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Bulletin of the Entomological Surveillance Network :

Aedes aegypti survey in Nouméa and Dumbéa.

*Activity subsidized by New-Caledonian Government,
with the collaboration of the city councils of Nouméa and Dumbéa.*

Written by Morgane POL, Sosiasi KILAMA and Nicolas POCQUET

Research and Expertise Unit in Medical Entomology (URE-EM), Institut Pasteur of New-Caledonia (IPNC)

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 entomological situation in Nouméa and Dumbéa.

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.

Larval and Pupal Index (LPI): estimates the mean number of larvae in late development stage (stage 4) and nymphs per house. It is a proxy for the number of adults produce per house.

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

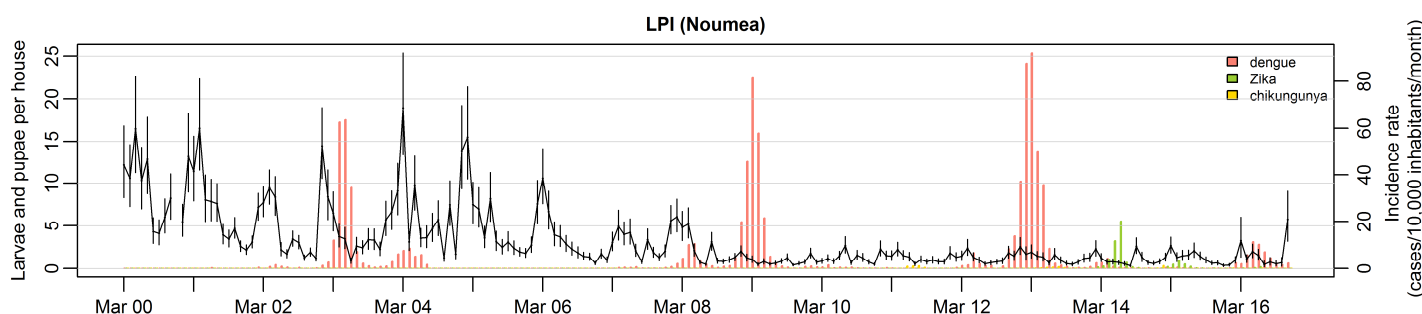


Figure 1: Monthly evolution of the Larval and Pupal Index in Nouméa, from 2000 to 2016 and epidemics of arbovirosis over the same period. The LPI estimates the mean number of larvae in late development stage (stage 4) and nymphs per house. It is a proxy for the number of adults produce per house. Between 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.

