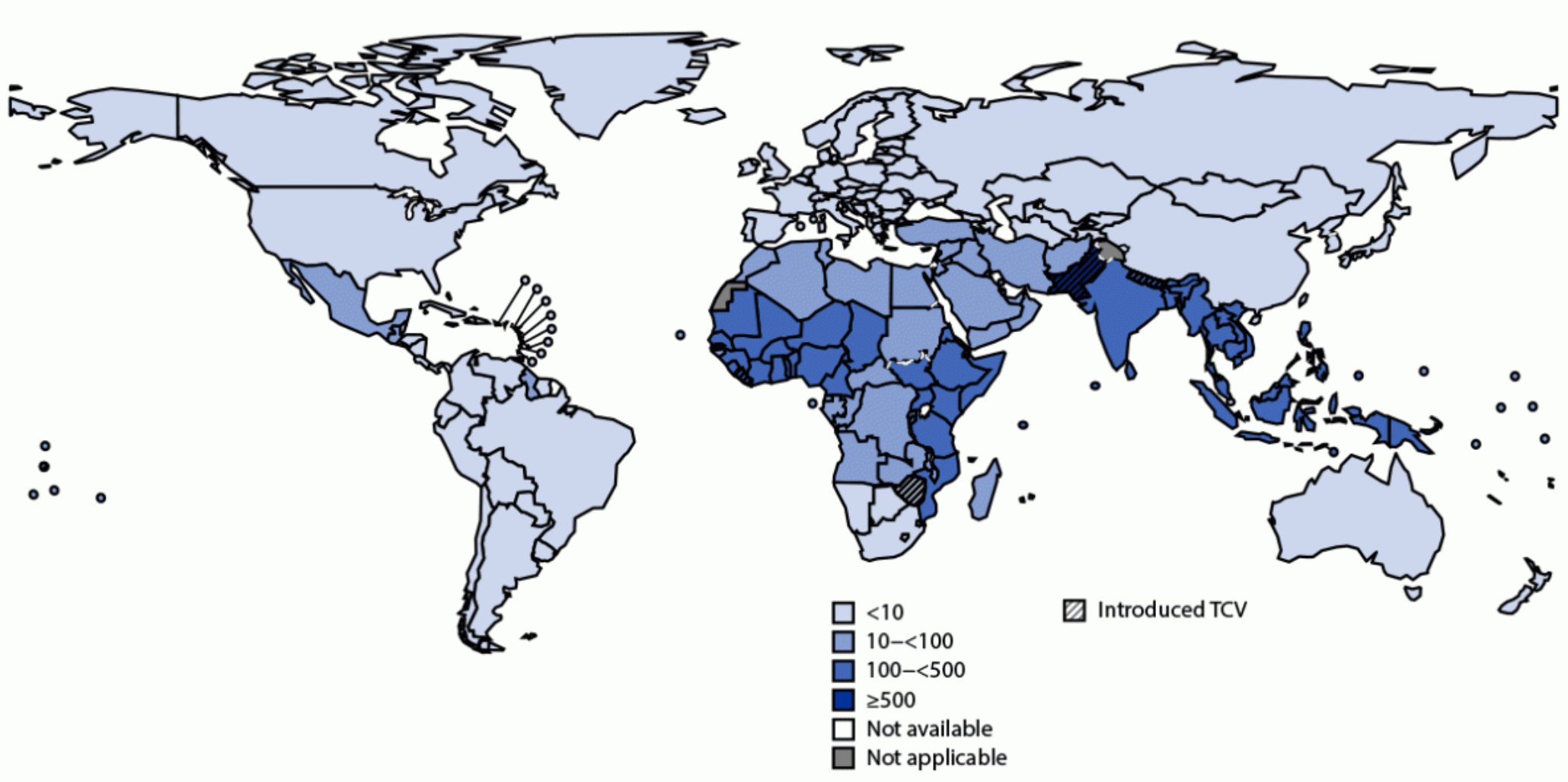
Tuberculosis

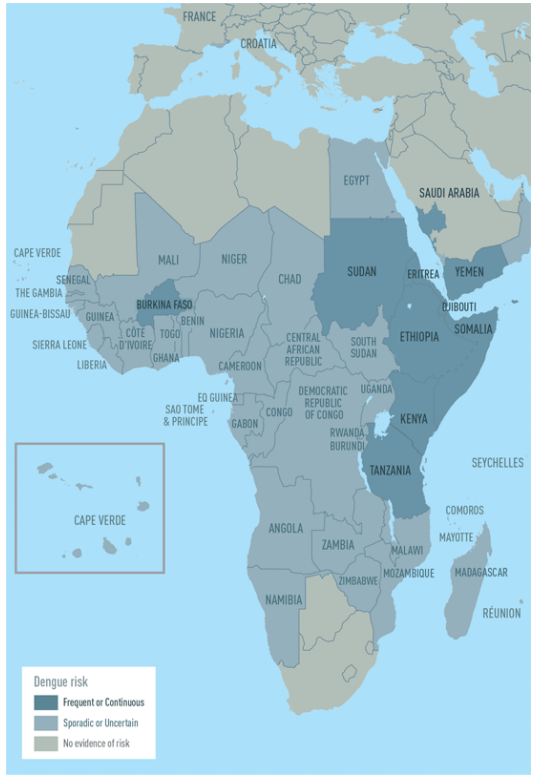


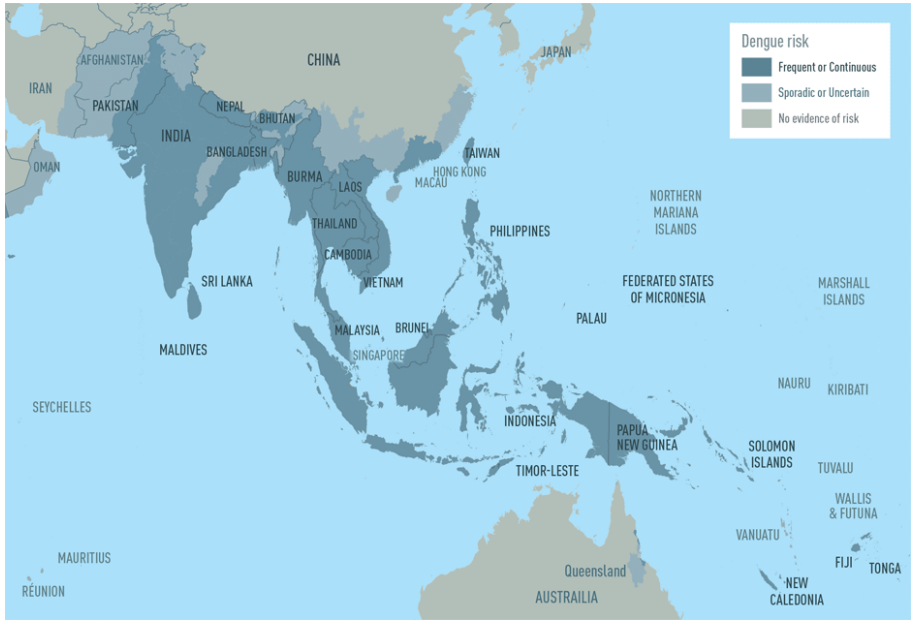
Typhoid



Cases per 100,000

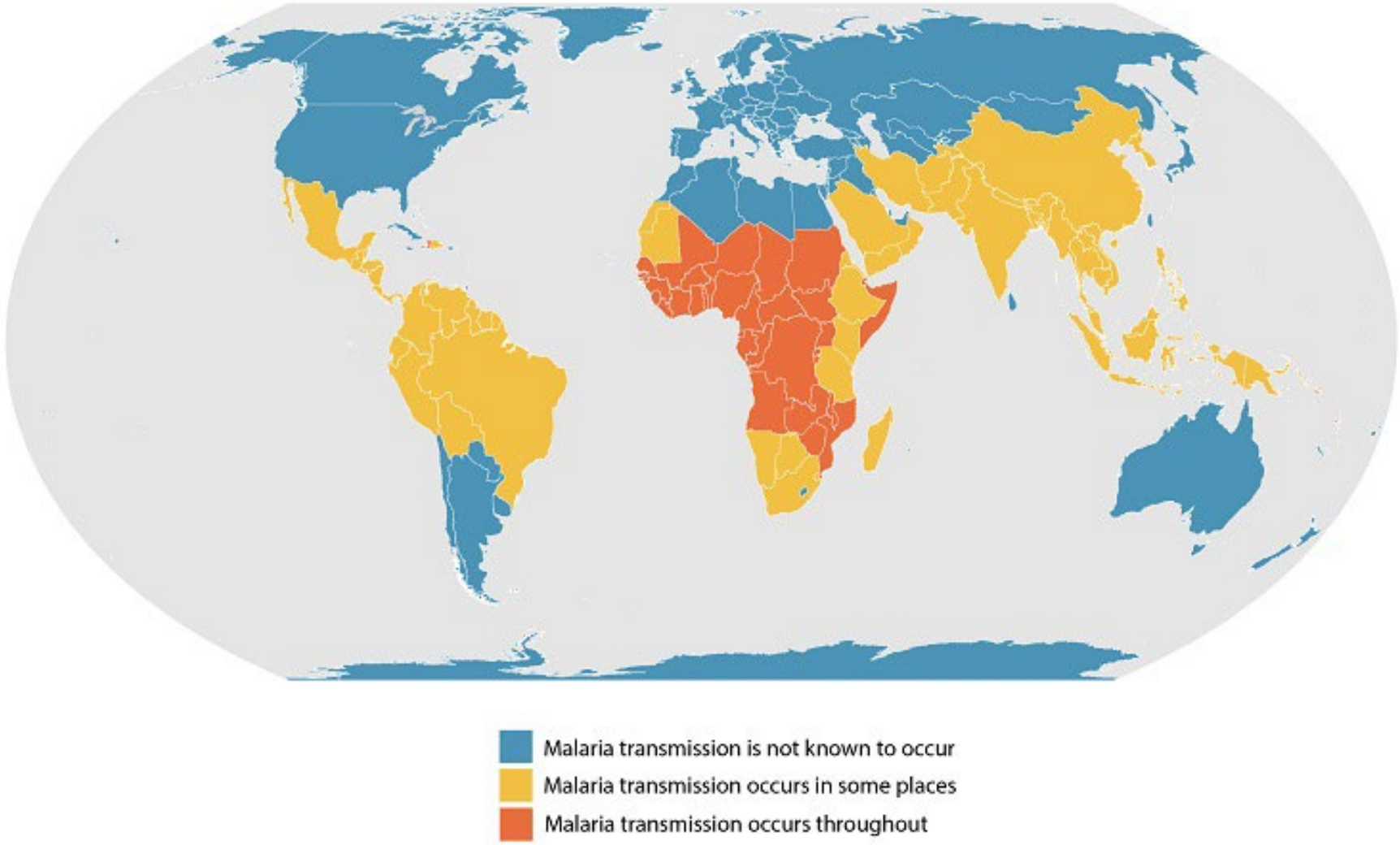
Dengue


FRANCE
CROATIA
EGYPT
SAUDI ARABIA
CAPE VERDE
MALI
NIGER
CHAD
SUDAN
ERITREA
YEMEN
SENEGAL
THE GAMBIA
BURKINA FASO
DJIBOUTI
GUINEA-BISSAU
GUINEA
BENIN
NIGERIA
ETHIOPIA
SOMALIA
SIERRA LEONE
CÔTE D'IVOIRE
TOGO
CENTRAL AFRICAN REPUBLIC
SOUTH SUDAN
LIBERIA
GHANA
CAMEROON
EQ GUINEA
DEMOCRATIC REPUBLIC OF CONGO
UGANDA
SAO TOME & PRINCIPE
GABON
CONGO
KENYA
RWANDA
BURUNDI
TANZANIA
SEYCHELLES
CAPE VERDE
COMOROS
ANGOLA
ZAMBIA
MAYOTTE
MALAWI
ZIMBABWE
MOZAMBIQUE
MADAGASCAR
NAMIBIA
RÉUNION
Dengue risk
Frequent or Continuous
Sporadic or Uncertain
No evidence of risk


