Tropical Diseases: "Neglected" No Longer

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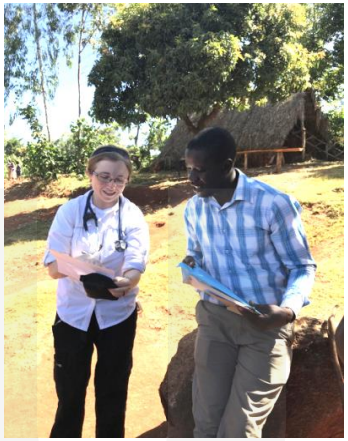
Primary Care Review February 10, 2026

Disclosures



- No financial disclosures or conflicts of interest to disclose
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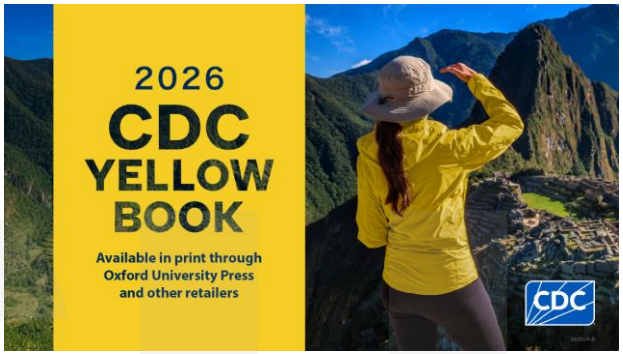
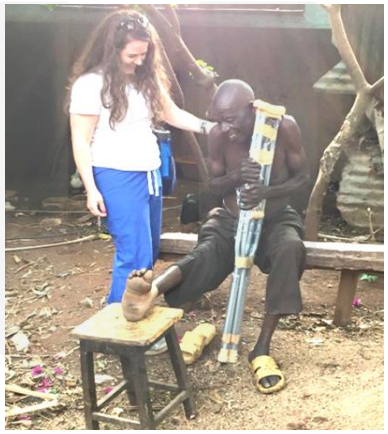
Objectives



- Review WHO NTD List
- Explore NTDs emerging in the U.S.
- Gain confidence in recognizing and managing tropical diseases in the returning traveler

Definition of Neglected Tropical Diseases (NTDs)



- Neglected Tropical Diseases (NTDs)
  - Poverty-linked
  - Low priority for research
  - Less attention from global health agencies

- Autochthonous = locally acquired
- Endemic = local or regional, ubiquitous in a population

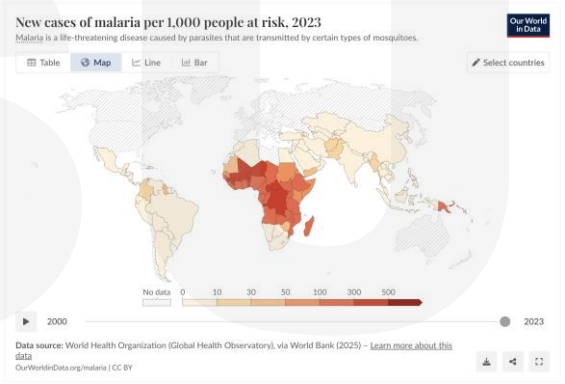
WHO List of NTDs

- Protozoans: Chagas disease, African trypanosomiasis, leishmaniasis
- Helminths: dracunculiasis (Guinea worm), echinococcosis, foodborne trematodiases, leishmaniasis, lymphatic filariasis, onchocerciasis (River blindness), schistosomiasis, soil-transmitted helminthiases, snakebite, taeniasis/cysticercosis
- Bacterial: Buruli ulcer, leprosy, noma, trachoma, yaws
- Viral: chikungunya, dengue, rabies
- Fungal: mycetoma, chromoblastomycosis
- Other: scabies (ectoparasites), snakebite envenoming
- https://www.who.int/health-topics/neglected-tropical-diseases#tab=tab_1

Disease Vectors

Mosquitoes

- Malaria
- **Chikungunya**
- **Dengue**
- Japanese encephalitis
- **Lymphatic filariasis (elephantiasis)**
- Rift Valley Fever
- West Nile
- Zika



https://ourworldindata.org/malaria

Disease Vectors

- Snails
  - **Schistosomiasis**
- Sandflies
  - **Leishmaniasis**
- *Simulium* Black Flies
  - **Onchocerciasis** River Blindness
- Bazaar fly (*Musca sorbens*)
  - **Trachoma**
- TseTse flies
  - **African Trypanosomiasis**
- Triatomine bug
  - **Chagas disease** (American Trypanosomiasis)
- Water fleas (cyclops copepods)
  - **Dracunculiasis** (Guinea Worm Disease)

Other Disease Vectors/Reservoirs

- Rats
- Fruit bats
- Mammal bites
- Unpasteurized dairy
- Soil, Contaminated Water

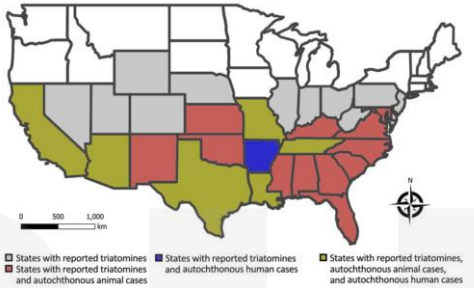
NTDs Emerging in the U.S.

