

2021 EBOLA VIRUS DISEASE – Guinea and Democratic Republic of Congo: considerations for the risk of introduction in Hamburg port and airport and other points of entry in the EU

February 2021

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➤ Monitoring the Ebola outbreak in West Africa

As of Feb. 18, 2021, seven confirmed cases have been reported in Guinea, including 6 deaths and 216 contacts. In the Democratic Republic of Congo, more than four cases have been reported, including 2 deaths and 400 contacts to date.

The border region of Nzérékoré in the southeast of Guinea and the town of Butembo in the province of North Kivu in Congo are affected.

The first currently traceable case in Guinea concerns the funeral of a nurse in Gouéké (01.02.2021), at which 6 people were infected with high probability. The funeral took place, as is often the case, without any special safety precautions. At traditional funerals, it happens that people involved wash and touch the corpses, which can promote the spread of the virus.

According to the WHO, the species is Zaire Ebola virus (ZEBOV), against which a vaccination exists and is stored in Switzerland and the USA.

In addition to the knowledge gained from the last epidemic about hygiene measures and the procurement and use of protective clothing, the particular importance of vaccinating the population has become apparent here. In total about 350,000 people in Guinea and the Democratic Republic of the Congo have been vaccinated against Ebola since the last outbreak; currently, 340 people in the Dem. Rep. Congo have been vaccinated.

Due to the close location of Nzérékoré to the border to Liberia, where the virus spread strongly during the last Ebola epidemic, the Liberian government is alarmed. Here, too, the population is to be vaccinated. In order for a large part of the population of the three

countries mentioned above to be vaccinated, thus achieving sufficient herd immunity, 22 million vaccine doses are required. Currently, 6890 vaccine doses are available worldwide, which must be stored at minus 60°C.

The countries currently affected can build on their experience of recent epidemics to establish rapid outbreak control. In addition to attempting to stockpile vaccines, including for bolting vaccination, this involves, among other things, containment measures with identification of sources of infection and contact tracing.

➤ **Shipping connections from Guinea and Democratic Republic of Congo**

There are regular, partly weekly, ship connections between Hamburg and Conakry and Pointe Noire (Republic of the Congo). The Democratic Republic of Congo, which is currently affected by the outbreak, has its only port in Matadi, which can only be reached by small ships due to draught obstructions, so cargo is transhipped at Pointe Noire.

Numerous connections between West African countries (neighbouring countries as Liberia and Ivory Coast) come along, as well as direct connections between Conakry and Pointe Noire.

A detailed backtracking of ships entering Hamburg from West Africa is not quite easy due to numerous and changeable stopovers. As an example, there is a weekly connection from Pointe Noire to Antwerp for a duration of 49 days, calling at 8 ports along the way. A second example: There is a connection from Pointe Noire via Antwerp (previously Monrovia and Abidjan) to Hamburg with a duration of about four weeks.

In addition, there are possible crew changes, which are not listed in advance.

From the point of view of infectious medicine, the risk of Ebola being introduced into Germany via the sea route appears to be low, but cannot be ruled out due to the difficult traceability described above and a long incubation period of up to 21 days. Another dynamic is the spread via neighbouring West African countries such as Liberia or Ivory Coast, where shipping connections to Europe and Hamburg also exist.

➤ **Consideration on the air travel volume from the outbreak areas using Hamburg as an example.**

To estimate the volume of travel from the affected areas, we analysed the possible flight movements from Conakry, Guinea to Hamburg. Using the flight data which are shown on flightradar24.de it was first possible to show the connections to the nearest international airports. Connecting flights from there were considered with a limitation to a maximum of three changes on the onward journey to Hamburg (see figure 1).

