Background for the Consultation on Yellow Fever and International Travel, 2010 (update February 2011)

Date: 4-5 March 2010

Location: Stockholm, Sweden

Prepared by: Informal Working Group on Geographic Risk of Yellow Fever (WG), a subgroup formed from the World Health Organization (WHO) Consultation on Yellow Fever (YF) and International Travel

TABLE OF CONTENTS

1. BACKGROUND OF CONSULTATION

1.1 Consultation on YF and International Travel, 2008

WHO convened a "Consultation on Yellow Fever (YF) and International Travel" on September 4-5, 2008 in Geneva with the objectives to:

1) Review criteria for inclusion and removal of countries and/or areas from the list for YF virus transmission
    i. To describe factors useful for determining geographic risk and more specifically, factors providing useful information on the risk of YF virus transmission.
    ii. To describe areas with risk of YF virus transmission by creating four classifications of risk. (Table 4 below)
    iii. To define where vaccination is recommended, taking into consideration the new classifications of risk.
2) Review country list/areas of YF virus transmission from where vector control-disinsection would be required for conveyances, according to Annex V of IHR.

There were a total of 41 participants from 14 different countries at the meeting, including country representatives, experts, consultants, and the WHO secretariat from headquarters and regional offices. This meeting was planned as a forum for international experts on YF to discuss new criteria for adding/removing countries to/from the Annex I list (countries with risk of YF virus transmission, to consider revising the YF risk map, and to revise criteria for disinsection of conveyances. This meeting came about in response to the new International Heath Regulations (2005) and as a consequence of informal dialogue between travel medicine specialists at WHO and CDC interested in achieving harmonization of recommendations. Recent events, such as continued reports of rare but severe and fatal adverse events associated with YF vaccine (YF vaccine-associated viscerotropic disease) and the reemergence of urban transmission of YF disease in Paraguay in early 2008, added a sense of urgency to the need to revisit criteria for designating and mapping countries with risk of YF virus transmission as well as recommendations on YF vaccination for international travel.

This 2008 consultation in Geneva included background presentations and discussions on geographic risks for YF and the origin and present status of the YF risk map.

Conclusions of the Consultation on YF and International Travel, 2008

1. General Conclusions

Within certain countries, and where data exist, it is possible to stratify areas according to the epidemiological risk of YF virus transmission. The factors that can provide useful information on risk of YF virus transmission are:

- Periodicity of reported human or animal YF cases (active or passive surveillance);
- Presence and distribution of mosquito vectors and non-human primate hosts involved in the YF virus transmission cycle (field research);
- Ecological factors (proxy indicators for presence, abundance, and activity of vectors and primates): Vegetation, rainfall, elevation, temperature (satellite imagery);
- Historical sero-surveys of the human population;
- Detection of YF virus or antibodies in non-human primates and in vector mosquitoes (field studies).

Using these factors, detailed country maps should be produced showing areas of risk classified as endemic, transitional, low risk (equivocal) and no risk. A subgroup from this consultation

group should be formed to ensure that this mapping work is carried out so that updated YF fever risk maps and country recommendations can be harmonized to the extent possible.

2. Simplified criteria for areas with risk[1]

- Endemic--areas with persistence of enzootic YF virus transmission over long periods of time and where:
  - YF vectors and non-human primate hosts are present;

  and
  - Human and/or non-human primate YF cases are reported repeatedly;

  or
  - Human YF cases were reported regularly prior to the achievement of high YF immunization coverage;

  or
  - Sero-surveys (pre-vaccination era) show evidence of high prevalence of YF infection.

- Transitional--areas bordering the YF endemic zone with periodic evidence of transmission during YF epizootic/epidemic expansions and where:
  - YF vectors and non-human primate hosts are present;

  and
  - Human YF cases (sporadic or epidemic) are reported at long intervals and during YF epizootic/epidemic expansions from bordering endemic areas;

  and/or
  - Sero-surveys (pre-vaccination era) show evidence of YF infection in persons born before last YF expansion.

- Low risk--areas bordering YF endemic or transitional areas and where:
  - YF vectors and non-human primate hosts are present;

  and
  - No human or non-human primate YF cases have been reported;

  and
  - There may be serological or other evidence of YF virus transmission in the past, but the evidence is uncertain or indicates a low prevalence of infection.

3. Vaccination recommendations

- Where there is a lack of information, a conservative approach (vaccination) is justified.
- Endemic and transitional areas – vaccination recommended for entering travellers.
- Low risk areas – vaccination recommended for entering travellers but balanced by individual risk factors, particularly risk factors for adverse events (e.g. advanced age), and for exposure to YF (e.g. travel for more than 1 week in rural areas).

4. Countries with risk of YF virus transmission

- Any country with an endemic, transitional or low risk area within its land borders.
- Recent absence of reported YF human cases is NOT a criterion for removal from list.
- Recommend that transit of less than 12 hrs in an international airport is not considered as a departure from that area for certification purposes.

Table 1 in Appendix 6.1 outlines the classifications for areas with risk of YF virus transmission based on the information above.

[1] Some criteria include elements for which there is no scientific basis for defining (such as "high levels", "long intervals") and which will require interpretation by experts with experience in this disease area.

1.2. Organization of the WG

1.2.1. History

The final conclusions to the 2008 consultation included the recommendation that a subgroup, or working group, be formed. This subgroup was called the Informal Working Group on Geographic Risk of YF (WG).

1.2.2. Objectives

The objectives of the WG were to ensure that the revised YF risk mapping work is carried out in order to harmonize, to the extent possible, YF risk maps and country-specific recommendations.

The task of the WG was to systematically re-evaluate, and in detail, areas with risk of YF virus transmission in South America and Africa.

1.2.3. Participants

The WG was comprised of the following YF and travellers' health subject matter individual experts and experts:

YF and Travel Medicine Expert	Affiliation
Annelies Wilder Smith	Individual Travel Medicine and YF Expert
Tom Monath	Individual Travel Medicine and YF Expert
Oyewale Tomori	Individual Travel Medicine and YF Expert
David Hill	National Travel Health Network and Centre (NaTHNaC), United Kingdom
Nina Marano	Centers for Disease Control and Prevention (CDC), United States
Erin Staples	Centers for Disease Control and Prevention (CDC), United States
Mark Gershman	Centers for Disease Control and Prevention (CDC), United States
Emily Jentes	Centers for Disease Control and Prevention (CDC), United States
Gilles Poumerol	World Health Organization (WHO), Headquarters (HQ)
Sergio Yactayo	World Health Organization (WHO), Headquarters (HQ)
William Perea	World Health Organization (WHO), Headquarters (HQ)
Rosamund Lewis	World Health Organization (WHO), Headquarters (HQ)
Ruth Anderson	World Health Organization (WHO), Headquarters (HQ)
Mona Lacoul	World Health Organization (WHO), Headquarters (HQ)
Johan Lemarchand	World Health Organization (WHO), Headquarters (HQ)
Nohelly Mombela	World Health Organization (WHO), Headquarters (HQ)
Martin Opoka	WHO, Eastern Mediterranean Regional Office (EMRO)

Otavio Oliva	WHO, Pan American Health Organization (PAHO)
Fenella Avokey	WHO, Regional Office for Africa (AFRO)
Adamou Yada	WHO, Regional Office for Africa (AFRO)
Hervé Zeller	European Centre for Disease Prevention and Control (ECDC)

2. METHODS

2.1 Teleconference meetings

The WG met by teleconference (and some in-person meetings) regularly every several weeks starting the end of September 2008. Dates of teleconferences included in 2008: 29 September; 6, 27 October; 3, 13, 24 November; 8, 19 December. In 2009, the teleconferences occurred 8, 22 January; 5 February; 17 April; 15 June; 20 July; 23 October; 9 November; and 7 December. In 2010, the teleconferences occurred 8, 19 January and 8, 22 February.

2.2 Process

A systematic review was conducted of every country with either a previous or current assessment of having a risk of YF. Table 1 (*Appendix 6.1*) outlines the criteria that the Consultation proposed the WG use to systematically review each country.

To the greatest extent possible, the WG utilized published resources and country reports to make its decisions. In the absence of such data, the experts provided valuable insight from their perspectives as to the geographic risk of YF to come to a consensus.

For some countries, YF risk mapping decisions were made on a country-wide basis rather than on a sub-national basis. This was done for countries where sub-national data did not exist (e.g. Rwanda, Angola) or where the situation may be evolving (e.g. Paraguay).

3. RESULTS

3.1 Proposed changes to 2008 consultation's conclusions of low risk

The 2008 consultation's conclusions stated, "Low risk areas – vaccination recommended for entering travellers but balanced by individual risk factors, particularly risk factors for adverse events (e.g. advanced age), and for exposure." The WG proposed to change the recommendations of vaccination for low risk areas to the following: "In general, vaccination is **not** recommended for travellers whose itinerary is limited to low risk areas. Consideration for vaccination must weigh the potential exposure to YF (e.g. prolonged travel, heavy exposure to mosquitoes, inability to avoid mosquito bites) against individual risk factors for vaccine-associated adverse events (e.g. age ≥ 60 years, altered immune status)."

3.2 Use of vegetation lines to delineate areas with risk in Africa

Currently, the YF risk map for Africa delineates the northern boundary for risk to be a conservative vegetation line that separates "barren or sparsely vegetated areas" (Sahara desert) from "open shrublands." Because the environmental and ecological conditions in "open shrublands" may be conducive to sylvatic mosquito vector breeding sites, they are included in the area with risk of YF virus transmission. Barren or sparsely vegetated lands are not considered favorable for mosquito breeding sites and therefore are excluded. Although this line could be consistently applied from Mauritania to Eritrea, the YF Risk Mapping Group concluded that using this method for areas in East and southern Africa is problematic. Therefore, the risk areas in the horn of Africa are currently delineated by human serological data, history of human cases, and expert knowledge of ecological, vector, and virus risk factors. It was decided that the future of YF risk mapping may involve modeling that would need to include landcover data (NDVI), human serological evidence of YF, human case distribution, non-human primate data, rainfall data, and vector distribution.

3.3 Use of elevation to delineate areas with risk in South America

YF risk area is delineated for second administrative subdivisions, based on evidence of YF infection in human and in non-human primates. Areas that are higher than 2300m are considered as boundary for risk, considering higher elevation are not favorable for YF vectors.

3.4 Selected cities with no risk

Certain cities, many of them major tourist destinations, have been classified as low or no risk, because although the vectors for YF are present, YF activity has not been documented.

3.5 Special situations

3.5.1 Central America as no risk

Central America and western Panama are considered no risk on the basis of the following observations:

- There have been no reports of YF activity (i.e., no human cases, monkey deaths or other evidence of virus transmission) for an extended period of time (5-8 times the typical cycle or reemergence of epizootic YF in tropical America);
- There is a lack of historical evidence indicating that YF activity occurs repeatedly or periodically;
- There are natural barriers to the introduction of YF into the region; and
- YF disappeared from Central America after the last event (1955). This was monitored and documented by several groups of researchers with active field programs, including the Gorgas Memorial Laboratories and the Middle America Research Unit, so that there can be reasonable assurances that persistent virus activity did not occur.

The last wave of jungle YF in this region occurred from 1948-1955. It was preceded in 1946-47 by an upsurge of YF in the Antioquia province of Colombia bordering eastern Panama and by YF virus transmission in eastern Panama in 1948-49. It was thought at the time that this was the first wave of jungle YF in Central America since 1484, and that such episodes occur extremely infrequently, with perhaps centuries between cycles. Urban YF had occurred in Central America, up to 1924 when *Ae. aegypti* was eradicated from the region, but without evidence for introductions into the jungle cycle. In 1950, the virus had to sweep from eastern Panama westward across the Panama Canal, which affords a barrier to YF. Early workers had noted that YF had come very close to the Canal but not crossed it, for example in 1941 when a case occurred 30 miles east of the Canal (a similar occurrence was noted in 1974). There appear to be ecological reasons for the barrier to YF virus transmission presented by the Canal. The Canal is located where it is because of a gap in the mountain system of Panama. The Canal determines a critical transition between tropical forest to the east and deciduous forest (with a severe dry season) to the west, which is in the lee of the mountains with respect to rainfall from the

northeasterly tradewinds. The abundance of canopy vectors (*Haemagogus spegazzinii*) in the deciduous forest west of the Canal is highly variable and markedly affected by rainfall patterns. Thus to cross the Canal, there would need to be the convergence of both the virus (a rare event) and favorable rainfall and vector density, a highly cyclical event. This convergence of cycles probably occurred in 1949-1950.

3.5.2 Coastal areas of Colombia

Travellers to low risk areas of the Choco, Valle de Cauca, Cauca, and Narino departments should note that this area lies between transitional areas in Ecuador (Esmeraldas Province) and the northern municipalities of the Choco department. This area has had no past reports of human YF cases, but has limited human YF surveillance. However, vaccination for travellers to low risk areas must be considered in light of the degree of potential exposure to YF virus in these heavily forested areas (e.g. prolonged travel or heavy exposure to mosquitoes, combined with the inability to avoid mosquito bites). Individual risk factors for adverse events to vaccination (e.g. age ≥60 years, altered immune status) must also be considered.

3.6 Individual country reports

3.6.1 Countries without risk classification changes

Although all countries' risk classifications were considered by the group, no change to the risk classifications were made after the WG review for the following holoendemic countries: Angola, Benin, Burkina Faso, Burundi, Cameroon, Central African Republic, Congo, Cote d'Ivoire, Equatorial Guinea, French Guiana, Gabon, The Gambia, Ghana, Guinea, Guinea-Bissau, Guyana, Liberia, Nigeria, Rwanda, Senegal, Sierra Leone, Suriname, Togo, and Uganda.

