Institut Pasteur de Nouvelle-Calédonie

Bulletin of the Entomological Surveillance Network : *Aedes aegypti* survey in Nouméa and Dumbéa.

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Introduction

In New Caledonia, the only known vector of dengue, chikungunya and Zika viruses is *Aedes aegypti*. Monitoring the evolution of *Ae. aegypti* populations' densities provides us with a better understanding of epidemic risks and enables us to take appropriate measures if necessary. This monitoring is carried out by the Entomological Surveillance Network, which was set up at the joint initiative of the Department of Health and Social Affairs of New Caledonia (DASS-NC), the Institut Pasteur of New Caledonia (IPNC) and the city councils of Nouméa, Dumbéa and Mont-Dore.

This bulletin presents the evolution of the entomological situation in Nouméa during the last 12 months.

Entomological indices description

A "positive breeding site" refers to any object containing stagnant water in which at least one larvae is found (including first development stage larvae).

The Houses Index (HI): estimates the percentage of houses where at least one positive breeding site is found.

The Breteau Index (BI): estimates the number of positive breeding sites found for 100 houses.

The "Sticky Trap" Index (STI): is the mean number of gravid females caught per sticky trap (only in Nouméa).

These indices are calculated for the specie *Ae. aegypti*.

Historic of the entomological situation

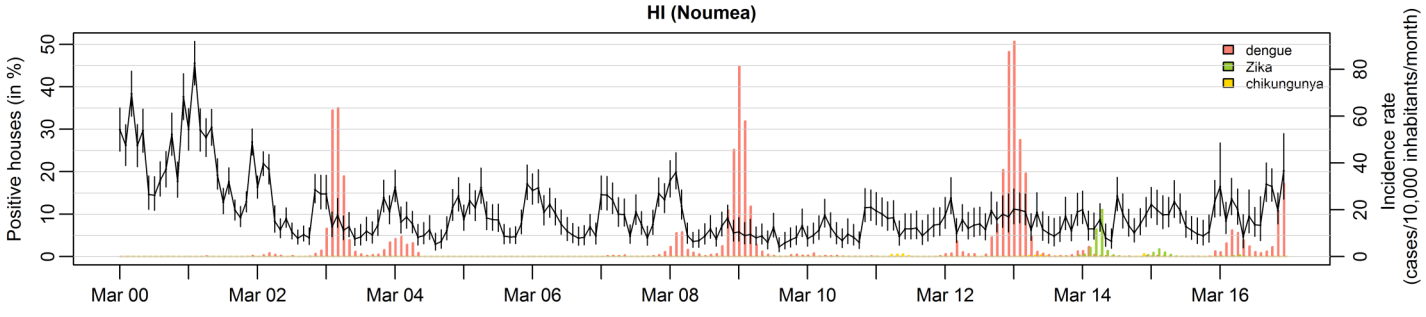

Figure 1: Monthly evolution of the Houses Index (HI) in Nouméa, from 2000 to 2017 and epidemics of arbovirosis over the same period. The Houses Index (HI) estimates the percentage of houses where at least one positive breeding site is found. Between 200 and 300 different houses are visited every month in Nouméa. The vertical bars on the index curves (in black) represent the 95% confidence intervals. Incidence rates for confirmed and probable human cases of dengue (red), Zika (green) and chikungunya (yellow) are also represented for Nouméa. More information about the entomological situation history of Nouméa and Dumbéa can be found in the Bulletin N°01/16 (http://www.institutpasteur.nc/bulletins-reseau-de-surveillance-entomologique/).

