



Ministry of Health and Medical Services
Solomon Islands

Dengue Outbreak: External Sitrep No. 3

From Epidemiological Week 33-41, 2016

Summary

- *Since August 2016, an unusual increase in dengue-like illness, including the number of NS1 positive cases, has been observed through the National Syndromic Surveillance System of the Ministry of Health and Medical Services (MHMS).*
- *An outbreak of dengue was declared for Honiara and Guadalcanal on 8 October 2016 and expanded to include other provinces on 19 October.*
- *Surveillance for dengue was enhanced in all 9 clinics in Honiara City Council (HCC) and expanded to other private practitioners and Guadalcanal in Week 40, therefore this week's report captures data from other health facilities not part of the routine syndromic surveillance system.*
- *A total of 1 212 cases of suspected dengue have been reported in Honiara, Guadalcanal, Malaita and Isabel (729 additional cases since last report) from epidemiological week 33 to week 41 (15 August to 16 October 2016). Among the National Syndromic Surveillance System sites, 292 cases were reported in Week 41, and over 400 cases reported by non-sentinel surveillance sites that have been activated for enhanced surveillance, indicating that the upward trend is related to increasing the number of surveillance sites as well as a real upward trend in cases.*
- *From Week 33 to Week 41, 650 rapid diagnostic tests have been conducted, and 209 were dengue NS1 positive (32%). In addition, 18 patients with negative NS1 tests were DENV IgM positive/IgG negative and are also considered as recent infections (total 227 positive; total 34% of those tested). A total of 364 cases were tested for dengue at the National Medical Laboratory and Kilu'ufi Medical Laboratory in Week 41 and 130 were DENV NS1 positive cases indicating an active dengue infection. In addition, 16 patients were DENV IgM antibody positive, DENV IgG negative. Overall, 146 patients or 40% of those tested in Week 41 had evidence of recent dengue infection.*
- *Dengue virus serotype 1 (DENV1) was confirmed in 3 out of 17 blood samples that were sent for confirmation in Pathology Queensland Laboratory. A case of dengue serotype-2 was also confirmed in a sample that was sent for Zika testing earlier in September, 2016 which turned out to be confirmed for DENV2 infection.*

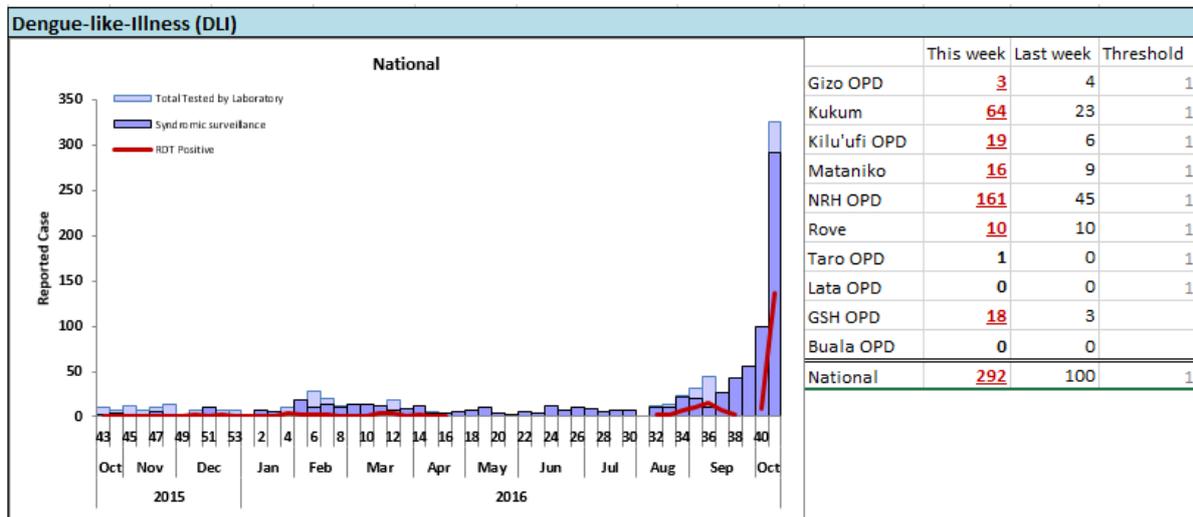
As this is rapidly evolving situation, all data are provisional and subject to change. Some of the cases are expected to be reclassified at the end of the outbreak based on a final review of laboratory results.