Similarly, Cape Verde and Djibouti were considered areas with no risk of YF virus transmission.

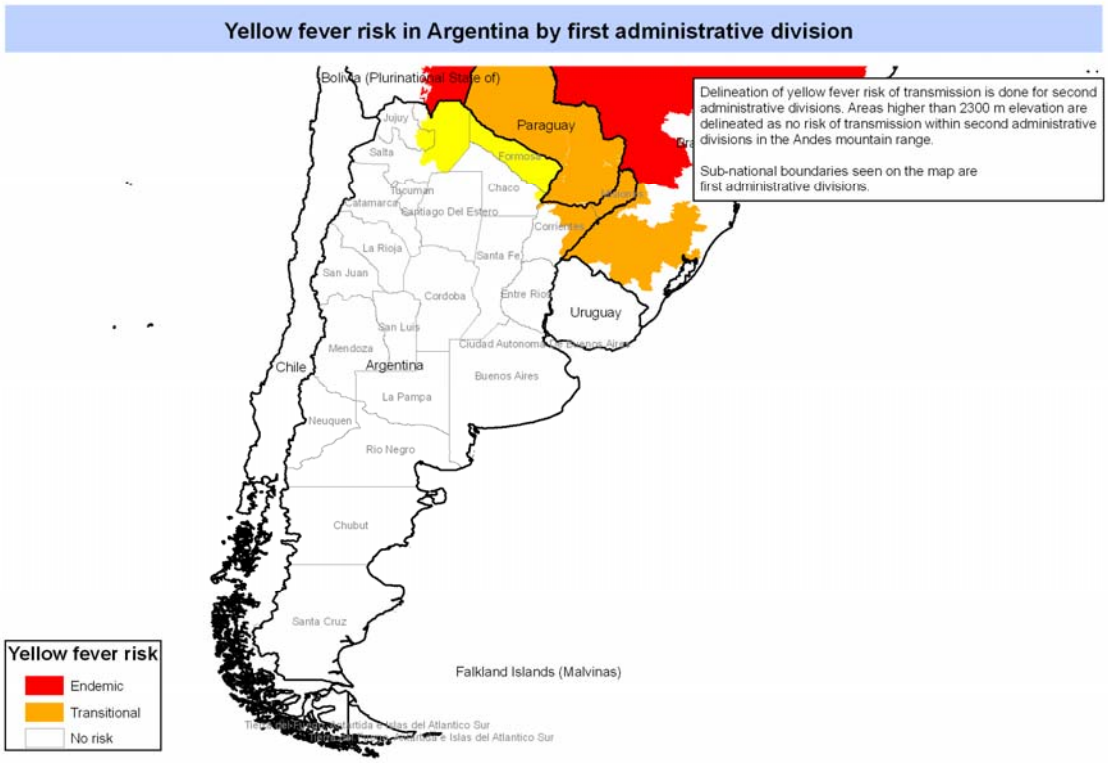
3.6.2 Countries with risk classification areas changed in 2009

Classifications for areas with risk in Mauritania, Mali, Niger, Chad, Sudan, and Bolivia were evaluated in December 2008. The conservative vegetation line (described above in 3.1) that separated "barren or sparsely vegetated areas" (Sahara desert) from "open shrublands" was adopted and determined the northern boundary for areas with risk in Mauritania, Mali, Niger, Chad, and Sudan. Similarly, elevation of 2300 m delineated the western boundary of areas with risk in Bolivia. These changes were published in the WHO International Travel and Health, 2009 and the CDC Health Information for International Travel (Yellow Book), 2010 and therefore will not be discussed further here.

3.6.3 Countries with risk classification area changes, proposed 2010

The following countries had changes proposed to their risk classifications and are described below: Argentina, Brazil, Colombia, Democratic Republic of Congo, Ecuador, Eritrea, Ethiopia, Kenya, Panama, Paraguay, Peru, Sao Tome and Principe, Somalia, Tanzania, Trinidad and Tobago, Venezuela, and Zambia.

Argentina



Previous Risk Classification

YF vaccination is recommended for all travellers ≥9 months of age who are going to the northern and northeastern forested areas of Argentina, including Iguassu Falls and all areas bordering Paraguay and Brazil. These areas include all departments of Misiones and Formosa Provinces; and the Department of Bermejo in Chaco Province; Departments of Berón de Astrada, Capital, General Alvear, General Paz, Ituzaingó, Itatí, Paso de los Libres, San Cosme, San Miguel, San Martín, and Santo Tomé in Corrientes Province; Departments of Valle Grande, Ledesma, Santa Bárbara, and San Pedro in Jujuy Province; and Departments of General José de San Martín, Oran, Rivadavia, and Anta in Salta Province.

Proposed Risk Classification

Transitional:

Northern and northeastern forested areas of Argentina bordering Paraguay and Brazil where elevations are <2,300 m: Misiones (all departments) and Corrientes (Berón de Astrada, Capital, General Alvear, General Paz, Ituzaingó, Itatí, Paso de los Libres, San Cosme, San Miguel, San Martín, Santo Tomé). Vaccination is also recommended for travelers visiting Iguassu Falls.

Low risk

Designated departments in the folllowing provinces, <2,300 m in elevation: Formosa (all departments), Chaco (Bermejo), Jujuy (Valle Grande, Ledesma, Santa Bárbara, San Pedro), and Salta (General José de San Martín, Oran, Rivadavia, Anta)

No Risk: Other Provinces and areas not listed above, including Tucuman, Catamarca, Santiago Del Estero, La Rioja, Santa Fe, Entre Rios, San Juan, Cordoba, Cuidad Autonoma De Buenos

Aires, San Luis, Mendoza, Buenos Aires, La Pampa, Neuquen, Rio Negra, Chubut, Santa Cruz, and Tierra del Fuego, Antartida e Islas del Atlantico Sur.

Rationale for Proposed Classification
The first notification of YF since official reporting commenced (1927) was in 1966. However, the extensive epizootic of 1948 in Brazil penetrated to Misiones Province in the subtropical north of Argentina, with 1 human case identified (in Campos de Taranco) [Pan American Sanitary Bureau. 1955. Am J Trop Med Hyg. Vol. 4. pg. 571)]. In 1966 another epizootic wave reached southern Brazil (Parana, Santa Catarina, Rio Grande do Sul) and Argentina, with human jungle YF cases reported from Missiones and Corrientes provinces (Bejarano, J.F.R. 1974, Rep Argent, Min Bien Soc Nac, 64 pg)

In 2001, an epizootic occurred in border areas of Brazil (Rio Grande do Sul) but no human cases were reported in Argentina. In 2007-2008, however, a similar wave penetrated border areas of Brazil (Parana) and Paraguay. YF in nonhuman primates was found to be widespread in districts of Misiones and Corrientes, and at least 5 human cases have been confirmed in Misiones, essentially the same areas affected in 1966.

Proposed Text for the ITH (2011) and CDC Yellow Book (2012)

Country requirement: no

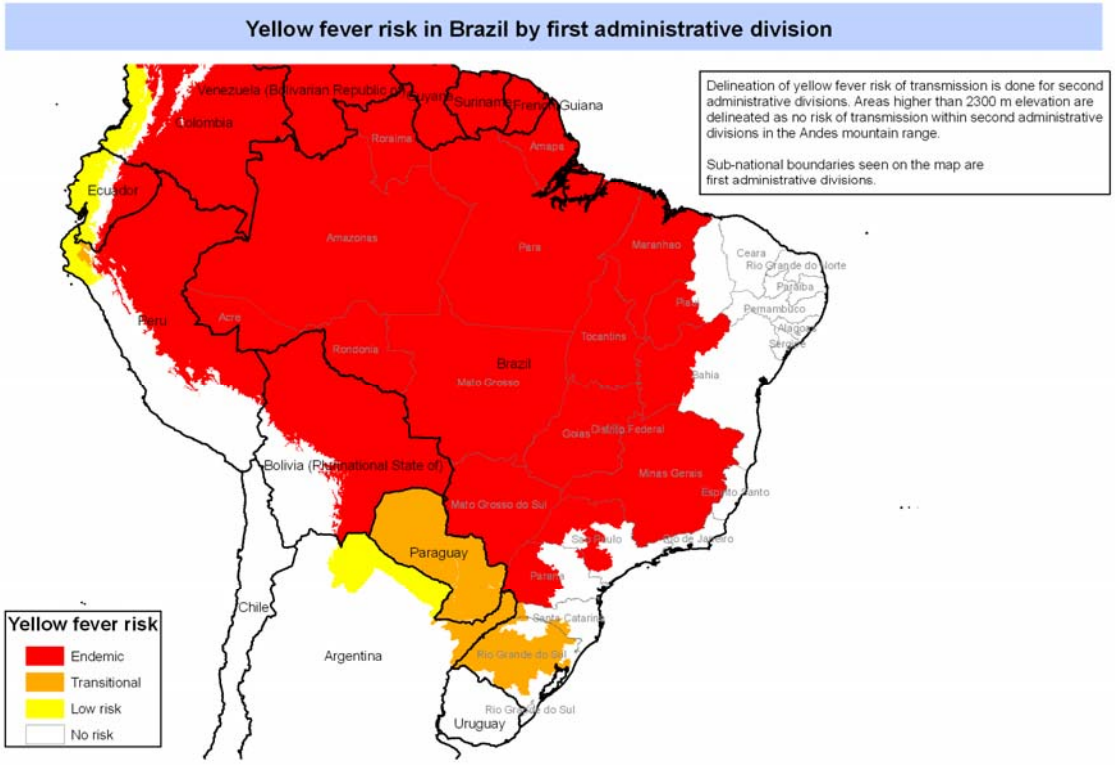
Yellow fever vaccine recommendation: yes:

Recommended for all travellers aged 9 months and over going to northern and north-eastern forested areas of Argentina bordering Brazil and Paraguay where altitudes are <2300 m (see Map X). Travellers to departments in the following provinces should be vaccinated: Misiones (all departments) and Corrientes (Berón de Astrada, Capital, General Alvear, General Paz, Ituzaingó, Itatí, Paso de los Libres, San Cosme, San Martín, San Miguel, Santo Tomé). Vaccination is also recommended for travellers visiting Iguazu Falls.

Generally not recommended for travellers whose itineraries are limited to the designated departments in the following provinces, where altitudes are <2300 m: Formosa (all departments), Chaco (Bermejo) Jujuy (Ledesma, San Pedro, Santa Bárbara, Valle Grande), and Salta (Anta, General José de San Martín, Oran, Rivadavia) (see Map X).

Not recommended for travellers whose itineraries are limited to areas at altitudes >2300 m and all provinces and departments not listed above.

Brazil



Previous Risk Classification
For all travellers ≥9 months of age going to the following areas with risk of YF virus transmission, including the ENTIRE states of Acre, Amapá, Amazonas, Distrito Federal (including the capital city of Brasilia), Goiás, Maranhão, Mato Grosso, Mato Grosso do Sul, Minas Gerais, Pará, Rondônia, Roraima, and Tocatins; and the designated areas of the following states: northwest and west Bahia, central and west Paraná, southwest Piauí, northwest and west central Rio Grande do Sul, far west Santa Catarina, and north and west São Paulo. Vaccination is recommended for travellers visiting Iguassu Falls. Vaccination is NOT recommended for travel to the following coastal cities: Rio de Janeiro, São Paulo, Salvador, Recife, and Fortaleza.

Proposed Risk Classification
Endemic: Recommended for all travellers ≥9 months of age going to the following areas with risk for YF virus transmission, including the ENTIRE states of Acre, Amapá, Amazones, Distrito Federal (including the capital city of Brasília), Goiás, Maranhão, Mato Grosso, Mato Grosso do Sul, Minas Gerais, Pará, Rondônia, Roraima, and Tocantins; and designated areas of the following states: Bahia, Paraná, Piauí, and São Paulo. Vaccination is also recommended for travellers visiting Iguassu Falls.

Transitional: Recommended for all travellers ≥9 months of age going to the following areas with risk for YF virus transmission, including designated areas of the Rio Grande do Sul and Santa Catarina states.

No risk: Vaccination is **not** recommended for travellers whose itineraries are limited to the states of Ceara, Rio Grande do Norte, Paraiba, Pernambuco, Alagoas, Sergipe, Espirito Santo, and Rio de Janeiro; and the cities of Rio de Janeiro, São Paulo, Salvador, Recife, or Fortaleza.

Rationale for Proposed Classification
The Amazon region is holoendemic for YF. Contiguous areas bordering this region [e.g. Maranhão, Tocantins, western Bahia State, and the Distrito Federal (Brasilia)] are affected in some years of high virus activity, and represent a transition zone. The grasslands and swamps—the Pantanal--of Mato Grosso do Sul and western São Paulo are intermittently affected. The westernmost areas of Parana, Sta. Catarina, and Rio Grande do Sul States to the south is involved only in unusual years (such as 1965-66, 1974, and 2007-08) when a YF epizootic sweeps southward. The population in the endemic and transitional states is routinely vaccinated, so that humans case surveillance does not accurately reflect the underlying risk of exposure. Many of the human cases reported (if not the majority) represent unvaccinated persons entering from outside the region. There have been several YF cases among unvaccinated tourists from outside Brazil.

