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TRAVELERS' PERCEPTION OF RISK

David Shlim

Travel medicine is based on the concept of risk reduction. In the context of travel medicine, "risk" refers to the possibility of harm occurring during a trip. Some risks are avoidable, while others are not. For example, vaccine-preventable diseases can be mostly avoided, depending on the protective efficacy of the vaccine. Perception of risk is a subjective evaluation of whether a risk is considered large or small; is 1 in 10,000 a large risk or a small risk? Tolerance refers to acknowledging a risk and accepting it; a risk of 1 in 100,000 might be tolerable for one traveler but not for another. The overall perception of risk is based on a combination of likelihood and severity. A low likelihood of a severe and untreatable disease might be perceived as more important than the greater likelihood of a less severe disease.

The rates of diseases (e.g., typhoid fever, malaria, Japanese encephalitis [JE]) in a particular country or location might not suffice for clinicians or travelers to make an individualized decision. Disease risks can range from 1 in 500 (an estimate of the risk for typhoid fever in unvaccinated travelers to Nepal) to 1 in 1,000,000 (an estimate of the risk for JE in travelers to Asia), and travelers need to determine what these statistics mean to them. Additional information to help make an informed decision should, most importantly, include the severity of the disease, how readily the disease can be treated, and the length and type of travel. For example, the disease risks encountered by high-end African safari goers might be quite different than the disease risks for people going to work in resource-poor areas of the same countries.

Even when risk is low, travelers' decisions will still reflect their perception and tolerance of risk. When told that the risk for JE is 1 in 1,000,000, one traveler might reply, "Then I guess I don't have to worry about it," while another might say, "That 1 will be me!" Each traveler will have their own ideas about the risks, benefits, and costs of vaccines and drug prophylaxis; clinicians should discuss these with travelers in detail, with the goal of shared decision-making.

Perception and tolerance of risk are connected to the concept of commitment, particularly in regard to remote, adventurous travel. Commitment refers to the fact that certain parts of a journey might not easily be reversed once entered upon. For example, a traveler trekking into a remote area might need to accept that rescue, if available at all, could be delayed for days. A traveler who has a myocardial infarction in a country with no advanced cardiac services might have a difficult time obtaining definitive medical care. If the traveler has already contemplated and accepted this commitment, they can more appropriately prepare to deal with health concerns if they occur.

The goal of travel medicine should be to help travelers assess the various risks they could face and then educate them on how to manage and minimize, rather than try to eliminate, those risks. Travel medicine practitioners should discuss available risk statistics and discern the traveler's perception and tolerance of risk, including their concerns about the risks from vaccines and prophylactic medications. Once this is done, the provider can then help travelers find their individual comfort level when making decisions about destinations, activities, and prevention measures.

Coronavirus disease 2019 (COVID-19) has had a profound impact on travelers' perception of risk. Every aspect of travel is now colored by the presence of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), from the mixing of travelers on the journey itself, to destination

(continued)

TRAVELERS' PERCEPTION OF RISK (CONTINUED)

accommodations and dining venues, to recreation and tourism activities. In addition, now, more than ever before, individual travelers are confronting and addressing their role as potential conduits for the global spread of disease; to minimize the risk of COVID-19 transmission to others, responsible travel currently entails (at a minimum) pretravel vaccination, a negative COVID-19 test result, and posttravel quarantine. The constantly shifting landscape, unprecedented in travel medicine, has upended our understanding and perception of risk. Figuring out whether travel is even safe or wise has become the most prominent decision people must now make, with no easy answers. What is true one week can be completely different a week later.

Risk perception, as it relates to travel in the era of COVID-19, is twofold: the risk of acquiring the disease while traveling, and the risk of being stranded by sudden lockdowns, quarantine, and flight cancellations. Travelers now have to weigh all of these issues well in advance, when planning for the typical overseas journey starts, and try to make guesses about the situation that could exist months into the future. As travel medicine providers, the best guidance we can give to travelers is to refer them to reliable resources of information about the latest conditions at their destination and help them remain flexible and willing to cancel their trip, even at the last moment, if or when the situation at the destination begins to worsen.

. . . *perspectives* chapters supplement the clinical guidance in this book with additional content, context, and expert opinion. The views expressed do not necessarily represent the official position of the Centers for Disease Control and Prevention (CDC).

VACCINATION & IMMUNOPROPHYLAXIS—GENERAL PRINCIPLES

Andrew Kroger, Mark Freedman

The pretravel health consultation is an opportunity to administer routine vaccines that are recommended based on age and other individual characteristics, and travel medicine practitioners should therefore be familiar with the general principles of vaccination and immunoprophylaxis. Routine vaccinations that are usually administered during childhood and adolescence in the United States include diphtheria, tetanus, pertussis (DTaP); *Haemophilus influenzae* type b (Hib); hepatitis A (HepA), hepatitis B (HepB); human papillomavirus (HPV); measles-mumps-rubella (MMR); meningococcal vaccine (MenACWY); pneumococcal disease, including pneumococcal conjugate vaccine (PCV13) and pneumococcal polysaccharide vaccine (PPSV23); poliomyelitis (IPV); rotavirus; and varicella. Influenza vaccine routinely is recommended for all people aged ≥6 months each year. Herpes zoster (shingles) vaccine is recommended for adults aged ≥50 years old. PPSV23 is recommended for all adults ≥65 years old.

Some routine vaccinations are administered at earlier ages for international travelers. For example, measles-mumps-rubella (MMR) vaccine is indicated for infants aged 6–11 months who travel abroad, and hepatitis A vaccine is indicated for some infants aged 6–11 months who travel abroad, whereas these vaccines are not routinely given before age 12 months in the United States.

The Advisory Committee on Immunization Practices (ACIP) website (www.cdc.gov/vaccines/acip/index.html) outlines recommendations, background, adverse reactions, precautions, and contraindications for vaccines and toxoids. For information on vaccinating travelers with altered immune function, see Sec. 3, Ch. 1, Immunocompromised Travelers.

SPACING OF VACCINES & IMMUNOBIOLOGICS

In general, most common vaccines can be given at the same visit, at separate injection sites, without impairing antibody responses or increasing rates of adverse reactions, except as outlined below. Simultaneous administration of indicated vaccines is particularly advantageous for international travelers for whom exposure to several infectious diseases might be imminent. Injectable live vaccines should be administered at intervals of ≥28 days, if not administered simultaneously.

Coronavirus Disease 2019 Vaccines

Coronavirus disease 2019 (COVID-19) vaccines can be administered concomitantly with any other vaccines. For COVID-19 vaccine and immunization information, including interim clinical considerations, see www.cdc.gov/vaccines/covid-19/index.html.

Live-Virus Vaccines

The immune response to an injected or intranasal live-virus vaccine (e.g., MMR, varicella, live attenuated influenza vaccines [LAIV]), might be impaired if administered within 28 days of another live-virus vaccine. Typically, the immune response is impaired only for the second live-virus vaccine administered. Whenever possible, providers should administer injected or intranasal live-virus vaccines on different days ≥28 days apart. If 2 injected or intranasal live-virus vaccines are administered on separate days, but administered <28 days apart, the second vaccine is invalid and should be readministered ≥28 days after the invalid dose.

Measles and other live-virus vaccines can interfere with the response to tuberculin skin testing and the interferon-γ release assay. Tuberculin testing, if otherwise indicated, can be done either on the same day that live-virus vaccines are administered or ≥4 weeks later.

YELLOW FEVER VACCINE

There is no evidence that inactivated vaccines interfere with the immune response to yellow fever vaccine. Therefore, inactivated vaccines can be administered at any time around yellow fever vaccination, including simultaneously. ACIP recommends that yellow fever vaccine be given at the same time as most other live-virus vaccines.

Notwithstanding ACIP's recommendation, limited data suggest that coadministration of yellow fever vaccine with measles-rubella or MMR vaccines might decrease the immune response. One study involving the simultaneous administration of yellow fever and MMR vaccines and a second involving simultaneous administration of yellow fever and measles-rubella vaccines in children demonstrated a decreased immune response against all antigens (except measles) when the vaccines were given on the same day versus 30 days apart. Additional studies are needed to confirm these findings, but the findings suggest that, if possible, yellow fever and MMR vaccines should be given ≥30 days apart.

No data are available on immune response to nasally administered LAIV given simultaneously with yellow fever vaccine. Data from LAIV and MMR vaccines found no evidence of interference, however. If yellow fever vaccine and another injectable live-virus vaccine are not administered simultaneously or ≥30 days apart, providers might consider measuring the patient's neutralizing antibody response to vaccination before travel. Contact the state health department or the Centers for Disease Control and Prevention (CDC) Arboviral Disease Branch (970-221-6400) to discuss serologic testing.

Meningococcal & Pneumococcal Vaccines

In people with conditions that increase the risk for invasive pneumococcal disease (e.g., HIV infection, anatomic or functional asplenia [including sickle-cell disease]), the quadrivalent meningococcal vaccine Menactra (MenACWY-D), should be administered at least 4 weeks after completion of the pneumococcal conjugate vaccine (PCV13)

series. Menactra should not be used in children <2 years of age with these risk conditions; MenACWY-CRM (Menveo) can be used instead (see Sec. 5, Part 1, Ch. 13, Meningococcal Disease, for meningococcal vaccine schedules).

Menactra can be administered before or concomitantly with DTaP. If this is not possible, Menactra should be administered 6 months after DTaP in people with HIV infection, anatomic or functional asplenia (including sickle-cell disease), or persistent complement component deficiency, conditions that increase the risk for invasive meningococcal disease.

PCV13 and the pneumococcal polysaccharide vaccine (PPSV23) should be administered at least 8 weeks apart. The minimum interval might be longer than 8 weeks depending on risk-condition and the order in which the vaccines are administered.

Missed Doses & Boosters

In some cases, a scheduled dose of vaccine might not be given on time. Travelers might forget to return to complete a series or receive a booster at a specified time. If this occurs, the dose should be given at the next visit. Available data indicate that intervals longer than those routinely recommended between doses do not affect seroconversion rates or titer when the vaccine schedule is completed. Consequently, an extended interval between doses does not necessitate restarting the series or adding doses of any vaccine. One exception is the preexposure rabies vaccine series. If an extended interval passes between doses of the preexposure rabies vaccine series, clinicians should assess the patient's immune status by serologic testing 7–14 days after the final dose in the series.

Antibody-Containing Blood Products

Antibody-containing blood products from the United States (e.g., immune globulin [IG] products) do not interfere with the immune response to yellow fever vaccine and are not believed to interfere with the response to LAIV or rotavirus vaccines. When MMR and varicella vaccines are given shortly before, simultaneously with, or after an antibody-containing blood product, response to the vaccine can be diminished. The duration of inhibition of MMR and varicella vaccines is related to the dose of IG in the product. MMR and varicella vaccines should either be administered ≥2 weeks before receipt of a blood product or should be delayed 3–11 months after receipt of the blood product, depending on the dose and type of blood product (see Timing and Spacing of Immunobiologics, General Best Practice Guidelines for Immunization: Best Practices Guidance of the Advisory Committee on Immunization Practices; Table 3-6. Recommended intervals between administration of antibody-containing products and measles- or varicella-containing vaccine, by product and indication for vaccination [www.cdc.gov/vaccines/hcp/acip-recs/general-recs/timing.html#t-05]).

If IG administration becomes necessary for another indication after MMR or varicella vaccines have been given, the IG might interfere with the immune response to the MMR or varicella vaccines. Vaccine virus replication and stimulation of immunity usually occur 2–3 weeks after vaccination. If the interval between administration of one of these live vaccines and the subsequent administration of an IG preparation is ≥14 days, the vaccine need not be readministered. If the interval is <14 days, the vaccine should be readministered after the interval shown in Table 3-5 (referenced in the previous paragraph), unless serologic testing indicates that antibodies have been produced. Such testing should be performed after the interval shown in Table 3-5 to avoid detecting antibodies from the IG preparation.

In some circumstances, MMR or varicella vaccine might be indicated for a patient for preexposure (travel) or postexposure prophylaxis. The patient might have received an antibody-containing blood product unrelated to prophylaxis; nevertheless, a potential for vaccine interference exists. Providers can administer MMR or varicella vaccines because the increased risk for disease and the protection afforded by the vaccine outweigh the concern that the vaccine might be less effective because of interference. If the dose is administered, it does not count toward the routine vaccination series and an additional dose of MMR or varicella vaccine should be administered no earlier than the

minimum interval for the antibody-containing blood product (highlighted in ACIP's General Best Practice Guidelines for Immunization) applied to the invalid dose of vaccine.

