



## RAPID RISK ASSESSMENT

# Yellow fever among travellers returning from South America

14 March 2017

### Main conclusions and options for response

A travel-associated case of yellow fever has been reported by the Netherlands in March 2017 after travel to Suriname. During the past eight months, four travel-associated cases of yellow fever have been identified among EU travellers returning from South America. This represents a significant increase on four travel-associated cases of yellow fever among EU travellers during the last 27 years (1999 to July 2016).

Brazil has been experiencing a yellow fever outbreak since January 2017 and travel recommendations have been updated accordingly [1,2]. Therefore, EU travellers travelling to areas at risk of yellow fever in South America should be informed of the potential exposure to yellow fever virus and an individual risk benefit analysis should be conducted during pre-travel medical consultation.

The ongoing yellow fever outbreak in Brazil should be carefully monitored, as the establishment of an urban cycle of yellow fever would have the potential to rapidly affect a significant number of people. The risk of introduction and further transmission of the yellow fever virus in the EU is currently considered very low.

#### Advice to travellers

EU citizens who travel to, or live in areas where there is evidence of periodic or persistent yellow fever virus transmission, especially those in outbreak-affected regions, are advised to:

- Be aware of the risk of yellow fever in endemic areas throughout South America, including recently affected States in Brazil. WHO publishes a list of countries, territories and areas with yellow fever vaccination requirements and recommendations [1-3].
- Check vaccination status and get vaccinated if necessary. Vaccination against yellow fever is recommended from nine months of age for people visiting or living in yellow fever risk areas. An individual risk benefit analysis should be conducted prior to vaccination, taking into account the period, destination, duration of travel and the likelihood of exposure to mosquitoes (e.g. rural areas, forests) as well as individual risk factors for adverse events following yellow fever vaccination.
- Take measures to prevent mosquito bites indoors and outdoors, especially between sunrise and sunset when *Aedes* and sylvatic yellow fever mosquito vectors are most active [4]. These measures include:
  - the use of mosquito repellent in accordance with the instructions indicated on the product label;
  - wearing long-sleeved shirts and long trousers;
  - sleeping or resting in screened/air-conditioned rooms, or using mosquito nets at night and during the day.

#### Advice to health professionals

Physicians, health professionals and travel health clinics should be provided with or have access to regularly updated information about areas with ongoing yellow fever transmission and should consider yellow fever in the differential diagnoses for illnesses in relation to travellers returning from affected areas.

To reduce the risk of adverse events following immunisation, healthcare practitioners should be aware of contraindications and comply with the manufacturers' precautionary advice before administering yellow fever vaccine [5].

## Source and date of request

ECDC internal decision, 10 March 2017.

## Public health issue

This risk assessment is triggered by the increase in the number of yellow fever cases among EU travellers with exposure in South America since August 2016 and assesses the risk of contracting yellow fever for travellers to South America.

## Consulted experts

Internal experts consulted (in alphabetical order): Mike Catchpole, Denis Coulombier, Thomas Mollet, Bertrand Sudre, Hervé Zeller.

## Disease background information

Background information on yellow fever can be found in the ECDC factsheet for health professionals at [http://ecdc.europa.eu/en/healthtopics/yellow\\_fever/factsheet-health-professionals/Pages/factsheet\\_health\\_professionals.aspx](http://ecdc.europa.eu/en/healthtopics/yellow_fever/factsheet-health-professionals/Pages/factsheet_health_professionals.aspx)

