

Survey of Mosquitoes Breeding Sites In The Sunyani Municipality, Bono Region, Ghana

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ABSTRACT

The main objective of this study was to assess mosquito breeding sites within the Sunyani Municipality in Ghana. We hypothesized that mosquito breeding sites within the Sunyani Municipality are mainly naturally induced.

A survey for mosquito breeding sites along with sampling of mosquito larva were undertaken within the Sunyani Municipality between December 2019 and February 2020. Mosquito species breeding sites were diagnosed following a guideline provided by Service (1993) and the mosquito larva collected were diagnosed to the genera level as per the taxonomic keys of Knight and Stone (1977). The breeding sites of the mosquito genera were also characterized as anthropogenic and naturally induced.

Of the 1421 possible mosquito breeding sites identified in the Municipality, 69.5% (n=987) were anthropogenic induced whereas 30.5% (434) were natural based breeding sites.

Mosquito breeding sites during the dry season in the Sunyani Municipality were mainly anthropogenic induced.

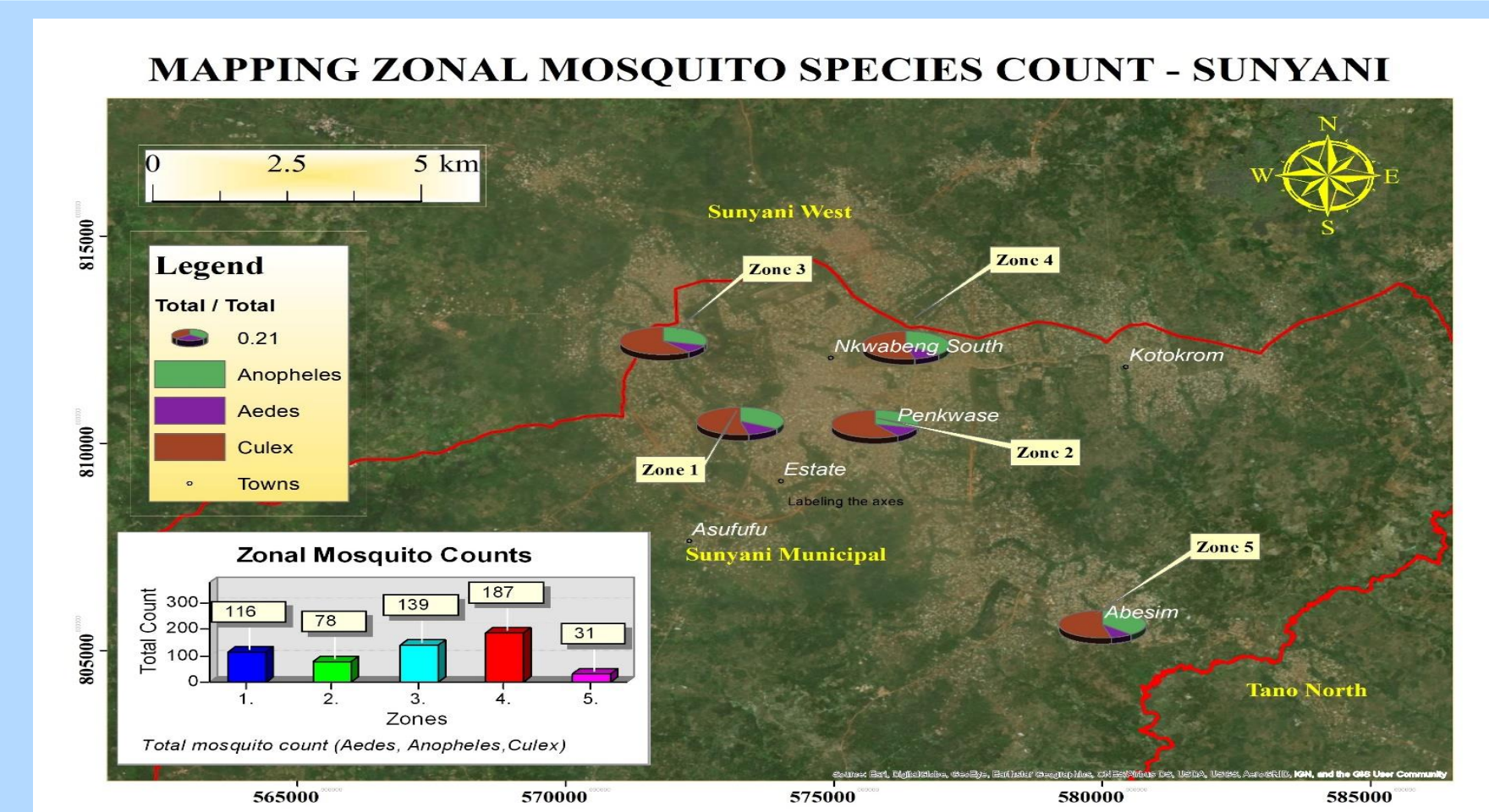


Fig. 1: Map of mosquito larval collection sites



Fig 2: Items used for mosquito larval samples collection.

Fig. 3: Larval sampling from lorry tyres - Aedes

INTRODUCTION

To investigate the types of mosquitoes, the range of major breeding sites and population dynamics of where mosquitoes species (i.e., *Anopheles* and *Culicine*) could be found breeding in the communities of the Municipality.

A simple random sampling technique was used to sample larvae of mosquitoes across the three zonal councils, made up of twenty-one (21) communities covering the entire Municipality between December, 2019 and February, 2020 by searching through the communities 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. Larva was collected by the dipping method (Service, 1993; Service, 2012).

METHODS AND MATERIALS

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) method in the morning (8:00am-12:00pm GMT) and in the afternoon (1:00pm-5pm GMT) (Service, 1993; Service, 2012).

However, 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 mosquito genera were characterized as anthropogenic and naturally induced.

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).