When IG is given with the first dose of hepatitis A vaccine, the proportion of recipients who develop a protective level of antibody is not affected, but antibody concentrations are lower. Because the final concentrations of antibody are still many times higher than those considered protective, the reduced immunogenicity is not expected to be clinically relevant. However, the effect of reduced antibody concentrations on long-term protection is unknown.

IG preparations interact minimally with other inactivated vaccines and toxoids. Other inactivated vaccines can be given simultaneously or at any time interval before or after an antibody-containing blood product is used. However, such vaccines should be administered at different injection sites from the IG.

VACCINATING PEOPLE WITH ACUTE ILLNESSES

Clinicians should take every opportunity to provide needed vaccinations. The decision to delay vaccination because of a current or recent acute illness depends on the severity of the symptoms and their cause. Although a moderate or severe acute illness is sufficient reason to postpone vaccination, minor illnesses (e.g., diarrhea, mild upper respiratory infection with or without low-grade fever, other low-grade febrile illness) are not contraindications to vaccination.

Antimicrobial therapy is not a contraindication to vaccination, except for antiviral agents active against influenza virus (e.g., baloxavir, oseltamivir, peramivir, zanamivir), since these antivirals can interfere with the replication of the live vaccine. If LAIV is administered first, any of these 4 antiviral drugs should be delayed ≥2 weeks, if feasible. Conversely, clinicians should delay LAIV for 48 hours after oseltamivir or zanamivir; for 5 days after peramivir; and for 17 days after baloxavir. Alternatively, clinicians can substitute inactivated influenza vaccine (IIV) for LAIV. Use of antiviral agents active against herpes viruses (e.g., acyclovir), are a precaution against administration of varicella-containing vaccines (varicella, MMRV) because the antiviral agent will interfere with the live vaccine.

Antimicrobial agents can prevent adequate immune response to live attenuated oral typhoid and cholera vaccines.

VACCINATION SCHEDULING FOR SELECTED TRAVEL VACCINES

Table 2-04 lists the minimum ages and minimum intervals between doses for available travel vaccines recommended in the United States. Available travel vaccines, including Japanese encephalitis vaccine, rabies vaccine, inactivated typhoid vaccine, and yellow fever vaccine, do not have routine non-travel recommendations.

ALLERGIES TO VACCINE COMPONENTS

Vaccine components can cause allergic reactions in some recipients. Reactions can be local or systemic and can include anaphylaxis or anaphylactic-like responses. A previous severe allergic reaction to any vaccine, regardless of the component suspected of being responsible for the reaction, is a contraindication to future receipt of the vaccine. Vaccine components responsible for reactions can include adjuvants, animal proteins, antibiotics, the vaccine antigen, preservatives (e.g., thimerosal), stabilizers (e.g., gelatin), or yeast.

Antibiotics & Preservatives

Some vaccines contain trace amounts of antibiotics or preservatives to which people might be allergic. Antibiotics used during vaccine manufacture include gentamicin, neomycin, polymyxin B, and streptomycin. The antibiotics most likely to cause severe allergic reactions (e.g., penicillin, cephalosporins, and sulfa drugs) are not contained in vaccines. Providers administering vaccines should carefully review the prescribing information before deciding if a person with antibiotic allergy should receive the vaccine.

Hepatitis A vaccine, some hepatitis B vaccines, some influenza vaccines, MMR vaccine, IPV, rabies vaccine, smallpox vaccine, and varicella vaccine contain trace amounts of neomycin or other antibiotics; the amount is less than

Table 2-04 Recommended & minimum ages, minimum intervals for travel vaccine doses[1]

VACCINE NAME	DOSE	RECOMMENDED AGE	MINIMUM AGE	MINIMUM INTERVAL BETWEEN DOSES
Japanese encephalitis Vero cell (IXIARO)[2]	1	2 months–17 years old 18–65 years old	≥2 months old ≥18 years old	28 days 7 days
	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	
	2		7 days after DOSE 1	14 days
	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]

Abbreviations: N/A, not applicable; ViCPS, Vi capsular polysaccharide
[1]Adapted from Table 1, Centers for Disease Control and Prevention. General recommendations on immunization: recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR Recomm Rep. 2011;60(RR-2):1–61.
[2]IXIARO is approved by the US Food and Drug Administration for people aged ≥2 months.
[3]Preexposure immunization for rabies has no minimum age. Reference: Centers for Disease Control and Prevention. Human rabies prevention—United States, 2008: recommendations of the Advisory Committee on Immunization Practices. MMWR Recomm Rep. 2008;57(RR-3):1–28.
[4]Consider administering a third dose of preexposure rabies vaccine to people expecting long-term rabies exposure risks.
[5]Oral typhoid vaccine is recommended to be administered 1 hour before a meal with a cold or lukewarm drink (temperature not to exceed body temperature—98.6°F [37°C]) on alternate days, for a total of 4 doses.
[6]Yellow fever vaccine may be administered to children aged <9 months in certain situations. Reference: Centers for Disease Control and Prevention. Yellow fever vaccine: recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR Recomm Rep. 2010;59(RR-7):1–27.
[7]Subsequent doses of yellow fever vaccine are recommended for people who previously received vaccine while pregnant, with HIV, or prior to a hematopoietic stem cell transplant (HSCT). Subsequent doses of yellow fever vaccine also are recommended for people at increased risk of contracting yellow fever due to the specific location or duration of travel, or due to virulent virus exposure (e.g., yellow fever laboratory workers). For others, only 1 lifetime dose is recommended.

would normally be used for the skin test to determine hypersensitivity. However, people who have experienced anaphylactic reactions to neomycin generally should not receive these vaccines. Most often, neomycin allergic response is a contact dermatitis—a manifestation of a delayed-type (cell-mediated) immune response—rather than anaphylaxis. A history of delayed-type reactions to neomycin is not a contraindication to receiving these vaccines.

Egg Protein

The most common animal protein allergen is egg protein in vaccines prepared by using embryonated chicken eggs (e.g., yellow fever vaccine, some influenza vaccines).

People who can eat lightly cooked eggs (e.g., scrambled eggs) without a reaction are unlikely to be egg allergic. Egg-allergic people might tolerate egg in baked products (e.g., bread or cake). Tolerance to egg-containing foods does

not exclude the possibility of egg allergy. Egg allergy can be confirmed by a consistent medical history of adverse reactions to eggs and egg-containing foods, plus skin or blood testing for immunoglobulin E directed against egg proteins.

People with a history of egg allergy who have experienced only hives after exposure to egg may receive influenza vaccine. Any licensed and recommended influenza vaccine that is otherwise appropriate for the recipient's age and health status may be used.

Those who report having had reactions to egg involving symptoms other than hives (e.g., angioedema, recurrent emesis, lightheadedness, or respiratory distress), or who required epinephrine or another emergency medical intervention, may similarly receive any licensed and recommended influenza vaccine that is otherwise appropriate for the recipient's age and health status. The selected vaccine should be administered in an inpatient or outpatient medical setting, and vaccine administration should be supervised by a health care provider who is able to recognize and manage severe allergic conditions. Cell-culture influenza vaccine (ccIIV4) and recombinant influenza vaccine do not require administration in a supervised setting, since neither vaccine is isolated or grown in eggs nor contains egg protein.

If a person has an egg allergy or a positive skin test to yellow fever vaccine but the vaccination is recommended because of their travel destination–specific risk, desensitization can be performed under direct supervision of a physician experienced in the management of anaphylaxis.

Thimerosal

Thimerosal, an organic mercurial compound in use since the 1930s, has been added to certain immunobiologic products as a preservative for multidose vials. Receiving thimerosal-containing vaccines has been postulated to lead to allergy induction. However, limited scientific evidence is available for this assertion. Allergy to thimerosal usually consists of local delayed-type hypersensitivity reactions. Thimerosal elicits positive delayed-type hypersensitivity to patch tests in 1%–18% of people tested, but these tests have limited or no clinical relevance. Most people do not experience reactions to thimerosal administered as a component of vaccines, even when patch or intradermal tests for thimerosal indicate hypersensitivity. A localized or delayed-type hypersensitivity reaction to thimerosal is not a contraindication to receipt of a vaccine that contains thimerosal.

Since mid-2001, non-influenza vaccines routinely recommended for infants have been manufactured without thimerosal. Vaccines that still contain thimerosal as a preservative include some influenza vaccines, one DT vaccine (www.fda.gov/media/119411/download), and one Td vaccine. Additional information about thimerosal and the thimerosal content of vaccines is available on the US Food and Drug Administration website (www.fda.gov/vaccines-blood-biologics/safety-availability-biologics/thimerosal-and-vaccines).

INJECTION ROUTE & INJECTION SITE

Injectable vaccines are administered by intramuscular and subcutaneous routes. The injection method depends in part on the presence of an adjuvant in some vaccines. Adjuvant refers to a vaccine component, distinct from the antigen, which enhances the immune response to the antigen. Providers should inject vaccines containing an adjuvant (DTaP, DT, HepA, HepB, Hib, HPV, PCV13, Td, Tdap, recombinant zoster vaccine [RZV]) into a muscle mass because subcutaneous or intradermal administration can cause local induration, inflammation, irritation, skin discoloration, and granuloma formation.

Detailed discussion and recommendations about vaccination for people with bleeding disorders or receiving anticoagulant therapy are available in the ACIP's General Best Practices Guidelines for Immunization (www.cdc.gov/vaccines/hcp/acip-recs/general-recs/index.html).

Immunobiologic manufacturers recommend the routes of administration for each product. Deviation from the recommended route of administration can reduce vaccine efficacy or increase local adverse reactions. ACIP publishes detailed recommendations on the route and site for all vaccines. CDC compiled a list of these publications at www.cdc.gov/vaccines/hcp/acip-recs.

POST-IMMUNIZATION ADVERSE EVENT REPORTING

Modern vaccines are safe and effective. Benefits and risks are associated with the use of all immunobiologics. Adverse events after immunization have been reported with all vaccines, ranging from frequent, minor, local reactions (e.g., pain at the injection site), to extremely rare, severe, systemic illness, such as that associated with yellow fever vaccine. Adverse events following specific vaccines and toxoids are discussed in detail in each ACIP statement.

In the United States, clinicians are required by law to report selected adverse events occurring after vaccination with any vaccine in the recommended childhood series. In addition, CDC strongly recommends that all vaccine adverse events be reported to the Vaccine Adverse Event Reporting System (VAERS), even if a causal relation to vaccination is not certain. VAERS reporting forms and information are available electronically at www.vaers.hhs.gov or can be requested by telephone at 800-822-7967 (toll-free). Clinicians are encouraged to report electronically at https://vaers.hhs.gov/esub/index.jsp.

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INTERACTIONS BETWEEN TRAVEL VACCINES & DRUGS

Ilan Youngster, Elizabeth Barnett

During pretravel consultations, travel health providers must consider potential interactions between vaccines and medications, including those already taken by the traveler. A study by S. Steinlauf et al. identified potential drug–drug interactions with travel-related medications in 45% of travelers taking medications for chronic conditions; 3.5% of these interactions were potentially serious.

VACCINE–VACCINE INTERACTIONS

Most common vaccines can be given safely and effectively at the same visit, at separate injection sites, without impairing antibody response or increasing rates of adverse reactions. However, certain vaccines, including pneumococcal and meningococcal vaccines and live virus vaccines, require appropriate spacing; further information

about vaccine–vaccine interactions is found in Sec. 2, Ch. 3, Vaccination & Immunoprophylaxis—General Principles.

TRAVEL VACCINES & DRUGS

Live Attenuated Oral Typhoid & Cholera Vaccines

Live attenuated vaccines generally should be avoided in immunocompromised travelers, including those taking antimetabolites, calcineurin inhibitors, cytotoxic agents, immunomodulators, and high-dose steroids (see Table 3-04).

ANTIMALARIAL DRUGS

Chloroquine and atovaquone-proguanil at doses used for malaria chemoprophylaxis can be given concurrently with oral typhoid vaccine. Data from an older formulation of the CVD 103-HgR oral cholera vaccine suggest that the immune response to the vaccine might be diminished when given concomitantly with chloroquine. Administer live attenuated oral cholera vaccine ≥10 days before beginning antimalarial prophylaxis with chloroquine. A study in children using oral cholera vaccine suggested no decrease in immunogenicity when given with atovaquone-proguanil.

ANTIMICROBIAL AGENTS

Antimicrobial agents can be active against the vaccine strains in the oral typhoid and cholera vaccines and might prevent adequate immune response to these vaccines. Therefore, delay vaccination with oral typhoid vaccine by >72 hours and delay oral cholera vaccine by >14 days after administration of antimicrobial agents. Parenteral typhoid vaccine is an alternative to the oral typhoid vaccine for travelers who have recently received antibiotics.

