

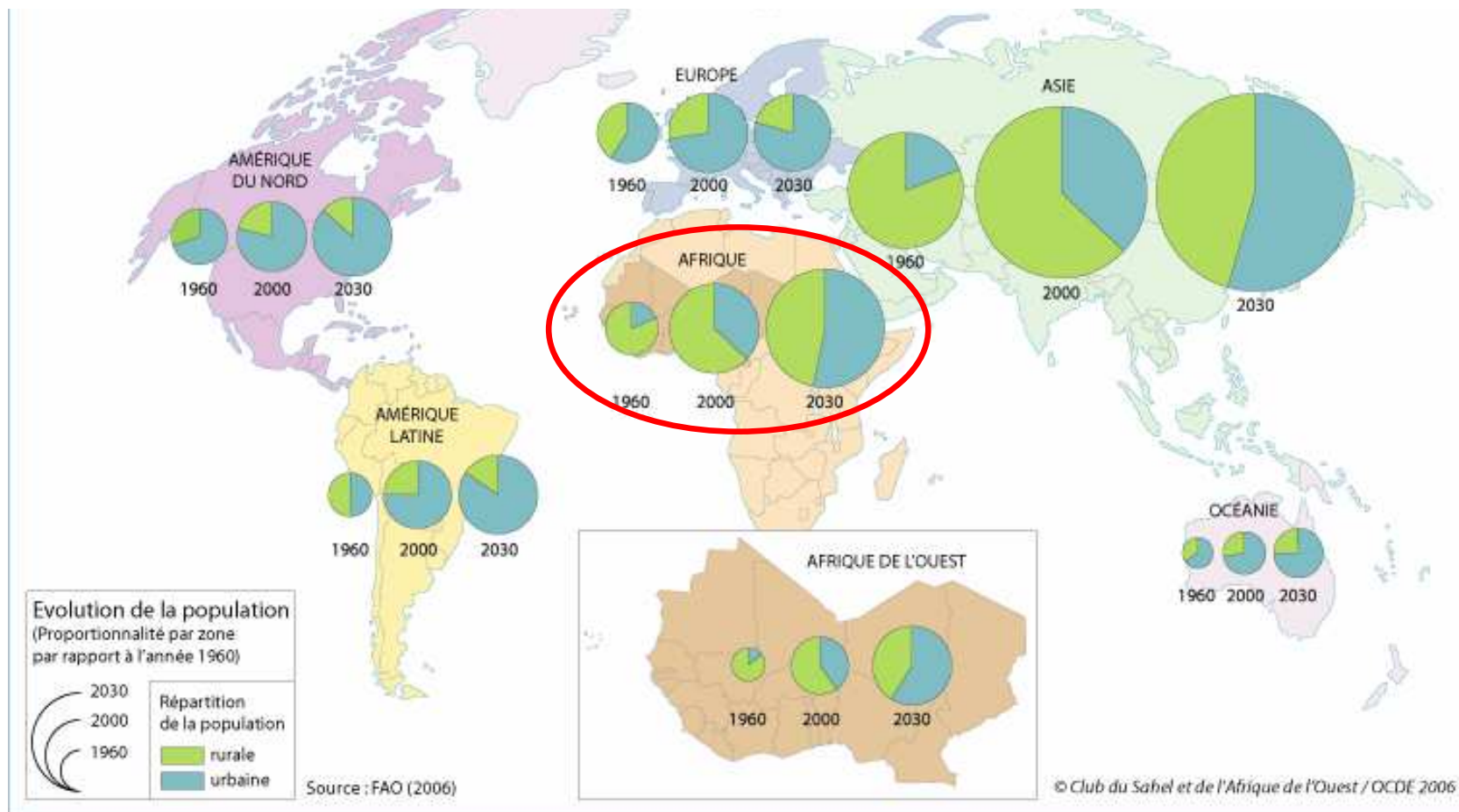
# Dengue fever: a new marker of health for African cities?