Current Entomological Situation in Nouméa

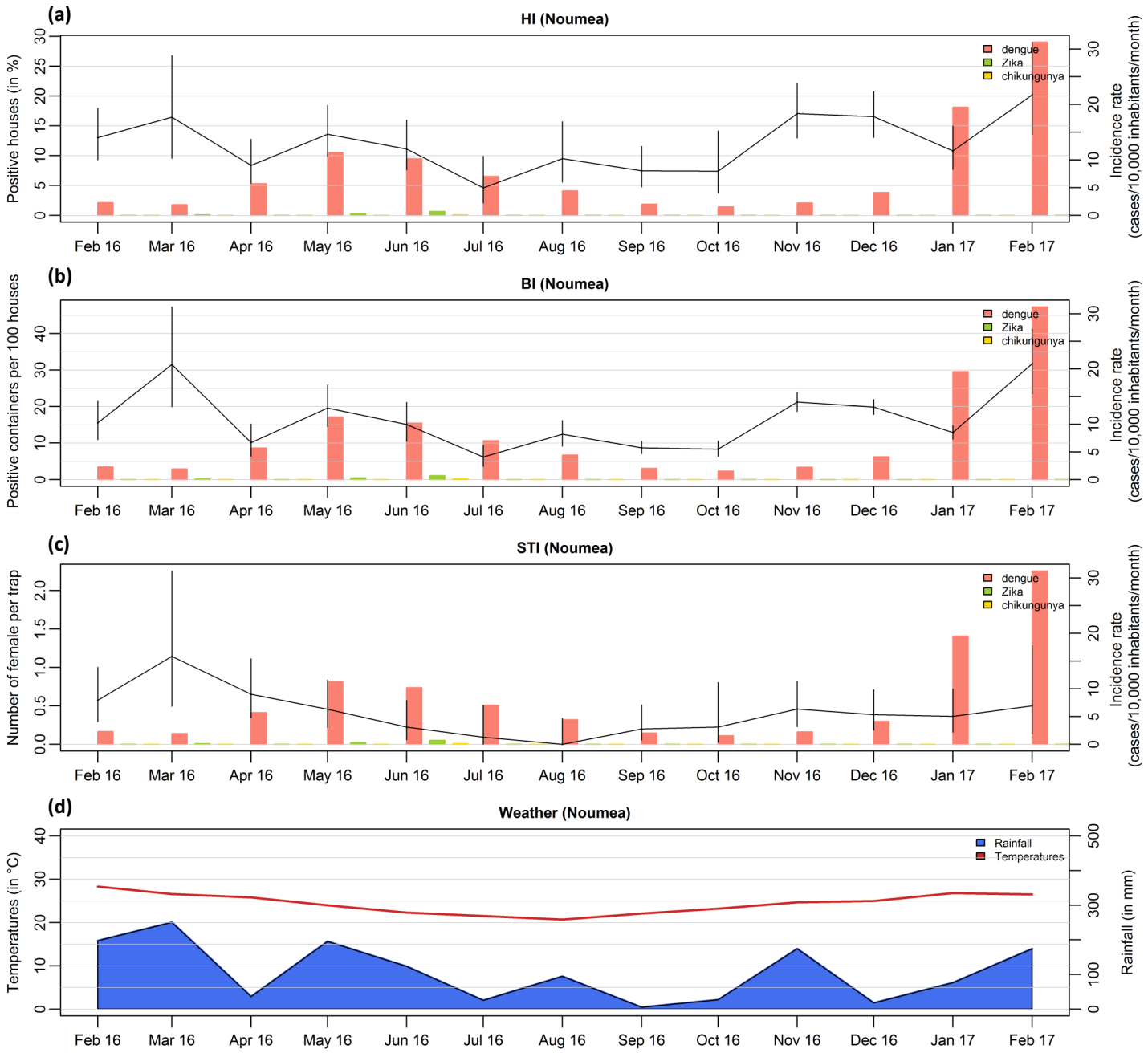

Figure 2: Monthly evolution of entomological indexes and effects of dengue, Zika and chikungunya on Nouméa from January 2016 to January 2017. (a) HI estimates the percentage of houses where at least one positive breeding site is found. (b) BI estimates the number of positive breeding sites found for 100 houses. (c) STI is the mean number of gravid females caught per sticky trap (around 30 traps per month). The vertical bar on the index curves represents the 95% confidence intervals. Incidence rates for confirmed and probable human cases of dengue (red), Zika (green) and chikungunya (yellow) are shown for the city of Nouméa (source: DASS-NC). (d) Weather data are presented for Nouméa (source: Météo France).

In February 2017, the entomological indexes are rising. Between January 2017 and February 2017, the percentage of homes with at least one positive breeding site is going from 10% to 20% (HI, Figure 2a). Over the same period, the number of positive breeding site found on average for 100 houses rose from 12 to almost 30 (BI, Figure 2b). The "Sticky Trap" Index (STI) on the other hand increases less (Figure 2c).

The entomological indices fluctuation over the last months can be explained by the changing weather. Thus, the decline in indices in January could be a result of the poor rainfall in December 2016. The important rains observed in January and February, could lead to an increase of the entomological indexes in the coming weeks .

The results of the Entomological Surveillance Network for the commune of Dumbéa being unavailable for the January and February 2017, the graphs will not be presented in this issue. Nevertheless, the entomological situation at Dumbéa in December 2016 is comparable to that described in Bulletin N° 02/16, available on the following link: http://www.institutpasteur.nc/bulletins-reseau-de-surveillance -entomological/ (English version available).

Entomological indices by sector: Nouméa (3 sectors)

The Figure 3 shows the detail of the indices by sector (Noumea West, East and South). The House Index (HI) and the Breteau Index (BI) are rising for the 3 sectors. The indexes are as high as observed in March 2016. The "Sticky Trap" Index (STI) suggests that since January there are more gravid females (ready-to-lay) in the western sector than in the other two areas of Noumea.