Rabies Vaccine

Concomitant use of chloroquine can reduce the antibody response to intradermal rabies vaccine administered as a preexposure vaccination. Use the intramuscular route for people taking chloroquine concurrently. Intradermal administration of rabies vaccine is not currently approved for use in the United States (see Sec. 5, Part 2, Ch. 19, . . . *perspectives*: Rabies Immunization).

ANTIMALARIAL DRUGS

Any time a new medication is prescribed, including antimalarial drugs, check for known or possible drug interactions (see Table 2-05) and inform the traveler of potential risks. Online clinical decision support tools (e.g., Micromedex) provide searchable databases of drug interactions.

Atovaquone-Proguanil

ANTIBIOTICS

Rifabutin, rifampin, and tetracycline might reduce plasma concentrations of atovaquone and should not be used concurrently with atovaquone-proguanil.

ANTICOAGULANTS

Patients on warfarin might need to reduce their anticoagulant dose or monitor their prothrombin time more closely while taking atovaquone-proguanil, although coadministration of these drugs is not contraindicated. The use of novel oral anticoagulants, including dabigatran, rivaroxaban, and apixaban, is not expected to cause significant interactions, and their use has been suggested as an alternative for patients in need of anticoagulation.

ANTIEMETICS

Metoclopramide can reduce bioavailability of atovaquone; unless no other antiemetics are available, this antiemetic should not be used to treat vomiting associated with the use of atovaquone at treatment doses.

ANTIHISTAMINES

Travelers taking atovaquone-proguanil for malaria prophylaxis should avoid using cimetidine (an H2 receptor antagonist) because this medication interferes with proguanil metabolism.

HIV MEDICATIONS

Atovaquone-proguanil might interact with the antiretroviral protease inhibitors atazanavir, darunavir, indinavir, lopinavir, and ritonavir, or the nonnucleoside reverse transcriptase inhibitors (NNRTIs) efavirenz, etravirine, and nevirapine, resulting in decreased levels of atovaquone-proguanil. For travelers taking any of

Table 2-05 Drugs & drug classes that can interact with selected antimalarials

ANTIMALARIALS	DRUGS & DRUG CLASSES THAT CAN INTERACT
Atovaquone-proguanil	Cimetidine Fluvoxamine Metoclopromide Rifabutin Rifampin Tetracycline Warfarin
Chloroquine	Ampicillin Antacids Calcineurin inhibitors Cimetidine Ciprofloxacin CYP2D6 enzyme substrates[1] CYP3A4 enzyme inhibitors[2] Digoxin Kaolin Methotrexate QT-prolonging agents[3]
Doxycycline	Antacids Bismuth subsalicylate Barbiturates Calcineurin inhibitors Carbamazepine Iron-containing preparations mTOR inhibitors Penicillin Phenytoin Warfarin
Mefloquine	Antiarrhythmic agents Anticonvulsants Beta blockers Calcineurin inhibitors Calcium channel receptor antagonists CYP3A4 enzyme inducers[4] CYP3A4 enzyme inhibitors[2] H1 receptor antagonists Lumefantrine mTOR inhibitors Phenothiazines Protease inhibitors Tricyclic antidepressants

[1]Examples include flecainide, fluoxetine, metoprolol, paroxetine, and propranolol.
[2]Examples include antiretroviral protease inhibitors (e.g., atazanavir, darunavir, lopinavir, ritonavir, saquinavir); azole antifungals (e.g., itraconazole, ketoconazole, posaconazole, voriconazole); macrolide antibiotics (e.g., azithromycin, clarithromycin, erythromycin); selective serotonin reuptake inhibitors (SSRIs; e.g., fluoxetine, fluvoxamine, sertraline); and cobicistat.
[3]Examples include amiodarone, lumefantrine, and sotalol.
[4]Examples include efavirenz, etravirine, nevirapine, rifabutin, rifampin, and glucocorticoids.

these medications, consider alternative malaria chemoprophylaxis (https://clinicalinfo.hiv.gov/en/table/table-5-significant-pharmacokinetic-interactions-between-drugs-used-treat-or-prevent).

SELECTIVE SEROTONIN REUPTAKE INHIBITORS

Fluvoxamine interferes with the metabolism of proguanil; consider an alternative antimalarial prophylaxis to atovaquone-proguanil for travelers taking this selective serotonin reuptake inhibitor (SSRI).

Chloroquine

ANTACIDS & ANTIDIARRHEALS

Chloroquine absorption might be reduced by antacids or kaolin; travelers should wait ≥4 hours between doses of these medications.

ANTIBIOTICS

Chloroquine inhibits bioavailability of ampicillin, and travelers should wait ≥2 hours between doses of these medications. Chloroquine should not be coadministered with either clarithromycin or erythromycin; azithromycin is a suggested alternative (https://clinicalinfo.hiv.gov/en/table/table-5-significant-pharmacokinetic-interactions-between-drugs-used-treat-or-prevent). Chloroquine also reportedly decreases the bioavailability of ciprofloxacin.

ANTIHISTAMINES

Concomitant use of cimetidine and chloroquine should be avoided because cimetidine can inhibit the metabolism of chloroquine and increase drug levels.

CYP2D6 ENZYME SUBSTRATES

Chloroquine is a CYP2D6 enzyme inhibitor. Monitor patients taking chloroquine concomitantly with other substrates of this enzyme (e.g., flecainide, fluoxetine, metoprolol, paroxetine, propranolol) for side effects.

CYP3A4 ENZYME INHIBITORS

CYP3A4 inhibitors (e.g., erythromycin, ketoconazole, ritonavir) can increase chloroquine levels; concomitant use should be avoided.

DIGOXIN

Chloroquine can increase digoxin levels; additional monitoring is warranted.

IMMUNOSUPPRESSANTS

Chloroquine decreases the bioavailability of methotrexate. Chloroquine also can cause increased levels of calcineurin inhibitors; use caution when prescribing chloroquine to travelers taking these agents.

QT-PROLONGING AGENTS

Avoid prescribing chloroquine to anyone taking other QT-prolonging agents (e.g., amiodarone, lumefantrine, sotalol); when taken in combination, chloroquine might increase the risk for prolonged QTc interval. In addition, the antiretroviral rilpivirine has also been shown to prolong QTc, and clinicians should avoid coadministration with chloroquine.

Doxycycline

ANTACIDS, BISMUTH SUBSALICYLATE, IRON

Absorption of tetracyclines might be impaired by aluminum-, calcium-, or magnesium-containing antacids, bismuth subsalicylate, and preparations containing iron; advise patients not to take these preparations within 3 hours of taking doxycycline.

ANTIBIOTICS

Doxycycline can interfere with the bactericidal activity of penicillin; thus, in general, clinicians should not prescribe these drugs together. Coadministration of doxycycline with rifabutin or rifampin can lower doxycycline levels; monitor doxycycline efficacy closely or consider alternative therapy.

ANTICOAGULANTS

Patients on warfarin might need to reduce their anticoagulant dose while taking doxycycline because of its ability to depress plasma prothrombin activity.

ANTICONVULSANTS

Barbiturates, carbamazepine, and phenytoin can decrease the half-life of doxycycline.

ANTIRETROVIRALS

Doxycycline has no known interaction with antiretroviral agents.

IMMUNOSUPPRESSANTS

Concurrent use of doxycycline and calcineurin inhibitors or mTOR inhibitors (sirolimus) can cause increased levels of these immunosuppressant drugs.

Mefloquine

Mefloquine can interact with several categories of drugs, including anticonvulsants, other antimalarial drugs, and drugs that alter cardiac conduction.

ANTICONVULSANTS

Mefloquine can lower plasma levels of several anticonvulsant medications, including carbamazepine, phenobarbital, phenytoin, and valproic acid; avoid concurrent use of mefloquine with these agents.

ANTIMALARIAL DRUGS

Mefloquine is associated with increased toxicities of the antimalarial drug lumefantrine, which is available in the United States in fixed combination to treat people with uncomplicated *Plasmodium falciparum* malaria. The combination of mefloquine and lumefantrine can cause potentially fatal QTc interval prolongation. Lumefantrine should therefore be avoided or used with caution in patients taking mefloquine prophylaxis.

CYP3A4 ENZYME INDUCERS

CYP3A4 inducers include medications used to treat HIV or HIV-associated infections (e.g., efavirenz, etravirine, nevirapine, rifabutin) and tuberculosis (rifampin). St. John's wort and glucocorticoids are also CYP3A4 inducers. All these drugs (rifabutin and rifampin, in particular) can decrease plasma concentrations of mefloquine, thereby reducing its efficacy as an antimalarial drug.

CYP3A4 ENZYME INHIBITORS

Potent CYP3A4 inhibitors (e.g., antiretroviral protease inhibitors, atazanavir, cobicistat [available in combination with elvitegravir], darunavir, lopinavir, ritonavir, saquinavir); azole antifungals (itraconazole, ketoconazole, posaconazole, voriconazole); macrolide antibiotics (azithromycin, clarithromycin, erythromycin); and SSRIs (fluoxetine, fluvoxamine, sertraline), can increase levels of mefloquine and thus increase the risk for QT prolongation.

Although no conclusive data are available regarding coadministration of mefloquine and other drugs that can affect cardiac conduction, avoid mefloquine use, or use it with caution, in patients taking antiarrhythmic or β-blocking agents, antihistamines (H1 receptor antagonists), calcium channel receptor antagonists, phenothiazines, SSRIs, or tricyclic antidepressants.

IMMUNOSUPPRESSANTS

Concomitant use of mefloquine can cause increased levels of calcineurin inhibitors and mTOR inhibitors (cyclosporine A, sirolimus, tacrolimus).

ANTI-HEPATITIS C VIRUS PROTEASE INHIBITORS

Avoid concurrent use of mefloquine and direct-acting protease inhibitors (boceprevir and telaprevir) used to treat hepatitis C. Newer direct-acting protease inhibitors (grazoprevir, paritaprevir, simeprevir) are believed to be associated with fewer drug–drug interactions, but safety data are lacking; consider alternatives to mefloquine pending additional data.

PSYCHIATRIC MEDICATIONS

Avoid prescribing mefloquine to travelers with a history of mood disorders or psychiatric disease; this information is included in the US Food and Drug Administration boxed warning for mefloquine.

DRUGS USED TO TREAT TRAVELERS' DIARRHEA

Antimicrobials commonly prescribed as treatment for travelers' diarrhea have the potential for interacting with several different classes of drugs (Table 2-06). As mentioned previously, online clinical decision support tools provide searchable databases that can help identify interactions with medications a person may already be taking.

Table 2-06 Drugs & drug classes that can interact with selected antibiotics

ANTIBIOTICS	DRUGS & DRUG CLASSES THAT CAN INTERACT
Azithromycin	Artemether Calcineurin inhibitors HIV medications Warfarin
Fluoroquinolones	Antacids containing magnesium or aluminum hydroxide Sildenafil Theophylline Tizanidine Warfarin
Rifamycins	No clinical drug interactions have been studied; none are expected

Azithromycin

ANTICOAGULANTS

Increased anticoagulant effects have been noted when azithromycin is used with warfarin; monitor prothrombin time for people taking these drugs concomitantly.

ANTIMALARIAL DRUGS

Because additive QTc prolongation can occur when azithromycin is used with the antimalarial artemether, avoid concomitant therapy.

HIV MEDICATIONS

Drug interactions have been reported with the macrolide antibiotics, clarithromycin and erythromycin; antiretroviral protease inhibitors; and the NNRTIs, efavirenz and nevirapine. Concomitant use of azithromycin and these drugs can increase the risk of QTc prolongation, but a short treatment course is not contraindicated for those without an underlying cardiac abnormality. When azithromycin is used with the protease inhibitor nelfinavir, advise patients about possible drug interactions.

IMMUNOSUPPRESSANTS

Concurrent use of macrolides with calcineurin inhibitors can cause increased levels of drugs belonging to this class of immunosuppressants.

Fluoroquinolones

ANTACIDS

Concurrent administration of ciprofloxacin and antacids that contain magnesium or aluminum hydroxide can reduce bioavailability of ciprofloxacin.

ANTICOAGULANTS

An increase in the international normalized ratio (INR) has been reported when levofloxacin and warfarin are used concurrently.

ASTHMA MEDICATION

Ciprofloxacin decreases clearance of theophylline and caffeine; clinicians should monitor theophylline levels when ciprofloxacin is used concurrently.

IMMUNOSUPPRESANTS

Fluoroquinolones can increase levels of calcineurin inhibitors, and doses should be adjusted for renal function.

OTHERS

Sildenafil should not be used by patients taking ciprofloxacin; concomitant use is associated with increased rates of adverse effects. Ciprofloxacin and other fluoroquinolones should not be used in patients taking tizanidine.

Rifamycins

RIFAMYCIN SV

No clinical drug interactions have been studied. Because of minimal systemic rifamycin concentrations observed after the recommended dose, clinically relevant drug interactions are not expected.