F. Fournet, C. Paupy, P. Handschumacher



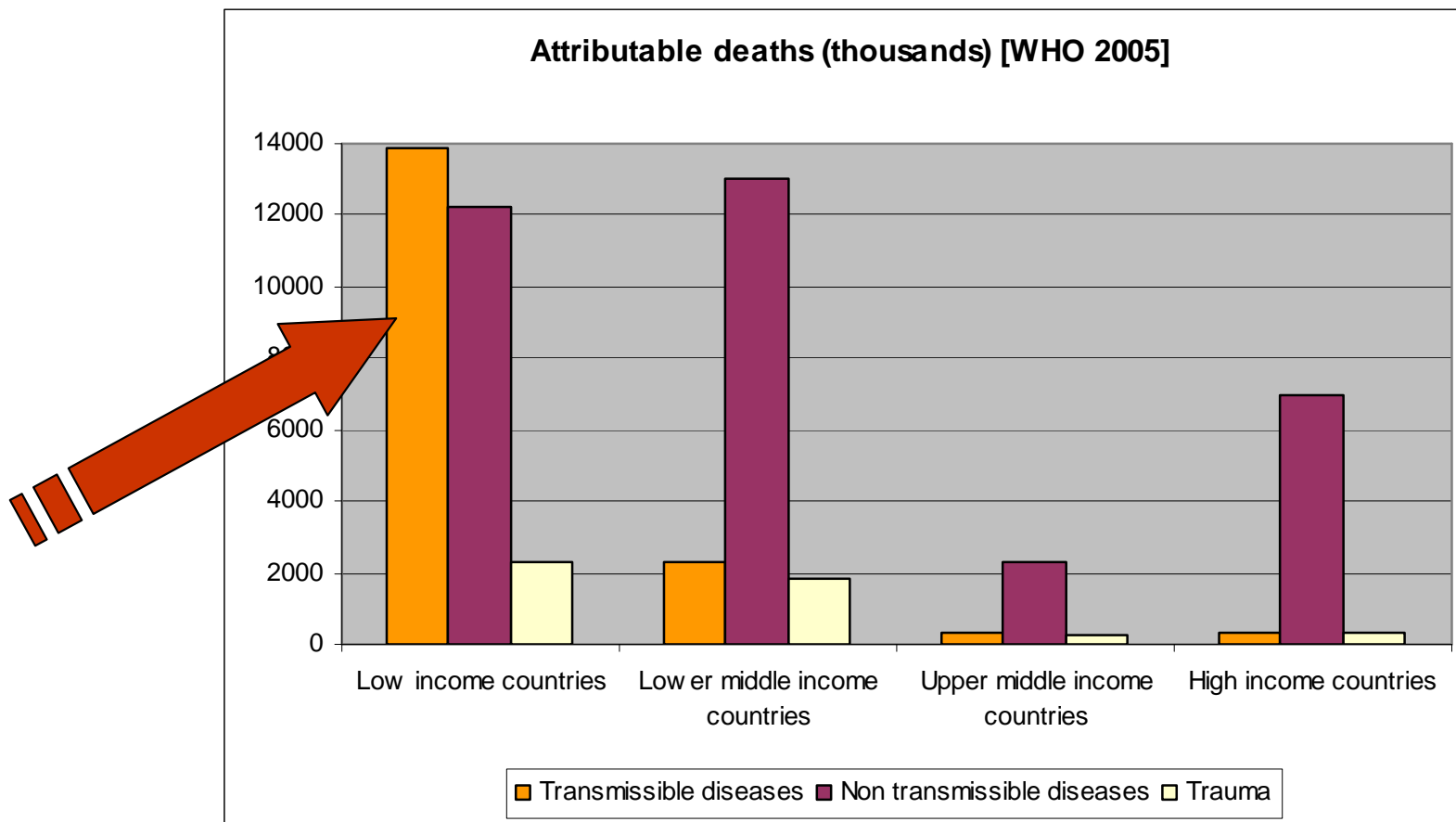
# Introduction (1)

▣ In developing countries, urbanization is an increasing process, particularly in Africa which was still a rural continent in 2000 (only 20% of urban people in Burkina Faso for example)



