

## Seasonality and tuberculosis incidence in Madagascar

### Background

Questions related to seasonality of tuberculosis remains controversial. The risk of TB transmission was assumed to be higher during winter months (1). In China, the number of reported cases peaked in spring and summer and decreased in autumn and winter with the annual reported incidence of 113.1/100,000 population (2). According to the WHO, many factors was identified to influence the incidence of TB such us malnutrition, indoor air pollution, active smoking, excessive drinking, HIV infection and diabetes and the seasonality. Cao and al. showed that the prevalence of tuberculosis was influenced by the time and space interaction effect. Then, average temperature, rainfall, wind speed, and air pressure has influenced tuberculosis. The average humidity didn't have no influence on tuberculosis (3). The objectives of the study are to detect seasonal pattern of tuberculosis and to assess the relationship between climate data and tuberculosis incidence.

### Methodology

TB data was extracted from screening TB dataset of the National TB Program of Madagascar based from 2010 to 2016. Data comes from the 230 centers of diagnostic and treatment of TB in Madagascar. Annual population data came from the Institute of Statistics (estimation based on the Census 2). We will collect climate data from the meteorological center of Antananarivo and/or from Worldclim during the same period of time. The annual the cumulative incidence of TB will be calculated by dividing the annual number of TB notifications by the annual number population. We will perform a temporal analysis of TB from 2010-2016 using time series analysis. Then we will use statistical model based on Bayesian methodology to explore climate factors, spatial statistical analysis, and space-time scan statistics to detect high and low reported incidence areas. Spatial panel data model were employed to identify the environmental influence factors (3).

### Results

In seven years, 176 662 new TB cases was notified. The annual cumulative incidence of TB per 100 000 inhabitants was evaluated to 111 in 2010, 117.6 in 2011, 111.3 in 2012, 113.5 in 2013, 117.2 in 2014, 120.8 in 2015 and 111.6 in 2016. It was observed that the number of TB case declined during the second trimester for each year. Positive microscopy represented the most observed clinical form. The number of extrapulmonary TB form has increase from 2010 to 2016 (figure1).

### Significance

In Madagascar, the winter period occurred during the second and third trimester during which there is a decline of TB case notified. The spring and summer peaks of tuberculosis cases are clearly demonstrated in most of the studies. Relationship between climate data and tuberculosis incidence need to be assessed to give objective explanation.

### Bibliography

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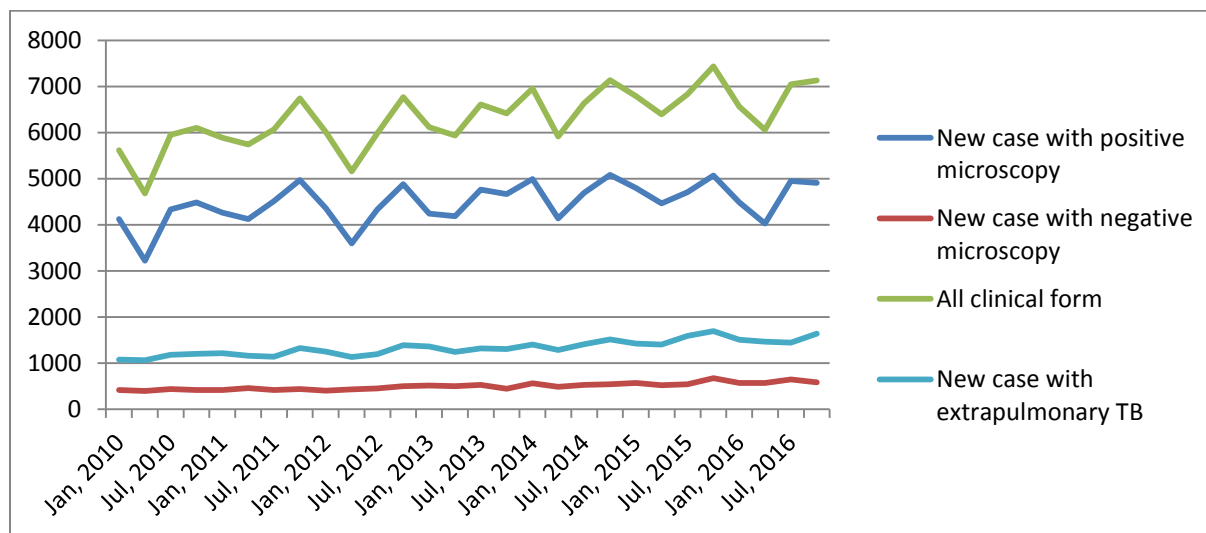


Figure 1: Temporal analysis of TB case notified from 2010 to 2016