

Malaria

Technical Explanation of Travax Malaria Mapping

Travax malaria maps are color images and gray-scale printouts may lose clarity. Consult the color version for clearest interpretation.

Shoreland Recommendations

Shoreland's malaria recommendations, which focus primarily on the risk to the individual traveler, reflect a primary synthesis of ongoing national and regional surveillance reports as well as the published literature on incidence in both endemic individuals and returned travelers. A review and reconciliation of this information, with the varying available advice from CDC, WHO, and other national and international authorities, is undertaken. Shoreland's recommendations may differ from those of individual countries' public health authorities because advice from individual national authorities outside the U.S. and WHO is increasingly weighted with estimates using constrained and often limited data on surveillance in returned travelers. Robust transmission data, down to the district level, are often available from the malarious country, including from states and districts not frequently visited by travelers; these data are reflected in Shoreland's malaria maps and recommendations. Furthermore, Travax country-specific recommendations pertain to healthy adult travelers. Guidance regarding pediatric and special needs travelers can be found under the relevant topic in the Travax Library.

Map Shading

The shading scheme on Travax malaria maps is a clinical aid that portrays malaria preventive recommendations geographically.

- **Solid red shading:** The preventive recommendation is chemoprophylaxis for **all** travelers (rare exceptions apply¹).
- **Grid shading:** The preventive recommendation is chemoprophylaxis for **certain** travelers.
- **Gray stippled shading:** The preventive recommendation is insect precautions only (rare exceptions apply¹). These are areas where malaria transmission is reported to occur at negligible levels in local populations.
- **Non-shaded areas** represent areas where no evidence of malaria transmission exists.

Shading represents the preventive recommendation and does not correlate directly to a defined quantitative probability of exposure. For example, a solid red shaded area in a sub-Saharan African country will have much higher transmission than a solid red shaded area in a South American country. The equal shading only means that the preventive recommendation is the same in both locations: the degree of transmission has surpassed the minimal threshold for which chemoprophylaxis is recommended for all travelers.

Note on the term "risk" – The shading scheme described above portrays recommendations for traveler protection strategies. "Risk" is a subjective term that means different things to different providers and travelers, and its use may lead to inconsistencies in recommendations between providers. The shading scheme on the Travax maps avoids the use of risk terminology, and instead directly states a recommended approach for each destination.

Areas where insect precautions only are recommended

Gray stippled shading is used on the maps for areas where insect precautions are recommended but chemoprophylaxis is not, as malaria transmission is negligible in these areas. The use of stippling reinforces the recommendation that chemoprophylaxis is not needed for travel to such areas (rare exceptions apply¹).

Areas where chemoprophylaxis is recommended for certain travelers

In the Travax malaria mapping scheme, these areas are locations where chemoprophylaxis is recommended for certain travelers based on factors including the characteristics of the itinerary, the characteristics of the traveler, and the degree of the traveler's aversion to risk. Medical providers should make their recommendation for these areas in consultation with the traveler based on an assessment of the factors. Key components of these factors are listed in the *Issues to Consider* box. Due to space limitations, the factors listed on the map itself are abbreviated. They should be understood as follows.

Issues to Consider

Factors favoring chemoprophylaxis

- *Adventure travel*: adventurous and other travelers without a set or planned itinerary, especially those with extensive outdoor exposure such as backpackers, campers, and hikers
- *Risk-averse travelers*: those who strongly prefer preventive drugs even when risk may be below the usual threshold for chemoprophylaxis
- *Vulnerable travelers*: those with underlying medical conditions and/or the potential for an especially adverse outcome from malaria (pregnant women, infants, immunocompromised individuals, or those with an underlying disease that could be intolerably exacerbated by malaria)
- *Areas subject to infrequent epidemics*: higher altitude areas where malaria transmission is normally non-existent or trivial for travelers, but where unpredictable and infrequent climatic events, years or decades apart, lead to conditions of rainfall or temperature in which epidemics can occur
- *Immigrants visiting friends and relatives*: individuals and their families whose country of origin presents malaria risk, who have emigrated to a malaria-free country, and who are now returning to visit friends and relatives
- *Flexible itineraries*: travel that may include the possibility of an unanticipated visit to an area of high malaria transmission within the country
- *Travel longer than 1 month*: the probability of malaria exposure increases with longer travel times
- *Unreliable availability of medical expertise at the destination and/or lack of appropriate and reliable treatment drugs*: travel to developing countries or other locations where the health care infrastructure would make malarial illness more problematic