# Introduction (2)

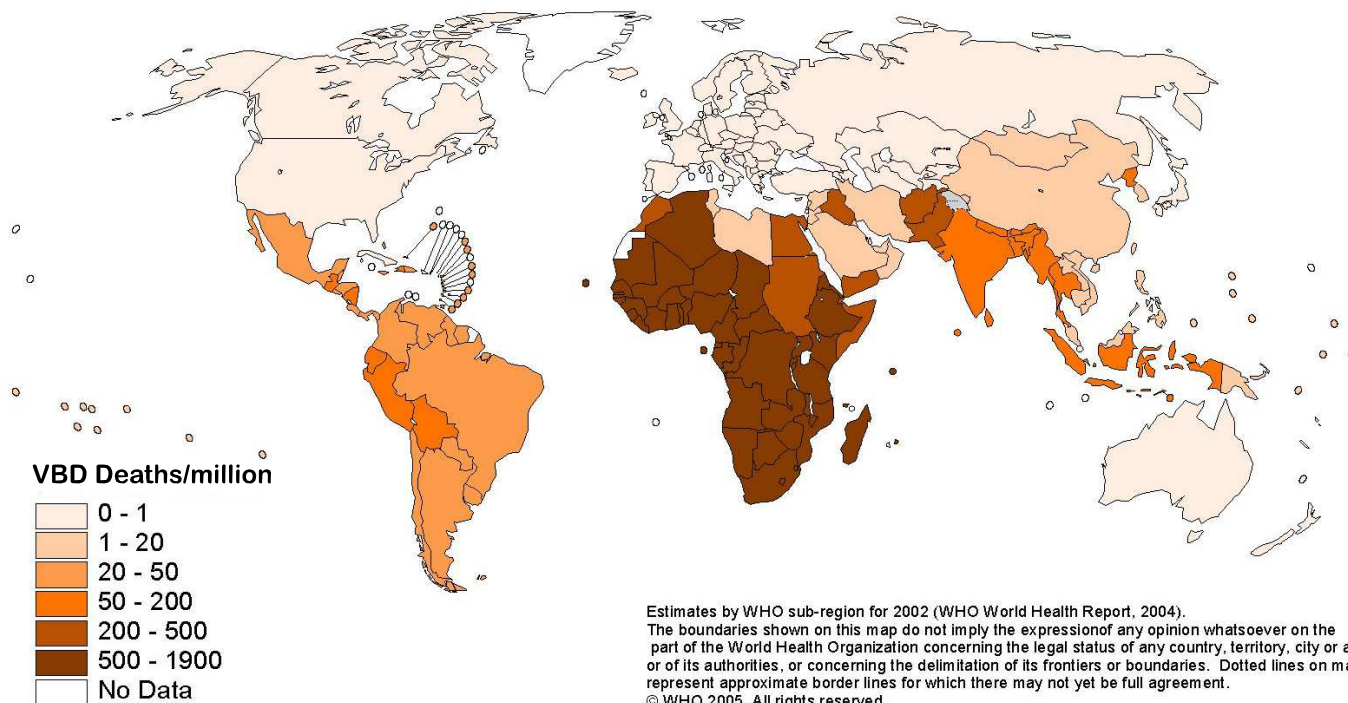
- In these countries, particularly in Africa, transmissible diseases (i.e. diarrhea, malaria, HIV) still represent the major part of the burden of diseases



# Introduction (3)

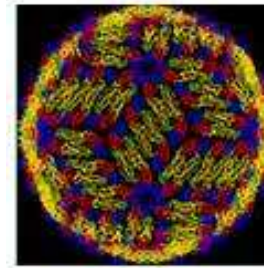
- Vector-borne diseases (malaria, yellow fever, dengue fever, leishmaniasis, trypanosomiasis) were supposed to disappear with urbanization (not a suitable environment) but their fall is not observed

## Deaths from vector-borne disease



# Pathogen system of dengue fever

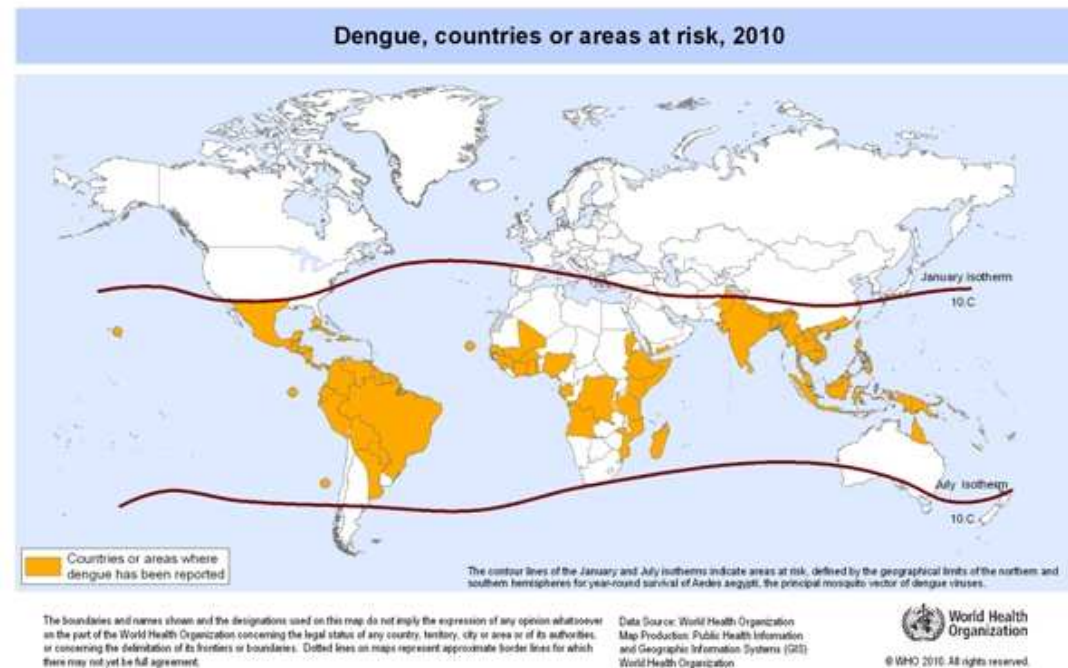
- 4 dengue serotypes (Den-1, Den-2, Den-3, Den-4) without cross protective immunity
- Dengue viruses are transmitted by *Aedes aegypti* (and *Ae. albopictus*)
- Urban vectors +++ linked to human activities
- Diurnal species → bednets are useless
- No specific treatment nor vaccine
- Expansion ↗ < globalization (population growth, urbanization, increased trade)