Proposed Text for the ITH (2011) and CDC Yellow Book (2012)

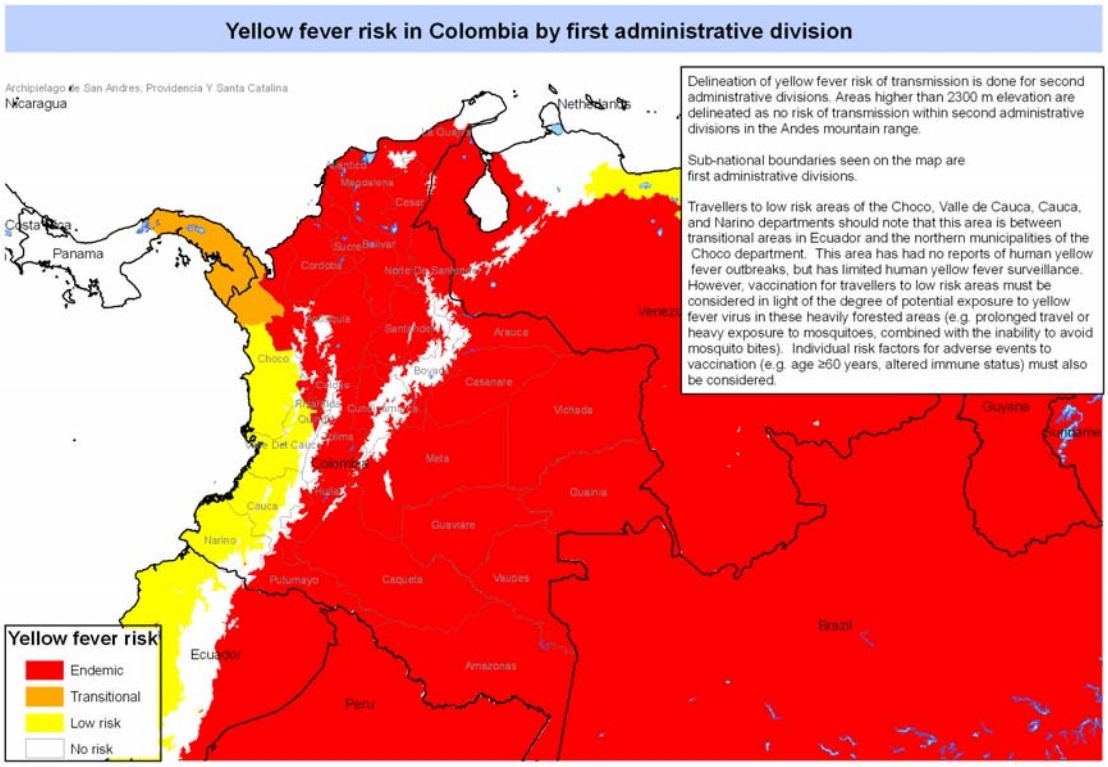
Country requirement: no

Yellow fever vaccine recommendation: yes:

Recommended for all travelers ≥9 months of age going to the following areas: the entire states of Acre, Amapá, Amazones, Distrito Federal (including the capital city of Brasília), Goiás, Maranhão, Mato Grosso, Mato Grosso do Sul, Minas Gerais, Pará, Rondônia, Roraima, Tocantins, and designated areas (see Map X) of the following states: Bahia, Paraná, Piauí, Rio Grande do Sul, Santa Catarina, and São Paulo. Vaccination is also recommended for travelers visiting Iguassu Falls.

Not recommended for travelers whose itineraries are limited to areas not listed above, including, the cities of Rio de Janeiro, São Paulo, Salvador, Recife, and Fortaleza (see Map X)

Colombia



Previous Risk Classification
For all travellers ≥9 months of age. Travellers whose itinerary is limited to the cities of Bogotá, Cali, or Medellín are at lower risk and may consider foregoing vaccination.

Proposed Risk Classification
Endemic: All other areas not listed below.

Transitional: Acandi, Unguia, Jurado, and Riosucio municipalities in the Choco department

Low risk: The areas west of the Andes for the entire departments of Narino, Cauca, and Valle de Cauca; all municipalities of the Choco department except for Acandi, Unguia, Jurado, and Riosucio; the cities of Barranquilla, Cartegena, Cali, or Medellin.

No risk: Areas above 2,300 m, the city of Bogota, and the Uribia municipality in the La Guajira department

Rationale for Proposed Classification
Yellow fever cases occur within a large area of the country. Excluded from yellow fever transmission are areas in the southwest at high elevation above 2300 m, the lowlands to the west of the mountain range, and the driest areas of the Guajira Peninsula.

Proposed Text for the ITH (2011) and CDC Yellow Book (2012)
Country requirement: no

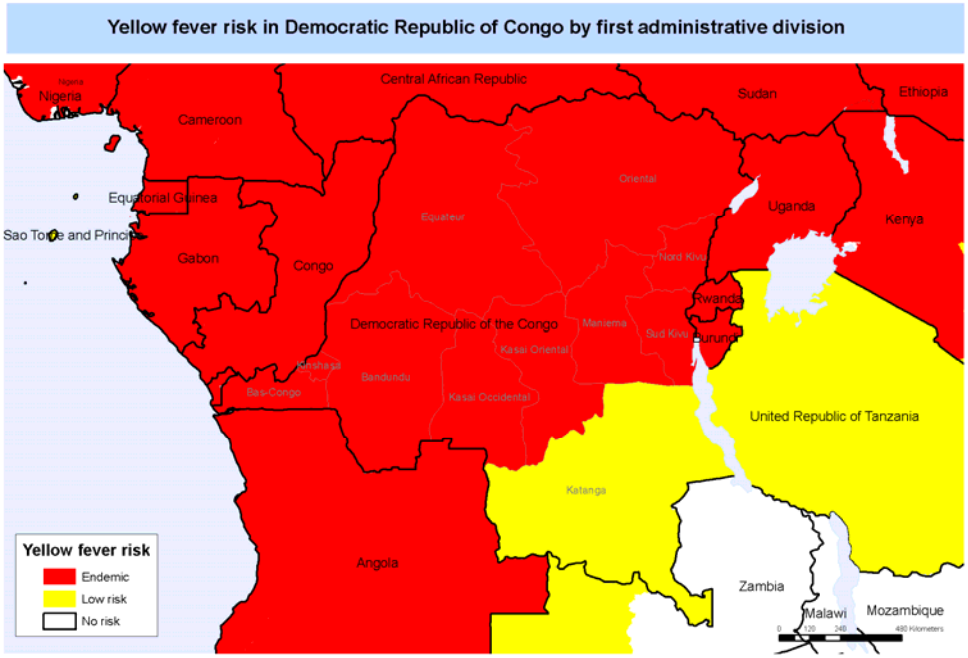
Yellow fever vaccination recommendation: yes:

Recommended for all travelers ≥9 months of age traveling to following departments <2,300 m in elevation (see Map): Amazonas, Antioquia, Arauca, Atlántico, Bolivar, Boyacá, Caldas, Caquetá, Casanare, Cauca, Cesar, Córdoba, Cundinamarca, Guainía, Guaviare, Huila, Magdalena, Meta, Norte de Santander, Putumayo, Quindio, Risaralda, San Andrés and Providencia, Santander, Sucre, Tolima, Vaupés, Vichada, Choco (only the municipalities of Acandí, Juradó, Riosucio, and Unguía), and La Guajira (only the municipalities of Albania, Barrancas, Dibulla, Distracción, El Molino, Fonseca, Hatonuevo, La Jagua del Pilar, Maicao, Manaure, Riohacha, San Juan del Cesar, Urumita, and Villanueva).

Generally not recommended for travelers whose itinerary is limited to the following areas west of the Andes <2,300 m in elevation: the departments of Nariño, Cauca, Valle de Cauca, and central and southern Choco and the cities of Barranquilla, Cartagena, Cali, and Medellín (see Map)

Not recommended for travelers whose itineraries are limited to all areas >2,300 m, including the city of Bogotá and the Uribia Municipality in the La Guajira Department

Democratic Republic of Congo



Previous Risk Classification
For all travellers ≥9 months of age.

Proposed Risk Classification
Endemic: All other provinces not listed below.

Low Risk: Katanga Province

Rationale for Proposed Classification
Outbreaks have occurred principally in the savanna-forest ecotone in the north (Oriental and Equateur Provinces), along the border with Sudan, Uganda and Central African Republic. In the last 45 years, only 2 cases have been officially notified. Serosurveys conducted between 1932-1946 [(Mahaffy, A.H. 1946. Trans Roy Soc Trop Med Hyg. Vol. 40. pg. 57); (Beeuwkes, H. et al. 1934. Trans Roy Soc Trop Med Hyg. Vol 28. pg. 233); (Liegois, P. et al. 1948. Ann Soc Belg Trop Med. Vol. 28, pg. 247)], 1951-53 (Soper, F.L. 1937. Am J Trop Med. Vol 17, pg. 457), and 1985 (Werner, et al. 1985. Ann Soc Belg Med Trop. Vol. 65, pg. 91) found widespread yellow fever activity.

No human cases have been reported from the Katanga province. Beeuwkes et al. reported no antibodies at one location (Elizabethville) in 1934 (Beeuwkes, et al. 1934. Trans Roy Soc Trop Med Hyg. Vol. 28, pg. 233.) In 1951-53 a seroprevalence of 2-15% was found in adults but not children at 6 of 14 locations sampled (Bonnel, P.H. et al. 1957. Bull WHO. Vol. 11 pg. 325). Without more recent data on yellow fever activity and because this region is contiguous with the western region of Zambia (see above) it is considered low risk.

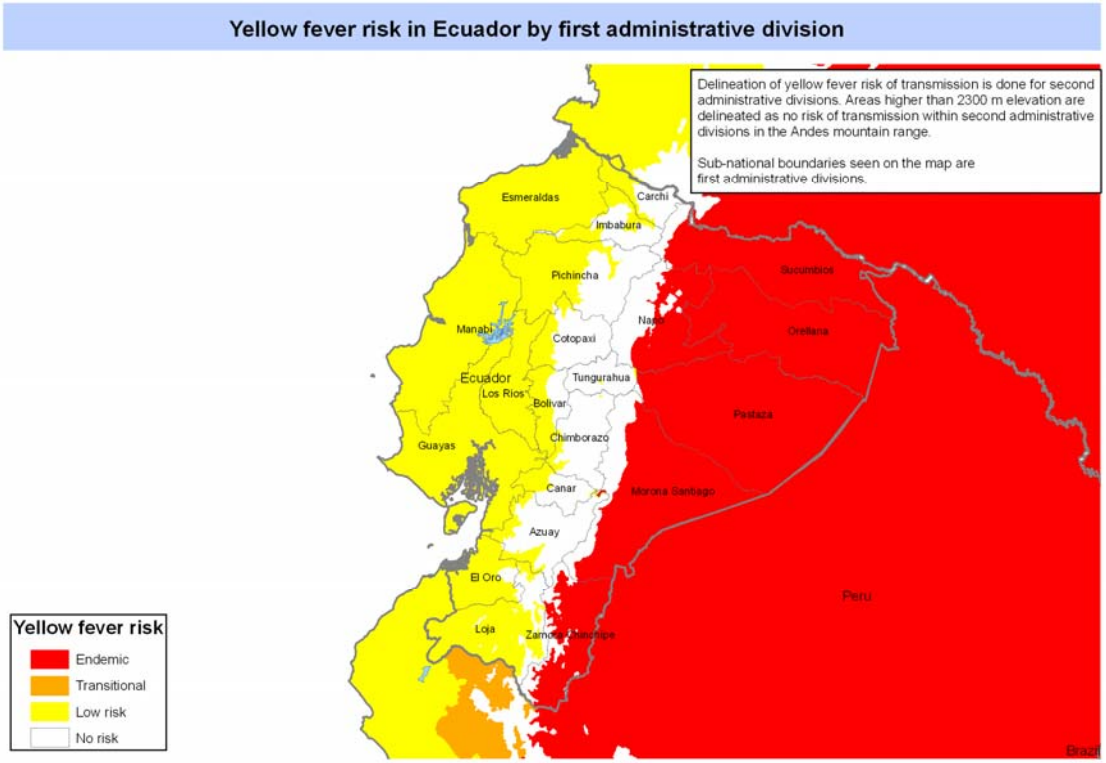
Proposed Text for the ITH (2011) and CDC Yellow Book (2012)
Country requirement: a yellow fever vaccination certificate is required from all travellers over 1 year of age.

Yellow fever vaccine recommendation: yes:

Recommended for all travelers ≥9 months of age, except as mentioned below

Generally not recommended for travelers whose itinerary is limited to the Katanga Province

Ecuador



Previous Risk Classification
For all travellers ≥9 months of age who are traveling to the following provinces in the Amazon Basin: Morona-Santiago, Napo, Orellana, Pastaza, Sucumbíos, and Zamora- Chinchipe, and all other areas in the eastern part of the Andes Mountains, NOT including the cities of Quito and Guayaquil or the Galápagos Islands

Proposed Risk Classification
Endemic: Areas east of the Andes Mountains below 2300 m, including the provinces of Sucumbios, Orellana, Pastaza, Napo, Morona Santiago, and Zamora Chinchipe.

Low Risk: West of the Andes below 2300 m, including the entire provinces of Esmeraldas,Manabi, Los Rios, and Guayas, and designated areas of the provinces of Carchi, Imbabura, Pichincha, Cotopaxi, Bolivar, Tungurahua, Chimborazo, Canar, Azuay, El Oro, and Loja

No Risk: Areas above 2300 m; the cities of Guayaquil and Quito; or the Galapagos Islands.

Rationale for Proposed Classification
Yellow fever cases reported in Ecuador, 1980-2005. The eastern boundary of the Andean Sierra demarcates the Amazon region of holoendemic yellow fever to the east. The outbreak of YF in 1997 among military personnel in Chontaduro, Esmeraldas province was due to imported cases (Trujillo, F. et al. 1997. Report of the Ministerio de Salud Publica, Direccion Nacional de Epidemiologia)

Proposed Text for the ITH (2011) and CDC Yellow Book (2012)

Country requirement: a yellow fever vaccination certificate is required from travellers over 1 year of age coming from countries with risk of yellow fever transmission. Nationals and residents of Ecuador are required to possess certificates of vaccination on their departure to an area with risk of yellow fever transmission.