AFGHANISTAN
CHINA
JAPAN
IRAN
PAKISTAN
NEPAL
BHUTAN
INDIA
BANGLADESH
TAIWAN
OMAN
HONG KONG
MACAU
BURMA
LAOS
NORTHERN MARIANA ISLANDS
THAILAND
PHILIPPINES
CAMBODIA
SRI LANKA
VIETNAM
FEDERATED STATES OF MICRONESIA
MARSHALL ISLANDS
PALAU
MALAYSIA
BRUNEI
MALDIVES
SINGAPORE
NAURU
KIRIBATI
SEYCHELLES
INDONESIA
PAPUA NEW GUINEA
SOLOMON ISLANDS
TIMOR-LESTE
TUVALU
WALLIS & FUTUNA
VANUATU
MAURITIUS
Queensland
FIJI
TONGA
RÉUNION
AUSTRAILIA
NEW CALEDONIA
Dengue risk
Frequent or Continuous
Sporadic or Uncertain
No evidence of risk

Hawaii
UNITED STATES
BERMUDA
DOMINICAN REPUBLIC
BRITISH VIRGIN ISLANDS
PUERTO RICO
ANGUILLA
US VIRGIN ISLANDS
SAINT KITTS & NEVIS
ANTIGUA & BARBUDA
MEXICO
THE BAHAMAS
CUBA
TURKS & CAICOS
JAMAICA
HAITI
DOMINICAN REPUBLIC
BELIZE
GUADELOUPE
GUATEMALA
HONDURAS
DOMINICA
EL SALVADOR
NICARAGUA
MARTINIQUE
SAINT LUCIA
COSTA RICA
PANAMA
VENEZUELA
GUYANA
SURINAME
FRENCH GUIANA
COLOMBIA
ARUBA
CURAÇAO
SAINT VINCENT & THE GRENADINES
BARBADOS
GRENADA
GALÁPAGOS ISLANDS
ECUADOR
TRINIDAD & TOBAGO
PERU
BRAZIL
KIRIBATI
FRENCH POLYNESIA
AMERICAN SAMOA
FIJI
BOLIVIA
TONGA
Easter Island
PARAGUAY
ARGENTINA
URUGUAY
Dengue risk
Frequent or Continuous
Sporadic or Uncertain
No evidence of risk

Malaria


Malaria transmission is not known to occur
Malaria transmission occurs in some places
Malaria transmission occurs throughout

Other concerning re-emergences

- Crimean Congo hemorrhagic fever: Africa, Middle East, Asia
- Yellow fever: African Region
- Diphtheria: Nigeria, Guinea, Philippines
- Bacterial Meningitis: Niger, Nigeria
- Marburg: Tanzania, Equatorial Guinea
- Chikungunya: South and Central America, Caribbean

In the United States

- Polio
- Measles
- Chickenpox
- Congenital syphilis
- Hepatitis A
- Pertussis
- Meningococcal infections

In the United States

- Locally acquired dengue
- Locally acquired malaria
- West Nile Virus
- Cholera
- Lyme, Anaplasmosis, Babesiosis
- Drug resistant Shigellosis
- Haemophilus influenza type B infections
- Leptospirosis

Why is re-emergence occurring?

Table 1

COVID-19 vaccination recommendations have changed. Find the latest recommendations at www.cdc.gov/covidschedule

Recommended Child and Adolescent Immunization Schedule for ages 18 years or younger, United States, 2023

These recommendations must be read with the notes that follow. For those who fall behind or start late, provide catch-up vaccination at the earliest opportunity as indicated by the green bars.
To determine minimum intervals between doses, see the catch-up schedule (Table 2).

