



POLICY BRIEF

Covering of domestic water storage containers and old tyres disposal: Control of dengue transmitting aedes mosquito breeding habitats in Tanzania

Key messages

- Between 2014 to 2019, Tanzania experienced two outbreaks of dengue fever in Dar es Salaam and Tanga cities.
- Main vectors of dengue virus are *Aedes aegypti* mosquito which prefers to breed in clean water containers.
- Every two out of five (40%) Tanzanian households require clean water storage containers for domestic use.
- In the rural areas, most of water storage containers were uncovered and out of 30 water storage containers, 23 (77%) contained *Aedes* larvae. In urban area, eight (80%) out of 10 old tyres were found to harbour *Aedes* larvae.
- Covering of domestic storage water containers and old tyres disposal have the potential to reduce breeding sites for dengue fever transmitting *Aedes* mosquito.
- This policy brief recommends the Ministry of Health through the social and behavioural change communication (SBCC) section to sensitize the community to cover domestic water storage containers in rural settings and to provide the roofs on the tyre storage areas to prevent rainwater from entering the tires and become the potential breeding sites for dengue transmitting *Aedes* mosquito in urban settings.

EXECUTIVE SUMMARY

In recent years, Tanzania has experienced outbreaks of dengue fever in major cities of Tanzania where the *Ae. aegypti* mosquito is the reported vector. The control of this mosquito vector is based on insecticide and yet the insecticide susceptibility of this species is not well known in many places in Tanzania. Conversely, the breeding habitats mostly preferred by this species is not well documented. Therefore, the present study aimed to determine the breeding habitats preference of *Aedes aegypti* mosquito in the three sites from three districts of the Lake zone, Tanzania. The *Ae. aegypti* mosquito larvae were collected from different

breeding sites at Bwiru street (Ilemela municipal council), Igekemaja village (Magu district) and Mwagagala (Misungwi district) and brought to the insectary for rearing. Regarding the breeding habitats preference, the *Aedes aegypti* mosquito prefer to breed in abandoned old tires in urban area and in small containers and water storage containers in rural setting. The breeding habitats of *Aedes aegypti* mosquito were abandoned old tires in urban area and in small containers and the uncovered water storage containers in rural setting. These findings, call for community education on proper storage of domestic water which will not favour this mosquito to breed.

BACKGROUND

Dengue virus is transmitted from one person to another through bites of *A. aegypti* mosquito (Ritchie, 2014). Dengue is a global epidemic whereby large population lives in countries endemic for the disease (Kraemer *et al.*, 2019).

Dengue has occurred in 195 countries globally between 1990 and 2017 (Zeng *et al.*, 2021). The incidence of the disease has increased in Africa since the 1980's, with many cases occurring in East African countries (Vairo *et al.*, 2012, 2016). Between 2014

and 2019, Tanzania has experienced two outbreaks of dengue fever in Dar es Salaam and Tanga cities (Mboera *et al.*, 2016; Vairo *et al.*, 2016). Uncovered water storage containers and old abandoned tyres are shown to be breeding grounds for *Aedes* mosquito thus contribute to the spread of dengue disease (Mboera *et al.*, 2016; Vairo *et al.*, 2016). Control of this mosquito has been based on insecticides targeting the adult stage of the mosquito and bio-larvicides targeting larval stage. Low access to tap water within communities has led people to store water in containers for domestic purposes. Communities should be mobilized to cover water containers at home and destroy breeding grounds of this mosquitoes. The mechanisms of repurposing the old tyres should be implemented as well as roofing of places where old tires are stored need to be strengthened. Previous studies in Northern Tanzania reported the presence of dengue with a seroprevalence

of 24% but such information is missing in other parts of the country where *Aedes* mosquitos are present (Kajeguka *et al.*, 2016).