- Chagas (American Trypanosomiasis)
- Leishmaniasis
- Chikungunya and Dengue
- Leprosy
- Hookworm
- (Rabies and Scabies)

https://a-z-animals.com/blog/diseases-commonly-carried-by-amadillos/

https://www.cdc.gov/chagas/about/index.html

Chagas

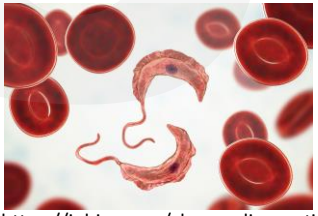


Beatty, et al., 2025

- From *trypanosoma cruzi* parasites often from triatomine insects
- Chagoma "Romaña's sign"

https://www.cdc.gov/chagas/about/index.html

- Dx:
  - Acute blood smear or PCR
  - Chronic antibody detection (EIA and immunoblot to confirm)



https://inbios.com/chagas-diagnostics/

- Tx: antiparasitics (benznidazole or nifurtimox)
- No vaccine, prevention= avoiding bugs
- Autochthonous human cases in 8 states
  - Beatty, et al., 2025 suggesting we now label this as "hypoendemic" in the U.S.

Leishmaniasis

https://www.npr.org/sections/goatsandsoda/2023/11/01/1209681147/leishmaniasis-sand-flies-tropical-disease-endemic-north-america-united-states

- *Leishmania* parasites from sand flies
- 3 forms: cutaneous, mucosal, or visceral
  - Cutaneous in southern U.S.
- Dx: Skin scraping or biopsy, PCR
- Tx: Amphotericin B, miltefosine
- No vaccine, prevention= avoiding bugs

https://onlinelibrary.wiley.com/doi/10.1111/ijd.13664

Chikungunya

2025 U.S. chikungunya cases* reported to ArboNET

Data are preliminary and subject to change. Data are current as of January 13, 2026.

Year	US States Locally acquired	US States Travel-associated†	US Territories Locally acquired	US Territories Travel-associated
2025	1	466	0	0

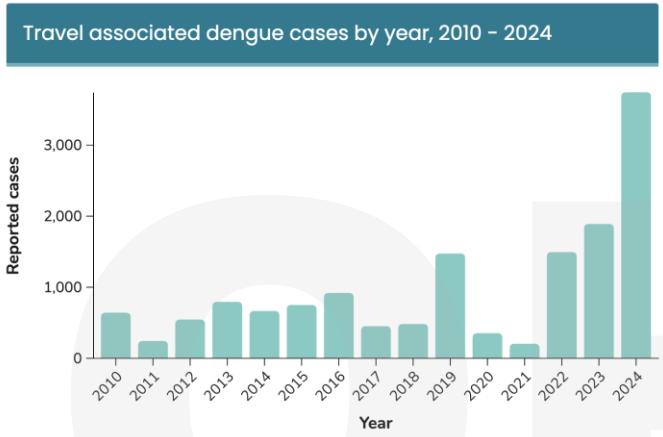
*Includes confirmed and probable disease cases
†Includes cases acquired through other routes (e.g., laboratory transmission)

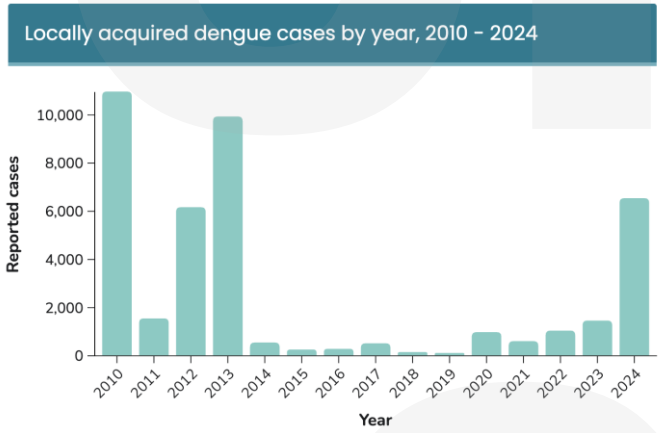
Year	US States Locally acquired	US States Travel-associated†	US Territories Locally acquired	US Territories Travel-associated
2014	12‡	2,799	4,659	51
2015	1‡	895	237	0
2016	0	248	180	1
2017	0	156	39	0
2018	0	116	8	0
2019	0	192	2	0
2020	0	33	0	0
2021	0	36	0	0
2022	0	81	0	0
2023	0	152	0	0
2024	0	199	0	0