Dengue-like Illness

The National Syndromic Surveillance system of the Ministry of Health and Medical Services (MHMS) has observed an unusual increase in the number of dengue-like illness through the sentinel surveillance sites specifically in Honiara and Guadalcanal since epidemiological week 33, 2016 including the number of NS1 positive cases that were tested using rapid diagnostic test (RDT). In epidemiological week 41 (10-16 October 2016), a total of 292 cases of dengue-like illness have been reported in 8 out of 10 sentinel surveillance sites. Cases of dengue-like illness (DLI) continue to increase in all Honiara sentinel sites and Good Samaritan Hospital.

Increasing case numbers was also noted in Kilu'ufi sentinel site in Malaita province in week 41. Taro Hospital outpatient department in Choiseul province has reported 1 case of dengue-like illness in week 41.

Figure 1. Cases of dengue-like illness (DLI) reported through the National Sentinel Syndromic Surveillance System, Week 41, 2016.



Descriptive Epidemiology

As of 16 October, 1 212 suspected dengue cases have been reported in Honiara, Guadalcanal, Malaita and Isabel, 798 additional cases since last report (Figure 2). Nine hundred and eighty-three (81.1%) cases were reported in Honiara and one hundred and sixty-one cases (13.3%) in Guadalcanal province, sixty-seven cases (5.5%) in Malaita province and one case (0.1%) in Isabel province. Cases are widespread in all areas of Honiara including the positive NS1 cases where the population daily movement is dynamic across all areas of observation. East Honiara (37.2%) and Central Honiara (18.8%) were identified as the main areas where active transmission of dengue cases is occurring. A proportion (31.1%) of the cases in Honiara have incomplete address information thus it was difficult to identify which areas they were from. In Guadalcanal, 82% of the dengue cases that were reported within the central part of Guadalcanal (zone 6).

Figure 2. Total number of suspected dengue cases by week in Solomon Islands (n=1212), Week 33-41, 2016

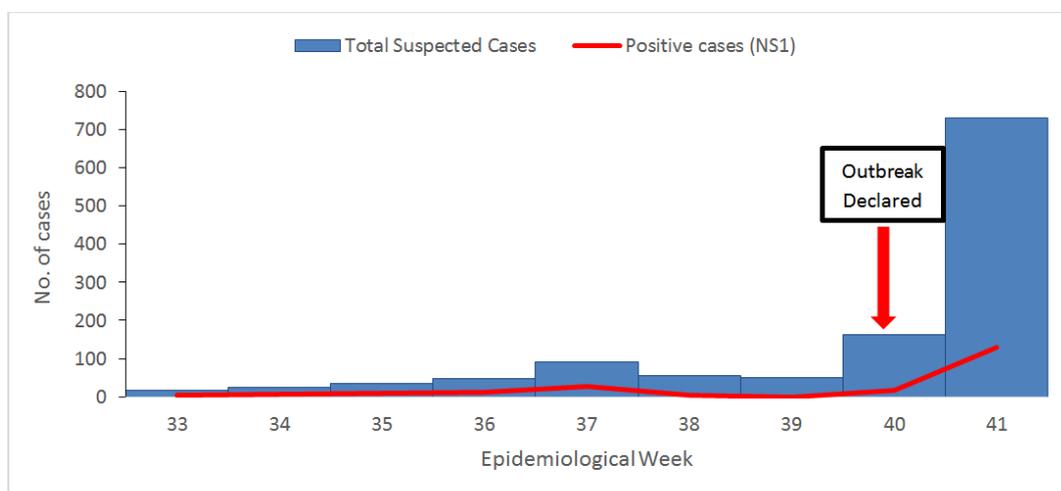


Figure 3 shows the DLI epidemic curve for Weeks 33 to 41 by the type of reporting site. Enhanced surveillance was established in Week 39 of the outbreak and 35 non-sentinel sites contributed data in Week 41. Eight of 10

sentinel sites reported DLI cases in Week 41. The data from non-sentinel sites in Weeks 33-38 reflect data collected retrospectively as part of a national line listing.