A cross-sectional study was conducted between Mar-Nov 2021 by a team of researcher from the National Institute for Medical Research (NIMR), Mwanza centre. The study was conducted in three districts namely, Magu, Ilemela and Misungwi in Mwanza region. The two sites in rural area were Igekemaja and Mwagagala villages in Magu and Misungwi districts, respectively. An urban area was Bwiru in Ilemela municipal council.

Standard dippers and pipettes were used to collect *Aedes* larvae from breeding sites around. All breeding sites encountered were recorded. The breeding sites which contained larvae were recorded and larvae from each dipper were countered. Majority of the breeding habitats of *A. aegypti* mosquito were uncovered water storage containers in the rural settings

and old tires in urban areas. Out of 10 old tyres found in urban area, 8 (80%) had larvae. In the rural areas, 23 (77%) out of 30 domestic water storage containers contained *Aedes* larvae (Figure 2 & 3).



Figure 1: *Ae. aegypti* breeding sites in rural settings.



Figure 2: *Ae. aegypti* breeding sites in urban settings.

Policy Options

Uncovered water storage containers and old abandoned tyres are shown to be breeding grounds for *Aedes* mosquito thus contribute to the spread of

dengue disease. Therefore, to avoid this, we propose.

- i. Ministry of Health through the social and behavioural change communication (SBCC) section to sensitize the community to cover domestic water storage containers.
- ii. Ministry of Health through the social and behavioural change communication (SBCC) section to sensitize the community to provide roofing to the tire storage areas, to prevent rainwater from entering the tires and become the potential breeding sites for dengue transmitting *Aedes* mosquito.

Implementation Considerations

- The Ministry of Health through the social and behavioural change communication (SBCC) section must sensitize the community to cover water containers and

roofing the tire storage area, to prevent rainwater from entering the tires and become the potential breeding sites for dengue transmitting *Aedes* mosquito.

Competing interest

The author declares that no competing interests exists.

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Key references

Kajeguka, D. *et al.* (2016) 'Prevalence of Dengue and Chikungunya virus infections 1 in north-eastern Tanzania: 2 a cross sectional study among participants presenting with malaria-like symptoms', *BMC Infectious Diseases*, 16(183), pp. 1–19.

Kraemer, M.U.G. *et al.* (2019) 'Past and future spread of the arbovirus vectors *Aedes aegypti* and *Aedes albopictus*', *Nature Microbiology*, 4(5), pp. 854–863. Available at: <https://doi.org/10.1038/s41564-019-0376-y>.

Mboera, L.E.G. *et al.* (2016) 'The Risk of Dengue Virus Transmission in Dar es Salaam, Tanzania during an Epidemic Period of 2014', *PLoS Neglected Tropical Diseases*, 10(1), pp. 1–15.

Ritchie, S.A. (2014) 'Dengue vector bionomics: Why *aedes aegypti* is such a good vector', *Dengue and Dengue Hemorrhagic Fever: Second Edition*, (1999), pp. 455–480. Available at: <https://doi.org/10.1079/9781845939649.0455>.

Vairo, F. *et al.* (2012) 'Seroprevalence of dengue infection: A cross-sectional survey in mainland Tanzania and on Pemba Island, Zanzibar', *International Journal of Infectious Diseases*, 16(1), pp. 2011–2013.

Vairo, F. *et al.* (2016) 'Clinical, virologic, and epidemiologic characteristics of dengue outbreak, Dar es Salaam, Tanzania, 2014', *Emerging Infectious Diseases*, 22(5), pp. 895–899.

Zeng, Z. *et al.* (2021) 'Global, regional, and national dengue burden from 1990 to 2017: A systematic analysis based on the global burden of disease study 2017', *EClinicalMedicine*, 32, p. 100712. Available at: <https://doi.org/10.1016/j.eclinm.2020.100712>.

Glossary

SBCC Social and Behavioural Change Communication
NIMR National Institute for Medical Research

About the Institute

The National Institute for Medical Research is a public health research institution established by the Act of Parliament No. 23 of 1979 with the mandate to carry out, co-ordinate, monitor and control health research in the United Republic of Tanzania.