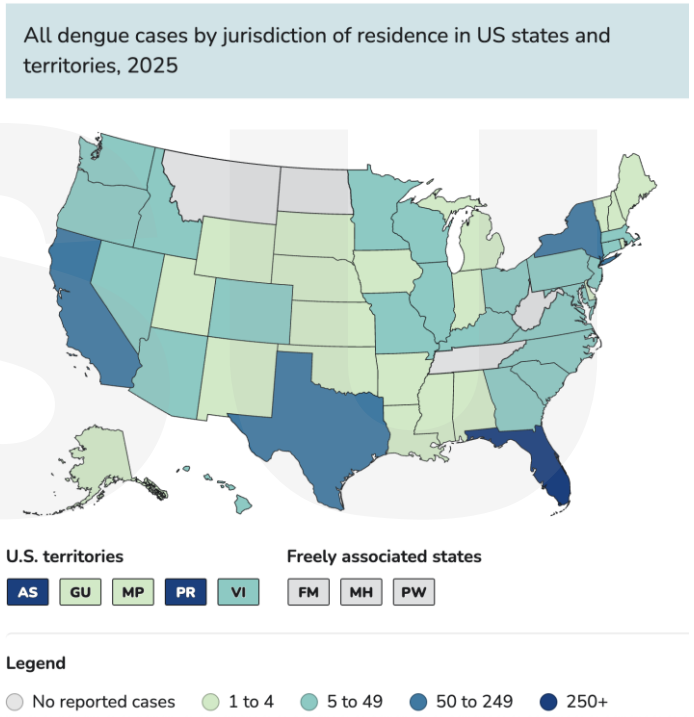
*Includes confirmed and probable disease cases
†Includes cases acquired through other routes (e.g., laboratory transmission)
‡Locally acquired cases reported from Florida in 2014 and from Texas in 2015

- During 2006–2013, an average of 28 people per year in the United States tested positive for recent chikungunya virus infection. All were travelers visiting or returning to the United States from affected areas in Asia, Africa, or the Indian Ocean.
- https://www.cdc.gov/chikungunya/data-maps/chikungunya-us.html