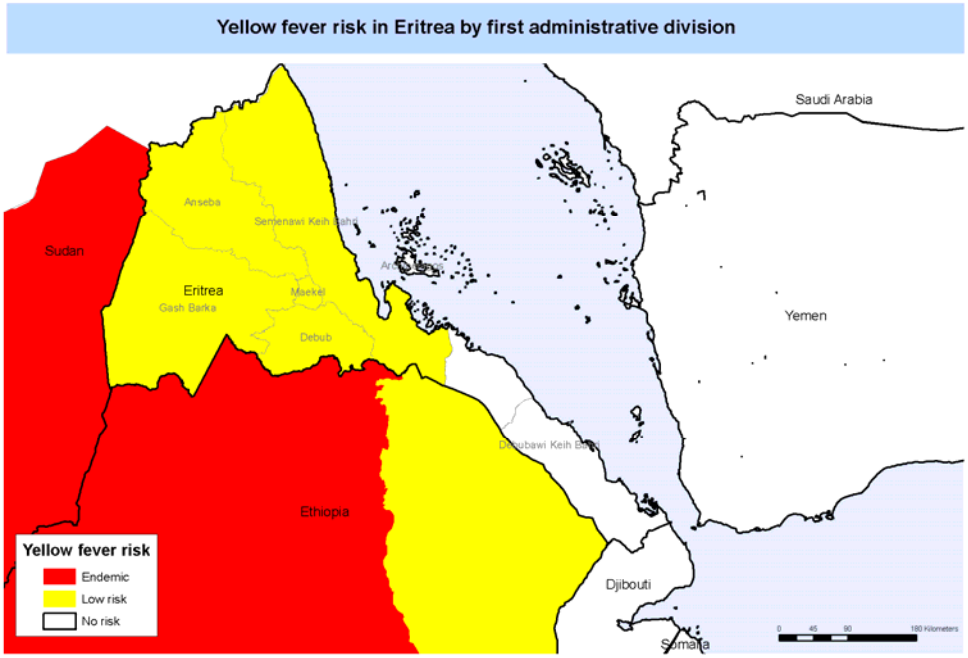
Yellow fever vaccine recommendation: yes;

Recommended for all travelers ≥9 months of age traveling to the following provinces east of the Andes Mountains <2,300 m in elevation: Sucumbios, Orellana, Pastaza, Napo, Morona-Santiago, and Zamora-Chinchipe (see Map)

Generally not recommended for travelers whose itinerary is limited to the following provinces west of the Andes and <2,300 m in elevation: Esmeraldas, Manabi, Los Rios, Guayas, and designated areas of Carchi, Imbabura, Pichincha, Cotopaxi, Bolivar, Tungurahua, Chimborazo, Canar, Azuay, El Oro, and Loja (see Map)

Not recommended for travelers whose itineraries are limited to all areas >2,300 m in elevation, the cities of Guayaquil and Quito, and the Galápagos Islands (see Map)

Eritrea



Previous Risk Classification
None

Proposed Risk Classification
Low risk: States of Debub, Mae Kel, Gash Barka, Anseba, and Semenawi Keih Bahri (except the Dahlak Archipelagos Islands)

No risk: State of Debubawi Keih Bahri and Dahlak Archipelagos Islands

Rationale for Proposed Classification
Yellow fever vectors and hosts are present in Eritrea. Moreover the western part of Eritrea is characterized by moist and dry savanna and thus may be considered conducive to yellow fever transmission.

There have been no YF cases reported in Eritrea, however, serosurveys in 1942-43 found 7/15 locations with neutralizing antibody positive children and adults, with an overall seroprevalence in children <15 years of 4.9%. These findings were confirmed during the 1953-54 serosurvey [(Bonnel, P.H. 1957. Bull WHO. Vol. 11. pg. 325); (Chabaud, M.A. et al. 1958. Bull WHO. Vol. 19, pg. 7); when 6% of children were found to be seropositive. The positive sera came from unvaccinated persons living in Assab in the eastern part of the country. While the historical risk has been documented, present risk cannot be excluded, and additional sero-surveys are needed to revise the recommendation.

Proposed Text for the ITH (2011) and CDC Yellow Book (2012)

Country requirement: a yellow fever vaccination certificate is required from travellers coming from countries with risk of yellow fever transmission.

Yellow fever vaccine recommendation: In general no.

Generally not recommended for travelers going to the following states: Debub, Mae Kel, Gash Barka, Anseba, and Semenawi Keih Bahri

Not recommended for all other areas not listed above, including the Dahlak Archipelagos Islands (see Map X)
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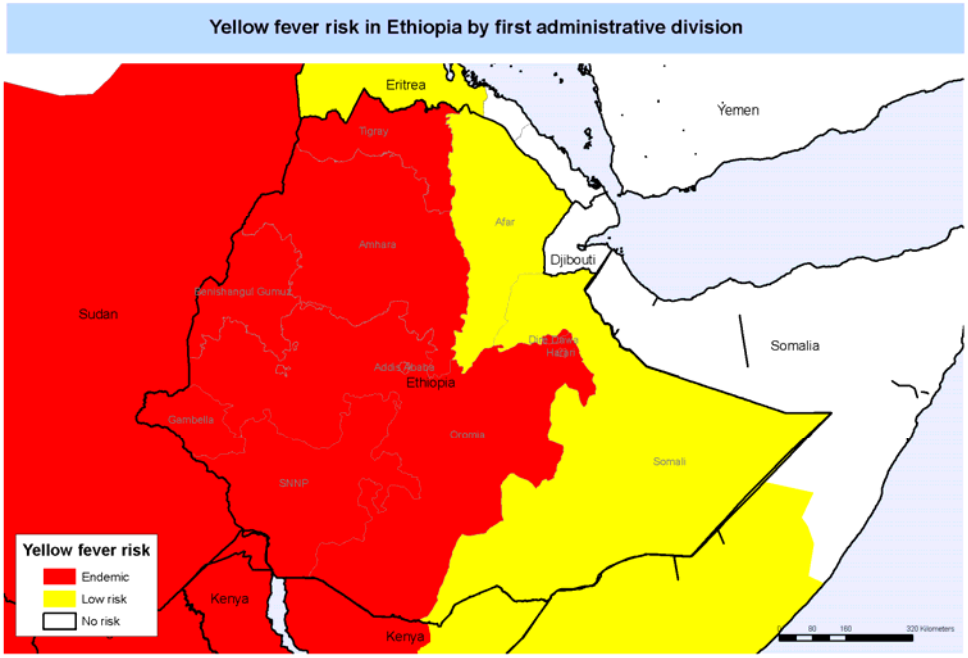
Ethiopia



Previous Risk Classification
For all travellers ≥9 months of age.

Proposed Risk Classification
Endemic: All other provinces not listed below and the city of Addis Ababa.

Low Risk: Afar and Somali Provinces

Rationale for Proposed Classification
An epidemic of severe and fatal illness with jaundice occurred in Daghabur in 1943 without clinical observation by competent observers or laboratory tests. The first confirmed reports of YF occurred in 1959 in Wollega Province, an extension of an outbreak in bordering areas of Sudan in the same year. A very large sylvatic epidemic ensued (1960-62) to the south in Kefa and Gamo-Gofa Districts. The disease reappeared in 1966 slightly to the east of this region (Arba-Minch District), suggesting persistence of the virus between1959-66. No subsequent cases have been recognized.

A serological survey after the 1943 epidemic found 4 out of 29 (13.8%) of adults in 1943 and 3/22 (14%) in 1944 with neutralizing antibodies [(Bonnel, P.H. 1957. Bull WHO. Vol. 11, pg. 325.); (Chabaud, M.A. et al. 1958. Bull WHO, Vol. 19, pg. 7)]. None of 36 children under 15 years were positive. A survey in the same general region (Shoa Plateau) and elsewhere in Ethiopia in 1953-54 was negative [Bonnel, P.H. et al. 1957. Bull WHO. Vol. 11, pg. 325); (Chabaud, M.A. et al. 1958. Bull WHO. Vol. 19. pg 7)]. It might be concluded that the appearance of YF in southwestern Ethiopia in 1959-62 was a virgin soil outbreak following introduction from Sudan, which underwent an outbreak in adjacent areas to the east in 1959. However, approximately 10 years after the 1960-66 outbreaks, Wood and Lee (Wood, O.L., et al. 1975. Ethiop Med J. Vol. 13. pg. 177) visited the outbreak site and found specific neutralizing antibodies in unvaccinated people (22%), including a child born after the outbreak, as well as in baboons and Colobus monkeys, suggesting persistence of (silent) YF virus transmission. There is insufficient evidence

to clearly differentiate areas of high and absent risk. From an ecological perspective, the area of highest risk corresponds to the western half of the country.

Proposed Text for the ITH (2011) and CDC Yellow Book (2012)

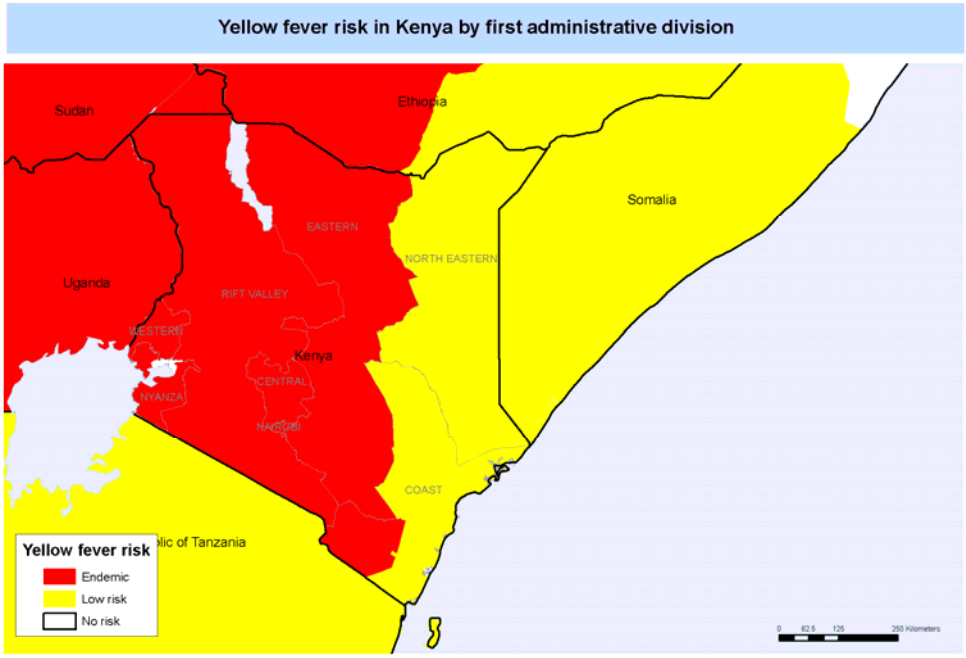
Country requirement: a yellow fever vaccination certificate is required from travellers over 1 year of age coming from countries with risk of yellow fever transmission.

Yellow fever vaccine recommendation: yes;

Recommended for all travelers ≥9 months of age, except as mentioned below

Generally not recommended for travelers whose itinerary is limited to the Afar and Somali provinces (see Map)

Kenya



Previous Risk Classification
For all travellers ≥9 months of age. The cities of Nairobi and Mombasa have lower risk of transmission than rural areas.

Proposed Risk Classification
Endemic: All other zones and states not listed below.

Low Risk: North Eastern zone (States of Mandera, Wajir, Garissa, Ijara) and Coastal zone (States of Tanariver, Lamu, Malindi, Kilifi, Kwale including Mombasa city), City of Nairobi

Rationale for Proposed Classification
Two cases of YF were described prior to the 1992-93 outbreak in Kenya in 1942 (Kitale) and in 1943 (Ngong Road Langata Forest Reserve, west of Nairobi). Following the 1992-93 outbreak, surveillance activities in the affected area continued to find evidence for transmission, with 59 and 73 suspected cases identified in 1994 and 1995, respectively, and cases were identified from outside the epidemic zone as well. (WER, 1996, Vol. 71, pg 103); (Sanders, et al., 1996, Emerg Infect Dis, Vol. 2, pg 236). The data suggest that either YF is enzootic/endemic or is periodically introduced and persists for years in western Kenya. In between outbreaks, the level of transmission may be low and escape detection when only human case surveillance is employed, particularly when outbreaks subside and the index of suspicion for this diagnosis wanes.

Kenya shares borders with Uganda, Sudan, and Ethiopia where YF is endemic or has caused serious epidemics. As recently as 2003, a major epidemic occurred in Equatoria Province, in a bordering area of Sudan (Onyango, et al., 2004, Emerg Infec Dis, Vol. 10, pg. 1668) and in 1966 an epidemic occurred in the Gamo Gofa Province, Ethiopia near the Kenyan border (Ardoin, et al. 1976, Trop Geogr Med, Vol 18, pg. 309). Serological Studies in the Northern Frontier District of Kenya following the 1966 outbreak revealed evidence for recent yellow fever transmission (Henderson, et al. 1968, Bull WHO, Vol. 38, pg. 229). A relevant point is that while no human cases were reported from the affected area in Ethiopia following the major epidemics in the

1960s, an investigation carried out over 10 years later revealed evidence for YF virus transmission between monkeys (Wood et al. 1975, Ethiop Med J, Vol. 13, 177-9), emphasizing that the absence of human case reports does not imply the absence of slyvatic virus transmission. Coastal Kenya has never been considered an area of YF activity, and the surveys there do not inform about risk elsewhere in the country.

