Burden of dengue in children and adults of Ouagadougou, Burkina Faso

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Key messages:

- **Increase of febrile cases and dengue positive cases to RDT from June to October**
- **More than two thirds of the enrolees in Ouagadougou presented antibodies to DENV**
- **We should consider dengue as a possible cause of febrile illness in Burkina Faso.**

Background

Dengue disease

Dengue is a febrile flu-like illness widespread throughout the tropics and caused by a flavivirus having 4 distinct but closely related serotypes (DEN-1, DEN-2, DEN-3 and DEN-4). This virus is transmitted by female mosquitoes mainly of the species Aedes aegypti, and to a lesser extent, of Aedes albopictus mosquitoes. The genus Aedes is the mosquito that also transmits chikungunya, yellow fever and Zika infection. Malaria, which prevails in the same tropical regions, is transmitted by female mosquitoes of the genus Anopheles.

In general, symptoms of dengue appear between 3 to 14 days after the infective bite. Although non specific, the symptoms are often characterized by high fever in the first 2-7 days, pain behind the eyes, rash, headache, nausea, vomiting, muscle and joint pain. Beside one dengue vaccine that has been licenced until now and recently implemented in Brazil, Mexico and El Salvador, there are no specific treatments or preventive methods. In most cases fever is reduced using analgesics and/or antalgics. Sometimes, complications may result into severe dengue (also known as dengue hemorrhagic fever), which is characterized by fever, abdominal pain, persistent vomiting, bleeding, and breathing difficulty, and eventually is potentially lethal. Infection with one serotype does not protect against the others, and sequential infections may put people at a greater risk for dengue he morrhagic fever.

Temporal distribution of dengue and Aedes in Burkina Faso

After the first cases reported in 1925, some additional cases were reported in the 80s and early 2000s (Figure 1). In 2013, one epidemic broke out in the capital, including all 3 stereotypes (Figure 1).

It was observed in the Ouagadougou that breeding sites were positively related to greater density of population and/or the existence of stagnant water. However, and although many breeding sites were found in dense populated zones of Juvénat Fille, the sector 22 showed many breeding sites far from habitations. The distribution of breeding sites resulting in dengue exposure is heterogeneous within the city. Moreover, health staff in Burkina Faso is not well trained and did not have enough abilities to recognised and treat non-malarial febrile illnesses.

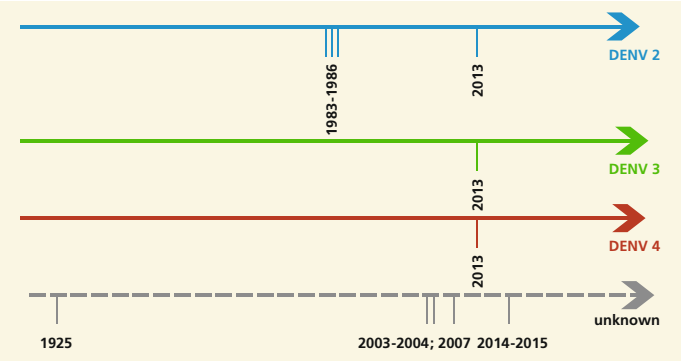

Figure 1. Temporal distribution of reported cases and DENV strain in Burkina Faso

Objectives

There are no data on the burden of dengue virus infection (DENV) in Burkina Faso. To address this gap, an interdisciplinary approach that simultaneously incorporates epidemiological, entomologic, ecosocial, economic, and behavioral dimensions has been carried out in Ouagadougou since December 2014 (Figure 2).

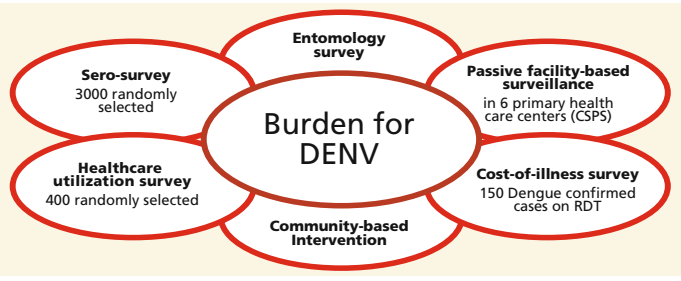

Figure 2. Components of the DENV project

Methods

The epidemiological dimension is based (i) on a passive facility based-surveillance carried out in six health centers (Juvénat Fille, Nioko, Pazani, Secteur 22, Secteur 25, Zongo : Figure 3)[1] by collection of acute and convalescent samples of febrile patients, (ii) on a population-based survey conducted 3 times every 6 month among healthy residents of Ouagadougou to assess the serostatus of DENV (prevalence of antibodies against dengue, in other words, to assess the average dengue transmission intensity) (iii) on an socio-economical study that characterizes economical and behavioral dimensions related to the febrile illness. One entomological study and an intervention are also carried out in parallel to assess the presence of Aedes and insecticide resistance as well as to test the effectiveness/process of a community-based intervention to decrease the presence of vectors.