Current Entomological Situation in Nouméa and Dumbéa

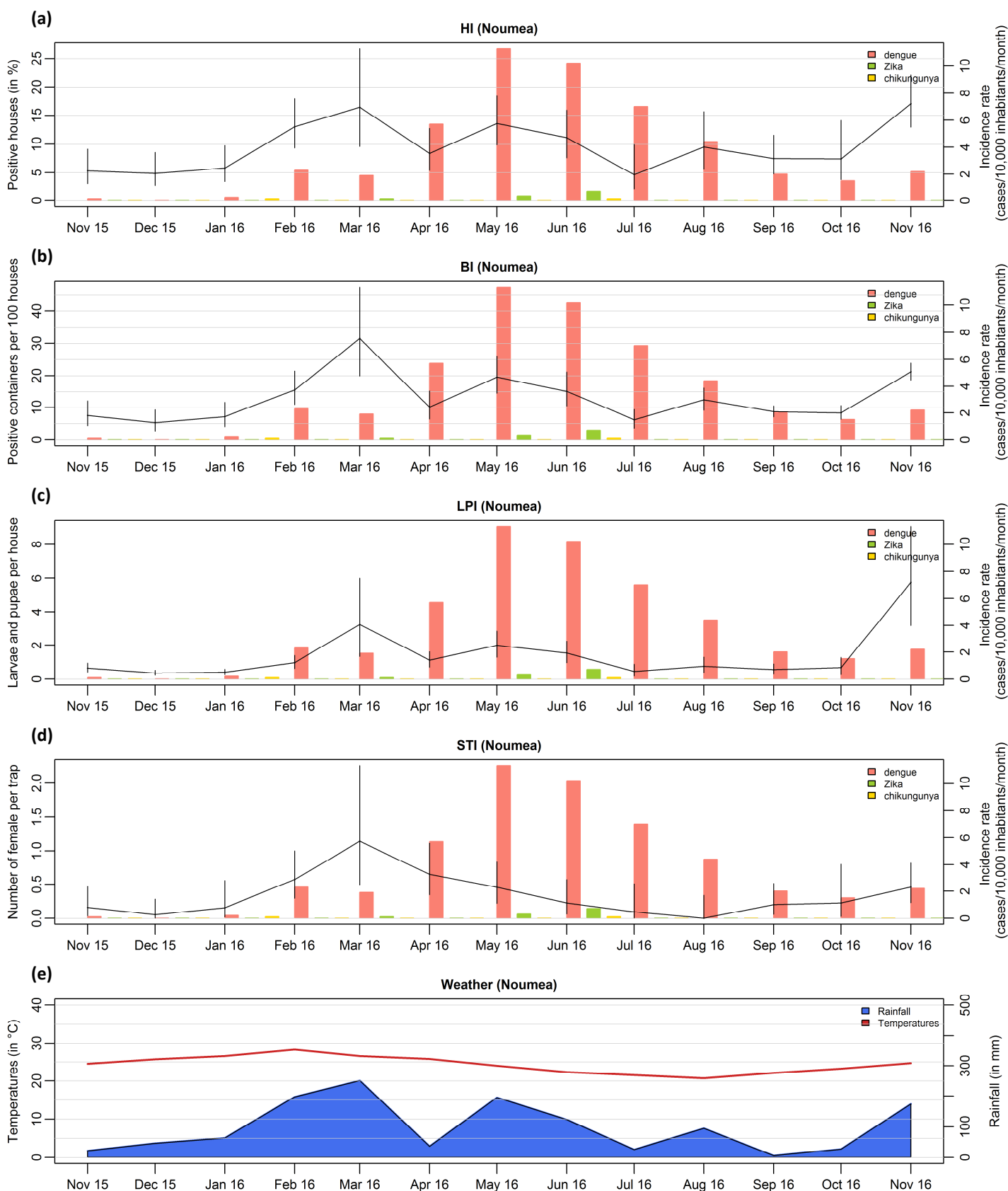


Figure 2: Monthly evolution of entomological indexes and effects of dengue, Zika and chikungunya on Nouméa from November 2015 to November 2016. (a) HI estimates the percentage of houses where at least one positive breeding site is found. (b) BI estimates the number of positive breeding sites found for 100 houses. (c) LPI estimates the mean number of larvae in late development stage (stage 4) and nymphs per house. These indices are calculated for all the sectors visited (between 200 and 300 different houses per month). (d) 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. 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). (e) Weather data are presented for Nouméa (source: Météo France).

We observed, in Nouméa, a large increase of the entomological indices in November (Figure 2a, 2b, 2c). Approximately 15% of houses had at least one positive breeding site (Figure 2a) and the LPI increased in one month from 1 to 5 larvae and nymphs produced on average per house. The LPI have not been that high since 2008 (Figure 1 and Figure 2c).

This increase of the entomological indices in November is certainly related to the strong precipitation recorded

(Figure 2d). These results could also be explained by the unusually high proportion of productive breeding sites in Nouméa (water drums and buckets).

Unlike Nouméa, the entomological indices of Dumbéa remain low for the moment (Figures 3a, 3b, 3c). However, the indices are likely to increase in the coming months if climatic conditions favourable to mosquito development persist.