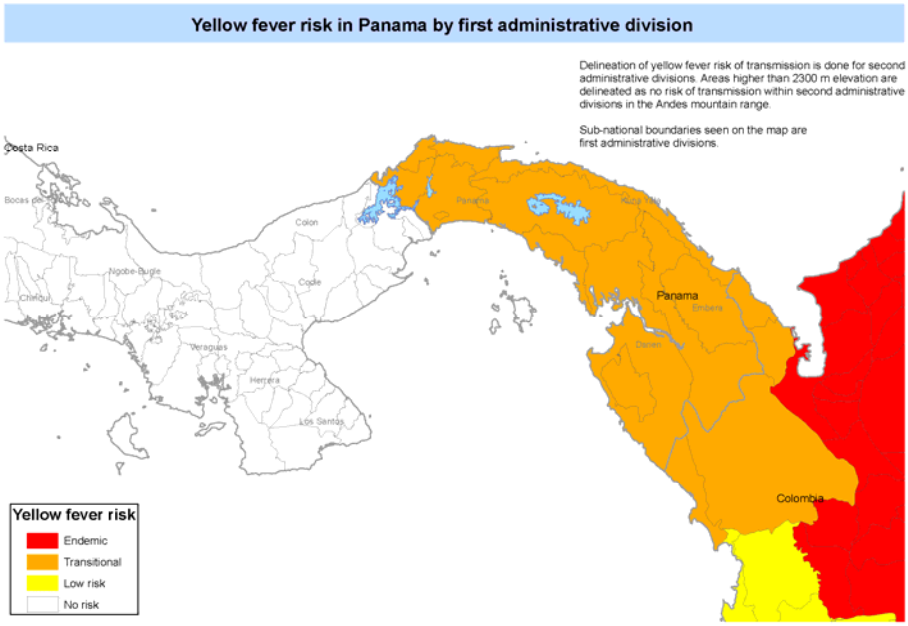
Proposed Text for the ITH (2011) and CDC Yellow Book (2012)

Country requirement: a yellow fever vaccination certificate is required from travellers over 1 year of age coming from countries with risk of yellow fever transmission.

Yellow fever vaccine recommendation: yes;

Recommended for all travelers ≥9 months of age, except as mentioned below
Generally not recommended for travelers whose itinerary is limited to the following areas: the entire North Eastern Province; the states of Tanariver, Lamu, Malindi, Kilifi, and Kwale in the Coastal Province; and the cities of Nairobi and Mombasa (see Map)

Panama



Previous Risk Classification
For all travellers ≥9 months of age traveling to the provinces of Darien, Kuna Yala (old San Blas), Comarca Emberá, and Panama east of the Canal Zone, EXCLUDING the Canal Zone, Panama City, and San Blas Islands.

Proposed Risk Classification
Transitional: Provinces of Darien, Kuna Yala (except San Blas Islands), and Comarca Embera. Also, the provinces of Colon and Panama - east of the canal zone.

No risk: West of the canal zone, city of Panama, canal zone itself, San Blas and Balboa islands and other provinces not included above.

Rationale for Proposed Classification
The WG believes that areas east of the Panama Canal should remain the transitional classification for the following reasons:

- YF vectors and non-human primates are present: The ecological setting in which this virus is transmitted has not changed with the passage of time and human case surveillance, while improving, is still inherently insensitive. Further, human vaccinations, although useful in local populations, have masked the natural transmission of YF virus. For these reasons we believe the evidence indicates that travel, particularly when there is extensive outdoor exposure to sylvatic *Haemagogus* vector mosquitoes in Eastern Panama, engenders a risk of YF infection.
- Human YF cases (sporadic or epidemic) are reported at long intervals and during YF epizootic cases/epidemic expansions from bordering endemic areas: YF outbreaks have been observed in Panama in 1948-49, 1956-57 and 1974 in Panama province (Chepo District) (PAHO Bull 1974;8:270-1). The Jungle YF epizootics in 1948 affected the entire country, whereas the outbreak in 1956-57 was confined to eastern Panama. Similarly, a third epizootic wave (4 associated human cases) in the Darien

in 1974 stopped short of the Canal. There have been neither case reports nor published work on virus transmission in eastern Panama since 1974. It is unclear whether the virus permanently resides in Panama or is introduced during infrequent epizootic waves from the south.

- Yellow fever virus was isolated from mosquitoes captured at Cerro Azul (Panama Province) and Mandinga (border of Colon and Kuna Yala Province) in 1956 (de Rodaniche et al.).

- Serological evidence of yellow fever transmission was found in Panama Province in 1941-2. (Kumm HW, Crawford PJ. The recent distribution of endemic yellow fever in Central America and neighboring countries. Am J Trop Med 1943;23:421-31). The Bayano River basin in Panama province is historically a region of yellow fever activity defined by serosurveys.
    - These data suggest that either YF is enzootic/endemic or is periodically introduced and persists for years in Eastern Panama. In between outbreaks, the level of transmission may be low and escape detection when only human case surveillance is employed, particularly when outbreaks subside and the index of suspicion for this diagnosis wanes. A relevant point is that the absence of human case reports does not imply the absence of sylvatic virus transmission.
    - While no human cases are reported in Panama since 1974, and while no flavivirus could be detected in 300 blood samples tested in the province of Darien in 2008, this is not sufficient to rule out YF enzootic transmission in Panama. The examples of Argentina and Paraguay where YF outbreaks occurred last year after respectively 40 years and 34 years with no YF cases detected could be cited.

Central America and western Panama are considered no risk on the basis of the following observations:

- There have been no reports of YF activity (i.e., no human cases, monkey deaths or other evidence of virus transmission) for an extended period of time (5-8 times the typical cycle or reemergence of epizootic YF in tropical America);
- There is a lack of historical evidence indicating that YF activity occurs repeatedly or periodically;
- There are natural barriers to the introduction of YF into the region; and
- YF disappeared from Central America after the last event (1955). This was monitored and documented by several groups of researchers with active field programs, including the Gorgas Memorial Laboratories and the Middle America Research Unit, so that there can be reasonable assurances that persistent virus activity did not occur.

The last wave of jungle YF in this region occurred from 1948-1955. It was preceded in 1946-47 by an upsurge of YF in the Antioquia province of Colombia bordering eastern Panama and by YF virus transmission in eastern Panama in 1948-49. It was thought at the time that this was the first wave of jungle YF in Central America since 1484, and that such episodes occur extremely infrequently, with perhaps centuries between cycles. Urban YF had occurred in Central America, up to 1924 when *Ae. aegypti* was eradicated from the region, but without evidence for introductions into the jungle cycle. In 1950, the virus had to sweep from eastern Panama westward across the Panama Canal, which affords a barrier to YF. Early workers had noted that YF had come very close to the Canal but not crossed it, for example in 1941 when a case occurred 30 miles east of the Canal (a similar occurrence was noted in 1974). There appear to be ecological reasons for the barrier to YF virus transmission presented by the Canal. The Canal is located where it is because of a gap in the mountain system of Panama. The Canal determines a critical transition between tropical forest to the east and deciduous forest (with a severe dry

season) to the west, which is in the lee of the mountains with respect to rainfall from the northeasterly tradewinds. The abundance of canopy vectors (*Haemagogus spegazzinii*) in the deciduous forest west of the Canal is highly variable and markedly affected by rainfall patterns. Thus to cross the Canal, there would need to be the convergence of both the virus (a rare event) and favorable rainfall and vector density, a highly cyclical event. This convergence of cycles probably occurred in 1949-1950.

Proposed Text for the ITH (2011) and CDC Yellow Book (2012)

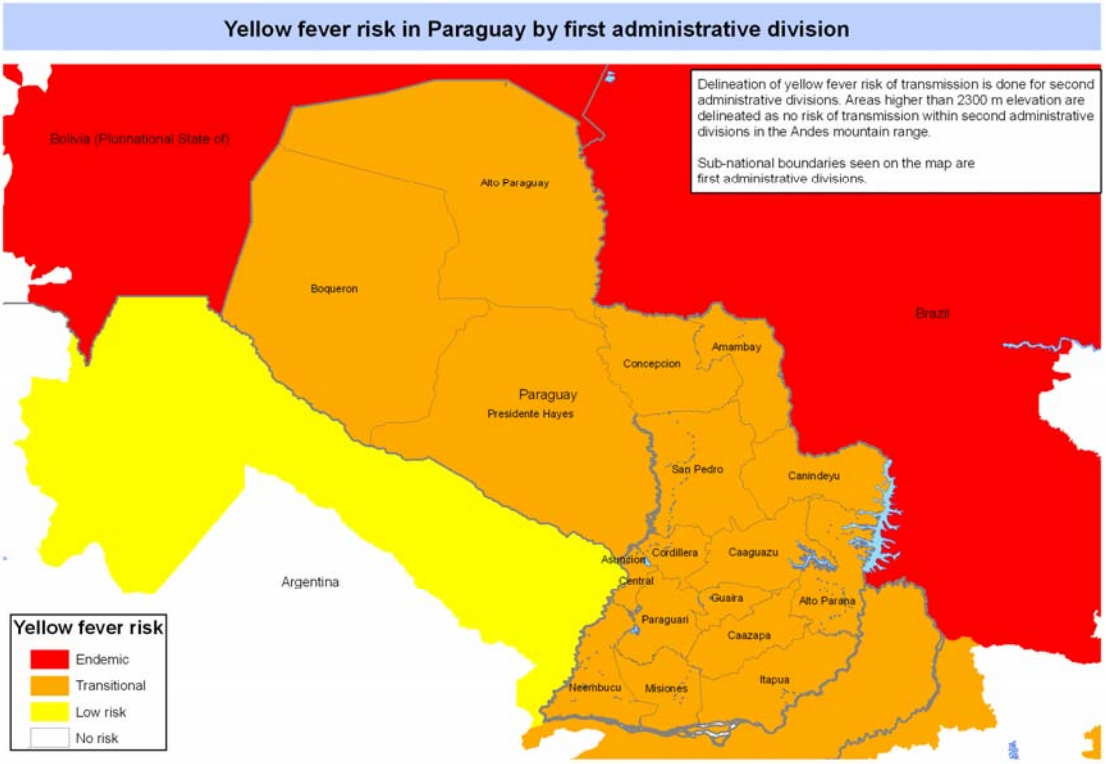
Country requirement: a yellow fever vaccination certificate is required from all travellers coming from countries with risk of yellow fever transmission.

Yellow fever vaccination recommendation: yes,;

Recommended for all travelers ≥9 months of age travelling to all mainland areas east of the canal zone, which consist of the entire provinces of Darien, Kuna Yala, and Comarca Embera and areas of the provinces of Colón and Panama that are east of the canal zone (see Map)

Not recommended for travelers whose itineraries are limited to areas west of the canal zone, the city of Panama, the canal zone itself, the San Blas Islands, and the Balboa Islands (see Map)

Paraguay



Previous Risk Classification
For all travellers ≥9 months of age

Proposed Risk Classification
Transitional: Whole Country

Low risk: Capital City of Asuncion

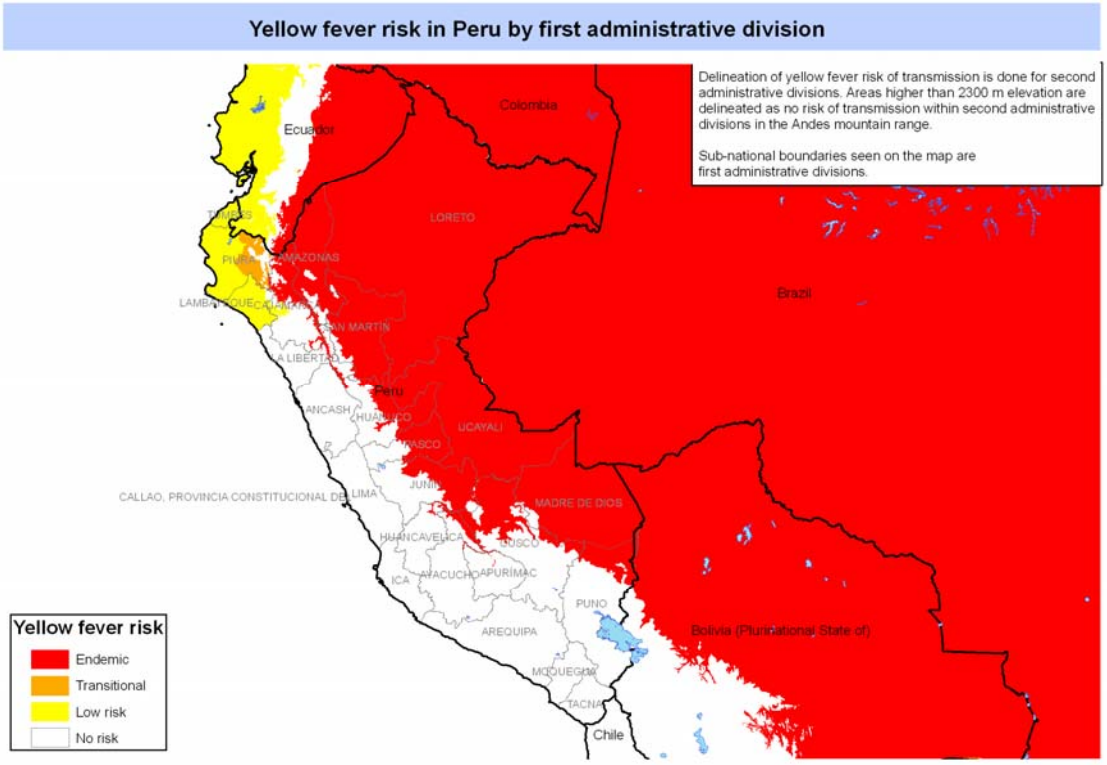
Rationale for Proposed Classification
Until 2008, urban YF had not been recorded since 1904. Since the initiation of official reporting (in 1927) the only year up to 2008, in which YF was reported was in 1974, when 9 cases were reported from Amambay Department along the border with Brazil. In 2008, 27 YF cases were identified in San Pedro and Central Departments and an investigation indicated that some were urban YF cases (*Ae. aegypti*-borne). Both the 1974 and 2008 episodes were the result of a southward sweep of an epizootic wave that arose in Brazil. It is possible that sporadic cases have occurred in Paraguay without recognition in other years, and it cannot be determined whether continuing enzootic transmission occurs for a period of time after recognized outbreaks. Further, because Paraguay is surrounded by endemic and transitional areas with risk of YF virus transmission, the entire country of Paraguay was classified as transitional.

