

Supplementary Material S1. Description of the spatial generalized linear model used to study the effect of agro-environmental determinants on avian influenza circulation.

The statistical analysis was based on spatial generalized linear mixed models, which were run using the MASS package of the R software. The spatial dependency between observations was accounted for by introducing a correlation structure in the models.

Formally, if Y_i and Y_j are the observations of the response variable at location i and j , the model can be written as:

$$\begin{cases} \log\left(\frac{E(Y_i)}{1 - E(Y_i)}\right) = x_i \beta \\ \text{corr}(Y_i, Y_j) = \exp\left(-\frac{d_{ij}}{r}\right) \end{cases}$$

where $E(Y_i) = P(Y_i = 1)$ is the expectation of Y_i , β is the coefficients for fixed effects, x_i is the explanatory variables for the i -th observation, $\text{corr}(Y_i, Y_j)$ is the correlation between Y_i and Y_j , d_{ij} is the Euclidian distance between locations i and j , and r is the range of the spatial correlation estimated from the data.