Fig. 4: Larval sampling from a barrel – Aedes & Culex

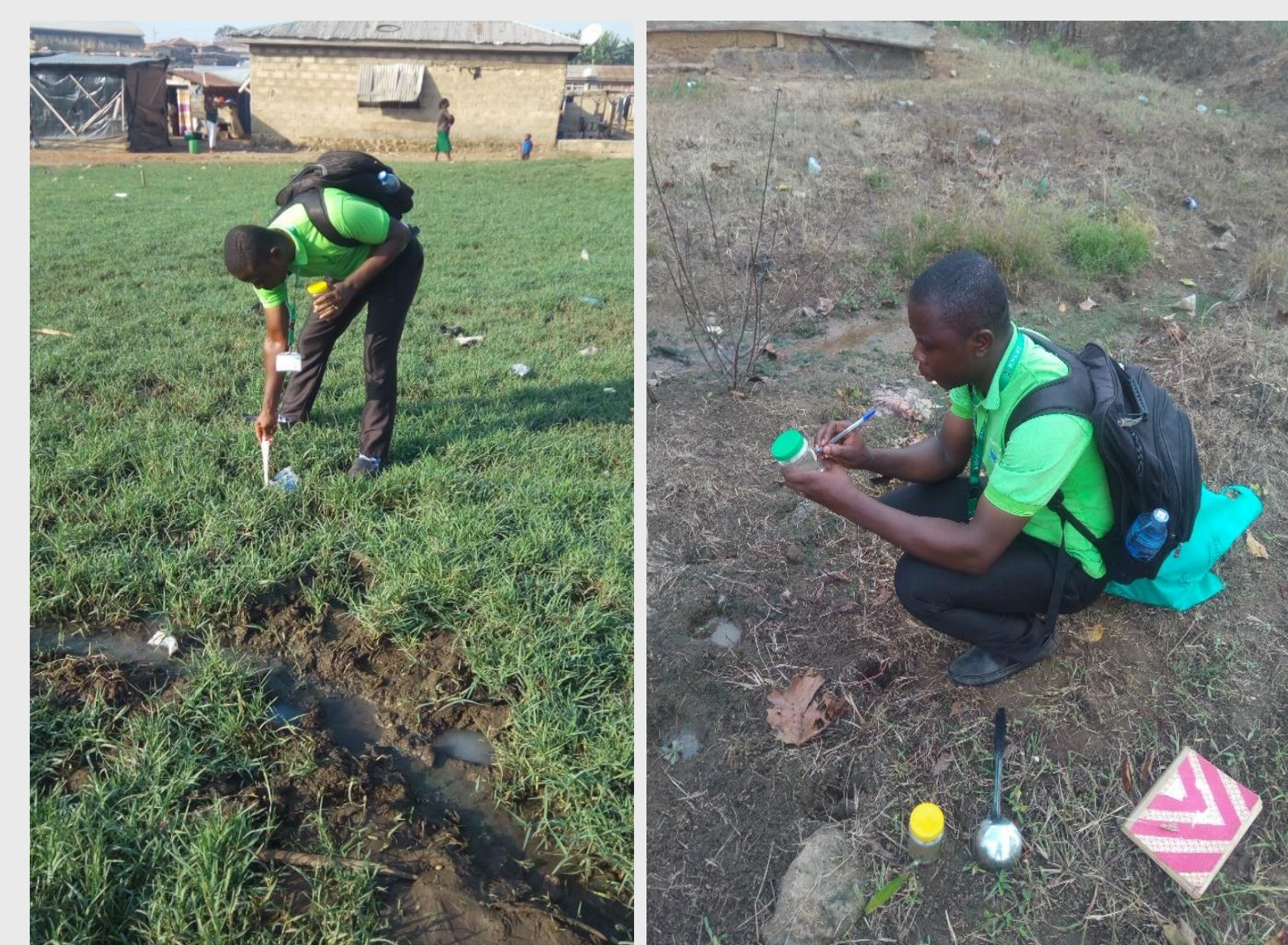


Fig. 5: Larval sampling from wetlands - Anopheles

METHODS AND MATERIALS CONT'D.

For easy identification of samples/specimen on the field, the species of mosquitoes were written on a paper tape and placed on the plastic containers (i.e., *Anopheles* and *Culicine*) at the laboratory before the research 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 (data collection book) from the field (Service, 1993; Service, 2012).



Fig. 6: Larval samples ready for processing in the laboratory



Fig. 7: Larval samples being reared in the laboratory



Fig. 8: Fully grown Anopheles adult mosquitoes' species

RESULTS

28.2% (n=401) of the sites were possible breeding sites of *Anopheles* species, with 174 of the *Anopheles* possible sites positive for *Anopheles* species. 64% (n=111) of the *Anopheles* sites were associated with wetlands. *Aedes* mosquito breeding sites constituted 19.1% (n=272) with majority 65% (n=177) constituting container receptacles and lorry tyres. Of all, 52.6% (n=748) identified as possible breeding sites for *Culex* mosquito species, majority 73.1% (n=547) were anthropogenic induced. 55.6% (n=79) of the breeding sites were associated with wastewaters emanating from bath houses.