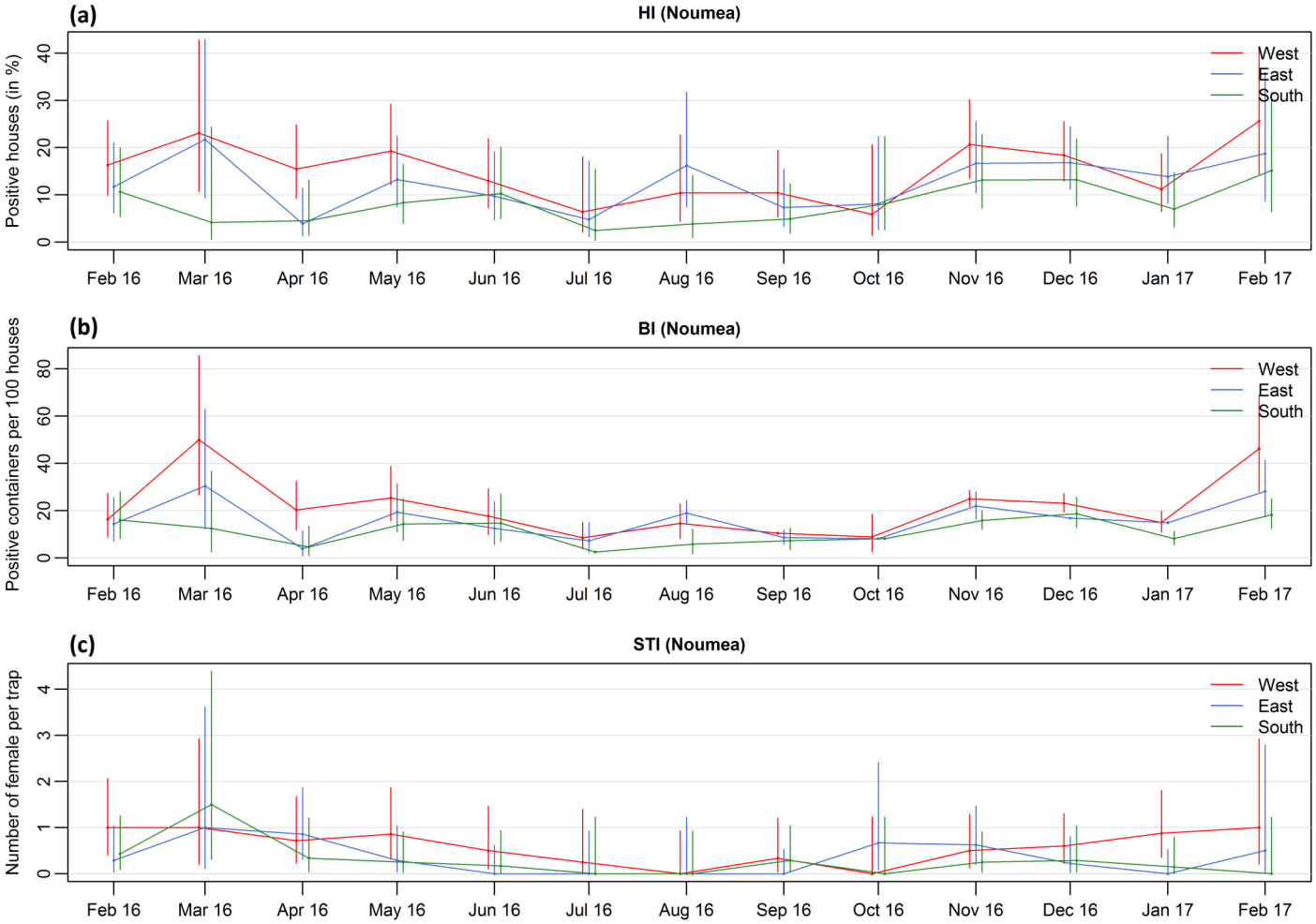

Figure 3: Monthly evolution of entomological indexes by sector from February 2016 to February 2017. (a) HI estimates the percentage of houses where at least one "positive" breeding site is found (b) BI estimates the number of positive breeding sites found for 100 houses ((c) STI is the mean number of gravid females caught per sticky trap (around 30 traps per month). The vertical bars on the index curves represent the 95% confidence intervals.

The situation is concerning. Entomological indices are increasing, in spite of the strengthening of the anti-vectorial actions around the dengue fever cases (insecticides spreading and destruction of the breeding sites around the cases). The current entomological conditions are unfortunately favourable to the expansion of the dengue fever epidemic.

