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England

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Plague in Madagascar: risk assessment for the UK

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Background

Plague is caused by the bacterium *Yersinia pestis*, usually found in small mammals and their fleas. The main clinical forms of plague infection are bubonic, pneumonic and less frequently, septicaemic plague. Bubonic plague is the most common form and is spread by bites from infected fleas from rats, while the pneumonic form is mainly spread by person-to-person transmission. The incubation period for the pneumonic form is shorter (1-4 days) than bubonic (2-8 days). Plague can be rapidly fatal if untreated, but common antibiotics can effectively cure it if they are administered early. New plague vaccines are in development but are not expected to be commercially available in the immediate future.

Madagascar is considered currently to be the most highly endemic country for plague. A seasonal upsurge in cases (predominantly the bubonic form) usually occurs early every year between September and April.

Evolution of outbreak in Madagascar

On 13 September 2017, the Madagascar Ministry of Public Health notified WHO of an outbreak of pneumonic plague, following the death of a 47-year-old woman in Soavinandriana Hospital, in the capital city Antananarivo on 11 September 2017. The outbreak started on 23 August 2017 when the index case, a 31-year-old male from Toamasina on the east coast, developed a malaria-like illness. On 27 August 2017, the index case travelled by public transport (bush taxi) from Ankazobe District to Toamasina (via Antananarivo) while symptomatic, and died on the way. A large cluster of infections occurred amongst his contacts (secondary cases), with onward transmission (tertiary cases).

Since then, cases of pneumonic plague without any apparent epidemiological links have been detected in different parts of the country, including non-endemic areas and major cities. Between August and 19 October 2017, WHO reported a total of 1297 cases including 102 deaths (case fatality rate 8%). This total includes suspected, probable and confirmed cases, but the majority are suspected, based on a broad case definition. Of the 1297 cases, 846 (67%) were classified as pneumonic, 279 as bubonic and one septicaemic, with 180 not yet classified. By 15 October, the Central Plague Laboratory of the Institut Pasteur of Madagascar had reported 126 cases as confirmed and 242 as probable. Reclassification is likely when further microbiological testing is completed. Susceptibility data indicate that outbreak isolates remain fully susceptible (14 tested to date).

The current pulmonary plague outbreak has affected 14 of 22 regions in the country, in particular, major urban areas including Antananarivo (three million inhabitants) and the

port city of Toamasina (~275,000 inhabitants). At least 39 healthcare workers have contracted plague since the beginning of the outbreak.

On 29 September 2017, the Malagasy health authorities confirmed pneumonic plague as the cause of death of a Seychelles basketball coach, who was attending the Indian Ocean Basket-ball Club championship from 23 September - 1 October 2017. A South African basketball player also tested positive for plague by PCR test on 3 October 2017. Neither had known epidemiological links to cases. All contacts of these two cases have completed active surveillance without any onward spread.

On 10 October, the Ministry of Health of the Seychelles reported a probable case in a person who had returned from travel to Madagascar. However, Reference Laboratory testing did not confirm the infection as PCR tests were negative. Thus, no cases have yet been exported from Madagascar.

Isolation and treatment centres have been established in Madagascar and an active search continues for cases and their contacts. Chemoprophylaxis is being provided to all identified contacts of confirmed and suspected cases of pneumonic plague and contacts are placed under active surveillance. The WHO and partners are providing technical and operational support, including infection prevention and control. Over 2000 medical staff and community health workers have been trained.

Exit screening of departing passengers has been instituted at the International Airport in Antananarivo.

Current WHO Risk Assessment

WHO Situation Report 5:

“Due to the increased risk of further spread and severe nature of disease, the overall risk at the national level in Madagascar is considered very high. The risk of regional spread is moderate due to the occurrence of frequent travel by air and sea to neighbouring Indian Ocean islands and other southern and eastern African countries, and the observation of a limited number of cases in travellers. [...]. The overall global risk is considered to be low.”

WHO information for international travellers:

“The risk of infection with *Yersinia pestis* for international travellers to Madagascar is generally low. However, travellers in rural areas of plague-endemic regions may be at risk, particularly if camping or hunting or if contact with rodents takes place. In addition, travellers to previously non-endemic regions from where cases of pneumonic plague have been recently reported should avoid crowded areas, avoid contact with dead animals, infected tissues or materials, and avoid close contact with patients with pneumonic plague.”

ECDC risk assessment (*updated 13 October*)

“According to the Madagascar tourist office, 293,000 tourists from the EU visited the country in 2016. The most popular months were October, November and December with around 40,000 visitors each month. In 2016, 137,000 travellers from 23 EU countries travelled to Madagascar by air, of which 75% originated from continental France. The peak travel months were July, August and October. In addition, there are daily flights to La Réunion and Mayotte in the Indian Ocean. Madagascar is also a popular destination for cruises.