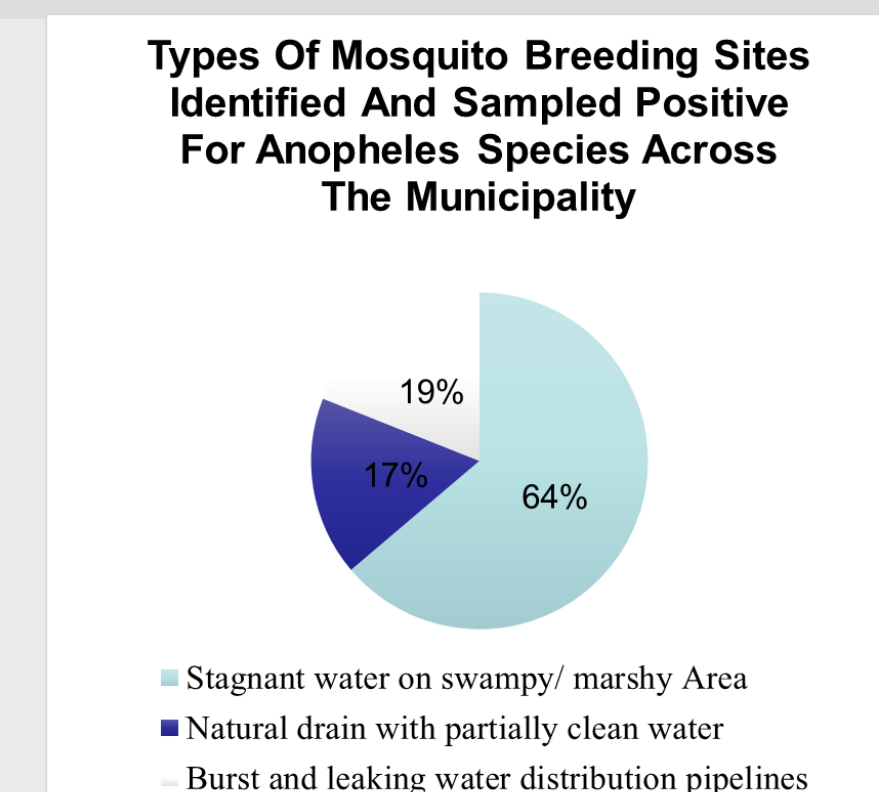


Fig. 9: Types of mosquito breeding sites sampled positive for Anopheles

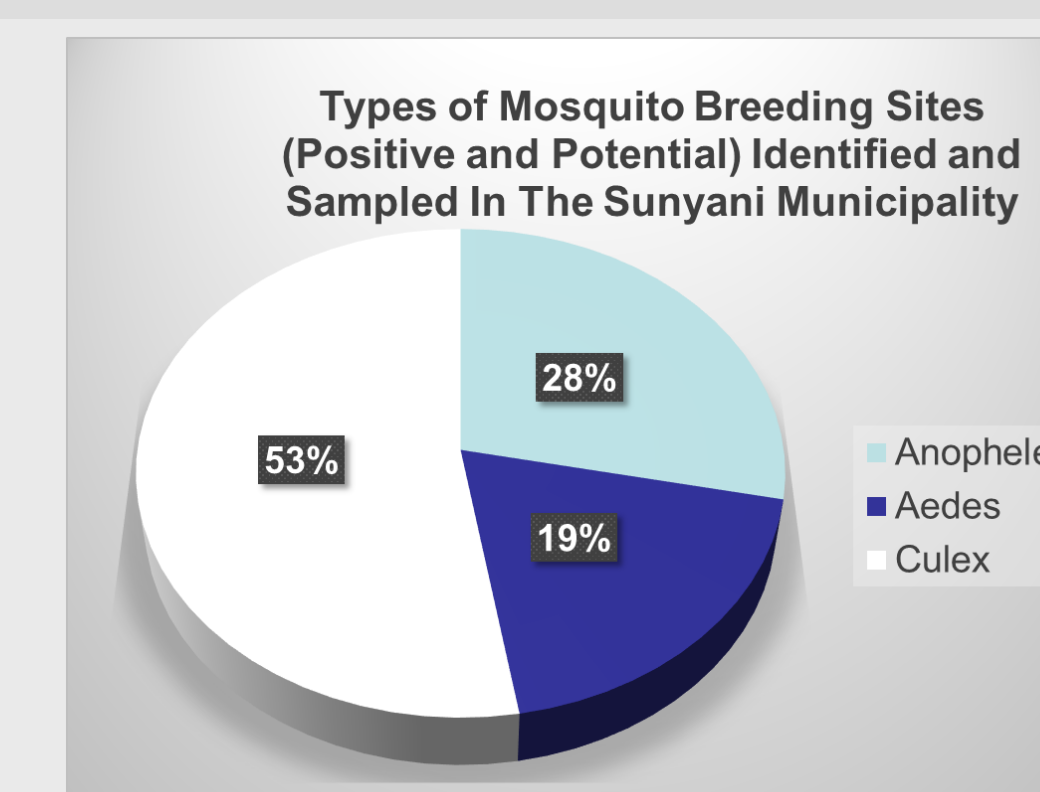


Fig. 10: Positive and potential mosquito breeding sites sampled for all species

RESULTS CONT'D

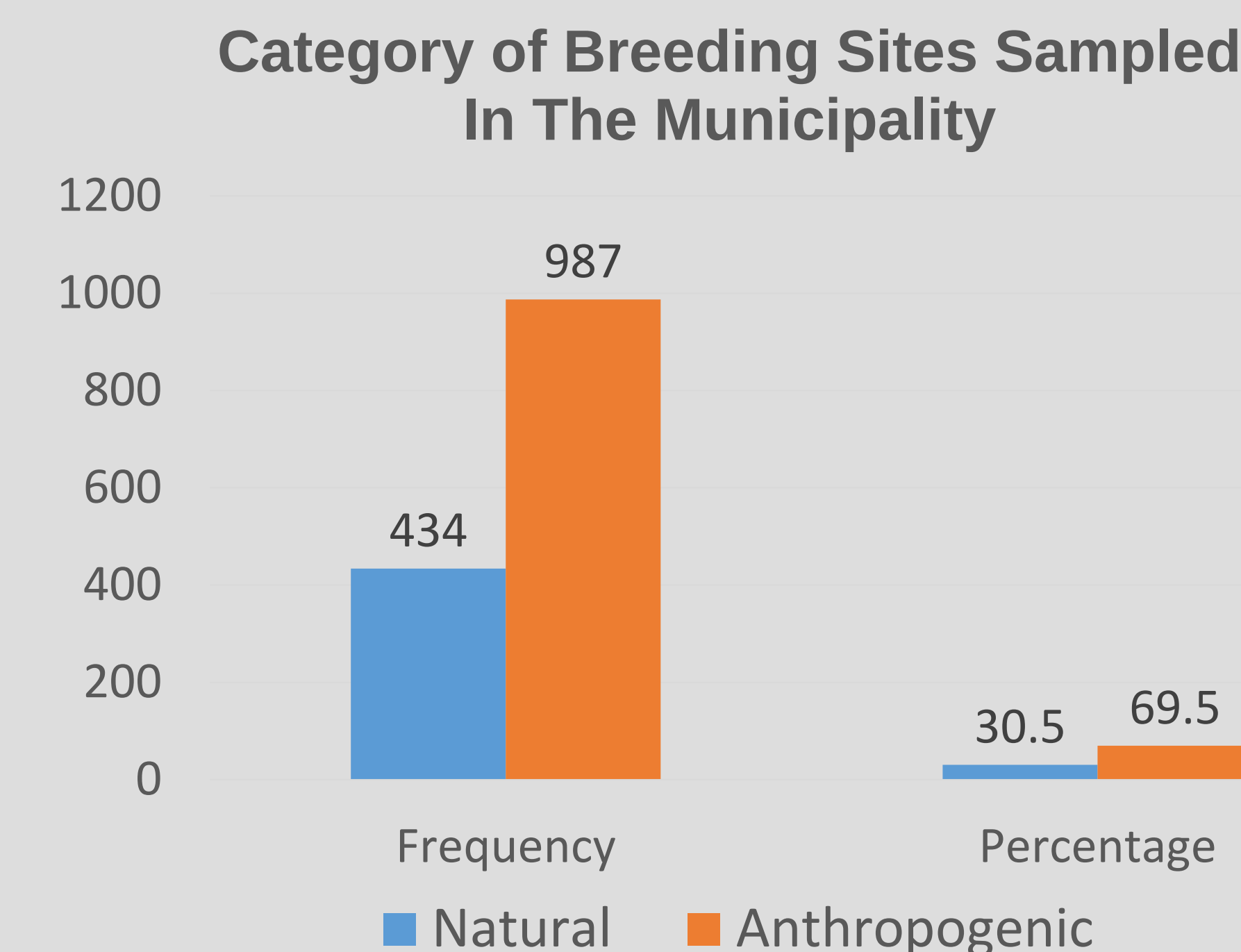
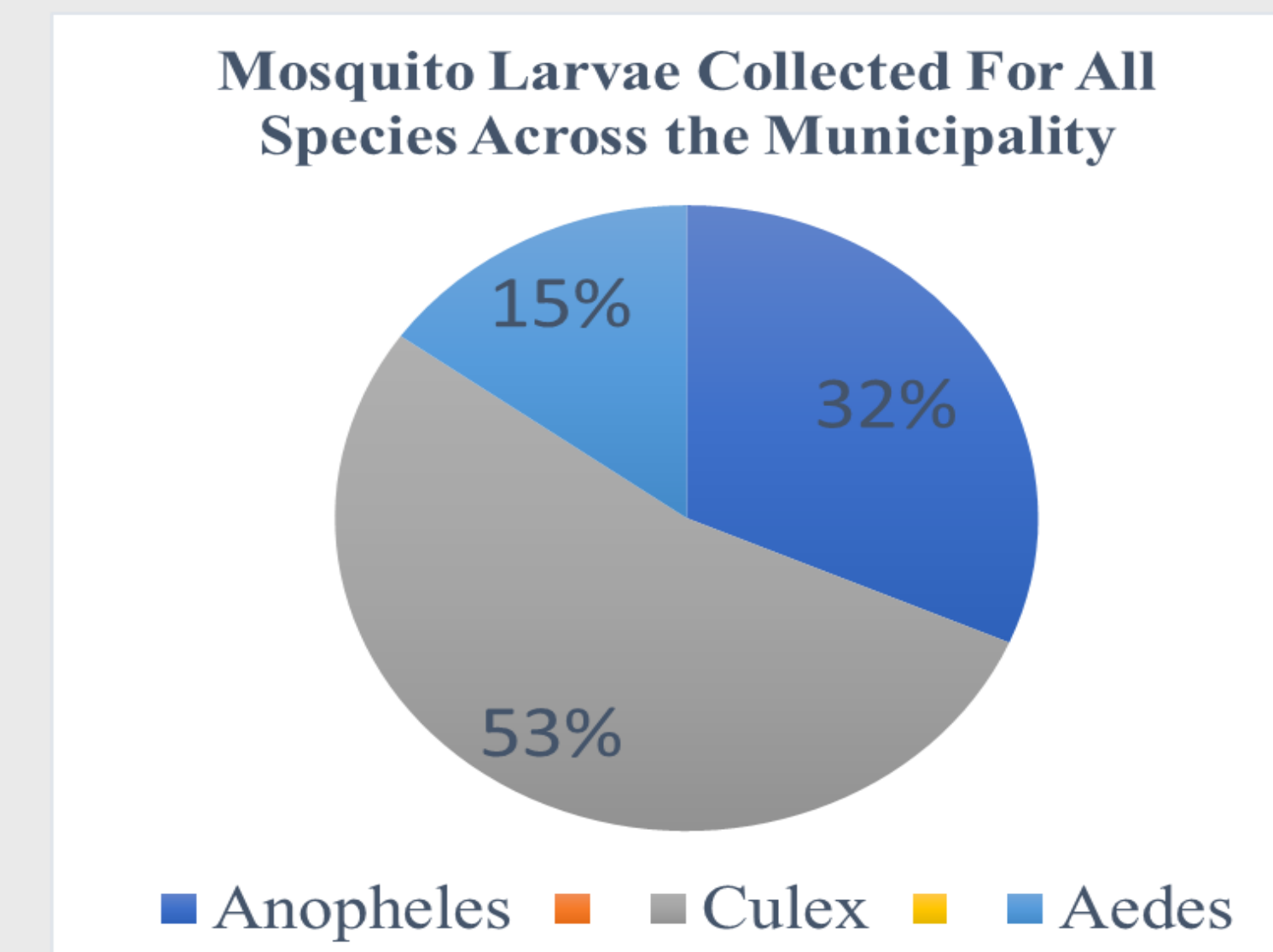


Fig. 11: Category of mosquito breeding sites sampled



CONCLUSIONS

Residents of the Municipality require education on health risk associated with producing mosquito breeding sites. Larva control during the dry season should be considered as an essential aspect of mosquito control in the study area by the National Malaria Elimination Programme (NMEP), Ghana

REFERENCES

- Knight, K. L. and A. Stone. 1977. A catalog of the mosquitoes of the world (Diptera: Culicidae). 2nd edition. Thomas Say Found., Entomol. Sot. Am., vol. 6, xi+ 611
- Service, M. W., 2012. Medical entomology for students. New York. NY: Cambridge University Press, 5th edition.
- Service, M. W., 1993. Mosquito Ecology: Field sampling methods. London: Chapman and Hall. Elsevier Applied Science, 2, p. 988.