Assessing rabies incidence and geographic variability in Madagascar in order to evaluate surveillance efficacy.

a. Background

Rabies is a lethal form of encephalitis caused by neurotropic viruses of the genus Lyssavirus. It is a zoonotic infection mainly transmitted by the saliva of infected animals.

Rabies is endemic in Madagascar, one of the poorest countries in the world with a health system that is hardly efficient to monitor and prevent disease outbreaks. The medical monitoring system in Madagascar is largely based on districts, though the country is subdivided into 22 administrative areas, 114 districts and about 2800 municipalities. In 2016, the human population was approximately estimated as 24.4 million inhabitants. The medical personal/population ratio approaches a satisfactory situation in urban areas, but the rural areas remain notably underprivileged.

Rabies remains a significant public health problem in Madagascar even though post-exposition prophylaxis is freely available to the human population. Four to 10 human cases are annually reported. Rabies is a notifiable disease. Surveillance is one of the five pillars of the rabies control. However the notifiable disease reporting system used in Madagascar is based on passive surveillance. From 2006, animal rabies was diagnosed in 51 over the 114 districts. The data available suggest important underreporting activity of rabies throughout the country. Understanding the spatial and temporal distribution of rabies will be critical to assessing the efficacity of surveillance. The aim of this study is to estimate rabies incidence from reported cases and evaluate the temporal and spatial distribution of cases in order to assess surveillance sensitivity in notification of rabies.

b. Methodology

From Jan 1, 2006 to Dec 31, 2017, rabies data from the Reference lab for rabies diagnosis were recorded. Each animal rabies case includes information regarding sex, age, owner's residential address, and date of death. Owner's residential address has been detailed to village level, the smallest administrative unit used in the country.

c. Results

From this surveillance period 651 animal cases were recorded by National Lab, among them 135 are from the district of the capital region. Here, we report these cases from the district of the capital region, which represent the best representative data in the country. The 2012 views a peak of detection of circulation of rabies at the capital. According to the surveillance data reported, rabies is recorded between 0 to 3 cases per week; however rabies is not detected for 501 weeks during these 11 years. Considering that the R0 of rabies is XX, we estimate that we have missed between xxx and xxx cases at the capital. This estimation will be improved using geographic distribution according to the fokontany, the smallest administrative unit in the country.

d. Significance

This study allows us to determine surveillance sensitivity at its baseline, and allows us also to estimate the effort required to ensure the maximum benefit at every stage of rabies control activities.

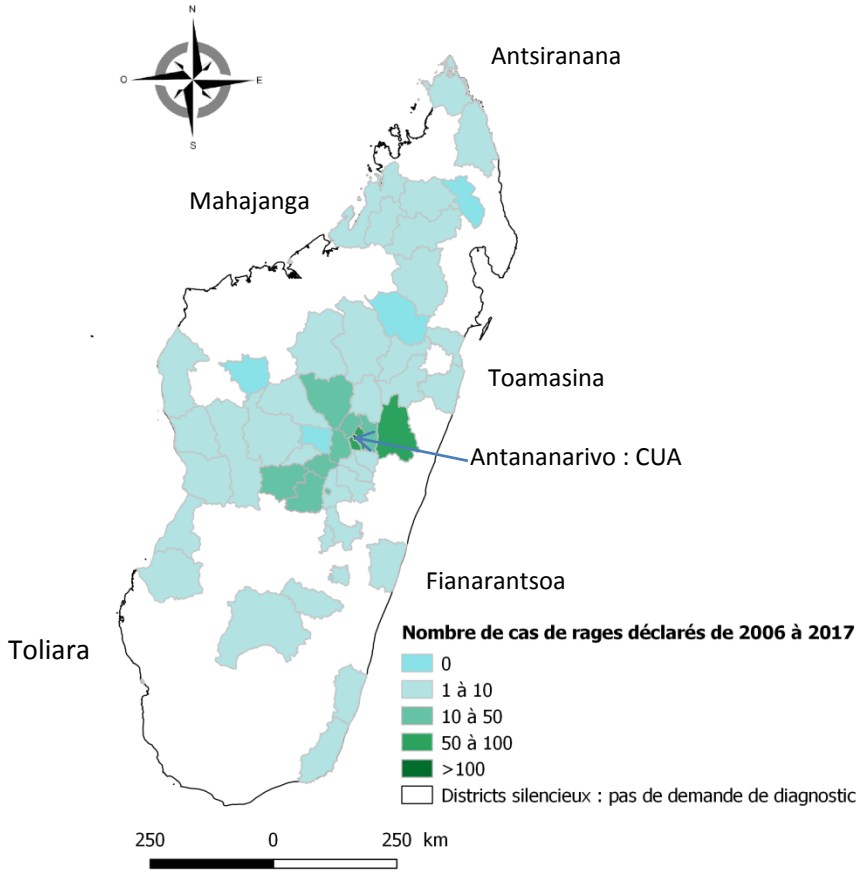

Figure 1 : Rabies notified from 2006 to 2017 in each district of Madagascar.

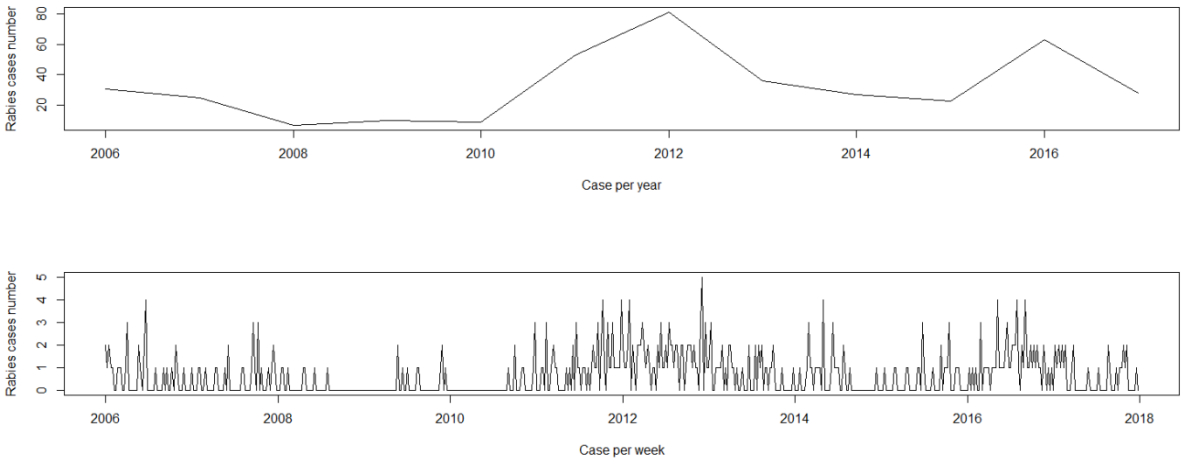

Figure 2 : Time series showing rabies notification in "Commune Urbaine of Antananarivo", from 2006 to 2017