Figure 3. The number of suspected dengue cases reported nationally by sentinel and non-sentinel sites

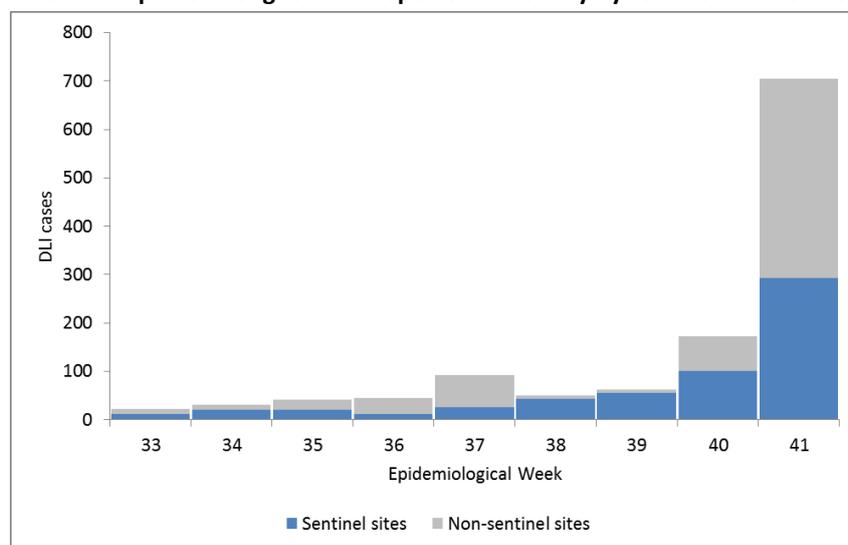


Figure 4. The number of suspected dengue cases in Honiara, Guadalcanal, Malaita and Isabel

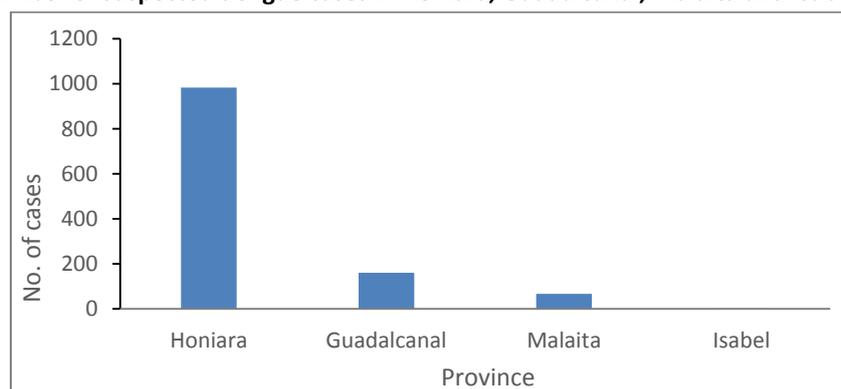


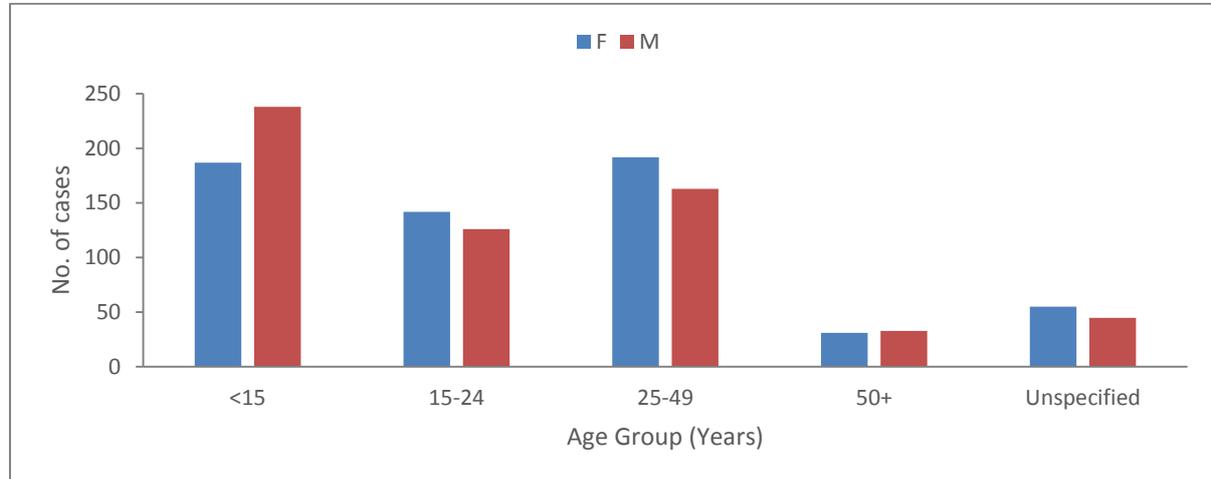
Table 1. Distribution of dengue cases in Honiara and Guadalcanal by area of location, Weeks 33-41, 2016