Dengue virus



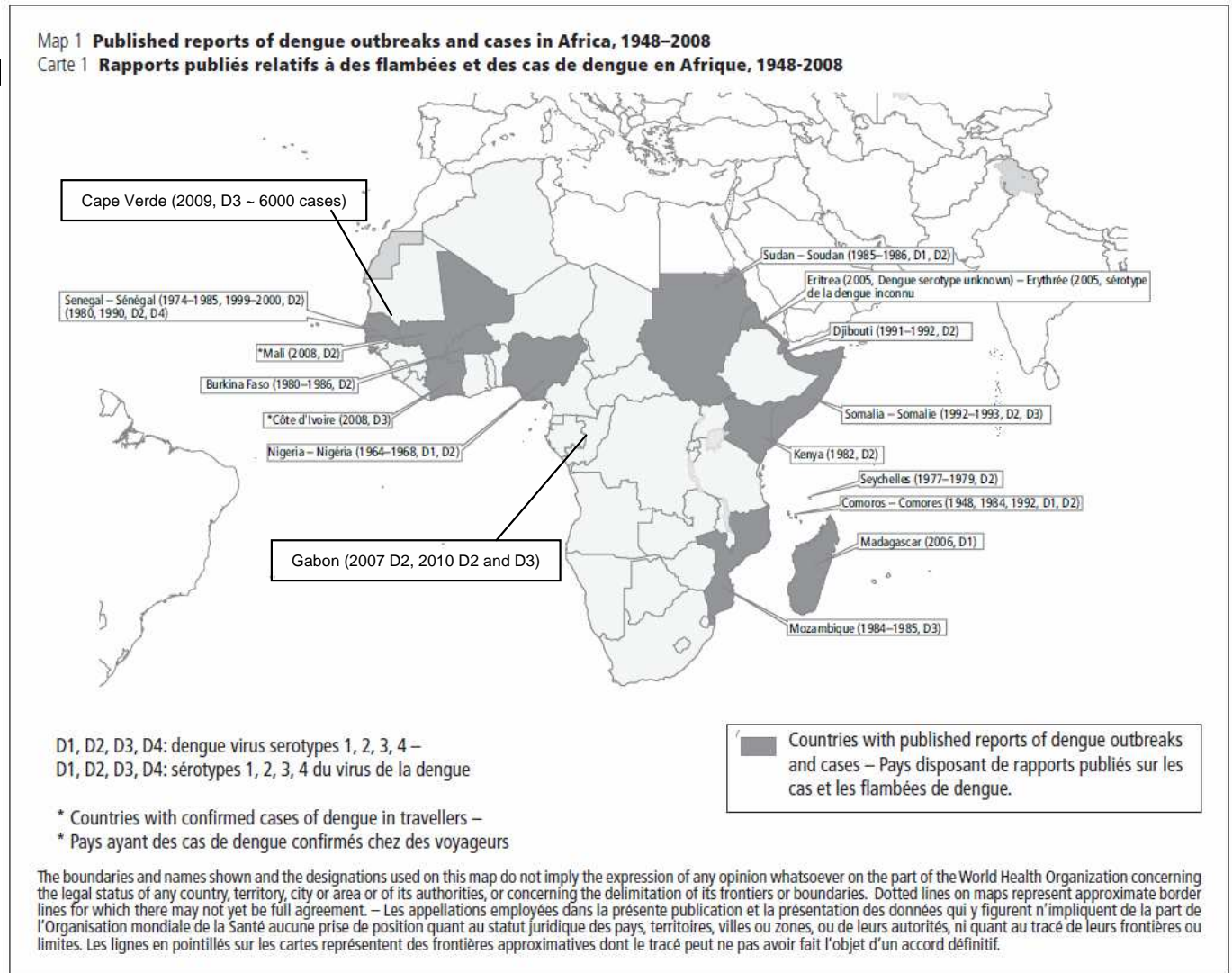
*Ae. aegypti*





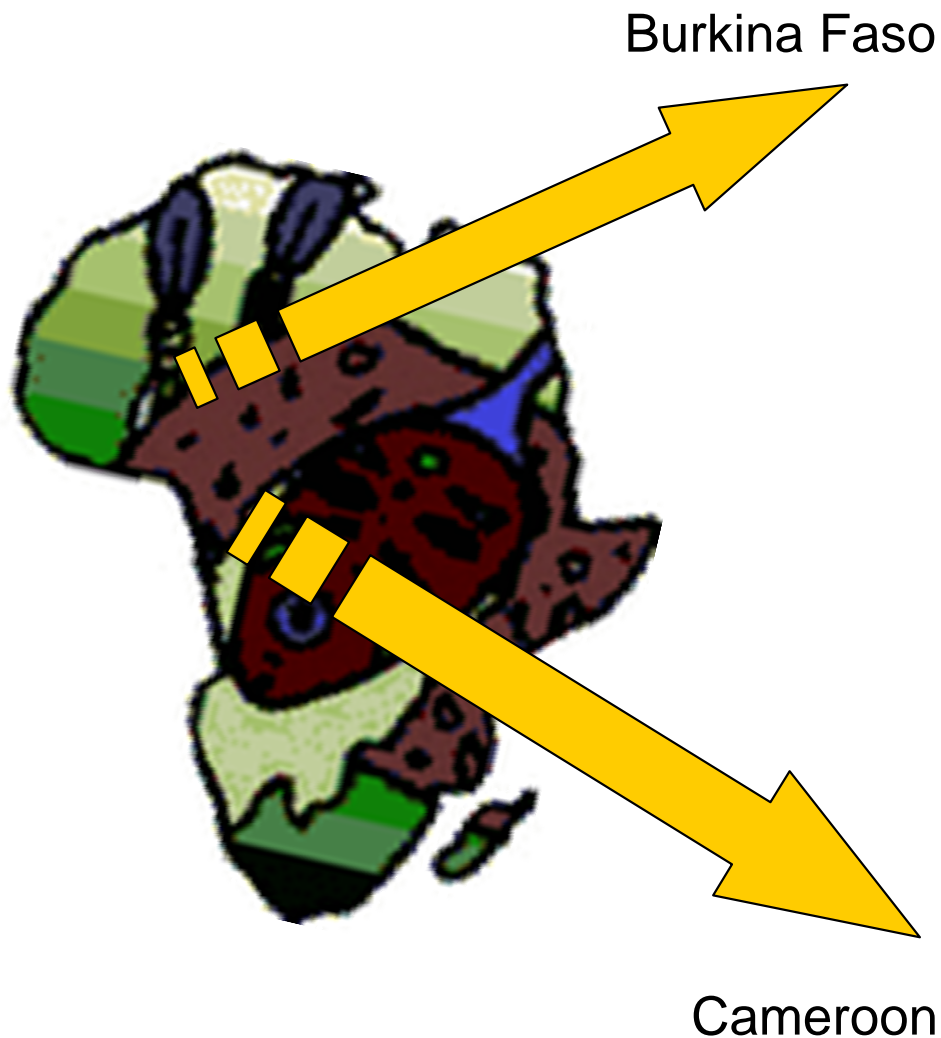
# Africa

- ❑ Bad knowledge of the situation in Africa but recent outbreaks in Gabon and Cape Verde, case report ↗
- ❑ Circulation of serotypes closer to those from Asia which increases risk of haemorrhagic forms