RIFAXIMIN

Rifaximin is not absorbed in appreciable amounts by intact bowel, and no clinically significant drug interactions have been reported to date with rifaximin except for minor changes in INR when used concurrently with warfarin.

DRUGS USED FOR TRAVEL TO HIGH ELEVATIONS

Before prescribing the carbonic anhydrase inhibitor, acetazolamide, to those planning high elevation travel, carefully review with them the complete list of medications they are already taking (Table 2-07).

Acetazolamide

ACETAMINOPHEN & DICLOFENAC SODIUM

Acetaminophen and diclofenac sodium form complex bonds with acetazolamide in the stomach's acidic environment, impairing absorption. Neither agent should be taken within 30 minutes of acetazolamide. Patients taking acetazolamide also can experience decreased excretion of anticholinergics, dextroamphetamine, ephedrine, mecamylamine, mexiletine, and quinidine.

ANTICONVULSANTS

Acetazolamide should not be given to patients taking the anticonvulsant topiramate because concurrent use is associated with toxicity.

BARBITURATES & SALICYLATES

Acetazolamide causes alkaline urine, which can increase the rate of excretion of barbiturates and salicylates and could cause salicylate toxicity, particularly in patients taking a high dose of aspirin.

Table 2-07 Drugs & drug classes that can interact with selected altitude illness drugs

ALTITUDE ILLNESS DRUG	DRUGS & DRUG CLASSES THAT CAN INTERACT
Acetazolamide	Acetaminophen Anticholinergics Aspirin, high dose Barbiturates Calcineurin inhibitors Corticosteroids Dextroamphetamine Diclofenac sodium Ephedrine Mecamylamine Metformin Mexilitine Quinidine Topiramate
Dexamethasone	Anticholinesterases Anticoagulants Digitalis preparations Hypoglycemic agents Isoniazid Macrolide antibiotics Oral contraceptives Phenytoin

CORTICOSTEROIDS

Hypokalemia caused by corticosteroids could occur when used concurrently with acetazolamide.

DIABETES MEDICATIONS

Use caution when concurrently administering metformin and acetazolamide because of increased risk for lactic acidosis.

IMMUNOSUPPRESSANTS

Monitor cyclosporine, sirolimus, and tacrolimus more closely when given with acetazolamide.

Dexamethasone

Using dexamethasone to treat altitude illness can be lifesaving. Dexamethasone interacts with several classes of drugs, however, including: anticholinesterases, anticoagulants, digitalis preparations, hypoglycemic agents, isoniazid, macrolide antibiotics, oral contraceptives, and phenytoin.

HIV MEDICATIONS

Patients with HIV require additional consideration in the pretravel consultation (see Sec. 3, Ch. 1, Immunocompromised Travelers). A study from Europe showed that ≤29% of HIV-positive travelers disclose their disease and medication status when seeking pretravel advice. Antiretroviral medications have multiple drug interactions, especially through their activation or inhibition of the CYP3A4 and CYP2D6 enzymes.

Several instances of antimalarial prophylaxis and treatment failure in patients taking protease inhibitors and both nucleoside and NNRTIs have been reported. By contrast, entry and integrase inhibitors are not a common cause of drug–drug interactions with commonly administered travel-related medications.

Several potential interactions are listed above, and 2 excellent resources for HIV medication interactions can be found at www.hiv-druginteractions.org and https://clinicalinfo.hiv.gov/en. HIV preexposure prophylaxis with emtricitabine/tenofovir is not a contraindication for any of the commonly used travel-related medications.

HERBAL & NUTRITIONAL SUPPLEMENTS

Up to 30% of travelers take herbal or nutritional supplements. Many travelers consider them to be of no clinical relevance and might not disclose their use unless specifically asked during the pretravel consultation. Clinicians should give special attention to supplements that activate or inhibit CYP2D6 or CYP3A4 enzymes (e.g., ginseng, grapefruit extract, hypericum, St. John's wort). Advise patients against coadministration of herbal and nutritional supplements with medications that are substrates for CYP2D6 or 3A4 enzymes, including chloroquine, macrolides, and mefloquine.

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YELLOW FEVER VACCINE & MALARIA PREVENTION INFORMATION, BY COUNTRY

2

Mark Gershman, Rhett Stoney (Yellow Fever)
Holly Biggs, Kathrine Tan (Malaria)

The following pages present country-specific information on yellow fever (YF) vaccine requirements and recommendations, and malaria transmission information and prevention recommendations. Country-specific maps are included to aid in interpreting the information. The information in this chapter was accurate at the time of publication; however, it is subject to change at any time due to changes in disease transmission or, in the case of YF, changing entry requirements for travelers. Updated information reflecting changes since publication can be found in the online version of this book (www.cdc.gov/yellowbook) and on the Centers for Disease Control and Prevention (CDC) Travelers' Health website (https://wwwnc.cdc.gov/travel). Recommendations for prevention of other travel-associated illnesses can also be found on the CDC Travelers' Health website (https://wwwnc.cdc.gov/travel).

YELLOW FEVER VACCINE

Entry Requirements

Entry requirements for proof of YF vaccination under the International Health Regulations (IHR) differ from CDC's YF vaccination recommendations. Under the IHR, countries are permitted to establish YF vaccine entry requirements to prevent the importation and transmission of YF virus within their boundaries. Certain countries require proof of vaccination from travelers arriving from all countries (Table 5-24); some countries require proof of vaccination only for travelers above a certain age coming from countries with risk for YF virus transmission. The World Health Organization (WHO) defines areas with risk for YF virus transmission as countries or areas where YF virus activity has been reported currently or in the past, and where vectors and animal reservoirs exist.

Unless issued a medical waiver by a yellow fever vaccine provider, travelers must comply with entry requirements for proof of vaccination against YF.

WHO publishes a list of YF vaccine country entry requirements and recommendations for international travelers approximately annually. But because entry requirements are subject to change at any time, health care professionals and travelers should refer to the online version of this book (www.cdc.gov/yellowbook) and the CDC Travelers' Health website (https://wwwnc.cdc.gov/travel) for any updates before departure.

CDC Recommendations

CDC's YF vaccine recommendations are guidance intended to protect travelers from acquiring YF virus infections during international travel. These recommendations are based on a classification system for destination-specific risk for YF virus transmission: endemic, transitional, low potential for exposure, and no risk (Table 2-08). CDC recommends YF vaccination for travel to areas classified as having endemic or transitional risk (Maps 5-10 and 5-11). Because of changes in YF virus circulation, however, recommendations can change; therefore, before departure, travelers and clinicians should check CDC's destination pages for up-to-date YF vaccine information (https://wwwnc.cdc.gov/travel/destinations/list).

Duration of Protection

In 2015, the US Advisory Committee on Immunization Practices published a recommendation that 1 dose of YF vaccine provides long-lasting protection and is adequate for most

Table 2-08 Yellow fever (YF) vaccine recommendation categories[1]

YF VACCINE RECOMMENDATION CATEGORY	RATIONALE
Recommended	Vaccination recommended for all travelers ≥9 months old going to areas with endemic or transitional YF risk, as determined by persistent or periodic YF virus transmission
Generally not recommended	Vaccination generally not recommended for travel to areas where the potential for YF virus exposure is low, as determined by absence of reports of human YF and past evidence suggestive of only low levels of YF virus transmission Vaccination might be considered for a small subset of travelers at increased risk for exposure to YF virus due to prolonged travel, heavy mosquito exposure, or inability to avoid mosquito bites
Not recommended	Vaccination not recommended for travel to areas where there is no risk for YF virus transmission, as determined by absence of past or present evidence of YF virus circulation in the area or environmental conditions not conducive to YF virus transmission

[1]This table is an abbreviated version of Table 1 from: Jentes ES, Poumerol G, Gershman MD, et al. The revised global yellow fever risk map and recommendations for vaccination, 2010: consensus of the Informal WHO Working Group on Geographic Risk for Yellow Fever. Lancet Infect Dis. 2011 Aug;11(8):622–32. The categories of risk of YF virus transmission and corresponding categories of YF vaccine recommendations that appear here are taken unchanged from the referenced article.

travelers. The recommendation also identifies specific groups of travelers who should receive additional doses, and others for whom additional doses should be considered (see Sec. 5, Part 2, Ch. 26, Yellow Fever). In July 2016, WHO officially amended the IHR to stipulate that a completed International Certificate of Vaccination or Prophylaxis is valid for the lifetime of the vaccinee, and YF vaccine booster doses are not necessary. Moreover, countries cannot require proof of revaccination (booster) against YF as a condition of entry, even if the traveler's last vaccination was >10 years ago.

Ultimately, when deciding whether to vaccinate travelers, clinicians should take into account destination-specific risks for YF virus infection, and individual risk factors (e.g., age, immune status) for serious YF vaccine–associated adverse events, in the context of the entry requirements. See Sec. 5, Part 2, Ch. 26, Yellow Fever, for a full discussion of YF disease and vaccination guidance.

MALARIA PREVENTION

The following recommendations to protect travelers from malaria were developed using the best available data from multiple sources. Countries are not required to submit malaria surveillance data to CDC. On an ongoing basis, CDC actively solicits data from multiple sources, including WHO (main and regional offices); national malaria control programs; international organizations; CDC overseas offices; US military; academic, research, and aid organizations; and the published scientific literature. The reliability and accuracy of those data are also assessed.

If the information is available, trends in malaria incidence and other data are considered in the context of malaria control activities within a given country or other mitigating factors (e.g., natural disasters, wars, the coronavirus disease 2019 pandemic) that can affect the ability to control malaria or accurately count and report it. Factors such as the volume of travel to that country and the number of acquired cases reported in the US surveillance system are also examined. In developing its recommendations, CDC considers areas within countries where malaria transmission occurs, substantial occurrences of antimalarial drug resistance, the proportions of species present, and the available malaria prophylaxis options.

Clinicians should use these recommendations in conjunction with an individual risk assessment and consider not only the destination but also the detailed itinerary, including specific cities, types of accommodations, season, and style of travel, as well as special health conditions (e.g., pregnancy). Several medications are available for malaria prophylaxis. When deciding which drug to use, consider the itinerary and length of trip, travelers' previous adverse reactions to antimalarials, drug allergies, medical history, and drug costs. For a thorough discussion of malaria and guidance for prophylaxis, see Sec. 5, Part 3, Ch. 16, Malaria.

COUNTRY-SPECIFIC INFORMATION

AFGHANISTAN

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

Transmission areas: All areas <2,500 m (≈8,200 ft) elevation (April–December)
Drug resistance[2]: Chloroquine
Species: *P. vivax* (primarily); *P. falciparum* (less commonly)
Recommended chemoprophylaxis: Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]

ALBANIA

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥1 year old arriving from countries with risk for YF virus transmission[1]
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

ALGERIA

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥9 months old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission[1]
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

AMERICAN SAMOA, UNITED STATES

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

ANDORRA

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

ANGOLA

YELLOW FEVER VACCINE

Entry requirements: Required for all arriving travelers ≥9 months old
CDC recommended for all travelers ≥9 months old

MALARIA PREVENTION

Transmission areas: All
Drug resistance[2]: Chloroquine
Species: *P. falciparum* (primarily); *P. malariae*, *P. ovale*, and *P. vivax* (less commonly)
Recommended chemoprophylaxis: Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]

ANGUILLA, UNITED KINGDOM

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

ANTARCTICA

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

ANTIGUA & BARBUDA

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥1 year old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission[1]
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

ARGENTINA

YELLOW FEVER VACCINE (MAP 2-01)

Entry requirements: None
CDC recommendations:
Recommended for travelers ≥9 months old going to Corrientes and Misiones Provinces
Generally not recommended for travel to Formosa Province or to designated areas of Chaco, Jujuy, and Salta Provinces
Not recommended for travel limited to provinces and areas not listed above

MALARIA PREVENTION

No malaria transmission

ARMENIA

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

MAP 2-01 Yellow fever vaccine recommendations for Argentina & neighboring countries[1]

[1] For footnotes, see page 84

ARUBA, NETHERLANDS

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥9 months old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission[1]
Entry will be denied if a valid vaccination certificate cannot be provided
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

AUSTRALIA

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥1 year old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission[1]
Travelers arriving from the Galápagos Islands of Ecuador are exempt from this requirement
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

AUSTRIA

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

AZERBAIJAN

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

AZORES, PORTUGAL

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

BAHAMAS, THE

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥1 year old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission[1]
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

BAHRAIN

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥9 months old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission[1]
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

BANGLADESH

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥1 year old arriving from countries with risk for YF virus transmission; this includes airport transits or layovers in countries with risk for YF virus transmission[1]
CDC recommendation: Not recommended