Dengue





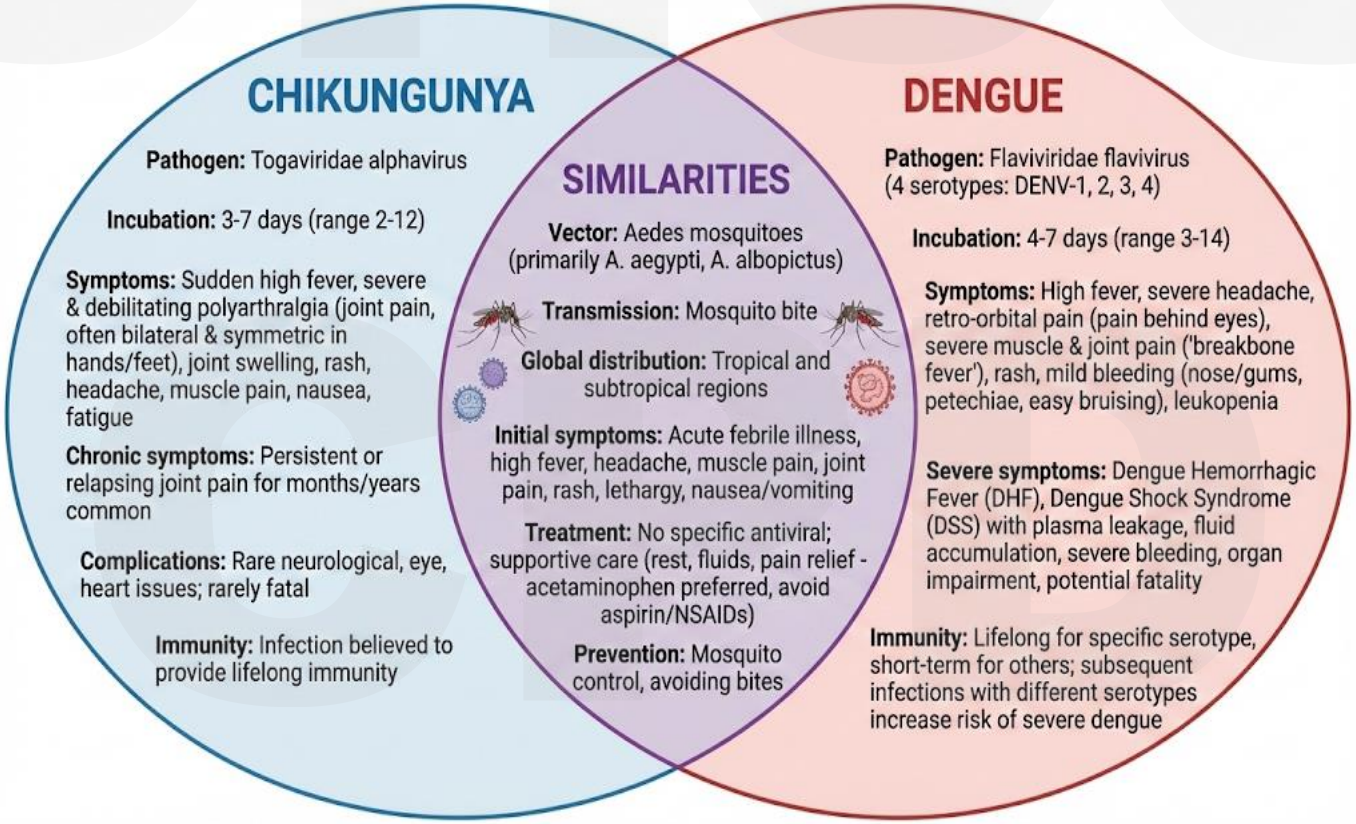


- Limited local spread of dengue has been reported in Florida, Hawaii, Texas, Arizona, and California.
- https://www.cdc.gov/dengue/data-research/facts-stats/historic-data.html

Chikungunya vs. Dengue

https://www.cdc.gov/mosquitoes/about/life-cycle-of-aedes-mosquitoes.html

RNA viruses from Aedes aegypti and albopictus mosquitoes



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Chikungunya vs. Dengue

Is it Chikungunya or Dengue?

Chikungunya and dengue are viruses most commonly transmitted by *Aedes aegypti* and *Aedes albopictus* mosquitoes. Anyone who lives in or has traveled to an area where chikungunya or dengue viruses are found is at risk for infection.

Chikungunya virus

- Approximately 3 in 4 people infected will develop disease.
- Incubation: 3–7 days (range: 2–12 days)
- Acute symptoms typically resolve within 7-10 days.
- Persons at risk for severe disease include neonates exposed intrapartum, older adults, and persons with underlying medical conditions.
- Infection is thought to confer lifetime immunity.
- Risk areas: http://www.cdc.gov/chikungunya/geo/index.html

Dengue virus

- Approximately 1 in 4 people infected will develop disease.
- Incubation: 4–7 days (range: 3–14 days)
- Some patients may develop life threatening consequences and require hospitalization.
- Since there are 4 distinct dengue viruses, a person can be infected up to 4 times. Infection with each dengue virus type confers lifetime immunity for that specific virus type.
- Risk areas: http://www.cdc.gov/dengue/

Treatment for Chikungunya and Dengue

Treat symptoms: Assess hydration and hemodynamic status and provide supportive care as needed. If adequate, instruct the patient to rest and drink fluids.

Treat or manage other conditions: Evaluate for other serious conditions (e.g., malaria and bacterial infections).

Relieve fever and pain: Recommend acetaminophen or paracetamol until dengue is ruled out. Aspirin and NSAIDs (like ibuprofen) can increase risk of bleeding in patients with dengue. NSAIDs, corticosteroids, or physiotherapy may help treat persistent joint pain.

Reduce risk of further transmission: Patients should protect themselves from further mosquito bites during the first week of illness to reduce the risk of local transmission. Vaccines are not available.

Signs and Symptoms

- Chikungunya begins as an acute febrile illness.
- Disease causes polyarthralgia; pain can be severe. Other common symptoms include headache, muscle pain, joint swelling, and rash.
- Some patients have persistence or relapse of rheumatologic symptoms in the months following acute illness.
- Mortality is rare and occurs mostly in older adults.

Signs and Symptoms

Dengue is an acute febrile illness that can vary in severity over a 5–7 day period. Recognizing warning signs for severe dengue and providing appropriate medical management can prevent morbidity and death.

Febrile Phase: Lasts 2–7 days after being bitten; can be biphasic.

- Fever with 2 or more of the following: Headache, retro-orbital pain, joint pain, muscle and/or bone pain, rash, mild bleeding (nose or gums, easy bruising), neutropenia

Critical Phase: Begins at defervescence, lasts 24–48 hours. Most patients improve but severe disease requiring hospitalization can occur.