Proposed Text for the ITH (2011) and CDC Yellow Book (2012)
Country requirement: a yellow fever vaccination certificate is required from travellers over 1 year of age coming from countries with risk of yellow fever transmission.
Yellow fever vaccine recommendation: yes;

Recommended for all travelers ≥9 months of age, except as mentioned below

Generally not recommended* for travelers whose itinerary is limited to the city of Asunción

Peru



Previous Risk Classification
For all travellers ≥9 months of age traveling to the areas east of the Andes Mountains (see Map 2-4) and for those who intend to visit any jungle areas of the country <2,300 m(<7,546 ft). Travellers who are limiting travel to the cities of Cuzco and Machu Picchu do NOT need vaccination.

Proposed YF revised risk mapping for Peru

Endemic: East of Andes below 2300 m, including the entire departments of Amazonas, Loreto, Ucayali, Madre de Dios and San Martin; and designated areas of the departments of Cajamarca, La Libertad, Ancash, Huanuco, Pasco, Junin, Huancavelica, Ayacucho, Apurimac, Cusco and Puno. *See table 1.*

Transitional: Designated areas of the department of Piura connected to the endemic area of Cajamarca. *See table 2.*

Low Risk: Entire provinces of Tumbes and Lambayeque, the Occidental territory of Piura, as well as Northwestern areas of Cajamarca neighboring Lambayeque. See table 3.

No risk: West of Andes and areas above 2300m, including entire departments of Lima, Ica, Arequipa, Moquegua, Tacna and almost all the entire departments of Ancash, Huancavelica, Ayacucho (except for selected areas in the Northeast) and Apurimac (selected areas in the north). This also includes Western regions of the provinces: La Libertad, Pasco, Junin and the

south part of Puno and Cuzco (including cities of Cuzco and Machu Picchu, as well as the Inca Trail)

Rationale for proposed YF risk classification

The eastern boundary of the Andean Sierra and Altiplano demarcate the Amazon region of holoendemic YF to the east. These endemic areas are extended upstream to the intermountain Peruvian tributaries of the Amazon River. The recognized endemic areas of transmission are distributed in 12 hydrographic basins. Tumbes, Piura and Lambayeque considered as low risk areas have ecological conditions characteristic of the tropical dry broadleaf forest where the primate host lives.

Proposed Text for the ITH (2011) and CDC Yellow Book (2012)

Country requirement: no

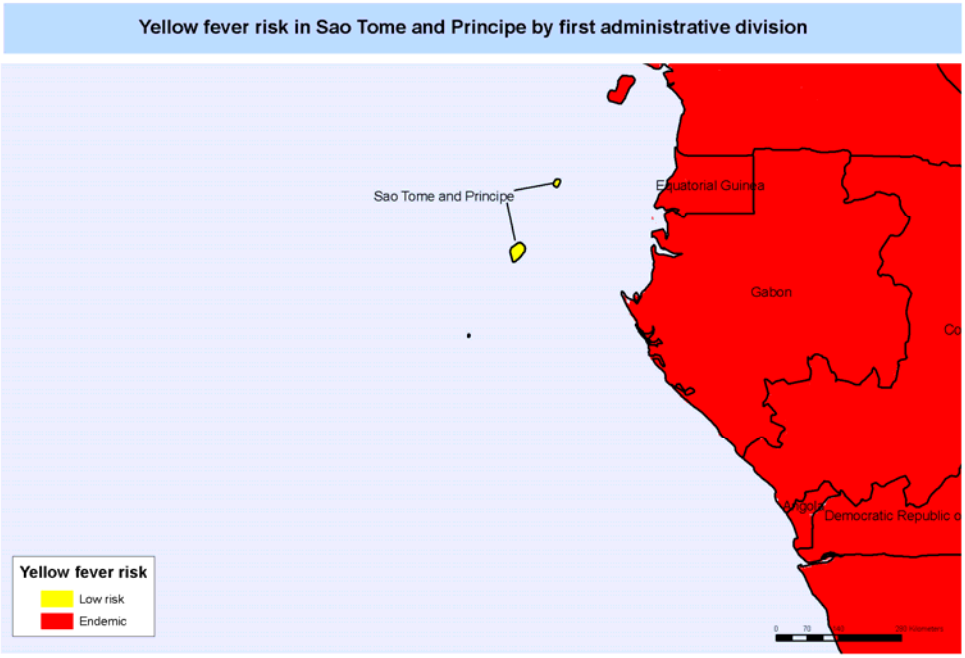
Yellow fever vaccine recommendation: yes;

Recommended for all travelers ≥9 months of age going to the following areas <2,300 m in elevation: the entire regions of Loreto, Amazonas, San Martin, Ucayali, and Madre de Dios and designated areas (see Map X) of the following regions: northern and eastern Cajamarca; eastern Piura; eastern La Libertad; far northeastern Ancash; northern, central, and eastern Huanuco; central and eastern Pasco; northern and eastern Junin; far northern Huancavelica; northern and northeastern Ayacucho; northern Apurimac; northwestern, northern, and northeastern Cusco; and northern Puno

Generally not recommended* for travelers whose itinerary is limited to the following areas west of the Andes: the entire regions of Tumbes and Lambayeque and the designated areas of western Piura and west-central Cajamarca (see Map X)

Not recommended for travelers whose itineraries are limited to the following areas: all areas >2,300 m in elevation, areas west of the Andes not listed above, the cities of Lima and Cuzco, Machu Picchu, and the Inca Trail (see Map X)

Sao Tome and Principe



Previous Risk Classification
For all travellers ≥9 months of age.

Proposed Risk Classification
Low risk: Whole Country

Rationale for Proposed Classification
No human cases have been reported. Neutralizing antibodies were found in the Rockefeller Foundation survey in 1934 but not during the survey in 1952 (Bonnel et al. 1957, Bull WHO, Vol. 11, pg. 325). Experts believed the seropositives in 1934 were from persons who came to the islands from the mainland to work in the cacao plantations (1954, Bull WHO, Vol. 11, Pg. 504). Sao Tome and Principe was moved to low risk due to its lack of human cases and historical serological surveys.

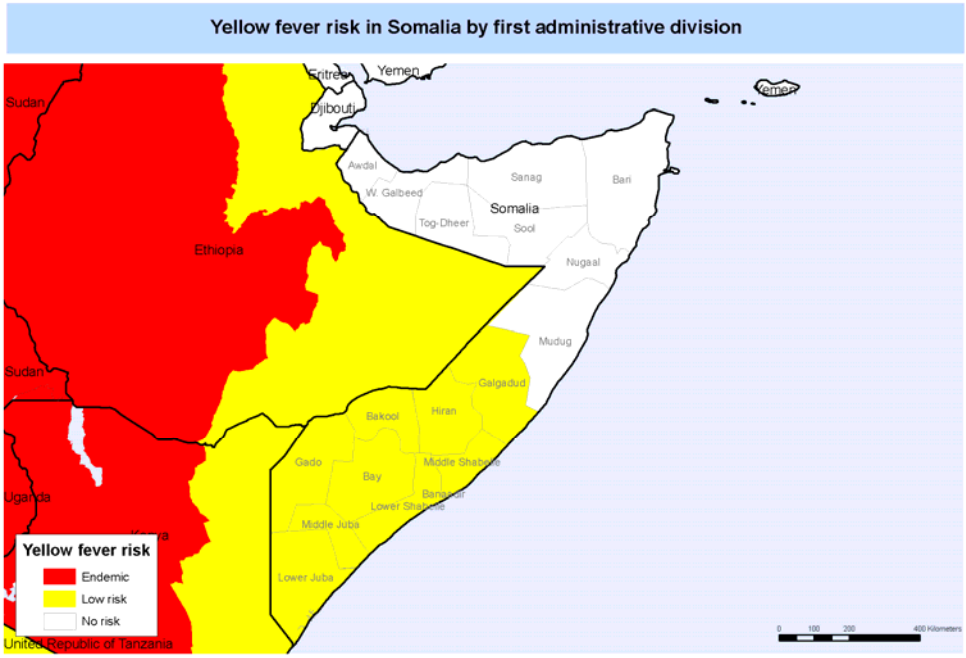
Proposed Text for the ITH (2011) and CDC Yellow Book (2012)

Country requirement: a yellow fever vaccination certificate is required from all travellers over 1 year of age

Yellow fever vaccine recommendation: no.

Generally not recommended* for travelers to São Tomé and Príncipe

Somalia



Previous Risk Classification
For all travellers ≥9 months of age.

Proposed Risk Classification
Low Risk: Galgadud, Hiran, Middle Shabelle, Banaadir, Lower Shabelle, Bakool, Bay, Gado, Middle Juba, and Lower Juba

No risk: All States north of Galgadud State

Rationale for Proposed Classification
A low prevalence of YF antibodies (3.7%) was found in adults in eastern Somalia (Villagio) in 1942 (Mahaffy, A.H. 1946. Trans Roy Soc Trop Med Hyg. Vol. 40, pg. 57-82). A more recent serosurvey (1966-67) was conducted in Somalia, northern Uganda (Karamoja), and northern Kenya following the YF outbreaks in southern Ethiopia in the 1960s (Henderson, B.E. 1968. Bull WHO, Vol. 38; pg. 229). Neutralizing antibodies (prevalence 8.5%) were found in Sciavella, Giohar District, Somalia (near Mogadishu). None had CF antibodies indicating recent infection. The region of south and south central Somalia probably has sufficient rainfall and vegetation to support transmission of YF.

Proposed Text for the ITH (2011) and CDC Yellow Book (2012)

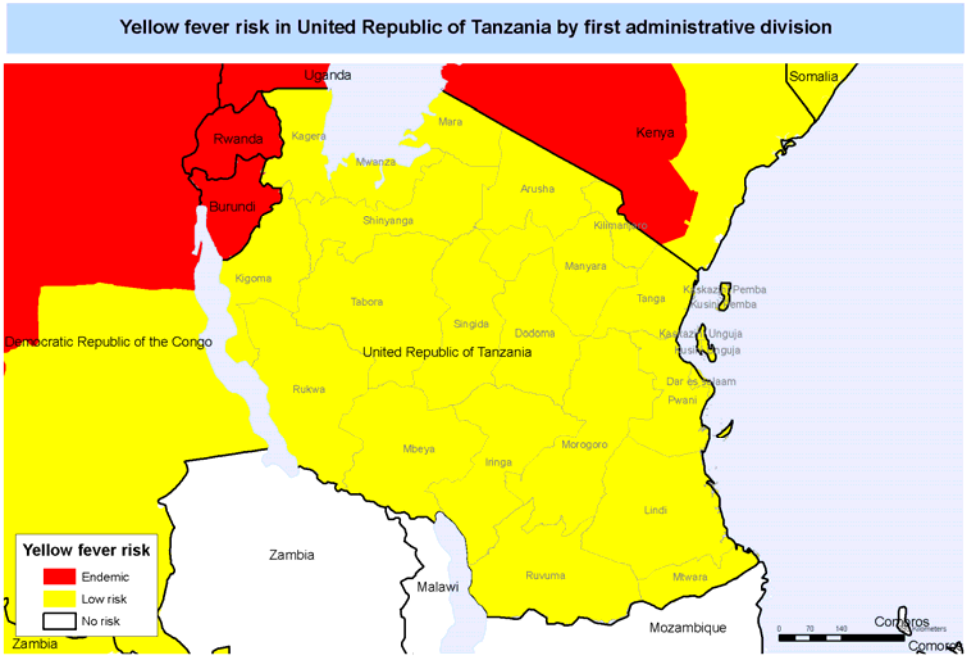
Country requirement: a yellow fever vaccination certificate is required from travellers coming from countries with risk of yellow fever transmission.

Yellow fever vaccine recommendation: In general no.

Generally not recommended for travelers going to the following regions: Galgadud, Hiran, Middle Shabelle, Banaadir, Lower Shabelle, Bakool, Bay, Gado, Middle Juba, and Lower Juba (see Map X)

Not recommended for all other areas not listed above

Tanzania



Previous Risk Classification
For all travellers ≥9 months of age. The city of Dar es Salaam has a lower risk of transmission than rural areas.

