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Short Communication

Spatial Distribution and Mainly Breeding Sites of *Aedesaegypti* (Diptera:Culicidae) in Luanda, Angola

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Abstract

Dengue activity has been reported sporadically in Angola. *Aedes aegypti* is mainly the Dengue vector in this country. The objective was to obtain information about the spatial distribution and the mainly breeding sites of *Ae. aegypti*, as well as, to determine the indexes (house, containers and Breteau) in Luanda. The study was carried out from April 2014 to March, 2015. *Ae. aegypti* was present in all municipalities of Luanda province. A total of 8 190 households were surveyed, of which 1 171 were positive to *Ae. aegypti* larvae. Values of the *Aedes* indexes showed variation during the study period. Water storage containers represented 88,6% of the total containers positive to *Ae. aegypti*. This work represent the first sampling was performed to determine the presence and identification of breeding sites of *Ae. aegypti* in whole Luanda province during this century, aspect of great importance for the establishment of a control program vector of Dengue in Angola.

INTRODUCTION

Aedes aegypti mosquito is originated in Africa and spread to other tropical countries in the 17th and 18th centuries [1-5]. Other *Aedes* species mosquitoes, including *Aedes simpsoni*, *Aedes africanus*, and *Aedes luteocephalus*, are reported in Africa and Angola. These species are potential Dengue vectors. *Ae .aegypti* was recorded by first time in Angola in 1903 [6]. Survey conducted by the National Malaria Control Program during 2010–2012 showed that *Ae. aegypti* was the only Dengue vector registered in Angola at that moment in Angola [5].

Dengue epidemics have been reported in Africa since the 19th century, in countries including Zanzibar (1823, 1870), Burkina Faso (1925), Egypt (1887,1927), South Africa (1926–1927), and Senegal (1927–1928) [2,7]. Between 1960 and 2010, 20 laboratory-confirmed outbreaks were reported in 15 African countries, with most occurring in Eastern Africa. All four Dengue virus serotypes have been isolated in Africa, with serotype 2 reported to cause the most epidemics [8]. Available data suggest that Dengue is endemic to 34countries across all regions of Africa of these, 22 have reported local transmission, which is laboratory-confirmed in 20 countries, while two (Egypt and Zanzibar) do not have laboratory confirmation. The remaining 12 countries have only diagnosed Dengue in travelers who had returned to non-endemic regions [4].

In Angola, Dengue activity has been reported sporadically. On April, 2013, the Public Health Directorate of Angola announced that six cases of dengue had been reported to the Ministry of Health of Angola (MHA). As of May 31, a total of 517 suspected Dengue cases had been reported and tested for Dengue with a rapid diagnostic test (RDT). All suspected cases were reported from Luanda Province, except for two from Malanje Province. Only Dengue sero type 1 was detected by molecular diagnostic testing [5].

There is only scanty data available about *Ae. aegypti* during this century in Angola for this reason the objective of this study was to obtain information about the spatial distribution and the mainly breeding sites of *Ae. aegypti*, as well as, to determine the indexes (House, Containers and Breteau) in Luanda, in order

to collect baseline information that could be useful for decision making during control operations aiming at preventing the possible epidemic occurrence in the country.

The study was carried out in Luanda, the capital city of Angola, as a population estimated of 6 542 944 in habitants (National Census data conducted from 15-31of May, 2014; National Institute of Statistics). A large proportion of the residents of Luanda live in densely populated urban slums. The city is divided in 7 municipalities Belas, Cacuaco, Cazenga, Icolo de Bengo, Quissama, Viana and Luanda municipality which has the same name as the province and is integrated by Ingombota, Maianga, Rangel, Samba, Sambizanga and Kilamba Kiaxi districts respectively. Each municipality is divided into comunes and these in neighborhoods. The rainy season is between November-May but the most accumulation of rain in Luanda occurs in March- April. Luanda had an annual rainfall of 323 millimeters during 2013 (Average Climatic Conditions Luanda, Angola; BBC Weather, 2013).

The data collection was conducted from April 2014 to March 2015. Sampling was carried out on all deposits containing water in the houses and in the vacant lots present in urban and peri-urban areas of the universo of each municipality in the province. Inspected deposit corresponded to: the water storage containers as basins, buckets, tanks, cistern, etc.; miscellaneous small artificial containers such as cans, jars, bottles, plastic cups etc.; used car tires; plants in water and potted etc. Household surveys of container-breeding mosquitoes were conducted randomly trying to cover the largest area of each municipality in the province. Four sampling (weekly) during the each month were carried out. From each positive container mosquito only larval sample was collected using a dropper, which was placed in vials containing 70 percent alcohol. The vials were labeled with the required information such as date and place of collection. The identification of the samples was using morphological keys [9,10]. A total of household in each sample was 35. The staff (5 persons) that performed the sampling belongs to the malaria program established in the province and trained for the activity by Cuban specialist in vector control. The indexes house, containers and Breteau were determined monthly. (House Index (HI): percentage of house with larvae; Container Index (CI): percentage of water-holding containers with larvae and Breteau Index (BI): the number of positive containers per 100 houses).