Here it was shown that, based on the weekly flights in an exemplary week, the airports Paris Charles de Gaulle (CDG) and Istanbul (IST) in particular enable a high level of forwarding to Hamburg. CDG is served both directly from Conakry and in transit from various other airports. IST is reached via Bamako Senou (BKO, Mali), Nonakchott Oumtounsy (NKC, Mauritania) and Dakar (DSS, Senegal) airports. From there, however, the route continues to

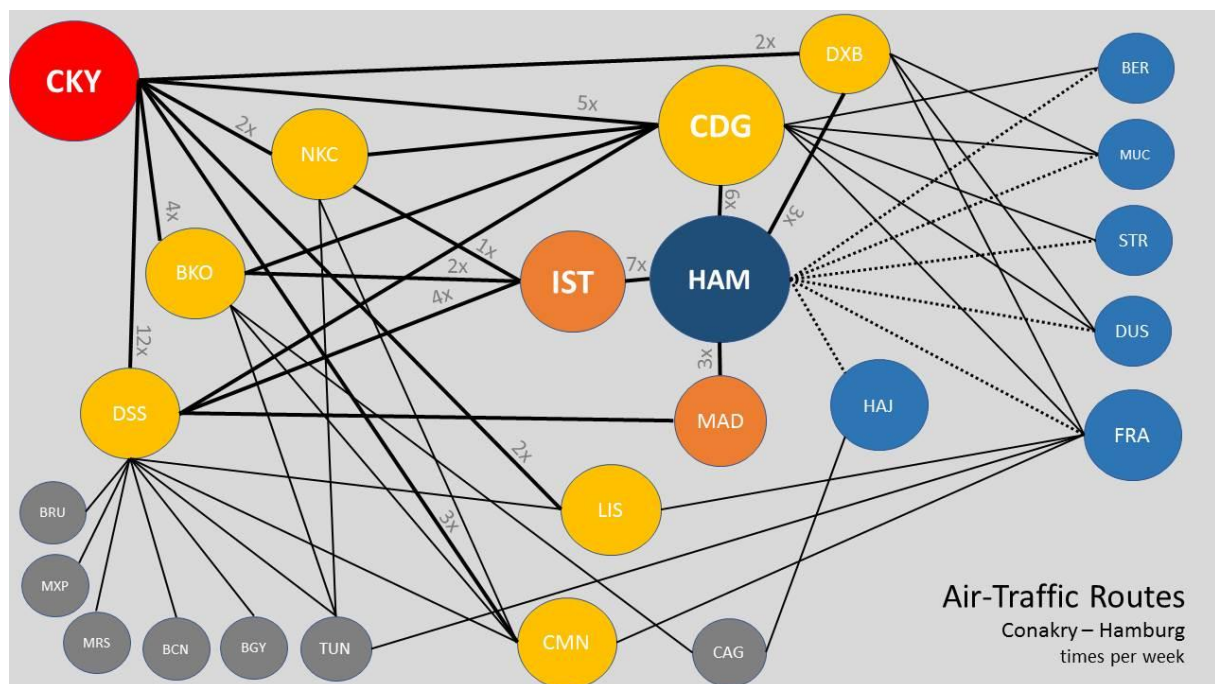
Hamburg with relatively high frequency (currently 7 times a week), resulting in a possible relevant inbound traffic here.

Journey times naturally vary depending on the route chosen from e.g. CKY to CDG to HAM with 6h 40min, CKY to BKO to IST to HAM 10h 18min or CKY to DXB to HAM 14h 33min. Variable transfer times must be added. Nevertheless, it can be assumed that Hamburg can usually be reached from Conakry within 24 hours.

Furthermore, it seems worth noting that the other international airports in Germany can also be reached from Conakry within the framework of these connections. From there, the onward journey can conceivably continue by other means of transport, such as the German federal Railways or intercity buses.

For the flight connections between the Democratic Republic of Congo and Hamburg, an analogous analysis shows that the main travel routes here are via Addis Ababa and Nairobi, and in transit via European airports, primarily via Paris and Istanbul, but also Amsterdam, Vienna and Liege (Belgium).

Figure 1: Analysis of possible flight connections from Conakry, Guinea to Hamburg using the flight data on flightradar24.de for an exemplary weeks in February 2021.



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