## Event background information

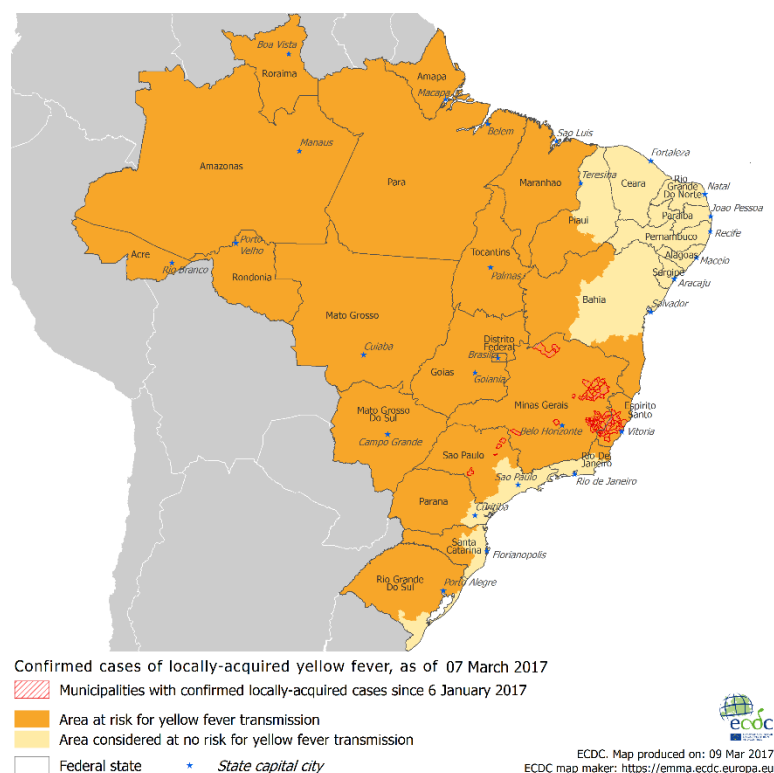
### Epidemiological situation in South America

Yellow fever disease is endemic in tropical areas of Africa and Central and South America. Over the past 10 years in the Americas, human cases of yellow fever have been reported in Argentina, Bolivia, Brazil, Colombia, Ecuador, Paraguay, Peru and Venezuela [6].

As of 8 March 2017, the Ministry of Health in Brazil has reported 378 confirmed human cases, including 127 deaths, and 934 suspected cases under investigation [7]. Confirmed cases were reported in the states of Minas Gerais, Espírito Santo and São Paulo while the states of Bahia, Tocantins, Rio Grande Do Norte and Goiás have only reported suspected cases (Figure 1). The current epidemic in Brazil has spread to areas in the State of Espírito Santo not previously considered as endemic. This is the largest yellow fever outbreak ever reported in Brazil [8,9]. The Brazilian Ministry of Health has launched mass vaccination campaigns to complement routine vaccination activities.

In addition, the Brazilian Ministry of Health has reported 1 185 epizootic transmissions in non-human primates, 386 of which had been laboratory confirmed [7].

Figure 1. Distribution of confirmed cases of locally acquired yellow fever, Brazil, 2017 (as of 9 March 2017)



Beyond Brazil, human cases of yellow fever were recorded in 2016 in Colombia (seven confirmed and five probable cases) and Peru (62 confirmed and 18 probable cases) [10].

### Infections among EU/EEA returning travellers

On 9 March 2017, the National Institute for Public Health and the Environment (RIVM) in the Netherlands reported a case of yellow fever through the Early Warning Response System (EWRS). The patient was a Dutch adult traveller who visited Suriname between February and March 2017 and was not vaccinated against yellow fever [11].

Between 1999 and August 2016, three travel-associated cases of confirmed yellow fever infection have been reported in scientific literature among unvaccinated EU/EEA travellers returning from Ivory Coast (Germany, 1999), Gambia (Belgium, 2001) and Ghana (Spain, 2009) [12,13]. An additional suspected case was reported in a traveller returning to the Netherlands from Suriname (2000), but this case was not confirmed by complete serological investigation [14].

Since August 2016, four cases have been reported in EU citizens with recent history of travel to South America. In addition to the case returning from Suriname reported here, three other cases had previously been reported:

- Two laboratory-confirmed yellow fever cases (one fatal) notified on 10 August 2016 through the International Health Regulations (IHR) by the World Health Organization (WHO) in French nationals who visited several yellow fever endemic areas in Peru [15]. Both individuals were not vaccinated against yellow fever.
- One yellow fever case reported by Bolivia in January 2017 in an unvaccinated 29-year-old Danish citizen who visited yellow fever endemic areas in the Amazon basin [10].