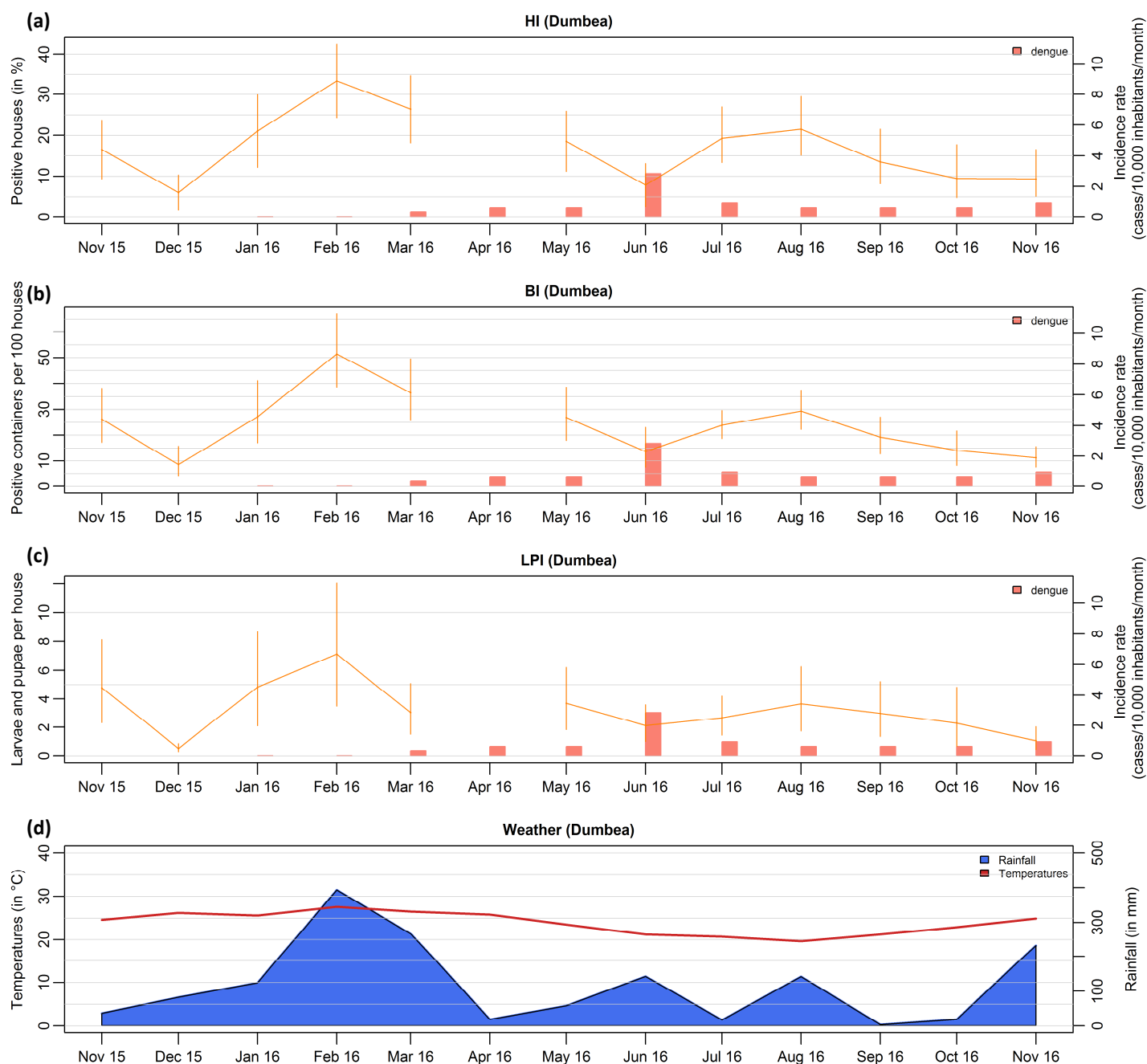


Figure 3: Monthly evolution of entomological indices and the incidence of dengue in Dumbéa from November 2015 to November 2016. (a), (b) and (c) cf. Legend of figure 2. The incidence rate of confirmed and probable human cases of dengue (in pink) is represented for Dumbéa (source: DASS-NC). (D) Weather data are presented for Dumbéa (source: Météo France).

The increase of the entomological indices in Nouméa add to the dengue fever transmission during the fresh season (Figures 2 and 3) are concerning. The coming epidemiological situation could deteriorate.

The population mobilization to destroy the breeding sites appears essential to limit the development of the mosquito vector *Ae. aegypti*.

Entomological indices by sector: Nouméa (3 sectors) and Dumbéa

The detail of the indices by sector (Nouméa West, East, South and Dumbéa) is presented in Figure 4. In November 2016, indices were higher in the three sectors of

Nouméa compared to the indices recorded in Dumbéa. The evolution of the indices during December will be carefully monitored.