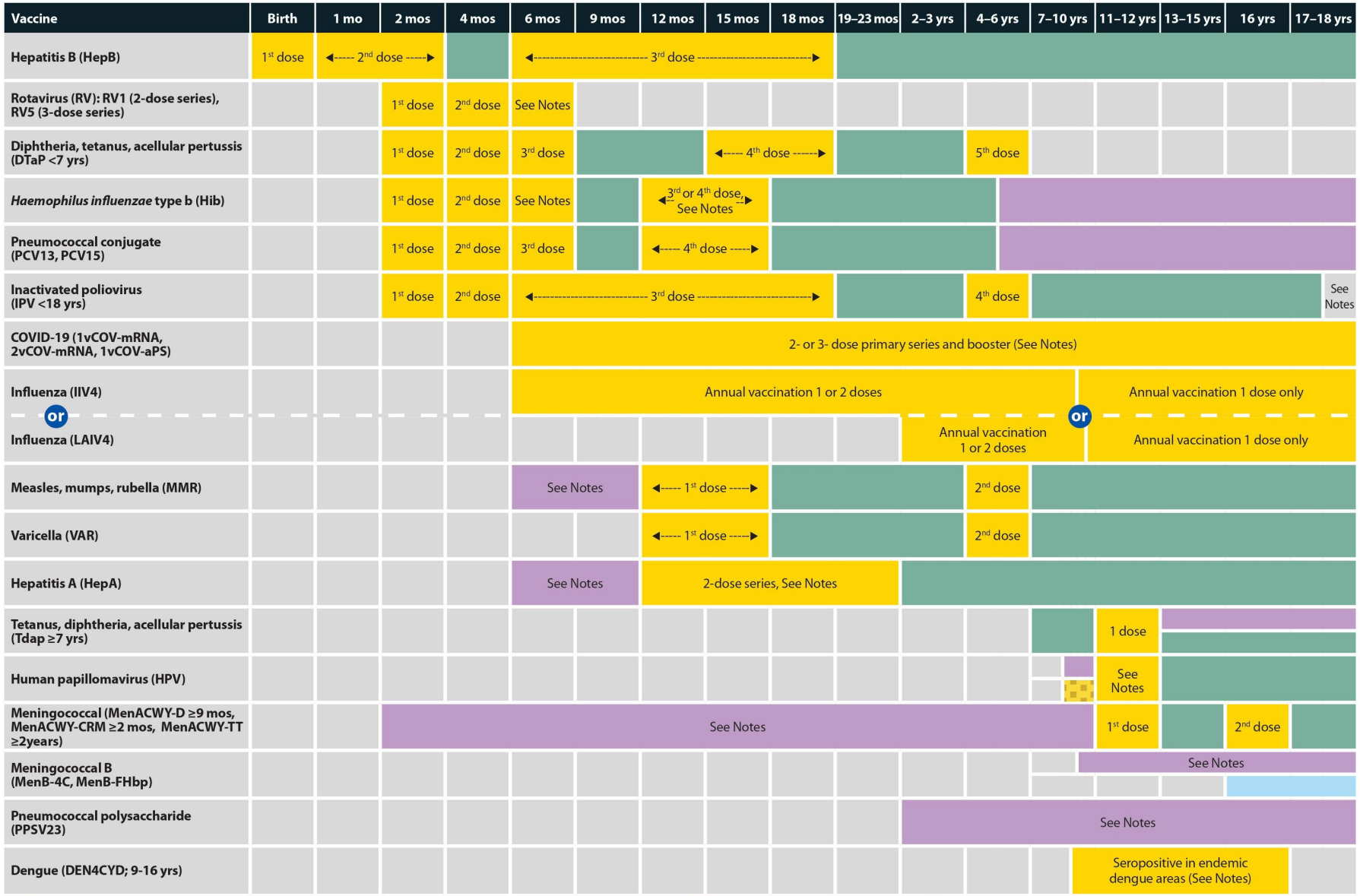


Table 1 COVID-19 vaccination recommendations have changed. Find the latest recommendations at www.cdc.gov/covidschedule

Recommended Adult Immunization Schedule for ages 19 years or older, United States, 2023