Area/Location	Total Suspected Cases	RDT-Positive Cases
Guadalcanal	161	13
Zone 6	132	12
Zone 1	27	1
Zone 2	2	0
Honiara	983	184
East Honiara	366	58
Central Honiara	185	28
West Honiara	126	17
Unspecified	306	81
Grand Total	1144	197

Of the 650 tests conducted from Week 33 to Week 41, 91 (44%) of the 208 suspected dengue cases diagnosed in the National Syndromic Surveillance System sites and 135 (31%) of the 430 patients seen at non-sentinel

sites tested dengue NS1 positive and/or dengue IgM positive in the absence of dengue IgG antibody i.e. recent infection. This 13% difference which is statistically significant ($p < 0.01$) in the dengue positive cases suggests that the national sentinel sites are adhering to the DLI case definition more closely than the non-sentinel, potentially less experienced, sites. Clinic name was missing for 12 patients.

Figure 5. Age distribution of dengue cases by gender, Weeks 33-41, 2016

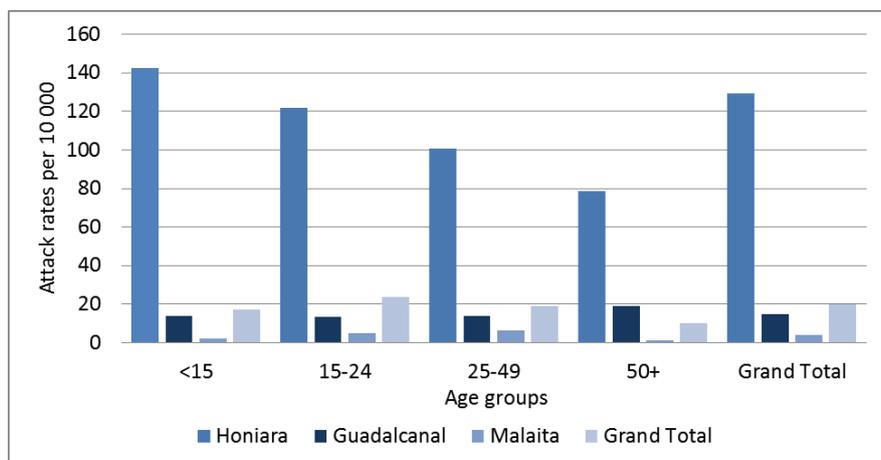


There is no significant difference between the number of male and female DLI cases. The mean age was 22 years old (ranging from 0-90 years) and the highest absolute number of cases are aged less than 15 years and 25 to 49 years.

Attack rates per 10 000 population

Figure 4 presents the age-specific attack rates (AR) of DLI per 10 000 population using the estimated 2016 Solomon Islands population projected from the 2009 census. This graph shows the ARs of DLI in Honiara since the beginning of the outbreak. As expected, the highest rates are in the 0-14 year age group, falling with increasing age. However, the fact that the rates remain high across all age groups is consistent with an outbreak caused by a new dengue serotype in a non-immune or partially immune population.

Figure 4. Age-specific attack rates (AR) of DLI per 10 000 population, by province



Health seeking behaviour

The date of symptom onset was collected in 545 cases. Overall, most people present early on days 0-4 of

illness onset. Figure 5 shows the days from symptom onset to first contact with health services before, and on or after, 8 October, the day the outbreak was declared. The figure shows that there was little difference in health seeking behavior in the two time periods i.e. the media attention and heightened awareness generated by the outbreak declaration did not cause people to present earlier. This suggests that symptoms are moderate to severe as both children and adults are presenting early. Most of the suspected dengue cases have sought health care between days 2 and 4 of illness; 69% of patients sought health care by day 2 of illness and 91% by day 4. There was no difference in how quickly patients sought health care across the age groups.