- ❑ Arrival of *Ae. Albopictus* in central Africa (Gabon, Cameroon, Central African Republic)



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# Research context: 2 programs



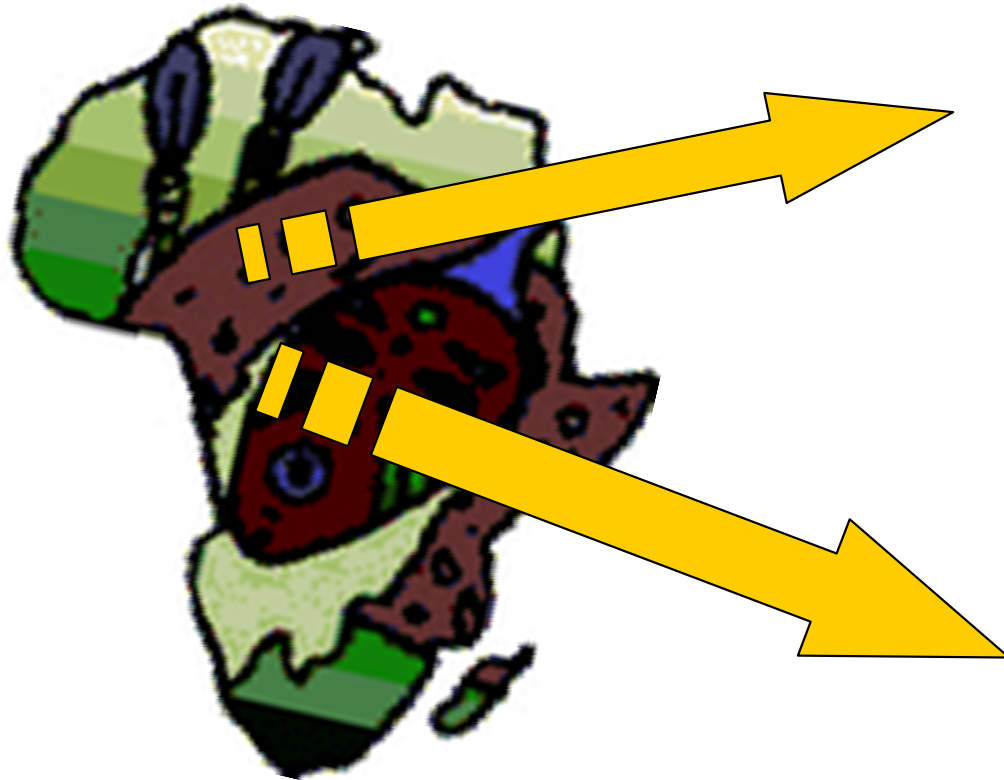
*Urbanization and vector-borne diseases: comparative study of the emergence of Dengue fever in Ouagadougou, Libreville and Vientiane (Ursumave, PIRVE)*