With the increase in the number of cases in Madagascar and the widening of the geographical spread, the probability of contracting plague in Madagascar is considered to be moderate for EU travellers and would most likely result from a direct close contact with a case of pneumonic plague in the affected areas.

The probability of importation to the EU through an incubating traveller arriving from Madagascar is considered low. This probability would be slightly higher among people [...] returning home in Madagascar to visit friends and relatives.”

<https://ecdc.europa.eu/sites/portal/files/documents/plague-madagascar-seychelles-rapid-risk-assessment-october-2017.pdf>

Risk to UK

Historically, the risk of infections for travellers to any plague endemic country has been regarded as very low, based on the rarity of reported cases (no cases in UK in the last 50 years). However, infection has already been confirmed in at least 2 visitors to Madagascar whilst they were still in the country. This indicates that there is a somewhat greater risk associated with this current outbreak than the usual risk of travel-related plague.

This risk assessment considers firstly the risk to UK from an imported case, and secondly, the risk to UK citizens travelling or working in the country.

1. Risk of an imported case in the UK

The probability of a case occurring in a person returning to the UK is very low.

This is because there are few exchanges between Madagascar and the UK:

- a) UK travellers are very small proportion of those visiting Madagascar from the EU (*note that data from ONS are based on a very small number of passenger interviews each year so confidence intervals for the estimates below will be wide*).
- average 4,548 visits each year from 2012 to 2016
 - most trips are for a holiday, and over half are for 14-27 nights
 - travel occurs throughout the year but more (38%) in UK summer period (July-Sept) and 24% in Oct-Dec
 - visits to UK by residents from Madagascar are much lower, averaging 621/year
- b) there are not significant numbers of UK citizens working in Madagascar, a Francophone country. There is a British Embassy in Antananarivo, and there may be other workers in healthcare and non-healthcare related occupations such as nature conservation and studies.

In addition, risk mitigation would be expected to reduce any risk of infection:

- exit screening of departing passengers has been instituted at the International Airport in Madagascar.
- information has been provided for travellers via the National Travel Health Network and Centre (NaTHNaC) and the FCO, which have each published information on the outbreak and advice for travellers
<https://travelhealthpro.org.uk/news/258/plague-in-madagascar> <https://www.gov.uk/foreign-travel-advice/madagascar>
- workers in occupations with specific risk of exposure, such as humanitarian workers in healthcare facilities, should be well aware of risks and how to control them (ie infection control processes required for protection).

There are no direct flights between UK and Antananarivo. Flight duration is likely to be a minimum of 15-20 hours and there is potential for an infected traveller to become symptomatic in transit. Although a symptomatic case on board an aircraft would pose a public health incident (see below), the short incubation periods for pneumonic plague (1-4 days) means they are more likely to present before arrival into the UK.

However, the impact of a case would be high.

2. Risk to travellers and those working in Madagascar

The risk of plague for international travellers to and those working in Madagascar has been very low, but certain factors of this outbreak **increase the risk of infection to low-moderate**.

This is due to the fact that, although plague is endemic in Madagascar, this outbreak notable because of:

- the rapid increase in case numbers

- the high proportion of cases that are pneumonic, a highly infectious form and associated with a high mortality rate
- cases are occurring across the country without any apparent epidemiological link
- rapid geographical spread of the infection with spread into large urban conurbations
- there have been cases in foreign visitors with no documented links to cases or other sources of transmission

Response to cases arising in the UK

- the High Consequence Infectious Diseases (HCID) programme (England) is aware of the outbreak and has discussed NHS preparedness and contingency plans
- the UK has robust systems in place for assessing illness in persons returning from travel or work overseas
- if health professionals suspect a case of plague they should discuss this with their local microbiology, virology or infectious disease consultant
- expert advice should be sought from the [Imported Fever Service](#) or the [Rare and Imported Pathogens Laboratory](#)
- all forms of plague are **statutorily notifiable**. Upon suspicion of a plague diagnosis, the local health protection team should be notified immediately
- prompt treatment for plague with antibiotics is usually effective

Conclusions

The probability of a case occurring in a person returning to the UK is **very low**, however, certain factors of this outbreak increase the risk of infection to **low-moderate** for international travellers to and those working in Madagascar.

It is important that all travellers to Madagascar seek advice before travelling and are aware of the risks and the potential outcome of infection, and the measures they can undertake to reduce these risks.

The HCID network in England is aware and plans are being put in place accordingly. As a precaution, guidance on management of cases and contacts is being developed.