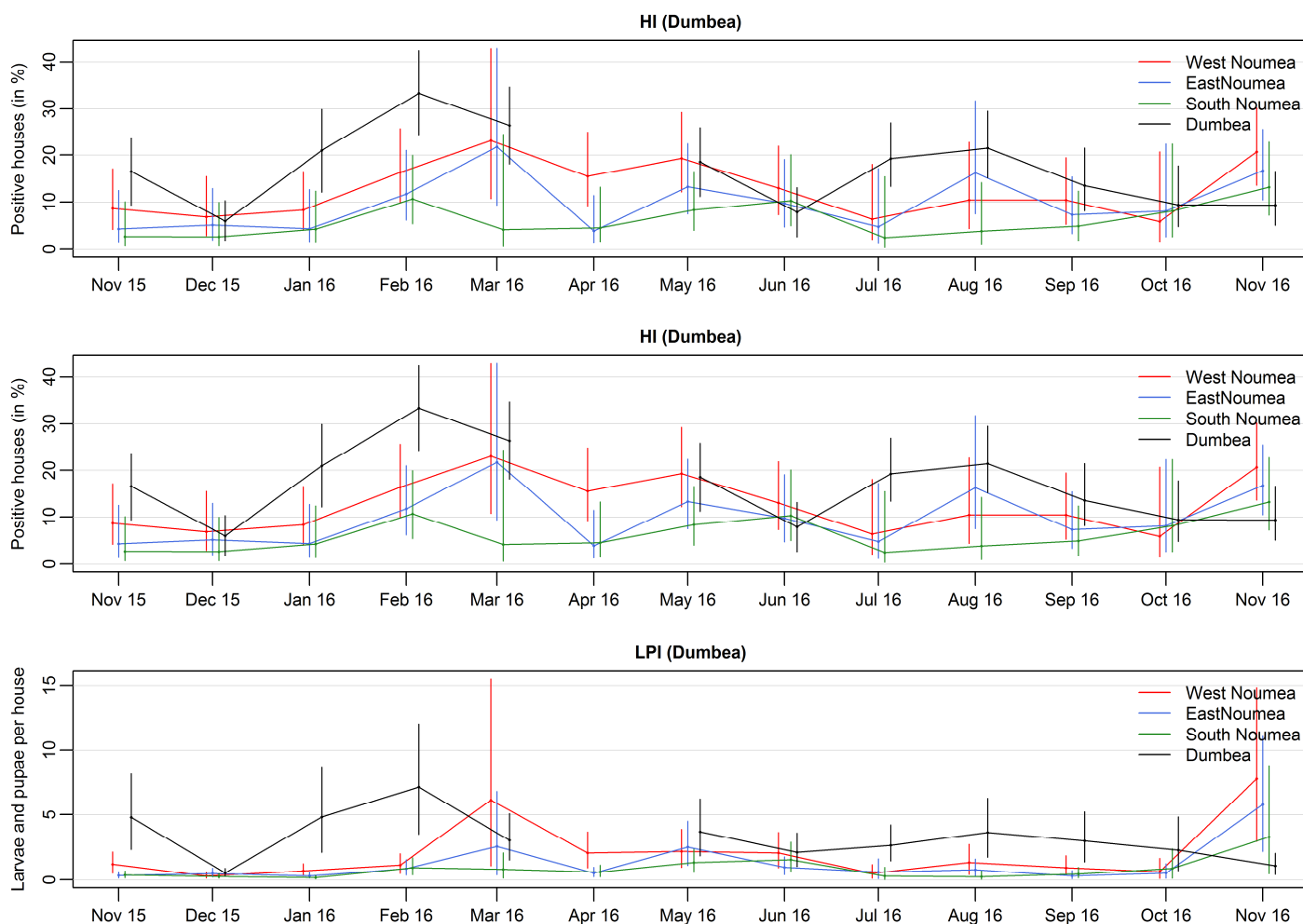


Figure 4: Monthly evolution of entomological indexes by sector from November 2015 to November 2016. (a) HI estimates the percentage of houses where at least one “positive” breeding site is found (b) BI estimates the number of positive breeding sites found for 100 houses (c) LPI estimates the mean number of larvae in late development stage (stage 4) and nymphs per house. For each sector, the indices were calculated on the data collected for about 100 houses per month. The vertical bars on the index curves represent the 95% confidence intervals.

Contact and useful links

Contact : Morgane POL (mpol@pasteur.nc)

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/>