*Dengue fever emergence in various environments (EPI-DENGUE, ANR)*

# Research context: 2 objectives

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□ Better knowledge of the situation in Africa (public health objective)

□ Better knowledge of the link between local urban situations, global urbanization process, urban management practices and health



# Research questions/Hypothesis

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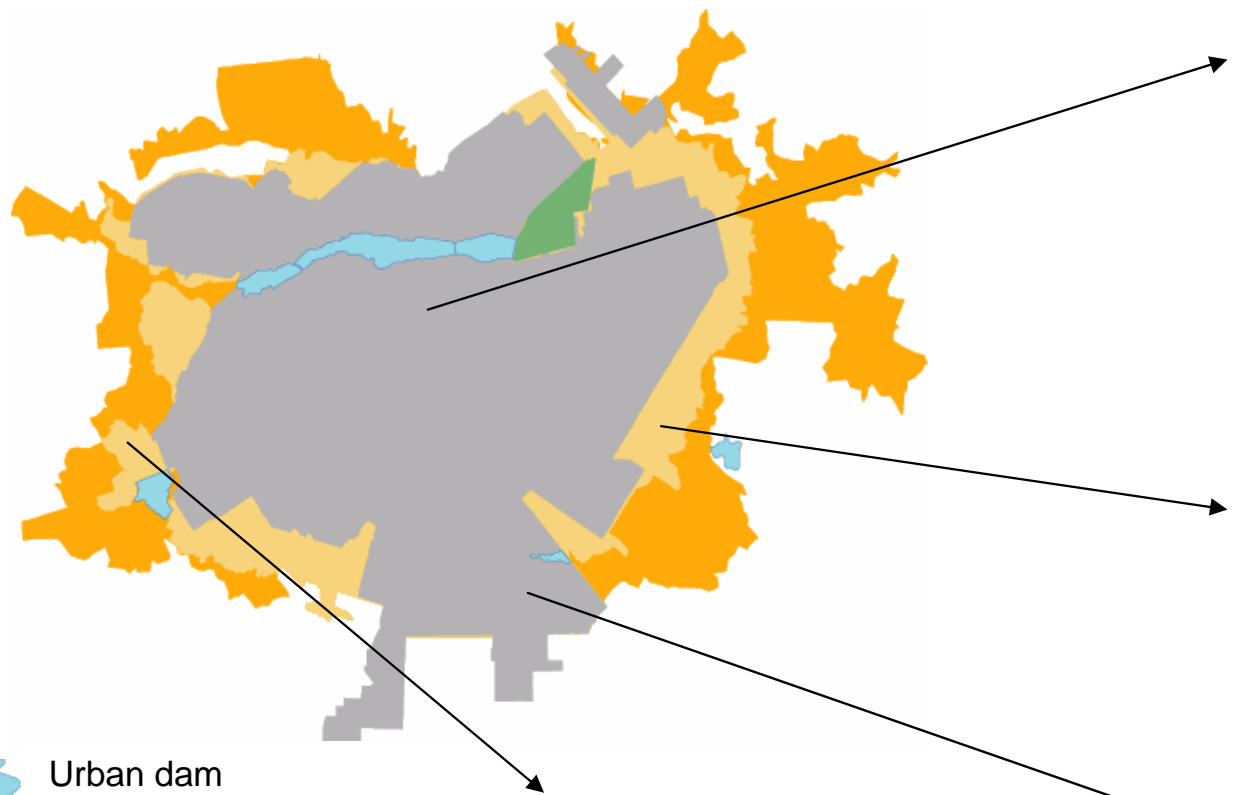
- ❑ Urbanization leads to social and spatial changes which are not randomly distributed within a city and which then affect differently health populations
- ❑ Dengue distribution appears to be heterogeneously distributed within the same city
- ❑ Some risk factors are known like environmental factors (vegetation), behavior factors (water storage or waste elimination) but what about their combination?
- ❑ How will global urbanization processes and stakeholders practices vs town specificities influence dengue emergence in various contexts?
- ❑ Is dengue fever an indicator of bad urbanization in Africa vs **bad practices in high urbanization context** elsewhere?