MALARIA PREVENTION

Transmission areas: Districts of Chittagong Hill Tract (Bandarban, Khagrachari, and Rangamati); and the following districts: Chattogram (Chittagong) and Cox's Bazar (in Chattogram [Chittagong] Division); Mymensingh, Netrakona, and Sherpur (in Mymensingh Division); Kurigram (in Rangpur Division); Habiganj, Moulvibazar, Sunamganj, and Sylhet (in Sylhet Division)
No malaria transmission in Dhaka (the capital)
Drug resistance[2]: Chloroquine
Species: *P. falciparum* (90%); *P. vivax* (10%); *P. malariae* (rare)
Recommended chemoprophylaxis: Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]

BARBADOS

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥1 year old arriving from countries with risk for YF virus transmission[1]
Travelers arriving from Guyana or Trinidad & Tobago are exempt from this requirement, unless an outbreak is occurring
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

BELARUS

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

BELGIUM

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

BELIZE

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

Transmission areas: Rare transmission
No malaria transmission in Belize City or on islands frequented by tourists (e.g., Ambergris Caye)
Drug resistance[2]: None
Species: *P. vivax* (primarily)
Recommended chemoprophylaxis: None (insect bite precautions and mosquito avoidance only)[4]

BENIN

YELLOW FEVER VACCINE

Entry requirements: Required for all arriving travelers ≥9 months old
CDC recommended for all travelers ≥9 months old

MALARIA PREVENTION

Transmission areas: All
Drug resistance[2]: Chloroquine
Species: *P. falciparum* (primarily); *P. malariae*, *P. ovale*, and *P. vivax* (less commonly)
Recommended chemoprophylaxis: Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]

BERMUDA, UNITED KINGDOM

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

BHUTAN

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

Transmission areas: Rare cases in rural areas <1,700 m (≈5,500 ft) elevation in districts along the southern border shared with India
Drug resistance[2]: Chloroquine
Species: *P. vivax* (primarily); *P. falciparum* (less commonly)
Recommended chemoprophylaxis: None (insect bite precautions and mosquito avoidance only)[4]

BOLIVIA

YELLOW FEVER VACCINE (MAP 2-02)

Entry requirements: Required for travelers ≥1 year old arriving from countries with risk for YF virus transmission[1]

CDC recommendations:

Recommended for travelers ≥9 months old going to areas <2,300 m (≈7,550 ft) elevation, east of the Andes Mountains: the entire departments of Beni, Pando, Santa Cruz, and designated areas in the departments of Chuquisaca, Cochabamba, La Paz, and Tarija

Not recommended for travel limited to areas >2,300 m (≈7,550 ft) elevation and any areas not listed above, including the cities of La Paz (administrative capital) and Sucre (constitutional [legislative and judicial] capital)

MALARIA PREVENTION

Transmission areas: All areas <2,500 m (≈8,200 ft) elevation

No malaria transmission in La Paz (administrative capital)

Drug resistance[2]: Chloroquine

Species: *P. vivax* (99%); *P. falciparum* (1%)

Recommended chemoprophylaxis: Atovaquone-proguanil, doxycycline, mefloquine, primaquine,[5] tafenoquine[3]

MAP 2-02 Yellow fever vaccine recommendations for Bolivia & neighboring countries[1]

[1]For footnotes, see page 84

BONAIRE, NETHERLANDS

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥9 months old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission[1]
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

BOSNIA & HERZEGOVINA

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

BOTSWANA

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥1 year old arriving from countries with risk for YF virus transmission; this includes transits through countries with risk for YF virus transmission[1]
CDC recommendation: Not recommended

MALARIA PREVENTION

Transmission areas: Districts/subdistricts of Bobirwa, Boteti, Chobe (including Chobe National Park), Ghanzi, Mahalapye, Ngamiland (Ngami), North East (including its capital, Francistown), Okavango, Serowe/Palapye, and Tutume
Rare cases or sporadic foci of transmission in districts/subdistricts of Kgalagadi North, Kgatleng, Kweneng, and Southern
No malaria transmission in Gaborone (the capital)
Drug resistance[2]: Chloroquine
Species: *P. falciparum* (primarily); *P. malariae*, *P. ovale*, and *P. vivax* (less commonly)
Recommended chemoprophylaxis:
Districts/subdistricts of Bobirwa, Boteti, Chobe (including Chobe National Park), Ghanzi, Mahalapye, Ngamiland (Ngami), North East (including its capital, Francistown), Okavango, Serowe/Palapye, and Tutume: Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]
Areas with rare cases or sporadic foci of transmission: no chemoprophylaxis recommended (insect bite precautions and mosquito avoidance only)[4]

BRAZIL

YELLOW FEVER VACCINE (MAP 2-03)

Entry requirements: None
CDC recommendations:
Recommended for travelers ≥9 months old going to the states of Acre, Amapá, Amazonas, Distrito Federal (including the capital city, Brasília), Espírito Santo,* Goiás, Maranhão, Mato Grosso, Mato Grosso do Sul, Minas Gerais, Pará, Paraná,* Piauí, Rio de Janeiro (including the city of Rio de Janeiro and all coastal islands),* Rio Grande do Sul,* Rondônia, Roraima, Santa Catarina,* São Paulo (including the city of São Paulo and all coastal islands),* Tocantins, and designated areas of Bahia*.
Vaccination is also recommended for travelers going to Iguaçu Falls
Not recommended for travel limited to any areas not listed above, including the cities of Fortaleza and Recife
*In 2017, in response to a large YF outbreak in multiple eastern states, CDC expanded its vaccination recommendations for travelers going to Brazil. The expanded YF vaccination recommendations for these states are preliminary. For updates, refer to the CDC Travelers' Health website at https://wwwnc.cdc.gov/travel.

MALARIA PREVENTION (MAP 2-04)

Transmission areas: All areas in the states of Acre, Amapá, Amazonas, Rondônia, and Roraima
Present in the states of Maranhão, Mato Grosso, and Pará, but rare cases in their capital cities (São Luis [capital of Maranhão], Cuiabá [capital of Mato Grosso], Belém [capital of Pará])
Rural and forested areas in the states of Espírito Santo, Goiás, Minas Gerais, Mato Grosso do Sul, Piauí, Rio de Janeiro, São Paolo, and Tocantins
No malaria transmission in the cities of Brasília (the capital), Rio de Janeiro, or São Paolo
No malaria transmission at Iguaçu Falls
Drug resistance[2]: Chloroquine
Species: *P. vivax* (90%); *P. falciparum* (10%)
Recommended chemoprophylaxis:
Transmission areas: Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]
Areas with rare cases: No chemoprophylaxis recommended (insect bite precautions and mosquito avoidance only)[4]

BRITISH INDIAN OCEAN TERRITORY (INCLUDING DIEGO GARCIA), UNITED KINGDOM

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

BRUNEI

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥9 months old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission[1]
CDC recommendation: Not recommended

MALARIA PREVENTION

Transmission areas: No human malaria

MAP 2-03 Yellow fever vaccine recommendations for Brazil & neighboring countries[1]

[1] For footnotes, see page 84

MAP 2-04 Malaria prevention in Brazil

Rare transmission of *P. knowlesi*[6] in primarily forested or forest-fringe areas
Drug resistance: None
Species: *P. knowlesi*[6] (100%)
Recommended chemoprophylaxis: None (insect bite precautions and mosquito avoidance only)[4]

BULGARIA

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

BURKINA FASO

YELLOW FEVER VACCINE

Entry requirements: Required for all arriving travelers ≥9 months old
CDC recommended for all travelers ≥9 months old

MALARIA PREVENTION

Transmission areas: All
Drug resistance[2]: Chloroquine
Species: *P. falciparum* (primarily); *P. malariae*, *P. ovale*, and *P. vivax* (less commonly)
Recommended chemoprophylaxis: Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]

BURMA (MYANMAR)

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥1 year old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission[1]
CDC recommendation: Not recommended

MALARIA PREVENTION

Transmission areas: All areas <1,000 m (≈3,300 ft) elevation, including Bagan
Rare transmission in areas >1,000 m (≈3,300 ft) elevation
Drug resistance[2]: Chloroquine and mefloquine
Species: *P. vivax* (60%); *P. falciparum* (40%); *P. knowlesi*,[6] *P. malariae*, and *P. ovale* (rare)
Recommended chemoprophylaxis:
Areas <1,000 m (≈3,300 ft) elevation in the regions of Bago and Tanintharyi, and in the states of Kachin, Kayah, Kayin, and Shan: Atovaquone-proguanil, doxycycline, tafenoquine[3]
Areas <1,000 m (≈3,300 ft) elevation in all other areas: Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]
Areas >1,000 m (≈3,300 ft) elevation: No chemoprophylaxis recommended (insect bite precautions and mosquito avoidance only)[4]

BURUNDI

YELLOW FEVER VACCINE

Entry requirements: Required for all arriving travelers ≥9 months old
CDC recommended for all travelers ≥9 months old

MALARIA PREVENTION

Transmission areas: All
Drug resistance[2]: Chloroquine
Species: *P. falciparum* (primarily); *P. malariae*, *P. ovale*, and *P. vivax* (less commonly)
Recommended chemoprophylaxis: Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]

CAMBODIA

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥1 year old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission[1]
CDC recommendation: Not recommended

MALARIA PREVENTION

Transmission areas: Present throughout the country
No (or negligible) malaria transmission in the cities of Phnom Penh (the capital) and Siem Reap
No (or negligible) malaria transmission at the main temple complex at Angkor Wat
Drug resistance[2]: Chloroquine and mefloquine
Species: *P. vivax* (80%); *P. falciparum* (20%); *P. knowlesi*[6] (rare)
Recommended chemoprophylaxis: Atovaquone-proguanil, doxycycline, tafenoquine[3]

CAMEROON

YELLOW FEVER VACCINE

Entry requirements: Required for all arriving travelers ≥1 year old
CDC recommended for all travelers ≥9 months old

MALARIA PREVENTION

Transmission areas: All
Drug resistance[2]: Chloroquine
Species: *P. falciparum* (primarily); *P. malariae*, *P. ovale*, and *P. vivax* (less commonly)
Recommended chemoprophylaxis: Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]

CANADA

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

CANARY ISLANDS, SPAIN

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

CAPE VERDE

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥1 year old arriving from countries with risk for YF virus transmission[1]
CDC recommendation: Not recommended

MALARIA PREVENTION
Transmission areas: No indigenous cases reported since 2018
Previously, rare cases on Santiago (São Tiago) Island and Boa Vista Island
Drug resistance[2]: Previously, chloroquine
Species: Previously, *P. falciparum* (primarily)
Recommended chemoprophylaxis: None (insect bite precautions and mosquito avoidance only)[4]

CAYMAN ISLANDS, UNITED KINGDOM

YELLOW FEVER VACCINE
Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION
No malaria transmission

CENTRAL AFRICAN REPUBLIC

YELLOW FEVER VACCINE
Entry requirements: Required for all arriving travelers ≥9 months old
CDC recommended for all travelers ≥9 months old

MALARIA PREVENTION
Transmission areas: All
Drug resistance[2]: Chloroquine
Species: *P. falciparum* (primarily); *P. malariae*, *P. ovale*, and *P. vivax* (less commonly)
Recommended chemoprophylaxis: Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]

CHAD

YELLOW FEVER VACCINE (MAP 5-10)
Entry requirements: Required for travelers ≥9 months old arriving from countries with risk for YF virus transmission[1]
CDC recommendations:
Recommended for travelers ≥9 months old going to areas south of the Sahara Desert
Not recommended for travel limited to areas in the Sahara Desert

MALARIA PREVENTION
Transmission areas: All
Drug resistance[2]: Chloroquine
Species: *P. falciparum* (primarily); *P. malariae*, *P. ovale*, and *P. vivax* (less commonly)
Recommended chemoprophylaxis: Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]

CHILE

YELLOW FEVER VACCINE
Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION
No malaria transmission

CHINA

YELLOW FEVER VACCINE
Entry requirements: Required for travelers ≥9 months old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission[1]
Travelers with itineraries limited to Hong Kong Special Administrative Region (SAR) or Macao SAR are exempt from this requirement
CDC recommendation: Not recommended

MALARIA PREVENTION
No malaria transmission

CHRISTMAS ISLAND, AUSTRALIA

YELLOW FEVER VACCINE
Entry requirements: Required for travelers ≥1 year old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission[1]
Travelers arriving from the Galápagos Islands of Ecuador are exempt from this requirement
CDC recommendation: Not recommended

MALARIA PREVENTION
No malaria transmission

COCOS (KEELING) ISLANDS, AUSTRALIA

YELLOW FEVER VACCINE
Entry requirements: Required for travelers ≥1 year old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission[1]
Travelers arriving from the Galápagos Islands of Ecuador are exempt from this requirement
CDC recommendation: Not recommended

