Survey of Aedes Mosquitoes (Diptera: Culicidae) Breeding Sites In The Sunyani Municipality, Bono Region, Ghana

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ABSTRACT

The main objective of this study was to assess (profile) Aedes mosquito breeding sites within the Sunyani Municipality, Ghana.

A survey (profiling) of Aedes mosquito breeding sites alongside sampling of Aedes mosquito larvae was undertaken within the Sunyani Municipality, Ghana by a simple random sampling technique between December 2019 and February 2020, by inspection of habitats for the presence of Aedes mosquito larvae visually through the dipping method.

Two hundred and seventy two (272) possible Aedes mosquito breeding sites identified in the Municipality. The various categories of breeding sites identified were; stagnant water in discarded lorry tyres (32.7%) (n=89); containers/yellow gallon receptacles (32.4%) (n=88); grey water in an engineered/eroded drains were (29%) (79); wetlands/swampy areas were (3.7%) (n=10) and discarded car seat were (2.2%) (n=6).

Aedes mosquito breeding sites during the dry season between December and February in the Municipality were predominantly anthropogenic induced.

Residents of the Sunyani Municipality must be educated on health risk associated with producing Aedes mosquito breeding sites.

Aedes larva control during the raining seasons and the dry season must be considered as an indispensable aspect of vector-borne disease control programmes in the study area.

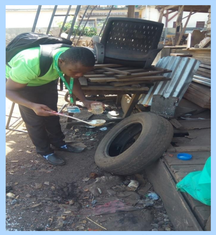

Fig. 1: Larval Sampling from discarded lorry tyres – Aedes

Fig. 2: Larval Sampling from discarded yellow container – Aedes

INTRODUCTION

In 1881, Carlos Finlay hypothesized that the etiologic agent responsible for yellow fever might be carried by mosquitoes, and this theory was proven to be true by Major Walter Reed who, in 1900 made the first observation that a human virus, yellow fever virus (YFV), can be transmitted by mosquitoes (Hammon and Reeves, 1945).

Yellow Fever (YF) is endemic in Ghana, and is noted to be associated with severe disease in approximately 15% of cases with a high case fatality ratio (CFR) (WHO, 2021).

In 2021, Ghana recorded 202 suspected cases of Yellow Fever (YF) comprising of 70 confirmed cases with 35 deaths across four regions (Savannah, Upper West, Bono and Oti) (WHO, 2021).

METHODS AND MATERIALS

A survey (profiling) of Aedes mosquito breeding sites alongside sampling of Aedes mosquito larvae was undertaken within the Sunyani Municipality, Ghana via a simple random sampling technique between December 2019 and February 2020, by inspection of habitats for the presence of Aedes mosquito larvae visually through the dipping method in the morning (8:00am-12:00pm GMT) and in the afternoon (1:00pm-5pm GMT).

Three zonal councils, made up of twenty-one (21) communities covering the entire Municipality were entered to identify, inspect and examine water bodies, containers, receptacles, wetlands (swampy and marshy areas), drains and water supply and storage facilities with the potential to harbour mosquito larvae (Service, 1993; Service, 2012).

During each survey, a habitat was first inspected for the presence of mosquito larvae visually, then by dipping a ladle (10cm diameter and 90ml capacity) and transferring into a plastic container/bottle (250ml capacity).

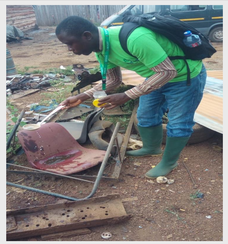

Fig. 3: Larval sampling from a discarded car seat - Aedes

Fig. 4: Larval sampling from a barrel on a premises - Aedes

METHODS AND MATERIALS CONT'D.

If mosquito larvae were present, 2-3 dips (about 250ml) were taken depending on the size of each larval habitat at interval along the edge. The breeding sites of the Aedes mosquito genera were also characterized as anthropogenic and naturally induced.

Aedes mosquito species breeding sites were identified following a guidelines provided by Service (1993) and were diagnosed morphologically to the genera level as per the taxonomic keys of Knight and Stone (1977).

For easy identification of samples/specimen, the species of mosquitoes were written on a paper tape and placed on the plastic containers (i.e., *Culicine*) at the laboratory before the team set off to the field each day. At the field, when samples were collected, the serial number, the type of breeding site and the location or community were written on the plastic containers.

A checklist that comprises the type of breeding site, category of breeding site, location, Global Position System (GPS) coordinates, and mosquito species found at the breeding site was used to record data from the field (Service, 1993; Service, 2012).

Fig. 5: Larval samples ready for processing in the laboratory

Fig. 6: Larval samples being reared in the laboratory

Fig. 7: Fully grown *Aedes* adult mosquitoes' species

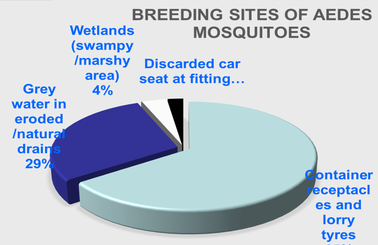

Fig. 8: Types of *Aedes* mosquito breeding sites sampled

Tab. 1: Category of *Aedes* mosquito breeding sites sampled

Category of Breeding Sites	Freq.	%
Anthropogenic	262	96.3
Natural	10	3.7

RESULTS

Out of the 272 possible Aedes mosquito breeding sites identified in the Municipality, (96.3%) (n=262) of the breeding sites were anthropogenic induced whilst (3.7%) (n=10) were natural based breeding sites. Stagnant water in discarded lorry tyres constituted (32.7%) (n=89), containers/yellow gallon receptacles were (32.4%) (88), grey water in an engineered/eroded drains were (29%) (n=79), wetlands/swampy areas were (3.7%) (n=10) and discarded car seat were (2.2%) (n=6).

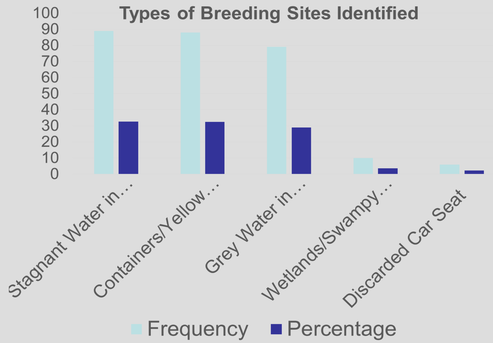

Fig. 9: Types of Aedes mosquito breeding sites identified & sampled

CONCLUSIONS

Aedes larva control during the raining seasons (major and minor, between April-October) and the dry season (November and March annually) must be considered as an indispensable aspect of vector-borne disease control programmes in the study area in order to prevent further outbreak of yellow fever disease in the near future.

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