Breeding sites found in Noumea

In order to reduce the transmission of the dengue fever virus and other arbovirus viruses, the population investment in vector-control activities is essential. Each person must take care to destroy all potential *Aedes aegypti* deposits around their dwellings, especially after rainy episodes. Figures 4 and 5 describe the different types of larval breeding sites found in Nouméa between 2000 and 2016. The categories "bottom plate" and "dishes and boxes" together account for 70% of the breeding sites found in Nouméa. These breeding sites, as well as all small forgotten objects in the garden, are easy to identify and destroy, so they should be treated as a priority.

Containers with stagnant water which can not be supress should be emptied once a week. Indeed, under optimal conditions of development, it takes only 8 to 10 days for an egg of *Aedes aegypti* to develop and reach the adult stage.

The DASS-NC (Department of Health and Social Affairs of New Caledonia) recommendations according the current dengue fever epidemic are available on their website.

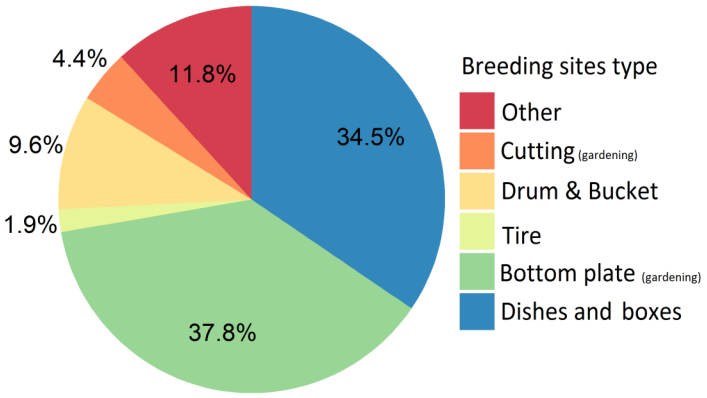

Figure 4 : Breeding sites type found in Noumea in 2016.

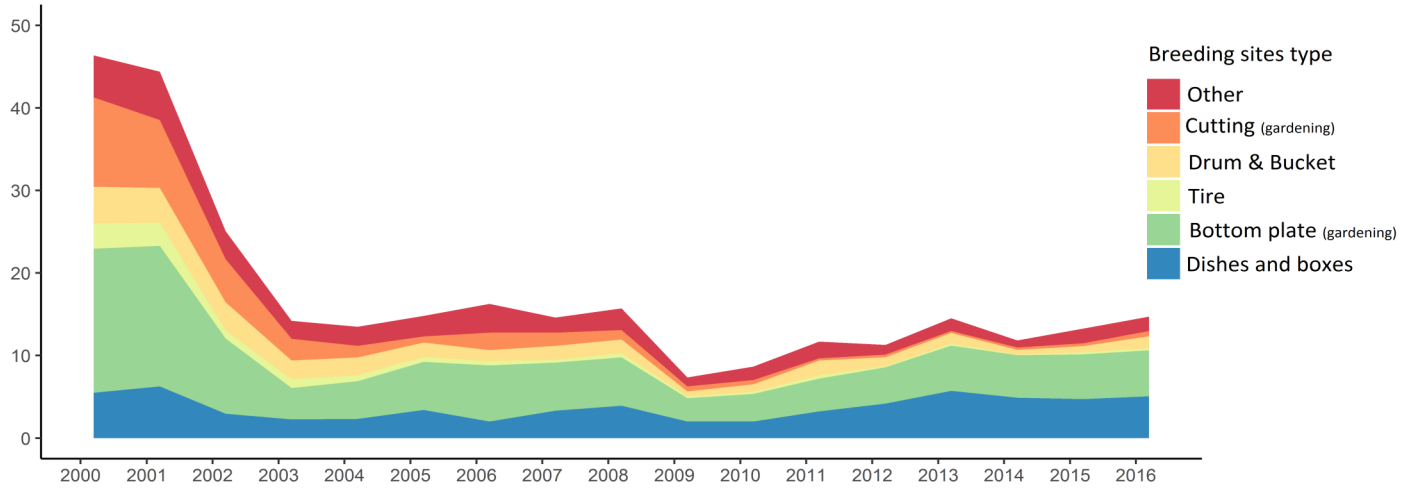

Figure 5 : Breeding sites type found annually in Noumea between 2000 and 2016

Contact and useful links

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To know more about :

Institut Pasteur of New Caledonia web-site (French):
http://www.institutpasteur.nc/les-moustiques-et-la-dengue/

Department of Health and Social Affairs of New Caledonia (DASS-NC) web-site (French):
http://www.dass.gouv.nc/portal/page/portal/dass/observatoire_sante/veille_sanitaire/

The Pacific Community (SPC) web-site (English available) :
http://www.spc.int/phd/epidemics/