- **Warning signs:** Evidence of plasma leakage–abdominal pain, persistent vomiting (at least 3 episodes/24 hours), clinical fluid accumulation, liver enlargement >2 cm, mucosal bleeding, lethargy or restlessness, hemoconcentration (↑HCT with rapid thrombocytopenia)

Recovery Phase (patient improvement):

- Gradual reabsorption of extravasated fluid from plasma leakage over 48–72 hours; diuresis; hemodynamic status stabilizes; patient can temporarily become bradycardic (but hemodynamically stable)

Diagnostic Testing: Test for both Chikungunya and Dengue

- Collect serum samples and order tests for both diseases.
- Contact your state health department for more information and to facilitate testing.
- For information on submitting diagnostic specimens for testing, including PRNT, to CDC: http://www.cdc.gov/ncezid/dvbd/specimensub/arboviral-shipping.html

Report Cases of Chikungunya and Dengue

- Both infections and diseases are nationally notifiable conditions.
- Contact state or local health department to report suspected and confirmed cases.

CDC

www.cdc.gov/chikungunya
www.cdc.gov/dengue

CS258812 October 14, 2015

https://clinicalgate.com/hansens-disease-leprosy/

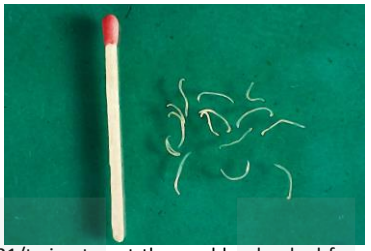
Leprosy

https://indiatomorrow.net/2015/04/25/ending-social-stigma-against-leprosy-patients/

- Hansen's disease from *mycobacterium leprae*
- ~ 200 cases per year in U.S., often from armadillo exposure
  - endemic in Central Florida?
- Sx onset up to 20 years after exposure
- Tx: rifampin, dapsone, and clofazimine for 1-2 years

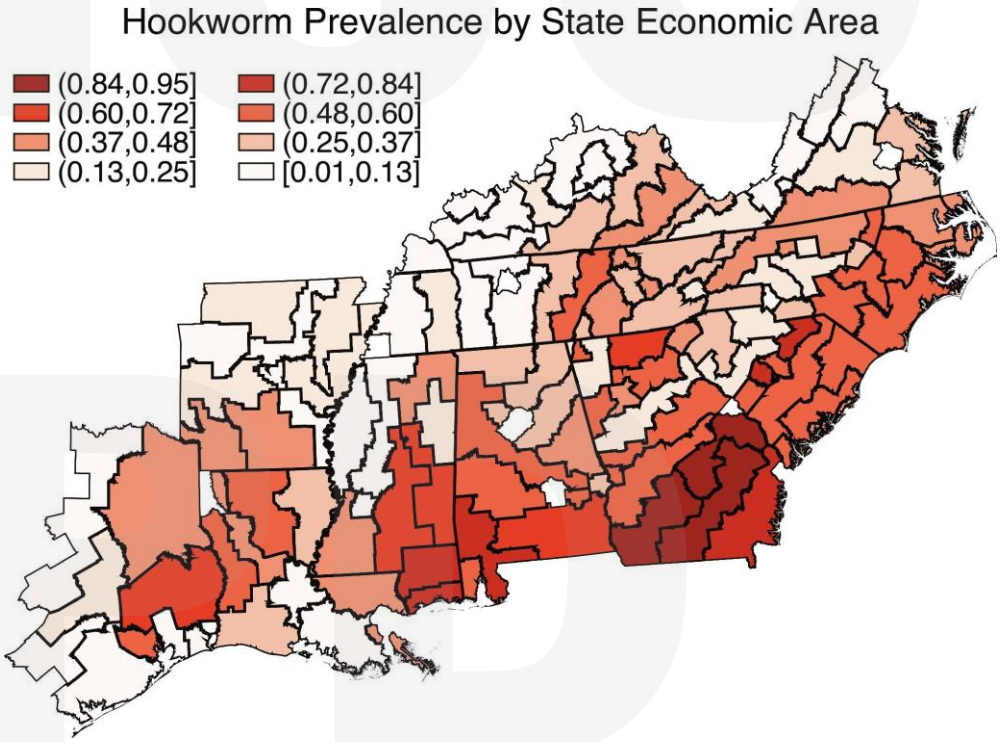
https://mdsearchlight.com/infectious-disease/hookworm/

Hookworm



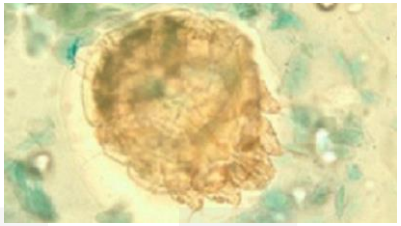
https://www.tpr.org/2015-07-21/trying-to-get-the-world-unhooked-from-hookworm

- In rural SE U.S.
- Warm, moist climates, sandy soil, and direct skin contact with contaminated soil (often from walking barefoot)

