Epidemiology of malaria in Madagascar: spatio-temporal distribution of complicated and uncomplicated malaria
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Annual trends

Epidemiological data:
The national Health Management Information System (HMIS) in Antananarivo provided monthly epidemiological data related to complicated and uncomplicated malaria cases from 2010 to 2014. Uncomplicated cases were reported by 3,074 public and private health centers and complicated cases were reported from 186 hospitals in 112 health districts throughout the country.

Material and methods
Population data:
The population by district was provided by the National Institute of Statistic (INSTAT). This population data is the projection of the latest general census of population and housing in 1993 and includes spatial distribution and structure by sex and by age.

Malaria trends:
- Interannual analysis of epidemiological data
- Integration of data into a Geographic Information System to map malaria trends by year, by month and by age for each district.

Results

- Annual spatial trends of complicated malaria is heterogeneous for each year. The highest value belong to the eastern and western coats (Figure 2).
- For uncomplicated malaria the district of Central Highlands and the South have the lowest value of incidence but until 2013 the incidence increased in the entire of country (Figure 2).

Seasonal trends
- The peak season of complicated and uncomplicated malaria is in the beginning of the year from January to April.
- The lowest period of incidence is during dry season and early fall from July to October.
- The two forms of malaria have similar seasonal trends (Figure 3).

Age trends
Uncomplicated malaria was reported for four age classes (Figure 4):
- 0-4 years: 39%
- 5-14 years: 32%
- 15-24 years: 11%
- 25+ years: 18%

Complicated malaria was reported into two age classes: 0-4 years (26%) and 5+ years (75%).

Conclusion
- Coastal districts have the highest value of incidence for both forms of malaria.
- The season trends is similar for each year.
- The vulnerable age group are under 5 years and 5 to 14 years.

The connectivity between districts and the persistence of malaria on the coast could induce the emergence of malaria in central highlands following reintroduction by travelers. Thus, non-endemic areas are at risk of emergence with complicated clinical malaria form. Districts presenting significantly high incidences should be carefully monitored in order to reduce transmission.

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