MALARIA PREVENTION
No malaria transmission

COLOMBIA

YELLOW FEVER VACCINE (MAP 2-05)
Entry requirements: Required for travelers ≥1 year old arriving from Angola, Brazil, Democratic Republic of the Congo, or Uganda; this includes >12-hour airport transits or layovers in any of these countries
CDC recommendations:
Recommended for all travelers ≥9 months old except as follows
Generally not recommended for travel limited to the cities of Barranquilla, Cali, Cartagena, or Medellín
Not recommended for travel limited to areas >2,300 m (≈7,550 ft) elevation, the archipelago department of San Andrés and Providencia, or the city of Bogotá (the capital)

MAP 2-05 Yellow fever vaccine recommendations for Colombia & neighboring countries[1]

[1] For footnotes, see page 84

MALARIA PREVENTION

Transmission areas: All areas <1,700 m (≈5,600 ft) elevation
No malaria transmission in the cities of Bogotá (the capital), Cartagena, or Medellín
Drug resistance[2]: Chloroquine
Malaria species: *P. falciparum* (50%), *P. vivax* (50%)
Recommended chemoprophylaxis: Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]

COMOROS

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

Transmission areas: All
Drug resistance[2]: Chloroquine
Species: *P. falciparum* (primarily); *P. malariae* and *P. vivax* (rare)
Recommended chemoprophylaxis: Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]

CONGO, REPUBLIC OF THE (CONGO-BRAZZAVILLE)

YELLOW FEVER VACCINE

Entry requirements: Required for all arriving travelers ≥9 months old
CDC recommended for all travelers ≥9 months old

MALARIA PREVENTION

Transmission areas: All
Drug resistance[2]: Chloroquine
Species: *P. falciparum* (primarily); *P. malariae*, *P. ovale*, and *P. vivax* (less commonly)
Recommended chemoprophylaxis: Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]

COOK ISLANDS, NEW ZEALAND

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

COSTA RICA

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥9 months old arriving from countries with risk for YF virus transmission[1]
Included in this requirement are travelers arriving from **Tanzania** and **Zambia**, and designated areas of: **Colombia** (the entire country, *except* the cities of Barranquilla, Bogotá, Cali, Cartagena, and Medellín, and the archipelago department, San Andrés and Providencia); **Ecuador** (the provinces of Morona-Santiago, Napo, Orellana, Pastaza, Sucumbíos, and Zamora-Chinchipe, and excluding the rest of the country); **Paraguay** (the entire country, *except* the city of Asunción); **Peru** (the entire country, *except* the cities of Cusco and Lima, the regions of Cajamarca, Lambayeque, Piura, and Tumbes, and the highland tourist areas of Machu Picchu and the Inca Trail); **Trinidad & Tobago** (the entire country, *except* the urban areas of Port of Spain; travelers with itineraries limited to the island of Tobago, and travelers with airport transits or layovers are also exempt from this requirement)
Travelers arriving from Argentina and Panama are exempt from this requirement
CDC recommendation: Not recommended

MALARIA PREVENTION

Transmission areas: Some transmission in Alajuela Province near the border with Nicaragua
Rare to no transmission in other parts of the country
Drug resistance[2]: None
Species: *P. vivax* (78%); *P. falciparum* (22%)
Recommended chemoprophylaxis:
Alajuela Province near the border with Nicaragua: Atovaquone-proguanil, chloroquine, doxycycline, mefloquine, tafenoquine[3]
All other areas: No chemoprophylaxis recommended (insect bite precautions and mosquito avoidance only)[4]

CÔTE D'IVOIRE (IVORY COAST)

YELLOW FEVER VACCINE

Entry requirements: Required for all arriving travelers ≥9 months old
CDC recommended for all travelers ≥9 months old

MALARIA PREVENTION

Transmission areas: All
Drug resistance[2]: Chloroquine
Species: *P. falciparum* (primarily); *P. malariae*, *P. ovale*, and *P. vivax* (less commonly)
Recommended chemoprophylaxis: Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]

CROATIA

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

CUBA

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥9 months old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission[1]
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

CURAÇAO, NETHERLANDS

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥9 months old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission[1]

CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

CYPRUS

YELLOW FEVER VACCINE

Entry requirements: None

CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

CZECH REPUBLIC

YELLOW FEVER VACCINE

Entry requirements: None

CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

DEMOCRATIC REPUBLIC OF THE CONGO (CONGO-KINSHASA)

YELLOW FEVER VACCINE

Entry requirements: Required for all arriving travelers ≥9 months old

CDC recommended for all travelers ≥9 months old

MALARIA PREVENTION

Transmission areas: All

Drug resistance[2]: Chloroquine

Species: *P. falciparum* (primarily); *P. malariae*, *P. ovale*, and *P. vivax* (less commonly)

Recommended chemoprophylaxis: Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]

DENMARK

YELLOW FEVER VACCINE

Entry requirements: None

CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

DJIBOUTI

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥1 year old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission[1]

CDC recommendation: Not recommended

MALARIA PREVENTION

Transmission areas: All

Drug resistance[2]: Chloroquine

Species: *P. falciparum* (60–70%); *P. vivax* (30–40%.); *P. ovale* (rare)

Recommended chemoprophylaxis: Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]

DOMINICA

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥1 year old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission[1]

CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

DOMINICAN REPUBLIC

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥1 year old arriving from the following states in Brazil: Espírito Santo, Mina Gerais, Rio de Janeiro, São Paulo; this includes >12-hour airport transits or layovers in any of these states

CDC recommendation: Not recommended

MALARIA PREVENTION

Transmission areas: Primarily in the provinces near the border with Haiti, and the provinces (including resort areas) of La Altagracia, San Cristóbal, San Juan, and Santo Domingo

In the Distrito Nacional, city of Santo Domingo (the capital), primarily in the La Ciénaga and Los Tres Brazos areas

Rare transmission in other provinces

Drug resistance[2]: None

Species: *P. falciparum* (100%)

Recommended chemoprophylaxis:

Provinces near the border with Haiti, and the provinces (including resort areas) of La Altagracia, San Cristóbal, San Juan, and Santo Domingo: Atovaquone-proguanil, chloroquine, doxycycline, mefloquine, tafenoquine[3]

All other areas: No chemoprophylaxis recommended (insect bite precautions and mosquito avoidance only)[4]

EASTER ISLAND, CHILE

YELLOW FEVER VACCINE

Entry requirements: Easter Island has not stated its YF vaccination certificate requirements

CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

ECUADOR (INCLUDING THE GALÁPAGOS ISLANDS)

YELLOW FEVER VACCINE (MAP 2-06)

Entry requirements: Required for travelers ≥1 year old arriving from Brazil, Democratic Republic of the Congo, or Uganda; this includes >12-hour airport transits or layovers in any of these countries

MAP 2-06 Yellow fever vaccine recommendations for Ecuador & neighboring countries[1]

[1] For footnotes, see page 84

CDC recommendations:
Recommended for travelers ≥9 months old going to areas <2,300 m (≈7,550 ft) elevation, east of the Andes Mountains, in the provinces of Morona-Santiago, Napo, Orellana, Pastaza, Sucumbíos, Tungurahua,* and Zamora-Chinchipe
Generally not recommended for travel limited to areas <2,300 m (≈7,550 ft) elevation, west of the Andes Mountains, in the provinces of Esmeraldas,* Guayas, Los Ríos, Manabí, Santa Elena, Santo Domingo de los Tsáchilas, and designated areas in the provinces of Azuay, Bolívar, Cañar, Carchi, Chimborazo, Cotopaxi, El Oro, Imbabura, Loja, and Pichincha
Not recommended for travel limited to areas >2,300 m (≈7,550 ft) elevation, the cities of Guayaquil or Quito (the capital), or the Galápagos Islands

*CDC recommendations differ from those published by WHO (www.who.int/travel-advice/vaccines).

MALARIA PREVENTION

Transmission areas: Areas <1,500 m (≈5,000 ft) elevation in the provinces of Carchi, Cotopaxi, Esmeraldas, Morona-Santiago, Orellana, Pastaza, and Sucumbíos
Rare cases <1,500 m (≈5,000 ft) in all other provinces
No malaria transmission in the cities of Guayaquil or Quito (the capital)
No malaria transmission on the Galápagos Islands
Drug resistance[2]: Chloroquine
Species: *P. vivax* (85%); *P. falciparum* (15%)

Recommended chemoprophylaxis:
Transmission areas in the provinces of Carchi, Cotopaxi, Esmeraldas, Morona-Santiago, Orellana, Pastaza, and Sucumbíos: Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]
All other areas with reported malaria transmission: No chemoprophylaxis recommended (insect bite precautions and mosquito avoidance only)[4]

EGYPT

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥9 months old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission[1]
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

EL SALVADOR

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥1 year old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission[1]
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

EQUATORIAL GUINEA

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥9 months old arriving from countries with risk for YF virus transmission[1]
CDC recommended for all travelers ≥9 months old

MALARIA PREVENTION

Transmission areas: All
Drug resistance[2]: Chloroquine
Species: *P. falciparum* (primarily); *P. malariae*, *P. ovale*, and *P. vivax* (less commonly)
Recommended chemoprophylaxis: Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]

ERITREA

YELLOW FEVER VACCINE (MAP 5-10)

Entry requirements: Required for travelers ≥9 months old arriving from countries with risk for YF virus transmission[1]
CDC recommendations:
Generally not recommended for travel to the regions of: Anseba, Debub (also known as South or Southern Region), Gash Barka, Ma'ekel (also known as Ma'akel or Central Region), or Semenawi K'eyih Bahri (also known as Northern Red Sea Region)
Not recommended for travel to any areas not listed above, including the Dahlak Archipelago

MALARIA PREVENTION

Transmission areas: All areas <2,200 m (≈7,200 ft) elevation
No malaria transmission in Asmara (the capital)
Drug resistance[2]: Chloroquine
Species: *P. falciparum* (80–85%); *P. vivax* (15–20%); *P. malariae* and *P. ovale* (rare)
Recommended chemoprophylaxis: Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]

ESTONIA

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

ESWATINI (SWAZILAND)

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥9 months old arriving from countries with risk for YF virus transmission; this includes airport transits or layovers in countries with risk for YF virus transmission[1]
CDC recommendation: Not recommended

MALARIA PREVENTION

Transmission areas: Eastern areas bordering Mozambique and South Africa, including the entire region of Lubombo and the eastern half of Hhohho, Manzini, and Shiselweni Regions
Drug resistance[2]: Chloroquine
Species: *P. falciparum* (primarily); *P. malariae*, *P. ovale*, and *P. vivax* (less commonly)
Recommended chemoprophylaxis: Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]

ETHIOPIA

YELLOW FEVER VACCINE (MAP 2-07)

Entry requirements: Required for travelers ≥9 months old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission[1]
CDC recommendations:
Recommended for all travelers ≥9 months old except as follows
Generally not recommended for travel limited to the regions of Afar or Somali

MALARIA PREVENTION

Transmission areas: All areas <2,500 m (≈8,200 ft) elevation, except none in Addis Ababa (the capital)
Drug resistance[2]: Chloroquine
Species: *P. falciparum* (80%); *P. vivax* (20%); *P. malariae* and *P. ovale* (rare)

MAP 2-07 Yellow fever vaccine recommendations for Ethiopia & neighboring countries[1]

[1] For footnotes, see page 84

Recommended chemoprophylaxis: Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]

FALKLAND ISLANDS (ISLAS MALVINAS), UK OVERSEAS TERRITORY (ALSO CLAIMED BY ARGENTINA)

YELLOW FEVER VACCINE

Entry requirements: None

CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

FAROE ISLANDS, DENMARK

YELLOW FEVER VACCINE

Entry requirements: None

CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

FIJI

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥1 year old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission[1]

CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

FINLAND

YELLOW FEVER VACCINE

Entry requirements: None

CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

FRANCE

YELLOW FEVER VACCINE

Entry requirements: None

CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

FRENCH GUIANA

YELLOW FEVER VACCINE

Entry requirements: Required for all arriving travelers ≥1 year old
CDC recommended for all travelers ≥9 months old

MALARIA PREVENTION

Transmission areas: Areas associated with gold mining, primarily the communes near the border with Brazil and Suriname, especially Régina and Saint-Georges-de-l'Oyapock; also, the communes of Kourou, Matoury, and Saint-Élie
No malaria transmission in coastal areas west of Kourou
No malaria transmission in Cayenne City (the capital)
Drug resistance[2]: Chloroquine
Species: *P. vivax* (85%); *P. falciparum* (15%); *P. malariae* (rare)
Recommended chemoprophylaxis: Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]