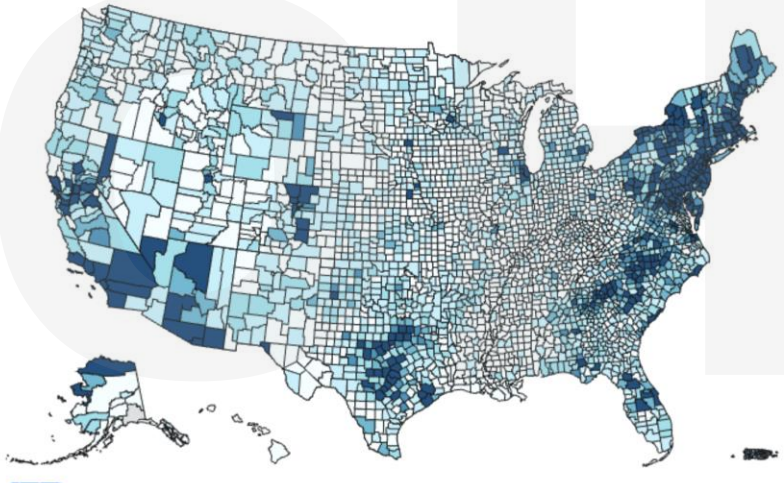


https://www.pnas.org/doi/10.1073/pnas.2504265122

Rabies and Scabies



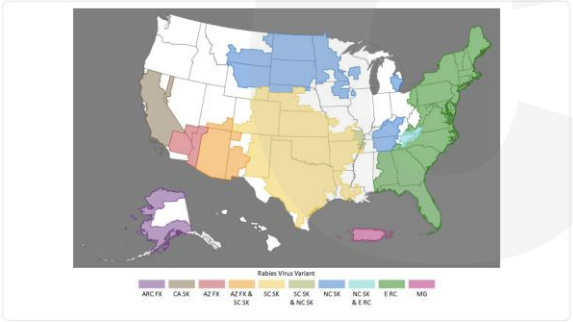
https://www.cdc.gov/scabies/about/index.html



Positive Rabies Cases 2019-2023

- 0
- 1-4
- 5-9
- 10-14
- 15-19
- 20+

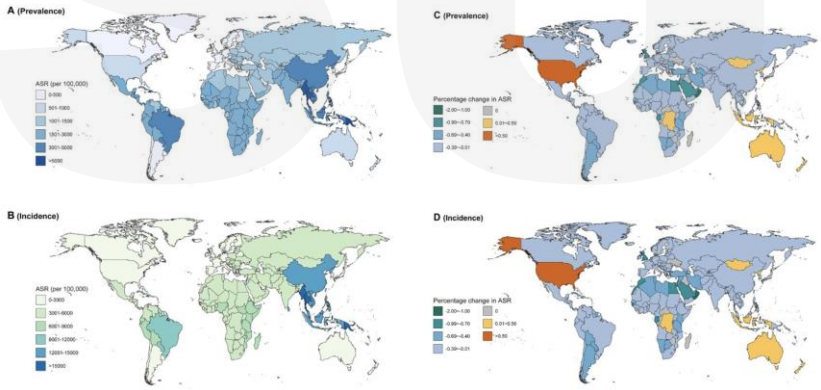
https://www.cdc.gov/rabies/php/protecting-public-health/index.html



Rabies variant territories in the United States

Rabies Virus Variant territories in the United States. Abbreviations: ARC FX = Arctic Fox, CA SK = California Skunk, AZ FX = Arizona Gray Fox, SC SK = South Central Skunk, NC SK = North Central Skunk, E RC = Eastern Raccoon, MG = Mongoose

Figure 1. The global distribution of age standardized rate (ASR) and the corresponding annual percentage change (APC) of scabies prevalence and incidence for both sexes. (A) The ASR of scabies prevalence in 2017; (B) The ASR of scabies incidence in 2017; (C) The APC in ASR of scabies prevalence from 1990 to 2017; (D) The APC in ASR of scabies incidence from 1990 to 2017.



- Rabies ~3 cases/yr, from bat bites
- Scabies affects ~1 million Americans annually

Reporting Protocols?