(1) The primary health centers of Nioko 1 was removed from the study from June 1st, 2015

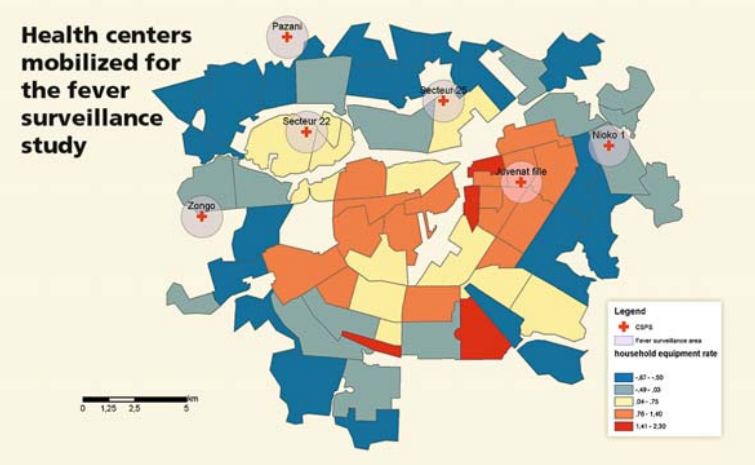

Figure 3. Map of the health centers mobilized for the fever surveillance study in the city of Ouagadougou (former sectors)

Preliminary results based on data collected in 2015

By the end of December 2015 a total of 818 febrile cases (including 41 positive cases with the rapid detection test (RDT)) had been enrolled in the fever surveillance survey. There was an increase of febrile cases from June to November 2015 (Figure 4).

The age group included most by febrile cases and DENV+ cases on rapid test was the group of 25-35 years of age. Among adults, there were more women, while there was no gender difference among children. The DENV+ cases were fund in Sector 25, Pazani and Juvénat Fille. About 22% of the febrile cases showed antibodies to DENV. However, there could be issue of cross-reactivity with other flavivirus and this may need to be considered when interpreting the data.

In June 2015 (enrolment bleed), a total of 3,066 individuals were enrolled for the sero-survey for the first bleeding (visit 1) and a total of 2,473 participants were followed up for the second bleeding (visit 2) in December 2015. Two bleedings occurred with an interval of 6 months to cover the main transmission period of rainy season. In both bleedings, more than two thirds of the enrolees presented antibodies to DENV. This may indicate that they already had a previous infection to dengue (Figure 5). However, as mentioned above, this could also be due to cross-reactivity with other flaviviruses that may be commonly circulating in the study area.

These results are still preliminary and further information will become available upon completion of the remaining tests.

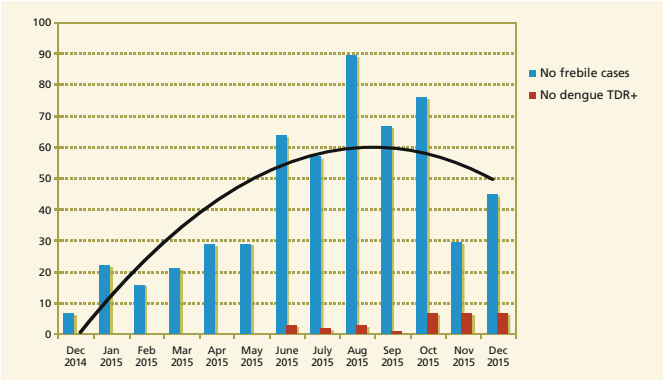

Figure 4. Monthly distribution of new enrolees (including positive cases to RDT) in the fever surveillance survey from December 2014 to December 2015

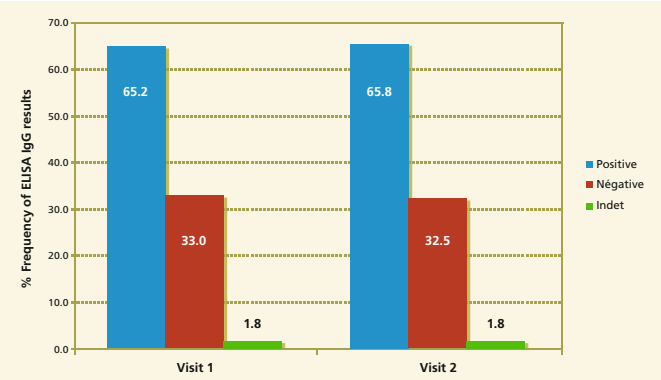

Figure 5. Distribution of antibodies among the enrolees in the first and second bleeding of the sero-survey in June (visit 1) and December 2015 (visit 2)

Conclusion

Breeding sites for Aedes and DENV are both present in Ouagadougou although their distribution are heterogeneous within the different districts. DENV rate varies along the year with a peak occurring between October and December. Although our results showed that women seem to be more exposed by DENV than men, infection rate is similar among children. The fact that two third of the population show IgG+ in the sero-survey (bleeding 1 and 2) suggest that those people already had DENV during the past. Although preliminary, our results demonstrate that dengue is a significant burden to monitor for surveillance in the city of Ouagadougou.

Source of Funding

Dengue Vaccine Initiative (DVI), International Vaccine institute (IVI), Canadian Institutes of Health Research (CIHR, ROH 115213).