FRENCH POLYNESIA (INCLUDING THE SOCIETY ISLANDS [BORA-BORA, MOOREA & TAHITI], MARQUESAS ISLANDS [HIVA OA & UA HUKA], AND AUSTRAL ISLANDS [TUBUAI & RURUTU]), FRANCE

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥1 year old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission[1]
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

GABON

YELLOW FEVER VACCINE

Entry requirements: Required for all arriving travelers ≥9 months old
CDC recommended for all travelers ≥9 months old

MALARIA PREVENTION

Transmission areas: All
Drug resistance[2]: Chloroquine
Species: *P. falciparum* (primarily); *P. malariae*, *P. ovale*, and *P. vivax* (less commonly)
Recommended chemoprophylaxis: Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]

GAMBIA, THE

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥9 months old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission[1]
CDC recommended for all travelers ≥9 months old

MALARIA PREVENTION

Transmission areas: All
Drug resistance[2]: Chloroquine
Species: *P. falciparum* (primarily); *P. malariae*, *P. ovale*, and *P. vivax* (less commonly)
Recommended chemoprophylaxis: Atovaquone-proguanil, doxycycline, mefloquine, or tafenoquine[3]

GEORGIA

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

GERMANY

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

GHANA

YELLOW FEVER VACCINE

Entry requirements: Required for all arriving travelers ≥9 months old
CDC recommended for all travelers ≥9 months old

MALARIA PREVENTION

Transmission areas: All
Drug resistance[2]: Chloroquine
Species: *P. falciparum* (primarily); *P. malariae*, *P. ovale*, and *P. vivax* (less commonly)
Recommended chemoprophylaxis: Atovaquone-proguanil, doxycycline, mefloquine, or tafenoquine[3]

GIBRALTAR, UNITED KINGDOM

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

GREECE

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

Transmission areas: Rare, local transmission in agricultural areas, associated with imported malaria (May–November)
No malaria transmission in tourist areas

Drug resistance[2]: Not applicable
Species: *P. vivax* (100%)
Recommended chemoprophylaxis: None

GREENLAND, DENMARK

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

GRENADA

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥1 year old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission[1]
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

GUADELOUPE (INCLUDING MARIE-GALANTE, LA DÉSIRADE & ÎLES DES SAINTES ISLANDS)

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥1 year old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission[1]
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

GUAM, UNITED STATES

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

GUATEMALA

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥1 year old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission[1]
CDC recommendation: Not recommended

MALARIA PREVENTION

Transmission areas: Primarily in the departments of Alta Verapaz, Escuintla, Izabal, Petén, and Suchitepéquez
Few cases reported in other departments
No malaria transmission in the cities of Antigua or Guatemala City (the capital)
No malaria transmission at Lake Atitlán
Drug resistance[2]: None
Species: *P. vivax* (99%); *P. falciparum* (1%)
Recommended chemoprophylaxis:
Departments of Alta Verapaz, Escuintla, Izabal, Petén, and Suchitepéquez: Atovaquone-proguanil, chloroquine, doxycycline, mefloquine, primaquine,[5] tafenoquine[3]
Other areas with reported malaria transmission: No chemoprophylaxis recommended (insect bite precautions and mosquito avoidance only)[4]

GUINEA

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥9 months old arriving from countries with risk for YF virus transmission[1]
CDC recommended for all travelers ≥9 months old

MALARIA PREVENTION

Transmission areas: All
Drug resistance[2]: Chloroquine
Species: *P. falciparum* (primarily); *P. malariae*, *P. ovale*, and *P. vivax* (less commonly)
Recommended chemoprophylaxis: Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]

GUINEA-BISSAU

YELLOW FEVER VACCINE

Entry requirements: Required for all arriving travelers ≥1 year old
CDC recommended for all travelers ≥9 months old

MALARIA PREVENTION

Transmission areas: All
Drug resistance[2]: Chloroquine
Species: *P. falciparum* (primarily); *P. malariae*, *P. ovale*, and *P. vivax* (less commonly)
Recommended chemoprophylaxis: Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]

GUYANA

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥1 year old arriving from countries with risk for YF virus transmission; this includes >4-hour airport transits or layovers in countries with risk for YF virus transmission[1]
CDC recommended for all travelers ≥9 months old

MALARIA PREVENTION

Transmission areas: All
Rare cases in the cities of Georgetown (the capital) and New Amsterdam
Drug resistance[2]: Chloroquine
Species: *P. vivax* (60%); *P. falciparum* (40%)
Recommended chemoprophylaxis:

All areas (except the cities of Georgetown and New Amsterdam): Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]
Cities of Georgetown and New Amsterdam: No chemoprophylaxis recommended (insect bite precautions and mosquito avoidance only)[4]

HAITI

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥1 year old arriving from countries with risk for YF virus transmission[1]
CDC recommendation: Not recommended

MALARIA PREVENTION

Transmission areas: All (including Labadie, also known as Port Labadee)
Drug resistance[2]: None
Species: *P. falciparum* (99%); *P. malariae* (rare)
Recommended chemoprophylaxis: Atovaquone-proguanil, chloroquine, doxycycline, mefloquine, tafenoquine[3]

HONDURAS

YELLOW FEVER VACCINE

Entry requirements: Required for travelers 1-60 years old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission[1]
CDC recommendation: Not recommended

MALARIA PREVENTION

Transmission areas:
Throughout the country and on the island of Roatán and other Bay Islands
No malaria transmission in the cities of San Pedro Sula or Tegucigalpa (the capital)
Drug resistance[2]: None
Species: *P. vivax* (93%); *P. falciparum* (7%)
Recommended chemoprophylaxis: Atovaquone-proguanil, chloroquine, doxycycline, mefloquine, tafenoquine[3]

HONG KONG SPECIAL ADMINISTRATIVE REGION, CHINA

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

HUNGARY

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

ICELAND

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

INDIA

YELLOW FEVER VACCINE

Entry requirements: Any traveler ≥9 months old arriving by air or by sea without a YF vaccination certificate will be detained in isolation for ≤6 days if they

- Arrive within 6 days of leaving an area with risk for YF virus transmission, or
- Have been in such an area in transit (exception: passengers and members of flight crews who, while in transit through an airport in an area with risk for YF virus transmission, remained in the airport during their entire stay and the health officer agrees to such an exemption), or
- Arrive on a ship that started from or touched at any port in an area with risk for YF virus transmission ≤30 days before its arrival in India, unless such a ship has been disinsected in accordance with the procedure recommended by the World Health Organization (WHO), or
- Arrive on an aircraft that has been in an area with risk for YF virus transmission and has not been disinsected in accordance with the Indian Aircraft Public Health Rules, 1954, or as recommended by WHO.

The following countries are regarded by the Government of India as areas with risk for YF virus transmission.

- **Africa**: Angola, Benin, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Equatorial Guinea, Ethiopia, Gabon, The Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Mali, Mauritania, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, South Sudan, Sudan, Togo, Uganda
- **Americas**: Argentina, Bolivia, Brazil, Colombia, Ecuador, French Guiana, Guyana, Panama, Paraguay, Peru, Suriname, Trinidad & Tobago (Trinidad only), Venezuela

When a case of YF is reported from any country, the Government of India regards that country as an area with risk for YF virus transmission and adds it to the above list.
CDC recommendation: Not recommended

MALARIA PREVENTION

Transmission areas: Throughout the country, including the cities of Bombay (Mumbai) and New Delhi (the capital)

No malaria transmission in areas >2,000 m (≈6,500 ft) elevation in Himachal Pradesh, Jammu and Kashmir, or Sikkim
Drug resistance[2]: Chloroquine
Species: *P. vivax* (50%); *P. falciparum* (>40%); *P. malariae* and *P. ovale* (rare)
Recommended chemoprophylaxis: Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]

INDONESIA

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥9 months old arriving from countries with risk for YF virus transmission[1]
CDC recommendation: Not recommended

MALARIA PREVENTION

Transmission areas: All areas of eastern Indonesia (the provinces of Maluku, North Maluku, East Nusa Tenggara, Papua, and West Papua), including the town of Labuan Bajo and the Komodo Islands in the Nusa Tenggara region
Rural areas of Kalimantan (Borneo), West Nusa Tenggara (includes the island of Lombok), Sulawesi, and Sumatra
Low transmission in rural areas of Java, including Pangandaran, Sukabumi, and Ujung Kulon
No malaria transmission in the cities of Jakarta (the capital) or Ubud
No malaria transmission in the resort areas of Bali or Java, the Gili Islands, or the Thousand Islands (Pulau Seribu)
Drug resistance[2]: Chloroquine (*P. falciparum* and *P. vivax*)
Species: *P. falciparum* (60%); *P. vivax* (40%); *P. knowlesi*,[6] *P. malariae*, and *P. ovale* (rare)
Recommended chemoprophylaxis: Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]

IRAN

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥9 months old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission[1]
CDC recommendation: Not recommended

MALARIA PREVENTION

Transmission areas: No indigenous cases reported since 2017
Previously, in rural areas of the provinces of Fars and Sistan va Baluchestan, and southern, tropical regions of the provinces of Hormozgan and Kerman (March–November)
Drug resistance[2]: Previously, chloroquine
Species: Previously, *P. vivax* (93%) and *P. falciparum* (7%)
Recommended chemoprophylaxis: None (insect bite precautions and mosquito avoidance only)[4]

IRAQ

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

IRELAND

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

ISRAEL

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

ITALY (INCLUDING HOLY SEE [VATICAN CITY])

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

JAMAICA

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥1 year old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission[1]
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

JAPAN

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

JORDAN

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

KAZAKHSTAN

YELLOW FEVER VACCINE

Entry requirements: Required for travelers arriving from countries with risk for YF virus transmission; this includes airport transits or layovers in countries with risk for YF virus transmission[1]
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

KENYA

YELLOW FEVER VACCINE (MAP 2-08)

Entry requirements: Required for travelers ≥1 year old arriving from countries with risk for YF virus transmission[1]
CDC recommendations:
Recommended for all travelers ≥9 months old except as follows
Generally not recommended for travel limited to: the city of Nairobi (the capital); the counties of the former North Eastern Province (Mandera, Wajir, and Garissa); or the counties (except Taita-Taveta) of the former Coast Province (Kilifi, including the city of Malindi; Kwale; Lamu; Mombasa, including the city of Mombasa; Tana River)

MALARIA PREVENTION (MAP 2-09)

Transmission areas: All areas (including game parks) <2,500 m (≈8,200 ft) elevation, including the city of Nairobi (the capital)
Drug resistance[2]: Chloroquine
Species: *P. falciparum* (primarily); *P. malariae*, *P. ovale*, and *P. vivax* (less commonly)
Recommended chemoprophylaxis: Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]

KIRIBATI (FORMERLY GILBERT ISLANDS; INCLUDING TARAWA, TABUAERAN [FANNING ISLAND] & BANABA [OCEAN ISLAND])

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

KOSOVO

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

KUWAIT

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

KYRGYZSTAN

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

LAOS

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

Transmission areas: All, except in Vientiane (the capital) where there is no transmission
Drug resistance[2]: Chloroquine and mefloquine
Species: *P. vivax* (55%); *P. falciparum* (45%); *P. knowlesi*,[6] *P. malariae*, and *P. ovale* (rare)
Recommended chemoprophylaxis:
Areas bordering Burma (the provinces of Bokeo and Luang Namtha), Cambodia; Thailand (the provinces of Champasak and Salavan); and Vietnam: Atovaquone-proguanil, doxycycline, tafenoquine[3]
All other areas with malaria transmission: Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]