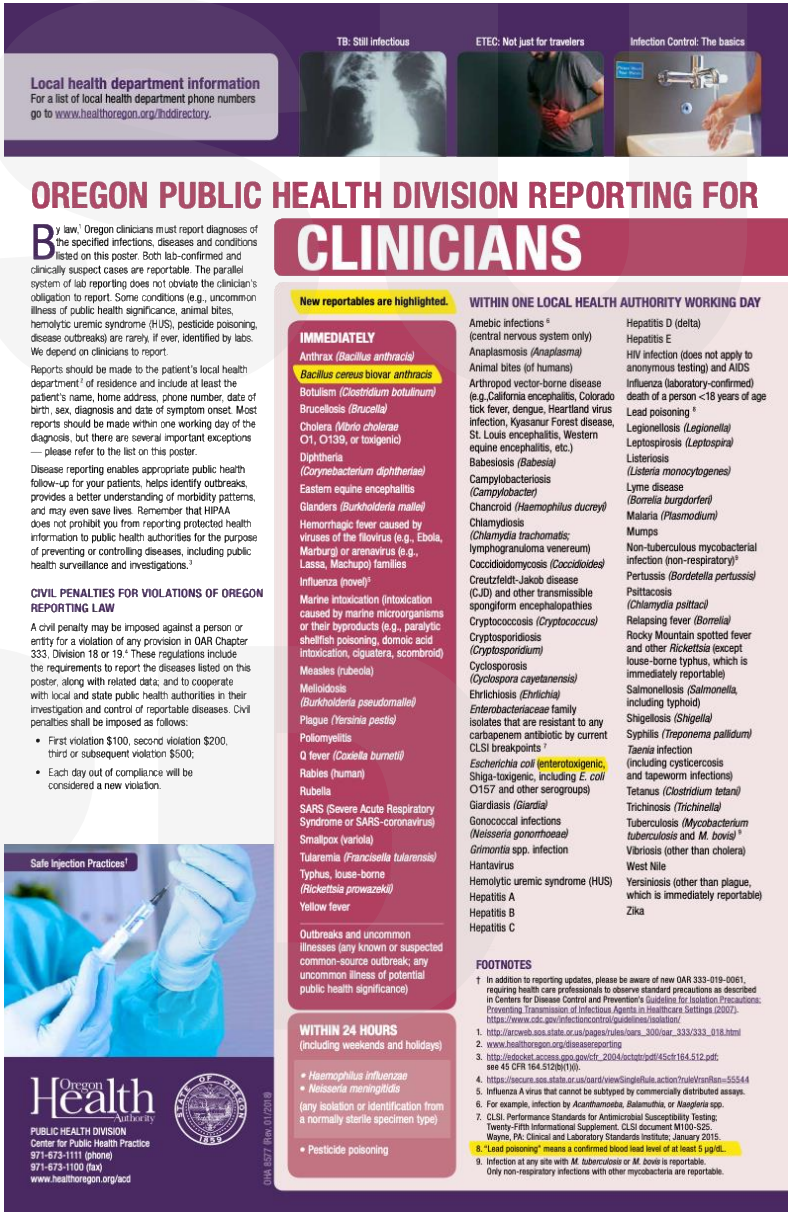
1. Local Health Department
2. Oregon Health Authority (OHA)
3. CDC National Notifiable Diseases Surveillance System (NNDSS)

Reportable Within One Working Day (Immediately)

- **Arthropod vector-borne diseases:** Including Dengue fever, Chikungunya, and various encephalitis types (California, St. Louis, West Nile, Western equine)
- **Malaria** (*Plasmodium* spp.)
- **Zika virus**
- **Yellow fever**
- **Plague** (*Yersinia pestis*)
- **Viral Hemorrhagic Fevers:** Such as Ebola, Marburg, or Lassa
- **Typhus** (louse-borne, *Rickettsia prowazekii*)
- **Cholera** (*Vibrio cholerae*)
- **Leptospirosis** (*Leptospira* spp.)
- **Tularemia** (*Francisella tularensis*)

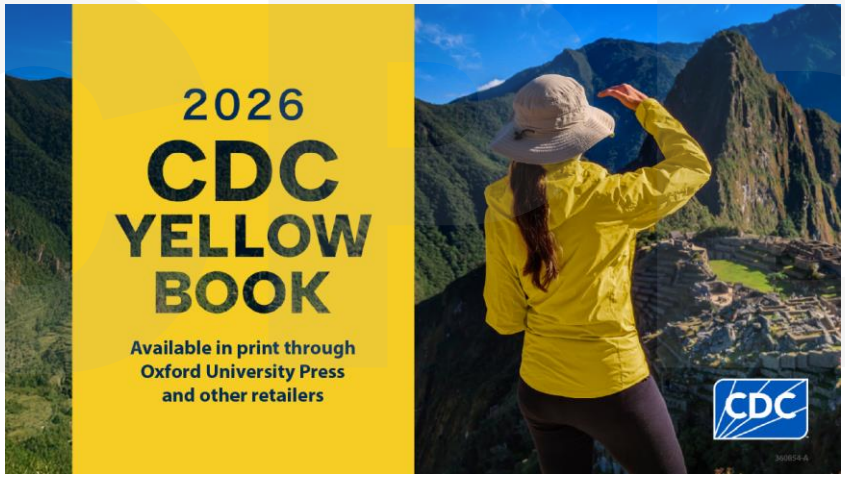
Other Reportable Parasitic/Tropical Infections

- **Amebic infections** (Central Nervous System only)
- **Babesiosis** (*Babesia* spp.)
- **Chagas disease** (American Trypanosomiasis) [0.1.2, 0.1.16 - *veterinary list, but generally included in surveillance*]
- **Cysticercosis** (*Taenia solium*)
- **Leishmaniasis** (*Leishmania* spp.) [0.1.1 - *veterinary list, but generally included in surveillance*]
- **Trichinosis** (*Trichinella* spp.)