# Methodology

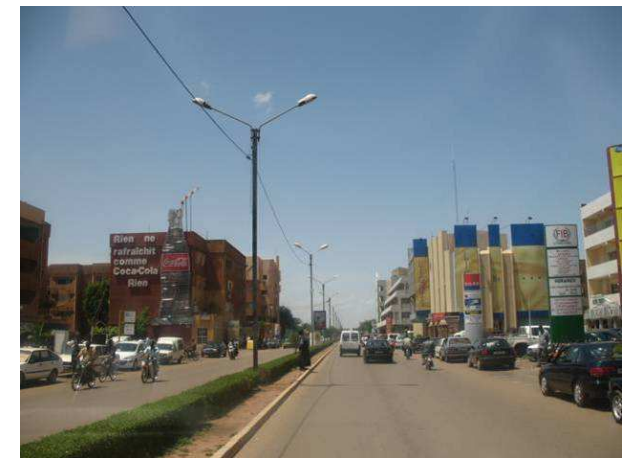
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- ❑ Cross-sectional survey in different districts of each city
- ❑ Studied population: children and adults
- ❑ Data collection by face-to-face field interviews
- ❑ Questions focused on household environment (density, urbanization degree), socio-demographic features (age, gender, education level, socio-economic level), population behaviors (water, waste and hygiene) and health (dengue serology)
- ❑ Entomological survey in Cameroon
- ❑ Epidemiological analysis, multi factorial analysis (principal components and hierarchical classification analysis) and spatial analysis

# Ouagadougou



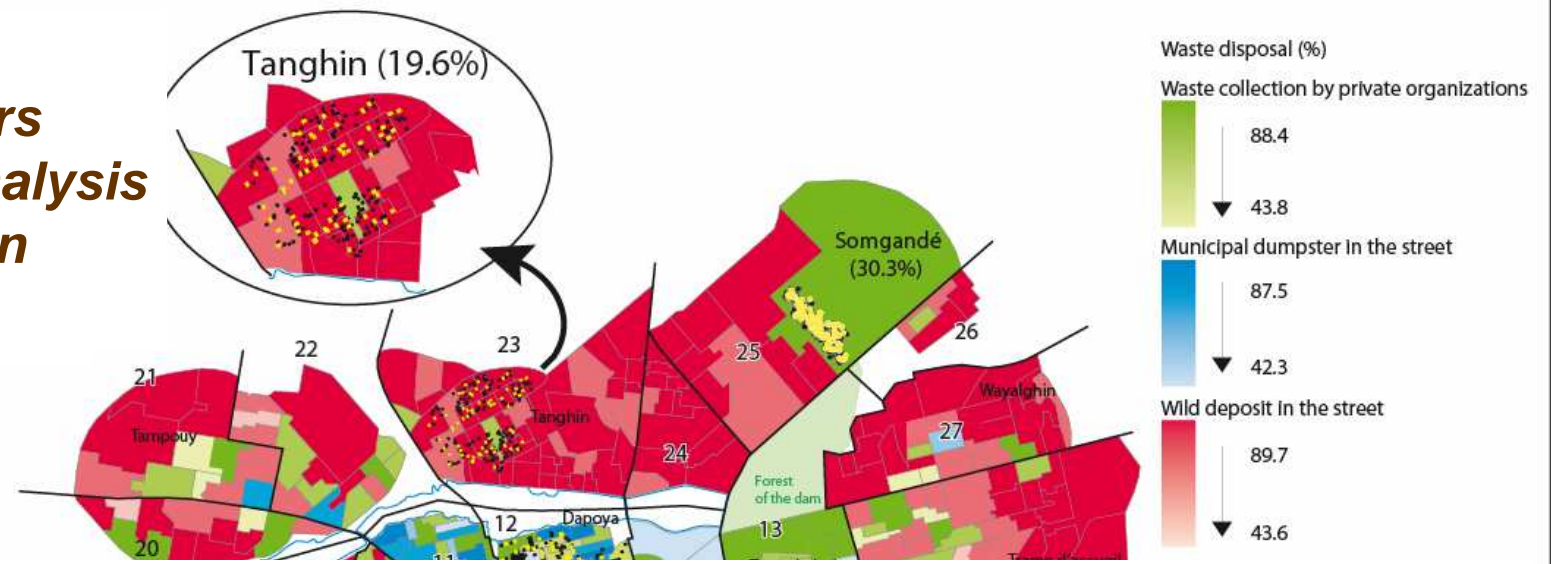
-  Urban dam
-  Forest
-  Regular area
-  Irregular densely built up area
-  Irregular sparsely built up area



