

Quantitative Assessment of the Entry through Mechanical Transport in Aircraft of Rift Valley Fever Virus-Infected Mosquitoes into Previously Unaffected Areas - Abstract

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Summary

Rift Valley Fever (RVF) is a zoonotic disease of significant international health concern and considered as an emerging risk to areas like Europe, where no RVF outbreaks in humans or animals have been reported. Building upon previous qualitative research, this study aimed at quantitatively assessing the risk of RVF virus introduction into previously unaffected areas via virus-carrying mosquitoes traveling in commercial aircraft from RVF-affected countries, which has been reported as a non-negligible pathway. Using the United Kingdom (UK) as an example of a RVF-free European country receiving flights from affected countries and considering African countries as examples of RVF-affected countries, the study built a stochastic step-by-step approach, including all relevant variables and applicable to a broader extent of cases. The model framework describing the pathway of RVFV introduction of interest to this study is presented in Figure 1. This model estimated that, given our assumptions, when an outbreak occurs, the total number of RVFV-infected mosquitoes that are mechanically transported in aircraft, in direct flights from RVF-affected East African countries to the UK, between May and October, has a most likely value of $N = 0$ and an average value of $N = 68$ (95% CI: 0–337). This estimate is considered as low but not negligible. The model can be easily scaled up to other European countries by amending appropriately country-specific variables (e.g., number of flights between countries) in order to map the areas/airports of higher risk (e.g., South Europe), inform risk management per country accordingly and adopt risk-mitigation measures.

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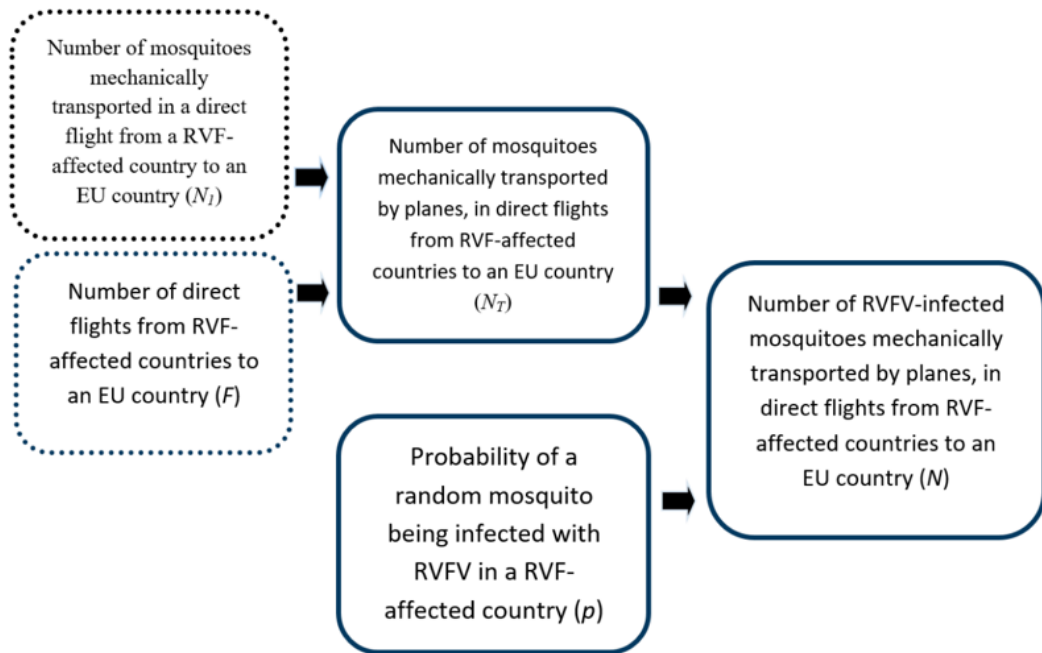


Figure 1: Model framework describing the introduction of RVFV-infected mosquitoes into an EU country, mechanically transported by commercial aircraft originating from RVF-affected countries

Keywords

Rift Valley Fever, vector-borne, quantitative risk assessment, cross-border