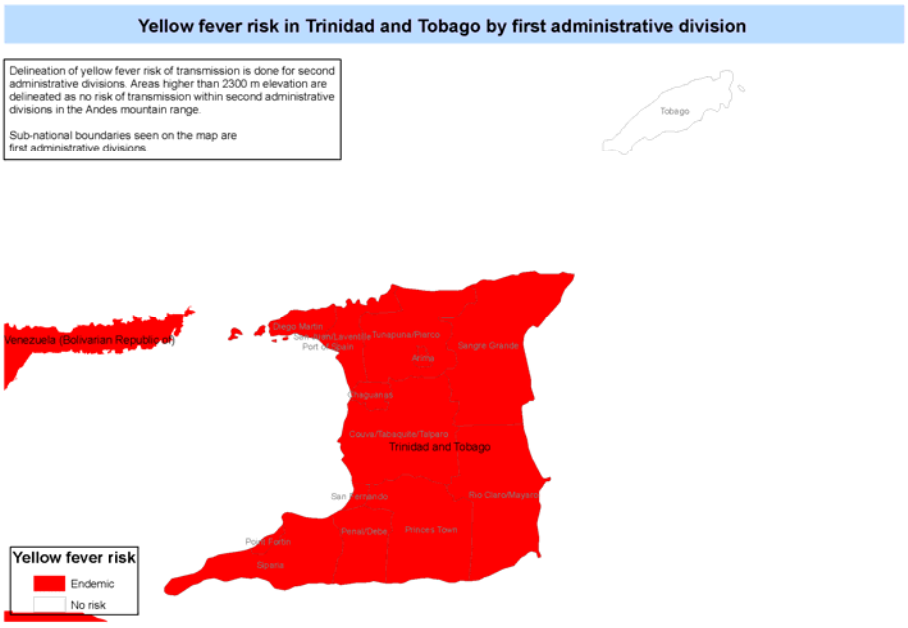
Proposed Risk Classification
Low Risk: Whole Country

Rationale for Proposed Classification
Human cases have not been reported from Tanzania. The only evidence for YF comes from serological surveys conducted in the 1940s [(Sawyer, W.A. 1934-35, Harvey Lectures. pg. 66-92); (Salah, S. et al. 1988. Ann Inst Pasteur Virol. Vol. 139: 439-42)] and 1951-53 (Bonnel et al. 1957, Bull WHO, Vol. 11, pg. 325). A low prevalence of children and adults (<5%) at several locations along the coast from Tanga in the North to Newala in the southeast were seropositive (positive galagos were also found at Newala). Positive sera were also found (1940s) along the Rwanda border and (adults only) in Moshi (at Kilimanjaro). A survey on Zanzibar conducted in 1951-53 revealed neutralizing antibodies in 2 (4%) of 55 unvaccinated children with no history of having travelled to the mainland (Bonnel et al. 1957, Bull WHO, Vol. 11, pg. 325).

Proposed Text for the ITH (2011) and CDC Yellow Book (2012)
Country requirement: a yellow fever vaccination certificate is required from travellers over 1 year of age coming from countries with risk of yellow fever transmission.
Yellow fever vaccine recommendation: in general no.
Vaccination is not recommended for travellers to Tanzania, which has low potential for exposure*.

* Consideration for vaccination of travellers visiting areas with *low potential for exposure* must weigh potential exposure to YF virus (e.g. prolonged travel, heavy exposure to mosquitoes, inability to avoid mosquito bites) against individual risk factors for vaccine-associated adverse events (e.g. age, immune status).

Trinidad and Tobago



Previous Risk Classification
For all travellers ≥9 months of age whose itinerary includes Trinidad. Port of Spain has lower risk of transmission than rural or forested areas. Cruise ship passengers who do not disembark from the ship or travellers visiting only the urban area of Port of Spain (including passengers in-transit only) may consider foregoing vaccination. Vaccination is NOT recommended for those visiting only Tobago.

Proposed Risk Classification
Endemic: Trinidad

Low Risk: Port of Spain

No risk: Tobago

Rationale for Proposed Classification
Evidence for epizootic YF in Trinidad was detected in 1953, and was followed by an urban outbreak in 1954 in Port of Spain. Enzootic transmission was detected in 1959, 1978-80, and 1988-89, with isolations from *Haemagogus janthinomys, Sabethes chloropterus*, and monkeys. A human outbreak of jungle YF occurred in 1979 and involved the central and northeast parts of the island. There have been no human case reports since 1979, but as noted above, virus transmission was detected in 1988-89 (Rawlins, S.C. et al. 1990. Trans Roy Soc Trop Med Hyg. Vol. 84. Pg. 142-143) suggesting a local reservoir or virus activity (or possibly reintroduction from nearby Sucre State, Venezuela). On January 22, 2009, the Trinidad Ministry of Health confirmed that two monkeys had died of YF virus infection. A number of other monkeys have been found dead, but no cause of death was confirmed (Promed, 19 Jan 09, source: Trinidad & Tobago MOH). Port of Spain represents a low risk to travellers during years in which virus is not detected in humans, mosquitoes or monkeys. There is no YF on Tobago.

Proposed Text for the ITH (2011) and CDC Yellow Book (2012)

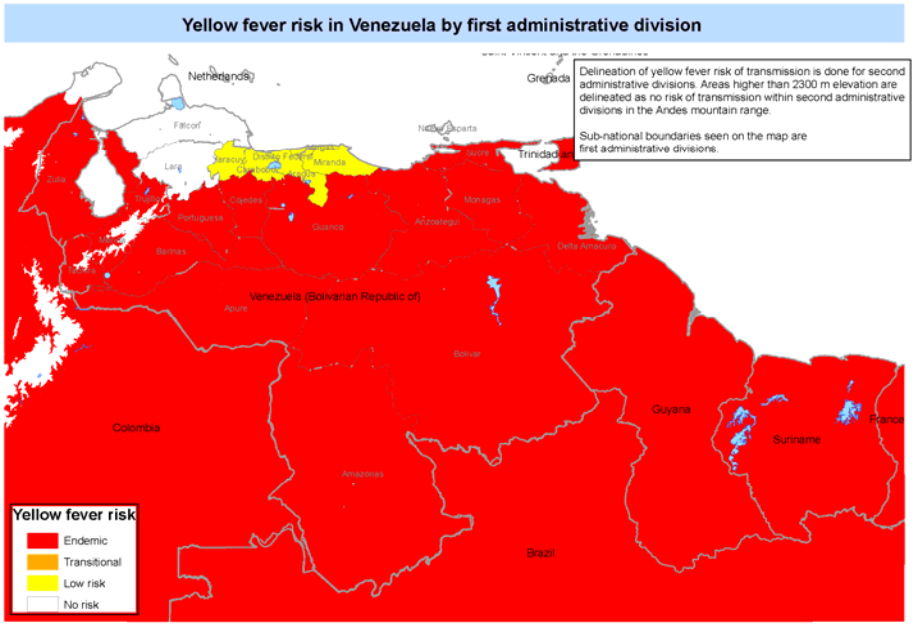
Country requirement: a yellow fever vaccination certificate is required from travellers over 1 year of age coming from countries with risk of yellow fever transmission.

Yellow fever vaccine recommendation: yes;
Recommended for all travelers ≥9 months of age travelling to the island of Trinidad, except as mentioned below

Generally not recommended for travelers whose itinerary is limited to the urban areas of the Port of Spain, cruise ship passengers who do not disembark from the ship, and airplane passengers in transit.

Not recommended for travelers whose itineraries are limited to the island of Tobago

Venezuela



Previous Risk Classification
For all travellers ≥9 months of age traveling to Venezuela, EXCEPT the northern coastal area. The cities of Caracas and Valencia are NOT in the endemic zone.

Proposed Risk Classification
Endemic: Provinces and areas not listed below.

Low risk: Yaracuy, Carabobo, Aragua, Vargas, Distrito Federal (including Province of Miranda)

No Risk: Entire provinces of Falcon and Lara; the peninsular section of the Paez administrative region in the Zuila Province; Margarita island; and the cities of Caracas and Valencia.

Rationale for Proposed Classification
The last human case of urban YF occurred in 1918 in the city of Coro, Falcon State (northwestern Venezuela).There are three main zones of endemic/enzootic YF: 1. Guyana zone (along the border with that country), tropical forest and grasslands drained by the Essequibo, Amazon, and Orinoco Rivers and consisting of Bolivar and Amazon States; 2. Lake Maracaibo zone, bordering Colombia, forests drained by the Zulia ad Catatumbo Rivers; and 3. San Camillo zone containing forests in the Orinoco basin and Andean foothills, in the states of Merida and Tachira.

Proposed Text for the ITH (2011) and CDC Yellow Book (2012)

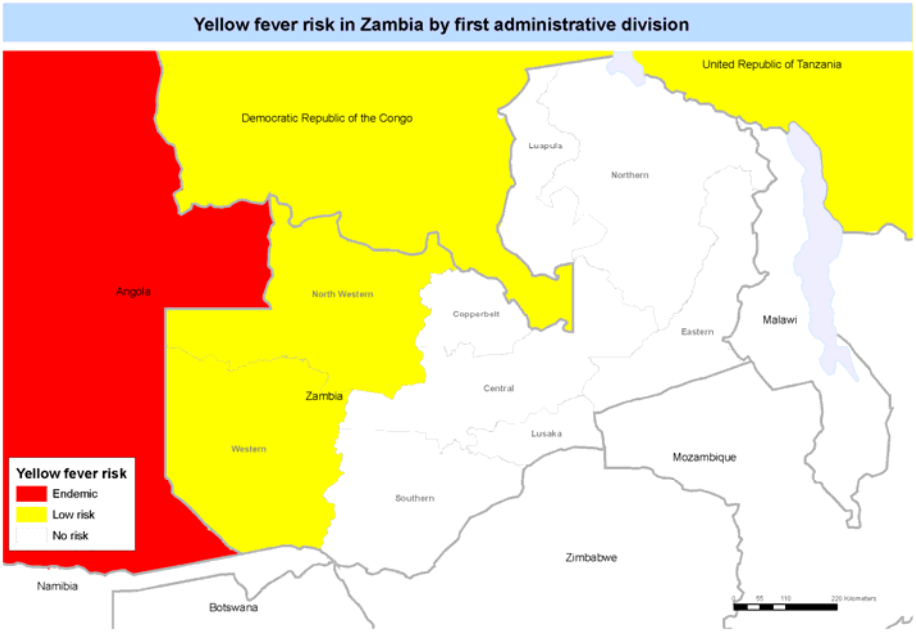
Country requirement: no.
Yellow fever vaccine recommendation: yes;

Recommended for all travelers ≥9 months of age, except as mentioned below

Generally not recommended* for travelers whose itinerary is limited to the following areas: the entire states of Yaracuy, Carabobo, Aragua, Vargas, and Miranda and the Distrito Federal (see Map)

Not recommended for travelers whose itineraries are limited to the following areas: the entire states of Falcon and Lara, the peninsular section of the Paez municipality of Zuila Province, Margarita Island, and the cities of Caracas and Valencia (see Map)

Zambia



Previous Risk Classification
None.

Proposed Risk Classification
Low Risk: North West and Western Provinces

No risk: All areas and provinces not listed above.

Rationale for Proposed Classification
No YF cases have been officially notified. However, a suspect case in 1943 was described from Zambezi (formerly Balovale, North-Western province) (Robinson, G.G. 1950, East Afr Med J. Vol. 27, pg. 284). The western part of Zambia within the Zambezi River basin surveyed in 1944 (Mahaffy, A.H. et al. 1946. Trans Roy Soc. Trop Med Hyg. Vol. 40, pg. 57) and again in 1951-53 (Bonnel, P.H., 1957. Bull WHO, Vol. 11, pg. 325) contained multiple locations with neutralizing antibodies. The seroprevalence across locations sampled ranged from 0-18% in children <15 years to 0- 17% in adults (Fig. 4). Past serological studies showed widespread YF virus transmission in the Western Provinces. No YF cases reported. While the historical risk has been documented, present risk cannot be excluded, and additional sero-surveys are needed to revise the recommendations. To ensure coherence with Angola mapping and to address that past serological studies showed widespread YF in the Western Provinces, the North Western and Western provinces were classified as low risk by the WG.

Proposed Text for the ITH (2011) and CDC Yellow Book (2012)

Country requirement: no

Yellow fever vaccine recommendation: In general no.
Generally not recommended* for travelers going to the following areas: the entire North West and Western provinces

Not recommended in all other areas not listed above

4. CHANGES TO THE ITH

The WG is proposing that low risk countries be removed from Annex 1. The countries affected by this change would be Sao Tome and Principe, the United Republic of Tanzania, Eritrea, Somalia, and Zambia.

This change would affect vaccination recommendations. Vaccination will generally not be recommended for travellers going to low risk countries. Consideration for vaccination must weigh the potential exposure to YF (e.g. prolonged travel, heavy exposure to mosquitoes, inability to avoid mosquito bites) against individual risk factors for vaccine-associated adverse events (e.g. age ≥ 60 years, altered immune status).

Further, proof of vaccination is often required for travellers coming from countries with risk of YF virus transmission (and sometimes, for travellers in transit through such countries). These low risk countries would not be considered as a country with risk of YF virus transmission and will be removed from ITH Annex 1 list.

5. PROPOSED FUTURE OF THE WG

5.2.1. Development of Protocols for Countries to Change Risk Classification

The WG will follow up on the development of these protocols and submit proposals within a year.

5.2.2. Review Risk Classifications Annually or on an Ad Hoc basis

The WG will continue to review risk classification in light of current YF developments and will meet as necessary via teleconference.

The WG will work to synthesize, electronically, the WG decisions with future surveillance data from WHO. This will involve working with the WHO YF Initiative Team to further improve and advance the evidence for risk classifications.