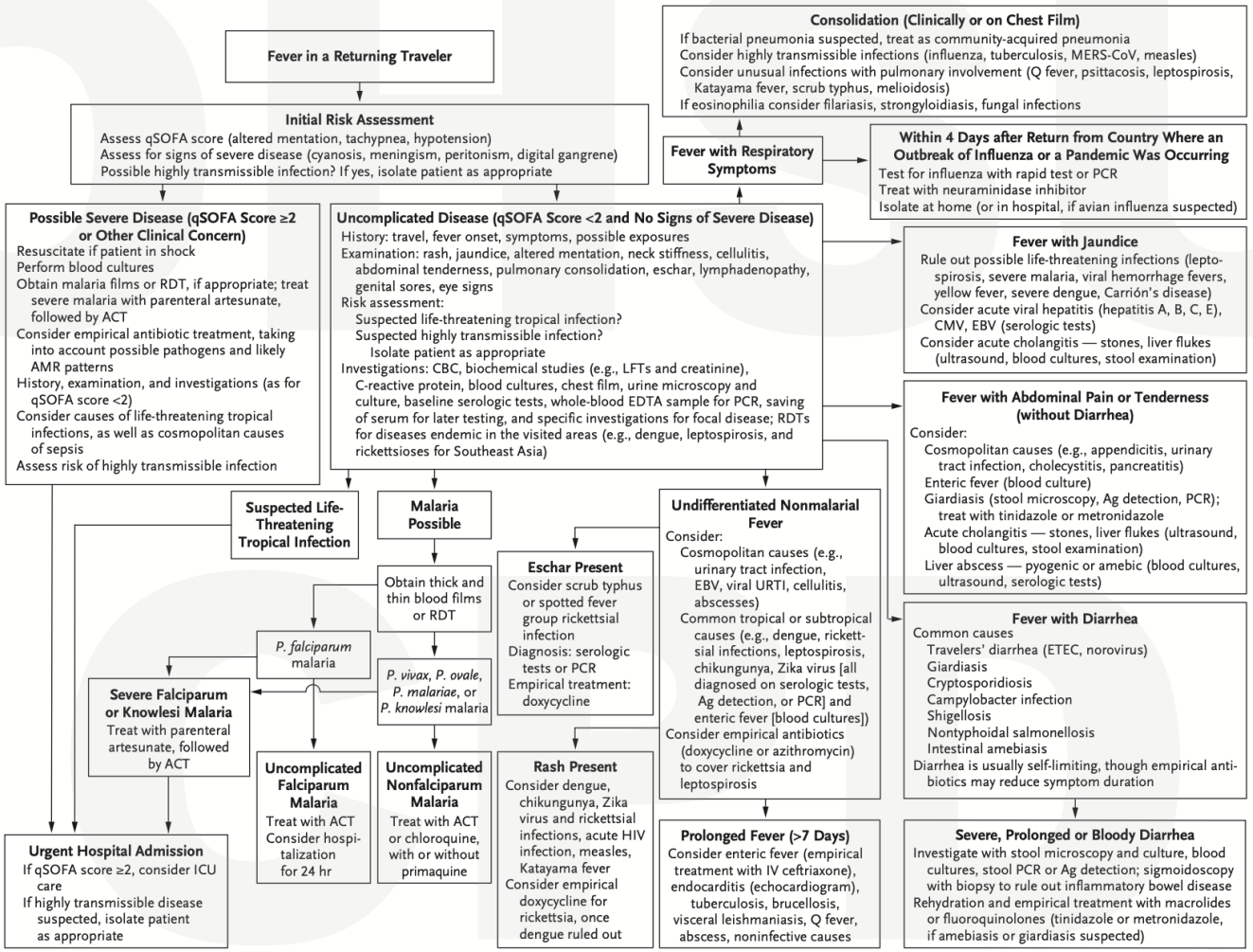


Key Take-Aways

- NTDs are nationally notifiable conditions
- Locally-acquired cases are increasing
- Consider having “travel-clinic” conversations when patients are traveling to the southern U.S.



Fevers in the Returning Traveler



Thwaites, G. E., & Day, N. P. J. (2017). Approach to fever in the returning traveler. *The New England Journal of Medicine*, *376*(18). https://doi.org/10.1056/NEJMc1703009

Case Study “Escape Room”

Can you diagnose and treat this returning traveler and escape the clinic room without catching the disease yourself?

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