Ae.aegypti was present in all municipalities of the province with a major infestation Ingombota and Samba districts belonging to Luanda municipality; and Cacuaco and Cazenga municipalities in the studied period (Figure 1). Of a total of 572 neighborhoods registered for Luanda (Data from the Provincial Directorate of Health and Vector Control Program); 242(42, 3%) distributed in the study area were sampled, being found positive for *Ae.aegypti* larvae 237(97.9%). A total of 8 190 households were surveyed, of which 1171 were positive with *Ae. aegypti* mosquito larvae. During the study period House index oscillated between 4,3 in January to 27,9 in June, container index between 2,1 in January to 9,3 in May and Breteau index between 5,8 in January to 42,2 in June (Figure 2). The average household container with wáter was 5. A total of 1667 container were positive with *Ae. aegypti* larvae of which 1478(88.6%) were water storage containers (tanks

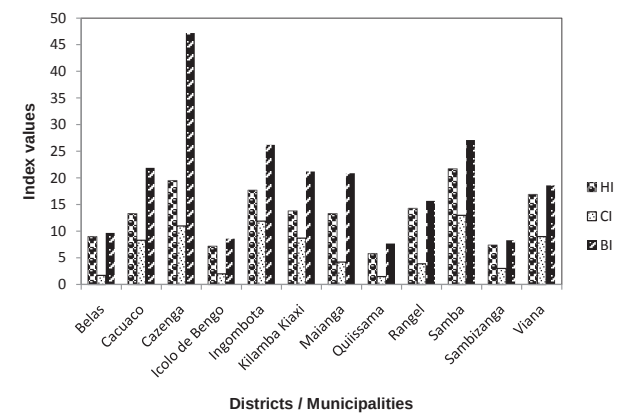

Figure 1 House index (HI), container index (CI), Breteau index (BI) for Aedesaegypti values in each district and municipality in Luanda province, Angola, April 2014 - March, 2015.

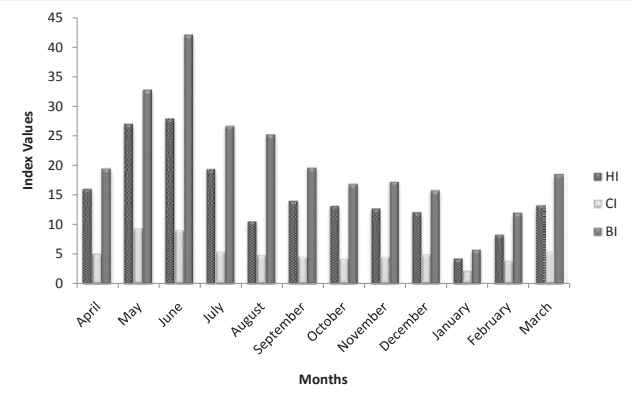

Figure 2 House index (HI), container index (CI), Breteau index (BI) for Aedes aegypti values monthly in Luanda, Angola, April 2014 - March, 2015.

>100 liters, tanks <100 liters, buckets, water wells, cisterns and basins) followed by plants in water and potted (7,3%); artificial miscellaneous containers (cups, jars, pots, toilet hole, bottles, etc) (2,5%) and used tires car (1,6%). *Ae.aegypti* larvae presence in artificial miscellaneous containers miscellaneous were founded mainly in May and June where it still accumulations of rain water are present (Figure 2).

During an outbreak of Yellow Fever in Luanda was founded that water-storage containers (mainly the bigger ones) accounted for 85 percent of the *Ae. aegypti* larval breeding, [11] the remaining were ornamental vases, abandoned objects, mainly with rainwater, of these, car tires were the most important type. During the survey carried out in 2013; 63, 1% belonged to water storage containers too [5]. In one study carried out in Senegal *Ae. aegypti* was founded in the storage containers (100% of the collected fauna), tires (96%), bamboo holes (90.6%) and discarded containers (51.4%) [12]. Similar result about the water storage container basically tanks was founded in Kenya during *Ae. Aegypti* pupa/demographic- survey [13]. On the other hand [11] founded that *Aedes* indexes varied greatly reaching

Breteau index values of about 40 during the rainy season in Luanda. Ours results coinciding with these previous findings. Urbanization is a major factor in facilitating the increase of *Aedes sp*. Mosquito populations [14], together with the accumulation of non-biodegradable, human-made containers in and around living areas, as well as deficiencies in the supply and distribution of water has provided the aquatic environment required by these mosquitoes in this country and in the continent [13].

It has long known of the existence of Dengue in Africa, but its epidemiology and the vectors studies are poorly documented. Dengue prediction models suggest that the true burden of Dengue in Africa can approach that of South America [8]. In Angola, Dengue activity has been reported sporadically. Early surveys in the 1960s revealed no evidence of Dengue activity [14], while outbreaks of clinically suspected dengue in the 1970s were proven to be caused by Chikungunya [15]. In the 1980s an outbreak of Dengue was reported from Luanda, with subsequent reports of travel-related Dengue acquired in Angola, by travellers from the Netherlands [16] and Brazil [17]. For a Brazilian travel-related case, the serotype identified was Dengue - 2. Since then, there has been little information on the risk of Dengue in Angola [19]. This may represent an absence of disease activity, or a lack of awareness, diagnostic resources and active surveillance. The origin of Dengue -1 strain responsible for the Luanda outbreak in 2013 is yet undetermined, while that the cases of Dengue and Chikungunya occurred during 2014, were confirmed by rapid test in Luanda but the circulating Dengue serotype was not identified.

In conclusion this work represent the first sampling was performed to determine the presence and identification of breeding sites of *Ae.aegypti* through out the whole Luanda province, aspect of great importance for the establishment of a control program vector of Dengue and Chikungunya. It is important to know besides that the values registered for Breteau and House indexes allow the occurrence of dengue epidemicso it entomological indicators should stimulate strength then the diagnostic in health institutions in Luanda for to know the real situation of this disease in Angola.

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