Factors against chemoprophylaxis

- *Air-conditioned hotels only*: Overnight accommodations are with certainty in reliably air-conditioned hotels only
- *Urban areas only*: Travel restricted to urban areas of large cities
- *Non-transmission season*: Travel assuredly during non-transmission season (where seasonality is stated in the "General information" statement in the malaria section)
- *Minimal nighttime exposure*: Minimal evening or nighttime exposure such as outdoor restaurants, unscreened windows, etc.
- *Travel shorter than 3 days*

City Symbols

In urban areas, malaria transmission may be equal to or less than the level in the surrounding region. The indicated preventive measures will vary accordingly and different symbols are used in the Key.

- A black-filled circle only appears in regions where chemoprophylaxis is recommended for all or certain travelers. It denotes the same recommendation as the region surrounding it. A black-filled circle within a dark-shaded area means chemoprophylaxis is recommended for all travelers to that city (rare exceptions apply¹). A black-filled circle within an area of grid-filled shading means chemoprophylaxis is recommended for some travelers, and the factors in the *Issues to Consider* box should be consulted.
- A gray-filled circle represents a city where insect precautions only are recommended (rare exceptions apply¹).
- A white-filled circle with a black center-dot is used in the special situation where a city's immediate outskirts present higher malaria transmission and exposure than the central urban area of that city. (In this context, "central" refers to the most highly developed and urbanized areas of the city, not necessarily the geographic center.) The immediate outskirts may be poor, peri-urban sectors that sprawl into rural topography, or they may be transitional zones when the city is adjacent to jungle or forested terrain. This symbol indicates insect precautions only are recommended in central urban areas, but at the city outskirts the preventive recommendation should be considered the same as the surrounding region. As malaria is typically transmitted from dusk to dawn, the location of sleeping accommodations should also be considered.
- A white-filled circle represents a city where no preventive measures are necessary (no evidence of transmission exists). It should be noted that in malaria-free cities surrounded by (or adjacent to) an active transmission area, the possibility of exposure generally increases as one approaches the city's periphery.
- A star represents the national capital. White, black, gray, or white-with-center-dot corresponds to the same descriptions as the city circles above, including the possible exceptions that are noted. A black star with a white center-dot (Nay Pyi Taw in Burma/Myanmar) indicates no protective measures are necessary in the central urban area, but chemoprophylaxis is recommended in the outskirts and the less-developed areas of the city.

Towns and villages are considered rural in character, not urban. They are not displayed on Travax malaria maps, except in the case of small countries that have few or no actual cities. In those cases, city circles may be used to represent towns, and the same indications noted above apply for preventive measures in those towns.

Map Dates

Travax malaria maps and their supporting data are thoroughly reviewed, country by country, on a regular schedule. Updates are also made between scheduled reviews when new information becomes available that entails a change to the recommendation text and/or the map shading. These two dates (last reviewed and last updated) are provided at the bottom of each malaria map page.

Notes

1. "Rare exceptions apply" – There may be exceptions to the recommendations of "Chemoprophylaxis for all travelers" and "Insect precautions only."
 - An example of a rare exception to the "Chemoprophylaxis for all travelers" recommendation would be an executive flying into such an area for only a few hours with no evening exposure. Chemoprophylaxis would not be recommended in this case.
 - An example of an exception to the "Insect precautions only" recommendation would be vulnerable travelers: those with underlying medical conditions and/or the potential for an especially adverse outcome from malaria (pregnant women, infants, immunocompromised individuals, or those with an underlying disease that could be intolerably exacerbated by malaria). Chemoprophylaxis would be recommended in this case.

Acknowledgments

The locations and/or boundaries of many of the national parks, reserves, and points of interest represented in Shoreland's maps have been extracted, with permission, from the World Database on Protected Areas (WDPA) Annual Release. The WDPA is a joint product of UNEP and IUCN, prepared by UNEP-WCMC, supported by IUCN WCPA and working with Governments, the Secretaries of MEAs and collaborating NGOs. For further information: protecteddareas@unep-wcmc.org.

Certain administrative boundaries for Botswana were derived from official geographic data issued by the University of Botswana's Okavango Research Institute (<http://www.ori.ub.bw>).

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