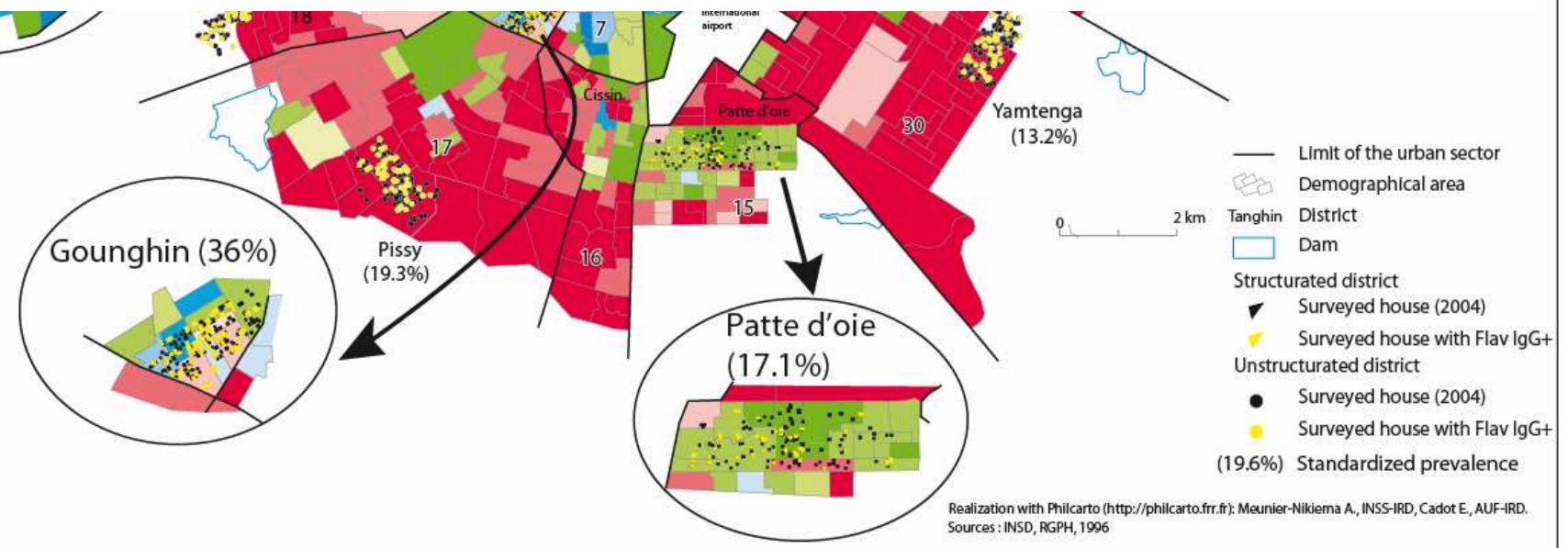


# Ouagadougou : urban management as a risk

*Identification of different risk factors but multivariate analysis did not fully explain these differences*



*Ouagadougou is developing at two speeds: the suburbs are at risk of vector-borne diseases by their precariousness, while the center is also exposed due to the difficulties of implementing an efficient urban policy*





# Dengue fever in Cameroon

*Search for inductive process of the risk which exceeds the framework of an example while appearing related to the urban fact itself in the context of the towns of Africa*



Political capital  
2 million people

# Results

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- Heterogeneous results
  - IgG prevalences → Douala = 60.8%, Garoua = 23%, and Yaounde = 9%
  - Entomological indices (BI) → Douala = 32, Garoua = 49 (*Ae. aegypti* only), and Yaounde = 19 (*Ae. albopictus* mainly)
- But ecological features stand out as risk factor only in Douala (drained lowlands)
- In contrast, sanitation and socio-economic variables emerge as common risk factor for the 3 cities, exceeding the specificity of each town

# Conclusion

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- ❑ Results highlight the need to consider dengue fever as a “new” problem in Africa
- ❑ Dengue fever emergence is related to specific urban situations but it also returns to processes which exceed the framework of each city
- ❑ Urban management policy (control of sprawl, waste management, sanitation) and stakeholders practices (environmental concern) are essential points
- ❑ **But** is the place effect not masked by the specific characteristics of households in a given site, making it disappear in favor of the domestic space characteristics?
- ❑ More than a marker of poverty, dengue can be considered as a marker of a bad urbanization in Africa

# Questions for the future

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- These results seems to be little in contradiction with those obtained in Asia (Vientiane, Laos) or Latin America (Santa Cruz de la Sierra, Bolivia), were dengue fever is circulating more actively in higher socio-economic level sub-areas
- **Does this mean** that new contaminated area react **first** differently from endemic dengue areas?



# Acknowledgement

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