Vaccine	19–26 years	27–49 years	50–64 years	≥65 years
COVID-19	2- or 3- dose primary series and booster (See Notes)			
Influenza inactivated (IIV4) or **Influenza recombinant** (RIV4)	1 dose annually			
or	or			
Influenza live, attenuated (LAIV4)	1 dose annually			
Tetanus, diphtheria, pertussis (Tdap or Td)	1 dose Tdap each pregnancy; 1 dose Td/Tdap for wound management (see notes)			
	1 dose Tdap, then Td or Tdap booster every 10 years			
Measles, mumps, rubella (MMR)	1 or 2 doses depending on indication (if born in 1957 or later)			For healthcare personnel, see notes
Varicella (VAR)	2 doses (if born in 1980 or later)	2 doses		
Zoster recombinant (RZV)	2 doses for immunocompromising conditions (see notes)		2 doses	
Human papillomavirus (HPV)	2 or 3 doses depending on age at initial vaccination or condition	27 through 45 years		
Pneumococcal (PCV15, PCV20, PPSV23)	1 dose PCV15 followed by PPSV23 OR 1 dose PCV20 (see notes)			See Notes
				See Notes
Hepatitis A (HepA)	2, 3, or 4 doses depending on vaccine			
Hepatitis B (HepB)	2, 3, or 4 doses depending on vaccine or condition			
Meningococcal A, C, W, Y (MenACWY)	1 or 2 doses depending on indication, see notes for booster recommendations			
Meningococcal B (MenB)	2 or 3 doses depending on vaccine and indication, see notes for booster recommendations			
	19 through 23 years			
***Haemophilus influenzae* type b** (Hib)	1 or 3 doses depending on indication			

Recommended vaccination for adults who meet age requirement, lack documentation of vaccination, or lack evidence of past infection

Recommended vaccination for adults with an additional risk factor or another indication

Recommended vaccination based on shared clinical decision-making

No recommendation/ Not applicable

VACCINE NAME	DOSE	RECOMMENDED AGE	MINIMUM AGE	MINIMUM INTERVAL TO NEXT DOSE[3]
Japanese encephalitis, Vero cell (IXIARO)[1]	1	2 months–17 years old 18–65 years old	≥2 months old ≥18 years old	28 days 7 days
Japanese encephalitis, Vero cell (IXIARO)	2	2 months–17 years old 18–65 years old	28 days after dose 1 7 days after dose 1	N/A
Rabies (preexposure)	1		See footnote 3	
Rabies (preexposure)	2		7 days after DOSE 1	14 days
Rabies (preexposure)	3[4]		21 days–3 years after DOSE 1	N/A
Typhoid Inactivated (ViCPS)		≥2 years	≥2 years	N/A
Typhoid Live attenuated (Ty21a)		≥6 years	≥6 years	See footnote 5
Yellow Fever		>9 months[6]	>9 months[6]	10 years[7]