LATVIA

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

LEBANON

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

LESOTHO

YELLOW FEVER VACCINE

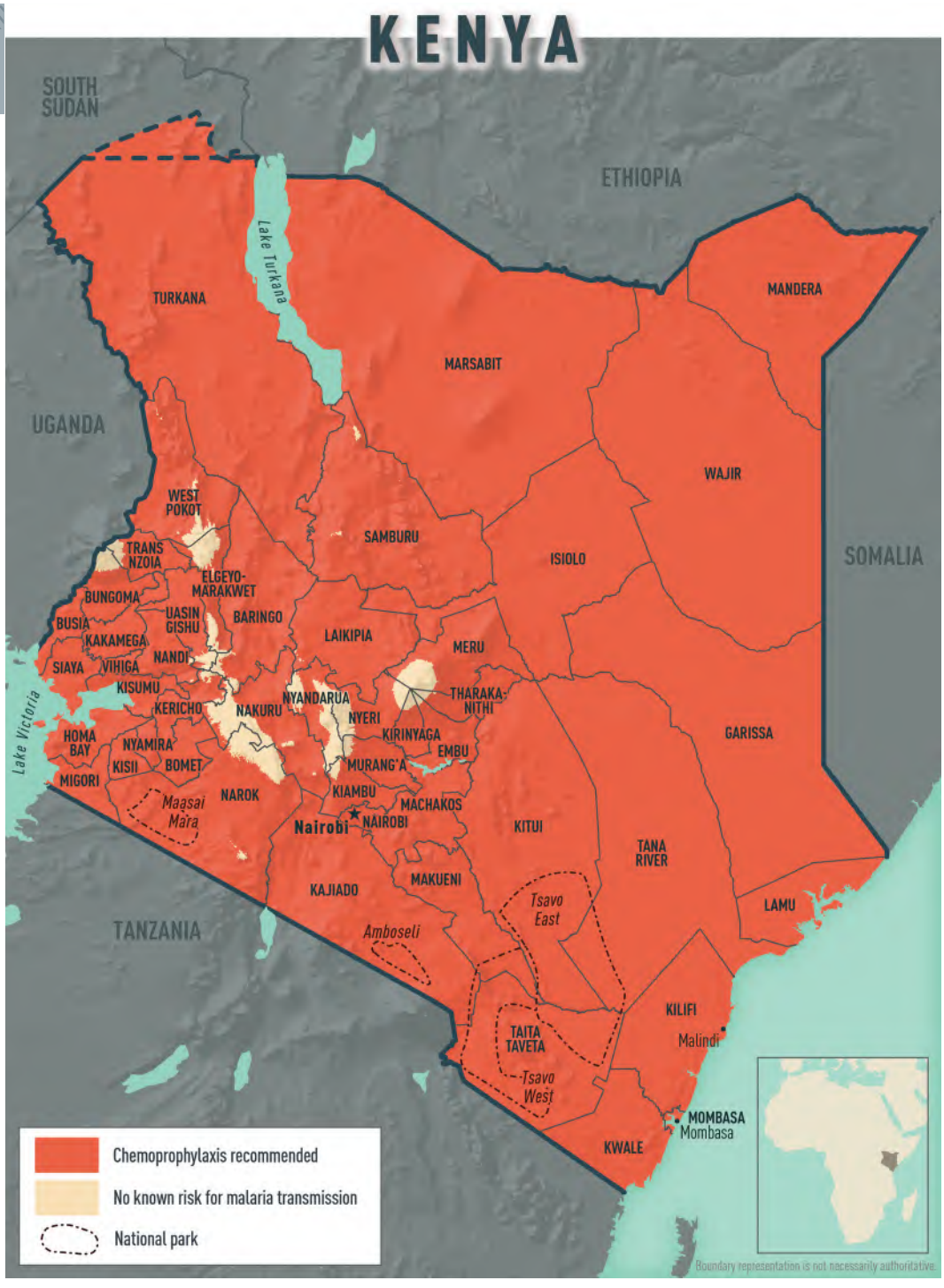
Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

MAP 2-08 Yellow fever vaccine recommendations for Kenya & neighboring countries[1]

[1] For footnotes, see page 84



MAP 2-09 Malaria prevention in Kenya

LIBERIA

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥9 months old arriving from countries with risk for YF virus transmission[1]
CDC recommended for all travelers ≥9 months old

MALARIA PREVENTION

Transmission areas: All
Drug resistance[2]: Chloroquine
Species: *P. falciparum* (primarily); *P. malariae*, *P. ovale*, and *P. vivax* (less commonly)
Recommended chemoprophylaxis: Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]

LIBYA

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

LIECHTENSTEIN

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

LITHUANIA

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

LUXEMBOURG

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

MACAU SPECIAL ADMINISTRATIVE REGION, CHINA

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

MADAGASCAR

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥9 months old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission[1]
CDC recommendation: Not recommended

MALARIA PREVENTION

Transmission areas: All; except in Antananarivo (the capital) where malaria transmission is rare
Drug resistance[2]: Chloroquine
Species: *P. falciparum* (primarily); *P. ovale* and *P. vivax* (less commonly)
Recommended chemoprophylaxis:
All areas (except the city of Antananarivo): Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]
Antananarivo: No chemoprophylaxis recommended (insect bite precautions and mosquito avoidance only)[4]

MADEIRA ISLANDS, PORTUGAL

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

MALAWI

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥1 year old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission[1]
CDC recommendation: Not recommended

MALARIA PREVENTION

Transmission areas: All
Drug resistance[2]: Chloroquine
Species: *P. falciparum* (primarily); *P. malariae*, *P. ovale*, and *P. vivax* (less commonly)
Recommended chemoprophylaxis: Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]

MALAYSIA

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥1 year old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission[1]
CDC recommendation: Not recommended

MALARIA PREVENTION

Transmission areas: No indigenous cases of human malaria since 2017
Zoonotic transmission of simian malaria occurs in rural, forested areas
No malaria transmission in other areas, including Kuala Lumpur (the capital), in Penang State, on Penang Island, or in George Town (capital of Penang State)
Drug resistance[2]: Previously, chloroquine
Species: *P. knowlesi*[6] (primarily); previously, *P. falciparum*, *P. malariae*, *P. ovale*, and *P. vivax*
Recommended chemoprophylaxis: In rural, forested areas: Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]

MALDIVES

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥9 months old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission[1]
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

MALI

YELLOW FEVER VACCINE (MAP 5-10)

Entry requirements: Required for all arriving travelers ≥9 months old
CDC recommendations:
Recommended for travelers ≥9 months old going to areas south of the Sahara Desert
Not recommended for travel limited to areas in the Sahara Desert

MALARIA PREVENTION

Transmission areas: All
Drug resistance[2]: Chloroquine
Species: *P. falciparum* (primarily); *P. malariae*, *P. ovale*, and *P. vivax* (less commonly)
Recommended chemoprophylaxis: Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]

MALTA

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥9 months old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission[1]
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

MARSHALL ISLANDS

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

MARTINIQUE

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥1 year old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission[1]
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

MAURITANIA

YELLOW FEVER VACCINE (MAP 5-10)

Entry requirements: Required for travelers ≥1 year old arriving from countries with risk for YF virus transmission[1]
CDC recommendations:
Recommended for travelers ≥9 months old going to areas south of the Sahara Desert
Not recommended for travel limited to areas in the Sahara Desert

MALARIA PREVENTION

Transmission areas: All; except in the regions of Dakhlet Nouadhibou and Tiris Zemmour where there is no transmission
Drug resistance[2]: Chloroquine
Species: *P. falciparum* (primarily); *P. malariae*, *P. ovale*, and *P. vivax* (less commonly)
Recommended chemoprophylaxis: Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]

MAURITIUS

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

MAYOTTE

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥1 year old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission[1]
CDC recommendation: Not recommended

MALARIA PREVENTION

Transmission areas: Rare cases
Drug resistance[2]: Chloroquine
Species: *P. falciparum* (primarily); *P. malariae*, *P. ovale*, and *P. vivax* (less commonly)
Recommended chemoprophylaxis: None (insect bite precautions and mosquito avoidance only)[4]

MEXICO

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MAP 2-10 Malaria prevention in Mexico

MALARIA PREVENTION (MAP 2-10)

Transmission areas: Chiapas State and southern part of Chihuahua State
Rare in the states of Campeche, Durango, Nayarit, Quintana Roo, Sinaloa, Sonora, and Tabasco
No malaria transmission along the US–Mexico border
Drug resistance[2]: None
Species: *P. vivax* (100%)
Recommended chemoprophylaxis:
Chiapas State and southern part of Chihuahua State: Atovaquone-proguanil, chloroquine, doxycycline, mefloquine, primaquine,[5] tafenoquine[3]
All other areas with malaria transmission: No chemoprophylaxis recommended (insect bite precautions and mosquito avoidance only)[4]

MICRONESIA, FEDERATED STATES OF (INCLUDING CHUUK, KOSRAE, POHNPEI & YAP)

YELLOW FEVER VACCINE
Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION
No malaria transmission

MOLDOVA

YELLOW FEVER VACCINE
Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION
No malaria transmission

MONACO

YELLOW FEVER VACCINE
Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION
No malaria transmission

MONGOLIA

YELLOW FEVER VACCINE
Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION
No malaria transmission

MONTENEGRO

YELLOW FEVER VACCINE
Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION
No malaria transmission

MONTSERRAT, UNITED KINGDOM

YELLOW FEVER VACCINE
Entry requirements: Required for travelers ≥1 year old arriving from countries with risk for YF virus transmission; this includes airport transits or layovers in countries with risk for YF virus transmission[1]
CDC recommendation: Not recommended

MALARIA PREVENTION
No malaria transmission

MOROCCO

YELLOW FEVER VACCINE
Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION
No malaria transmission

MOZAMBIQUE

YELLOW FEVER VACCINE
Entry requirements: Required for travelers ≥1 year old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission[1]
CDC recommendation: Not recommended

MALARIA PREVENTION
Transmission areas: All
Drug resistance[2]: Chloroquine
Species: *P. falciparum* (primarily); *P. malariae*, *P. ovale*, and *P. vivax* (less commonly)
Recommended chemoprophylaxis: Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]

NAMIBIA

YELLOW FEVER VACCINE
Entry requirements: Required for travelers ≥9 months old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission[1]
CDC recommendation: Not recommended

MALARIA PREVENTION
Transmission areas: In the regions of Kavango (East and West), Kunene, Ohangwena, Omaheke, Omusati, Oshana, Oshikoto, Otjozondjupa, and Zambezi
Rare in other parts of the country
No malaria transmission in Windhoek (the capital)
Drug resistance[2]: Chloroquine
Species: *P. falciparum* (primarily); *P. malariae*, *P. ovale*, and *P. vivax* (less commonly)
Recommended chemoprophylaxis:
Kavango (East and West), Kunene, Ohangwena, Omaheke, Omusati, Oshana, Oshikoto, Otjozondjupa, and Zambezi: Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]

All other areas with malaria transmission: No chemoprophylaxis recommended (insect bite precautions and mosquito avoidance only)[4]

NAURU

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

NEPAL

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥9 months old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission[1]
CDC recommendation: Not recommended

MALARIA PREVENTION

Transmission areas:
Throughout the country in areas <2,000 m (≈6,500 ft) elevation
No malaria transmission in Kathmandu (the capital) or on typical Himalayan treks
Drug resistance[2]: Chloroquine
Species: *P. vivax* (primarily); *P. falciparum* (<10%)
Recommended chemoprophylaxis: Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]

NETHERLANDS

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

NEW CALEDONIA, FRANCE

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥1 year old arriving from countries with risk for YF virus transmission; this includes >12-hour airport transits or layovers in countries with risk for YF virus transmission[1]
In the event of an epidemic threat to the territory, a specific vaccination certificate may be required
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

NEW ZEALAND

YELLOW FEVER VACCINE

Entry requirements: None
CDC recommendation: Not recommended

MALARIA PREVENTION

No malaria transmission

NICARAGUA

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥1 year old arriving from countries with risk for YF virus transmission[1]
CDC recommendation: Not recommended

MALARIA PREVENTION

Transmission areas: Región Autónoma Atlántico Norte (RAAN) and Región Autónoma Atlántico Sur (RAAS)
Rare cases in the departments of Boaco, Chinandega, Estelí, Jinotega, León, Matagalpa, and Nueva Segovia
No malaria transmission in Managua (the capital)
Drug resistance[2]: None
Species: *P. vivax* (80%); *P. falciparum* (20%)
Recommended chemoprophylaxis:
Región Autónoma Atlántico Norte (RAAN) and Región Autónoma Atlántico Sur (RAAS): Atovaquone-proguanil, chloroquine, doxycycline, mefloquine, tafenoquine[3]
All other areas with malaria transmission: No chemoprophylaxis recommended (insect bite precautions and mosquito avoidance only)[4]

NIGER

YELLOW FEVER VACCINE (MAP 5-10)

Entry requirements: Required for all arriving travelers ≥9 months old
CDC recommendations:
Recommended for travelers ≥9 months old going to areas south of the Sahara Desert
Not recommended for travel limited to areas in the Sahara Desert

MALARIA PREVENTION

Transmission areas: All
Drug resistance[2]: Chloroquine
Species: *P. falciparum* (primarily); *P. malariae*, *P. ovale*, and *P. vivax* (less commonly)
Recommended chemoprophylaxis: Atovaquone-proguanil, doxycycline, mefloquine, tafenoquine[3]

NIGERIA

YELLOW FEVER VACCINE

Entry requirements: Required for travelers ≥9 months old arriving from countries with risk for YF virus transmission; this includes airport transits or layovers in countries with risk for YF virus transmission[1]
CDC recommended for all travelers ≥9 months old

MALARIA PREVENTION

Transmission areas: All
Drug resistance[2]: Chloroquine
Species: *P. falciparum* (primarily); *P. malariae*, *P. ovale*, and *P. vivax* (less commonly)