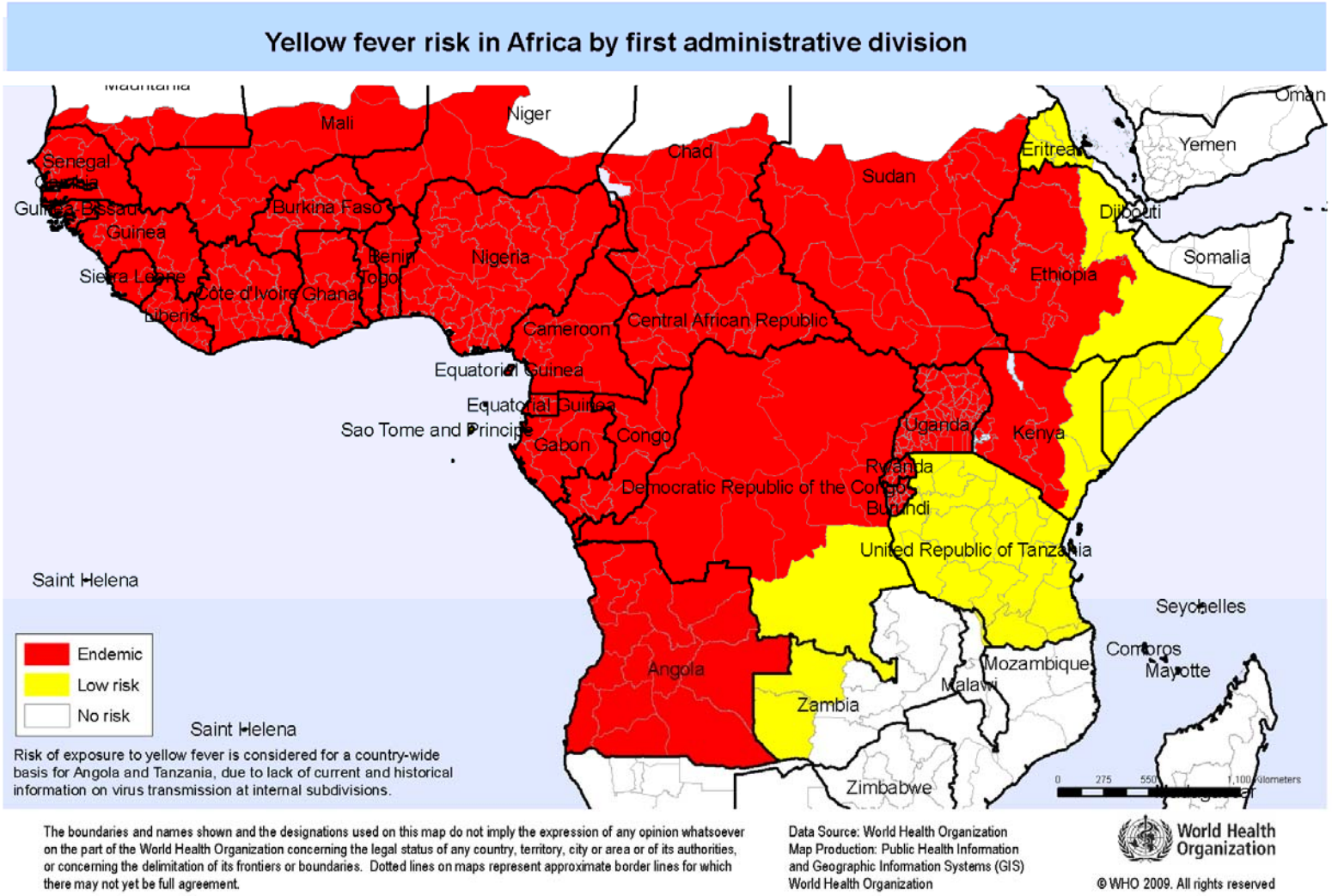
6. APPENDICES

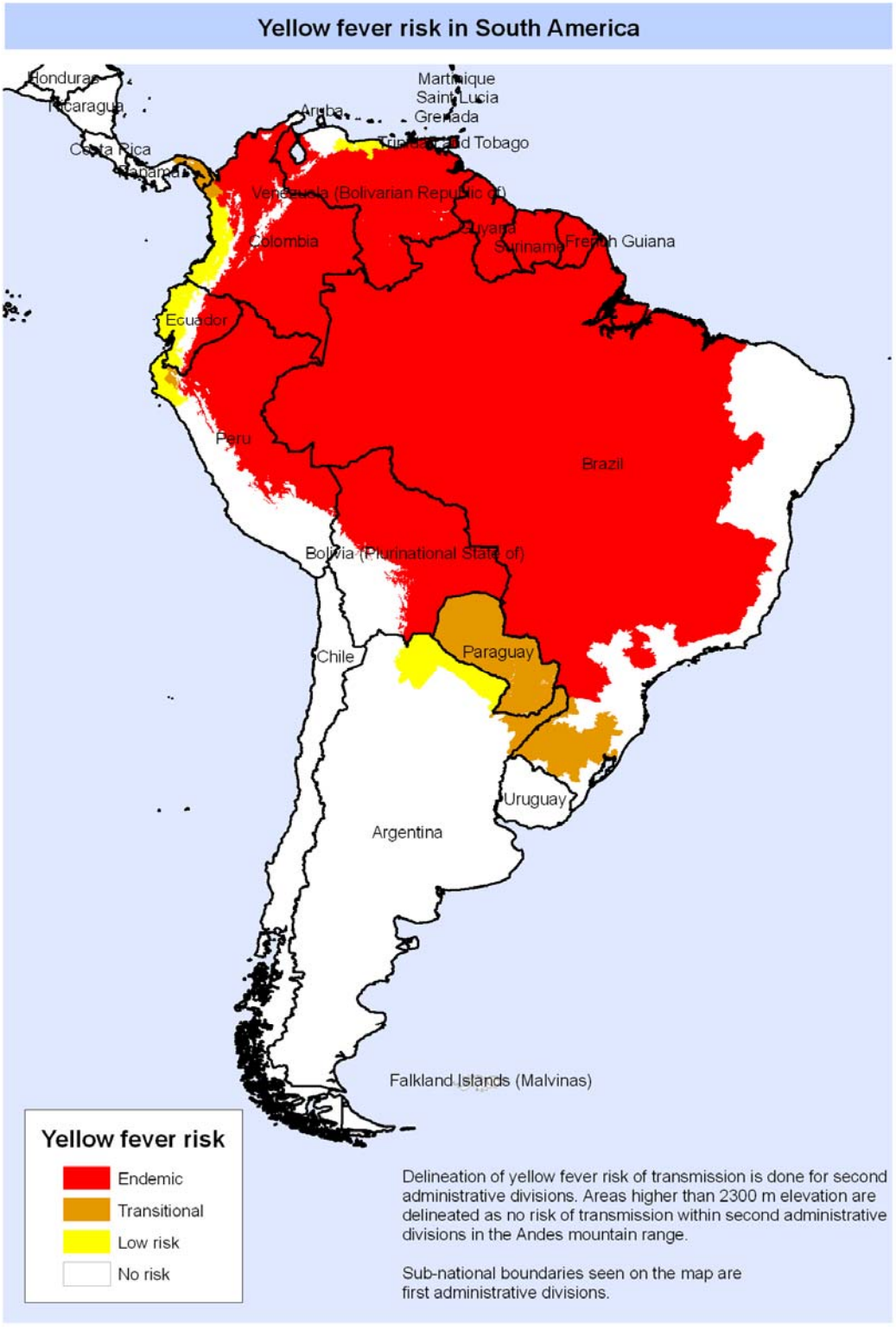
6.1. Table 1. Classifications for areas with risk for YF virus transmission: Criteria for classification*, risk of infection, and vaccine recommendation

Classification	Criteria for Classification	Risk of Infection	Vaccination **
Endemic	Areas with persistence of enzootic YF virus transmission over long periods of time and where: • YF vectors and non-human primate hosts are present; AND • Human and/or non-human primate YF cases are reported repeatedly; OR • Human YF cases were reported regularly prior to the achievement of high YF immunization coverage; OR • Sero-surveys (pre-vaccination era) show evidence of high levels of YF infection.	High	Vaccination recommended for all travellers ≥ 9 months old
Transitional	Areas bordering YF endemic zone with periodic evidence of transmission during YF epizootic/epidemic expansions and where: • YF vectors and non-human primates are present; AND • Human YF cases (sporadic or epidemic) are reported at long intervals and during YF epizootic cases/epidemic expansions from bordering endemic areas; AND/OR • Sero-surveys (pre-vaccination era) show evidence of YF infection in persons born before last YF expansion.	Moderate to High	Vaccination recommended for all travellers ≥ 9 months old
Low Risk	Areas bordering YF endemic or transitional areas and where: • YF vectors and non-human primate YF hosts are present; AND • No human or non-human primate YF cases have been reported; AND • There may be serological or other evidence of low levels of YF viral transmission in the past.	Low	Vaccination recommended for entering travellers but balanced by individual risk factors, particularly risk factors for adverse events (e.g. advanced age), and for exposure to YF (e.g. travel for more than 1 week in rural areas).

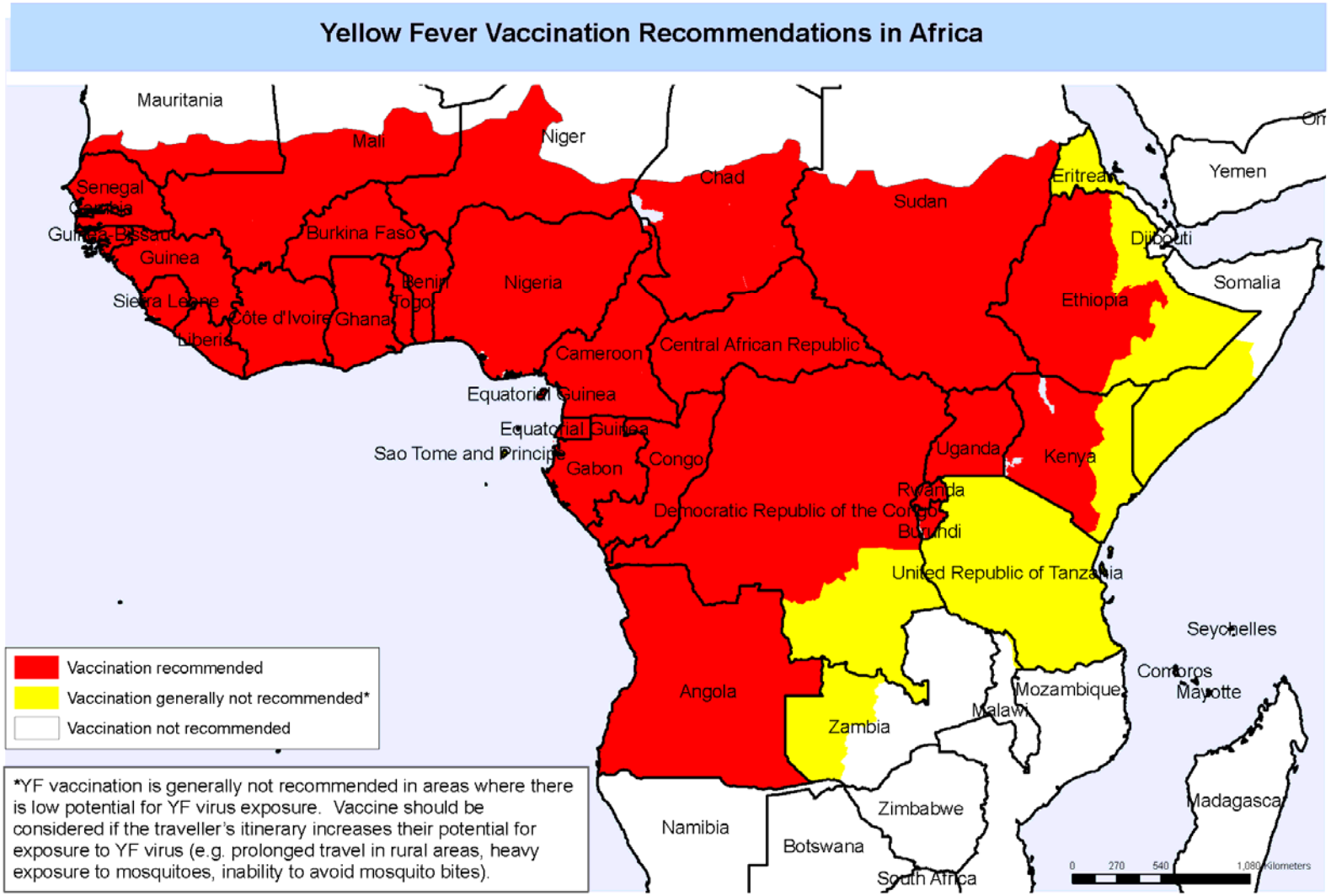
*Some criteria include elements for which there is no scientific basis for defining (such as “high levels”, “long intervals”) and which will require interpretation by experts with experience in this disease area. **Where there is a lack of information, a conservative approach is justified.

6.2 Global YF risk maps with Consultation's classification




Yellow fever risk in South America
Honduras
Nicaragua
Costa Rica
Panama
Aruba
Martinique
Saint Lucia
Grenada
Trinidad Tobago
Venezuela (Bolivarian Republic of)
Colombia
Guyana
Suriname
French Guiana
Ecuador
Peru
Brazil
Bolivia (Plurinational State of)
Chile
Paraguay
Uruguay
Argentina
Falkland Islands (Malvinas)
Yellow fever risk
Endemic
Transitional
Low risk
No risk
Delineation of yellow fever risk of transmission is done for second administrative divisions. Areas higher than 2300 m elevation are delineated as no risk of transmission within second administrative divisions in the Andes mountain range.
Sub-national boundaries seen on the map are first administrative divisions.

6.3 Global YF vaccination maps for publication in the ITH and CDC Yellow Book




Yellow Fever Vaccination Recommendations in South America
Belize
Honduras
Nicaragua
Costa Rica
Panama
Aruba
Guadeloupe
Martinique
Saint Lucia
Grenada
Trinidad Tobago
Venezuela (Bolivarian Republic of)
Guyana
Suriname
French Guiana
Colombia
Ecuador
Peru
Brazil
Bolivia (Plurinational State of)
Chile
Paraguay
Uruguay
Argentina
Falkland Islands (Malvinas)
Vaccination recommended
Vaccination generally not recommended*
Vaccination not recommended
*YF vaccination is generally not recommended in areas where there is low potential for YF virus exposure. Vaccine should be considered if the traveller's itinerary increases their potential for exposure to YF virus (e.g. prolonged travel in rural areas, heavy exposure to mosquitoes, inability to avoid mosquito bites).