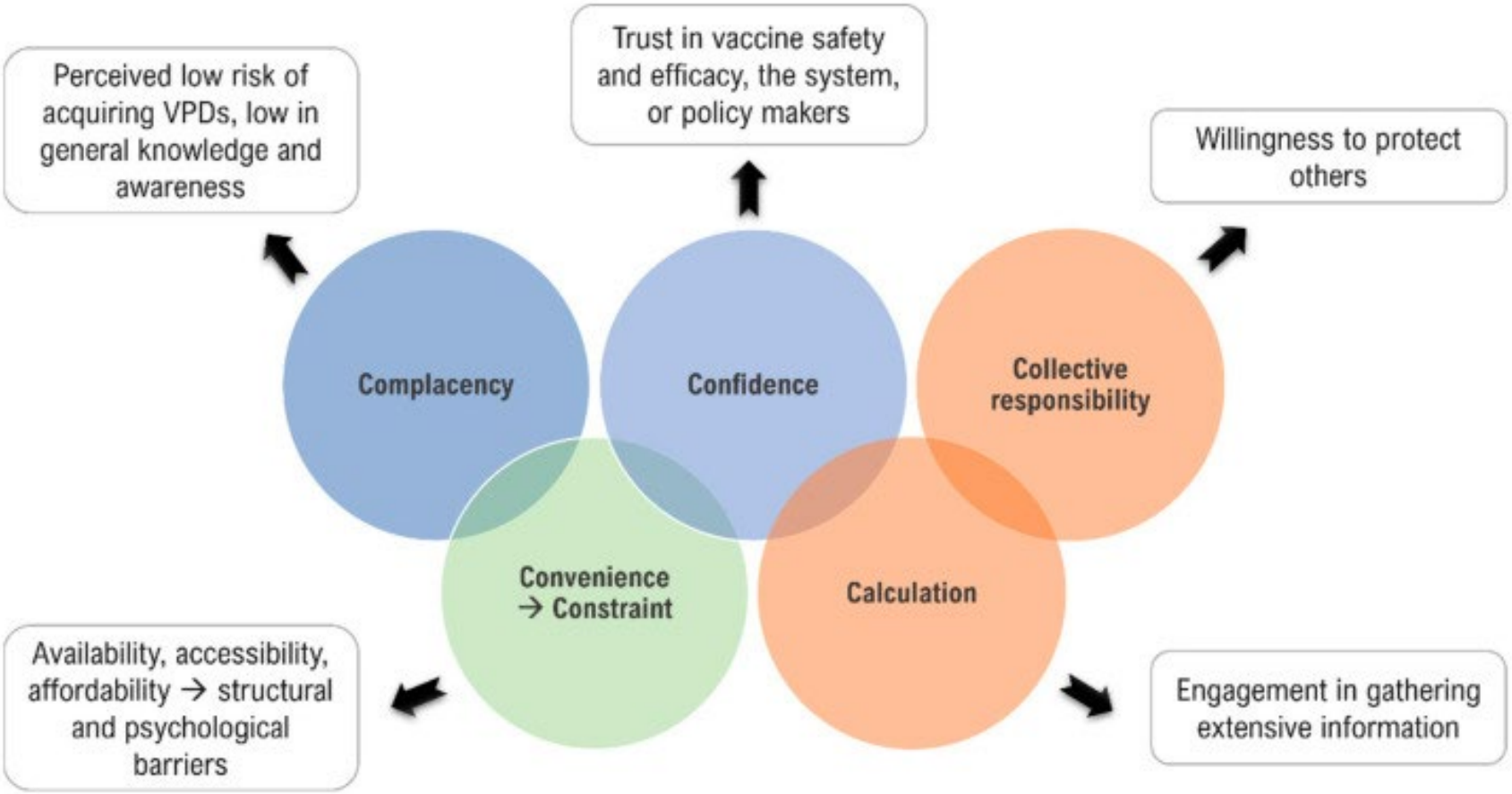
Vaccine hesitancy

- Can be understood as a delay in acceptance or complete refusal of vaccines despite availability, has also been framed as an aspect of the decision-making process
- Named amongst the World Health Organization's ten threats to global health in 2019
- Decreases individual and herd level immunity which has the potential to increase incidence and prevalence of virtually any vaccine preventable illness
- E.g. following the childhood vaccination schedule would prevent an estimated 20 million cases of disease, and 42,000 deaths annually

Vaccine hesitancy

- Has been directly linked to outbreaks/ persistence of measles, polio, varicella, pertussis, invasive Haemophilus Influenza disease, pneumococcal disease
- National prevalence has been estimated to be 23.5%, with state level variation from 11 to 40%
- Multifactorial; can be understood through the 5C’s model

Vaccine hesitancy



Modern Challenges

- Social media platforms
- Online misinformation
- The “post-truth” era
- Decline in trust of expertise
- Politicization of public health
- Alternative health care advocacy

Dealing with vaccine hesitancy

- Diagnostic tools: Vaccine Barriers Assessment Tool
- Communication: Broad and targeted community campaigns, patient communication (motivational interviewing), use of decision aids to assess health literacy challenges
- Community engagement: With “vaccine champions”; healthcare professions, community, faith and industrial leaders
- Misinformation: Social listening to identify and answer misconceptions and information gaps
- Incentives/ mandates for vaccination

References

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- WHO Map Gallery
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Thank you!