Figure 5. Days from illness onset to first contact with health service before and after outbreak declaration (n=545)

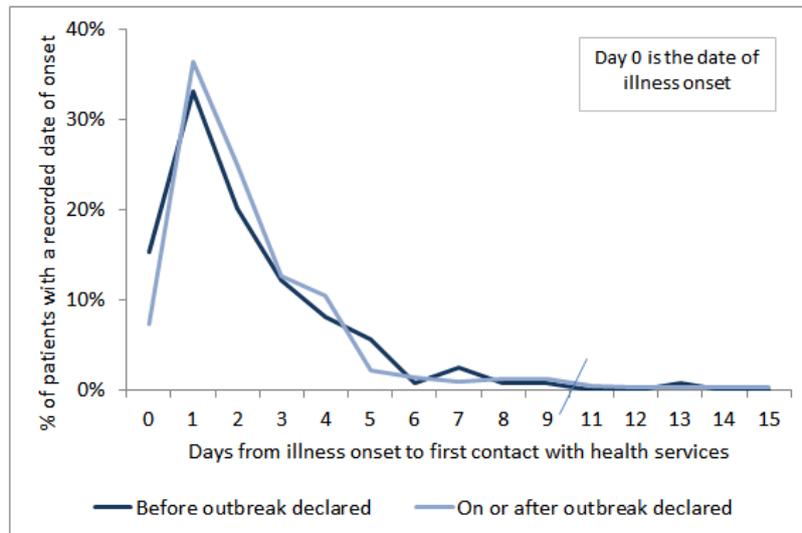
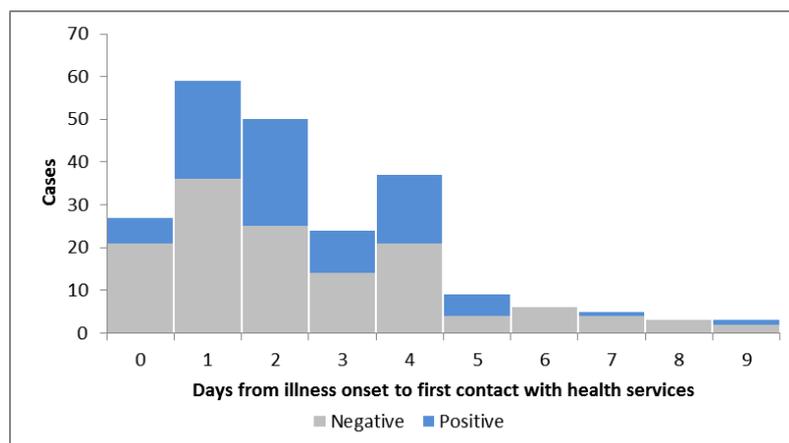


Figure 6 shows dengue NS1 results by days of illness in 223 patients with a recorded date of illness onset who were tested with a rapid diagnostic test. The highest percent NS1 positive occurred on days 2 to 5 of illness and fell off rapidly thereafter.

Figure 6. Dengue NS1 results by days of illness (n=223)



Hospitalized Cases

A total of 39 suspected dengue cases have been admitted to the National Referral Hospital (NRH) from 10-16 October, 2016. 17 of the admitted cases were children below the age of 15 years (3 months to 10 years). The

average length of stay at the hospital was 2 days. Twelve of the admitted cases were adult cases aged from 25 years and above (25-74 years) have been admitted to the current isolation ward in the Orthopedic ward, NRH.

Laboratory Surveillance

From Week 33 to Week 41, 650 rapid diagnostic tests have been conducted, and 209 were dengue NS1 positive (32%). In addition, 18 patients with negative NS1 tests were DENV IgM positive/IgG negative and are also considered as recent infections (total 227 positive; total 34% of those tested). A total of 364 cases were tested for dengue at the National Medical Laboratory and Kilu'ufi Medical Laboratory in Week 41 and 130 were DENV NS1 positive cases indicating an active dengue infection. In addition, 16 patients were DENV IgM antibody positive, DENV IgG negative. Overall, 146 patients or 40% of those tested in Week 41 had evidence of recent dengue infection.

Preliminary results received from Pathology Queensland Laboratory on 12 October have confirmed dengue virus serotype 1 (DENV1) in 3 out of 17 samples (one was a sample from Kilu'ufi in Malaita in a patient with date of onset on 6 August 2016), 7 were unspecified dengue virus infections, 3 were unspecified flavivirus infections and 4 were equivocal results using the Microsphere Immunoassay (MIA) testing method. There was a confirmed DENV2 case reported from a private clinic in Honiara. The sample was sent to Pathology Queensland Laboratory for Zika testing but confirmed as DENV2 infection. Additional samples will be sent for further confirmation in the coming week for molecular testing using polymerase chain reaction (PCR) to confirm if there is co-circulation of all three serotypes DENV1, DENV2 and DENV3. Based on these results, there is evidence that the increased number of NS1 positive cases observed is likely to be caused by the re-emergence of DENV1 and possibly DENV2 in Honiara and Guadalcanal triggering the current outbreak.