## ECDC threat assessment for the EU

Yellow fever presents with cyclical patterns in South American countries. Historically, endemic periods characterised by the occurrence of isolated cases in unvaccinated individuals have alternated with epidemic periods characterised by outbreaks in populations with low vaccine coverage [16]. These three-to-seven-year cyclical intervals are related to cyclical epizootics in non-human primates [17]. The last epidemic in South America occurred between 2007 and 2009 [18]. In some areas, there are long periods without evidence of transmission, such as in French Guiana where a case was reported in 1998 following a period without cases since 1902 [19]. Similarly, no cases of yellow fever had been confirmed since 1972 in Suriname until the recent case was found in a Dutch traveller returning in 2017.

As South America is currently experiencing a cyclical increase in the number of non-human primates and human cases, an increase in the number of cases in unvaccinated travellers returning from affected areas in South America is not unexpected. The risk for travellers may extend beyond areas historically considered endemic, as seen in the State of Espírito Santo in Brazil.

### Risk for travellers to affected areas in South America

WHO recommends yellow fever vaccination for travel to specific areas of the Amazon basin countries: Bolivia, Brazil, Colombia, Ecuador, French Guiana, Guyana, Paraguay, Peru, Suriname and Venezuela. WHO regularly updates the list of areas where yellow fever vaccination is recommended for travellers. On 6 March 2017, WHO added the State of Espírito Santo in Brazil to the list of recommended areas for yellow fever vaccination [1,2].

The unusual increase in travel-associated cases over the past six months – four cases since August 2016 compared to the historical baseline – is consistent with an increased circulation of yellow fever virus in South America.

The four travel related cases of yellow fever reported to date have affected unvaccinated travellers to areas known to be endemic for yellow fever and therefore covered by the yellow fever vaccination recommendations. A study in Cuzco, Peru, showed that only one in 30 tourists had received information on vector-borne prevention [20]. This further highlights the fact that unaware and unvaccinated travellers to affected areas are at risk of becoming infected. Of particular concern are individuals who cannot be vaccinated because they do not meet the vaccination criteria (e.g. babies under nine months of age and people with underlying health conditions). Strict personal protection measures should be enforced for these individuals to mitigate the risks of being infected. Yellow fever vaccination is generally not mandatory in order to enter South American countries, except in some countries (e.g. Suriname) where proof of vaccination against yellow fever is requested upon entry for travellers coming from countries affected by yellow fever [1].

With regard to Suriname, the recent travel-associated case provides evidence to consider local transmission of yellow fever in the country. As the precise location of exposure is unknown, Suriname as a whole should be considered at risk, especially forested areas.

### Risk of introduction and transmission in the EU

The risk of introduction into the EU/EEA countries of yellow fever virus by infected returning travellers is considered low, as most travellers coming from affected areas are likely to have been immunised. However, the introduction of the virus through viraemic travellers remains possible and its likelihood is related to the geographical extension of the yellow fever outbreak in South America, the number of travellers from affected areas entering the EU and the vaccine coverage among them.

The risk of yellow fever transmission in the EU/EEA is currently very low as it depends on the virus being introduced by viraemic travellers to an area with an established, competent and active mosquito vector population. In Europe, *Aedes aegypti*, the primary vector of yellow fever in urban settings, is present in Madeira. Recent studies have shown that *Aedes albopictus* mosquitoes from France can potentially transmit yellow fever virus [21]. However, the likelihood of the virus being introduced into local competent vector populations in the EU through viraemic travellers from South America is considered to be very low and current weather conditions in Europe are not favourable for vector activity.

According to the latest external quality assessment performed, Europe has the laboratory capacity to detect yellow fever [22]. However, close collaboration between expert laboratories is required for diagnosis confirmation and additional investigations.

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