Consideration of a synthesis tool for malaria analysis
ACTU PALU Project

**Context**
- ANR 2008 – 2010
- Coordinated by UMR 151 – LPED – IRD
- Richard Lalou
- Contribution of: UMR 6012 ESPACE
- Multidisciplinary research laboratory

**Stake**
- To link the socio-spatial characteristics
- By creating an index of paludal risk
- In a urban heterogeneous context

**Methodology**
- Survey
- 3000 Households
- 50 Districts
- Thickdrop diagnostsis
Malaria is the first endemic disease in the world. Establishing a map of the prevalence in a small scale for one specific site is a major goal for the next years.

Nevertheless, some obstacles remain:

- Difficulty to organize the numerous decisive factors of the disease into a hierarchy.
- In urban area: Impact of population, culture diversity and socio-economical status
URBANIZATION PROCESS

INCREASE IN THE NUMBER OF SANITARY INFRASTRUCTURES

BETTER HEALTH CARE

PRESUMPTIVE TREATMENT PREVENTIVE CHEMOTHERAPY

LOWER MALARIA EXPOSURE

INCREASE IN THE NUMBER OF CONSTRUCTIONS

INCREASE IN THE BUILDING DENSITY

INCREASE OF POLLUTION

LOW TRANSMISSION

DELAY TO GET IMMUNITY AND RESISTANCE

HETEROGENOUS AREA (JUXTAPOSITION OF BUILDINGS AND VEGETATION)

LOWER EXPOSURE RATE

INCREASE OF SERIOUS CASE OF MALARIA FOR NON-IMMUNIZED PEOPLE

INCREASE IN THE NUMBER OF SANITARY INFRASTRUCTURES

INCREASE IN THE BUILDING DENSITY

INCREASE OF POLLUTION
Field work

Les districts retenus

classification

Type 1 (307)
Type 2 (274)
Type 3 (335)
Type 4 (528)
Type 5 (526)

communes d'arrondissement

Données : ANSD. 2002 / Fonds : A.Ndonky, ACTUPALU (UMR 151 LPED), 2008
From social geography...

ACTUPALU Database

Cultural and socio-demographic characteristics

Social networks

Mobility

Knowledge and representation on health and disease

Characteristics of home environment

Characteristics of household

...To urban ecology
Aim:
To create an index of paludal risk which would tend to include various factors of environmental risk.

Nevertheless problems prove to be numerous:
- Scalar
- Temporal
- More technical (balance of factors according to their respective importance)
Considering the numerous factors

Social economic status

Infected mosquitoes rate

Household Demography

Mobility

Picturing of the disease

Location

Urban morphology

Soil conditions

Weather conditions

URBAN AREA

HUMAN BEING

VECTOR
By creating an index of risk (1)

**VULNERABILITY**

- Habitat typology (H)
- Prevention (picturing of pathology) (Pr)
- Socio-eco-demographic variables (P)

**HAZARD**

- Urban typology (T)
- Flood area (F)
- Soil occupation (S)

\[
I = \frac{a \left(\frac{\alpha H + \beta P + \gamma Pr}{3}\right) + b \left(\frac{\delta T + \varepsilon F + \varepsilon S}{3}\right)}{2}
\]

*Variables are selected by stepwise regression*
By creating an index of risk (2)

« a » and « b » are independant variables and need to be balanced.

\[
\begin{align*}
\text{Vulnerability:} & \quad a \cdot \frac{\alpha H + \beta P + \gamma Pr}{3} \\
\text{Hazard:} & \quad b \cdot \frac{\delta T + \varepsilon F + \varepsilon S}{3}
\end{align*}
\]

\[l = \frac{a \cdot \frac{\alpha H + \beta P + \gamma Pr}{3} + b \cdot \frac{\delta T + \varepsilon F + \varepsilon S}{3}}{2}\]

Comment: Hazard, vulnerability and the risk data are respectively confirmed by entomological and parasitical data.
Methodological limits

This index doesn’t consider:

- Immunity
- Mobility
- Perceptions about the neighbourhood health structures
- Use of health care services
Epidemic spread of malaria in urban setting depends on countless factors.

This kind of research shows the interest of and the difficulty to link social aspects and "geographic" ones.

Urban environment studies involve a multi-factorial reasoning, close to what the social sciences approach should be.
In order to ripen this index, we could insert the healthcare. This index could deal with some following points:

**Healthcare quality:**
- Meshing of health structures
- Cost
- Quality of treatments

**City practices:**
- Perceptions about neighborhood health structures
- Mobility
- Use of health care services during fever crisis
THANKS FOR YOUR ATTENTION

Camille PERCHOUX, Marion BORDERON
University of Provence (Aix-Marseille)
UMR 6012 ESPACE

camille.perchoux@club-internet.fr

http://univ-provence.fr/umrespace