Discussion

- The number of cases in week 41 shows a large increase due to more sites reporting as part of the enhanced surveillance for dengue. However there is a clear upward trend in the data from the *National Syndromic Surveillance System* sites as well as the non-sentinel sites indicating that the number of suspected dengue cases is still on the rise.
- Historical evidence has shown that both dengue virus 1 and 2 had circulated in Solomon Islands in the past and re-introduction of both serotypes will likely spread in populated areas like Honiara and urban centres in other provinces (specifically Guadalcanal, Malaita and Western). DENV1 was documented (Li et al. *Emerging Infectious Diseases*.www.cdc.gov/eid.Vol.16, No.1, January 2010) to have circulated in Solomon Islands 14 years ago in 2002. This means those who are aged below 15 years are susceptible to this dengue strain which is somewhat consistent with the current surveillance findings that the highest number of cases is in this age group. It is likely that DENV1 is causing the current dengue outbreak. Also historical data have indicated DENV2 had circulated in Solomon Islands most recently in 1994. This may also mean that those who were born after 1994 or aged below 23 are likely susceptible to DENV2 infection. DENV-1 is known to cause a higher proportion of clinically apparent disease (Yung C-F et al. *American Journal of Tropical Medicine and Hygiene*. 2015;92(5):999-1005. doi:10.4269/ajtmh.14-0628). The clinical attack rates across all age groups are
- Further confirmatory testing will help to provide additional evidence to understand the current outbreak; specifically if there is co-circulation of both types DENV1 and DENV2, and whether these serotypes will replace DENV3 as the main circulating serotypes. In addition, approximately 60% of the patients tested are DENV NS1 and IgM negative indicating that a sample of dengue negative cases should also be tested for other arboviruses, including chikungunya and Zika virus as these are known to co-circulate with dengue viruses in the Pacific and their clinical presentations are similar.

- There is some missing information in the surveillance data from sentinel sites which can make the interpretation challenging, specifically to identify the geographical distribution of reported cases which is important for vector management activities.

Recommendations and Actions

- **Case surveillance:** All reporting sites should continue recording and reporting suspected dengue cases with required information as per surveillance protocol and guided by the Public Health Emergency and Surveillance Unit (PHESU). Surveillance for dengue has been enhanced to all HCC clinics and other health facilities in Guadalcanal province in week 40. Refresher training on the use of the case definition and data collection has been conducted for all HCC nurses, NRH frontline staff (both emergency and outpatient) and Good Samaritan hospital staff including other nurses from other health centers within Guadalcanal. However, further training may be warranted given the significant difference in the dengue NS1/IgM percentage positive of patients seen in sentinel versus non-sentinel sites.
- **Public risk communication:**
 - Public should be advised on personal protection against dengue and continuing cleaning up of their home environment to reduce the breeding sites of mosquitoes transmitting this disease.
 - Public should be advised on seeking health services if having dengue like signs and symptoms such as fever, rashes, muscles pain, red eyes.
- **Clinical case management:** All health facilities in Honiara and surrounding health facilities in Guadalcanal should be advised on the ongoing transmission of dengue and ensure that all clinical staff are familiar with the case definition, warning signs of severe dengue and treatment and testing guidelines. A refresher clinical management training was conducted for all nurses and doctors from NRH, Guadalcanal Health and HCC Health on 14 October 2016.
- Hospital indicators of severity will be monitored to help determine the caseload impact on health services and whether some of the DLI cases are caused by other arboviruses.
- A sample of test negative DLI cases should also be tested for chikungunya and Zika viruses. The NRH laboratory has the capacity to run chikungunya ELISA tests; testing for Zika virus requires sample shipment overseas at this time. An analysis of the frequency of presenting symptoms and signs will be carried out. A sampling strategy to monitor the outbreak in the known affected areas will be implemented.
- **Integrated vector management:** Vector control through space spraying operations aims to reduce the intensity of transmission and mitigate the caseload burden on the health system. The decision on vector control measures is being guided by MHEOC.