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Determinants of the spread of Dengue in Tripura - A case study of the Gomati District

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Abstract: *Sudden increase in Dengue cases was reported in a few rural pockets of Gomati district in Tripura, a north eastern state of India in the month of November, 2021. Tulsirampara, Twibaglai and Molsompara were reported to be the affected pockets under Atharobola block of Gomati district in Tripura state. An entomological survey was conducted to identify the reasons of the sudden upsurge of dengue cases. Larval indices calculated were above the alarming level which indicates a high risk of transmission. In those areas water sources were found to be far away from the living places of the local dwellers and the local people were found to store water in some self-innovated containers which was one of the reasons of huge mosquito breeding.*

Key Words: *dengue, vector-borne disease, breeding source, container.*

1. INTRODUCTION:

Dengue is recognized as a major health issue in large urban tropical cities but is also observed in rural areas [11]. The burden of rural dengue is increasing [12] and may even exceed that of urban areas [13]. The transmission dynamics of dengue in rural areas depend on the physical environment of the locality which provides different habitats for *Aedes*, the main vector of dengue [14]. In Tripura, dengue has spread more in rural areas, especially in tribal pockets. Tripura is a landlocked small hilly state in the north-eastern part of India with tropical weather [1]. A major portion of the tribal population in the state resides in the hilly and rural areas. They live in and around forests and hills and are greatly dependent on nature. They cultivate using a traditional method named 'jhum' [1]. Some of them shifted themselves to rubber plantations and many of them have piggeries at their home. The topology of their living areas is ideal for vectors for which they are affected by vector-borne disease like dengue and malaria.

2. STUDY AREA:

Clustering of the dengue cases was recorded in Tulsirampara, Twibaglai, and Molsompara of Gomati District in Tripura state, and hence these were chosen to be the study site.

3. METHODOLOGY:

Larvae were collected by dipping and adults were collected by the aspirator. Larval survey and entomological indices, viz. House Index (HI), Container Index (CI) and Breteau Index (BI) were calculated to make out the risk level.

4. RESULTS:

Larvae were collected from both natural and artificial containers.

(a) Natural Containers: Leaf axils of Arum and pineapple, cut end of the bamboo.
(b) Artificial container: Metallic container, plastic container, earthen pot, tyre, plastic water container, cement tank, plastic drum, glass bottles (fig - a).

Water scarcity is a common problem in the rural pockets of Tripura. Therefore, people need to store water for their daily purposes and adopt some self-innovative ideas to store water -

i. In some villages people make a hole in the plastic water container through which they insert a plastic pipe to fill up the tank and leave it open after use while the tank is covered with a lid (fig-b). Mosquito enters through this hole and breeds in the tank. Larvae were collected from these tanks.

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ii. Two unusual containers *viz*. plastic-coated bamboo cane drums (c) and soil embedded plastic-coated water reservoir (d) are two unusual containers that hold a huge no of *Aedes* mosquitoes. People store water in these containers which are economic and serve their purpose also.

Unusual breeding sites

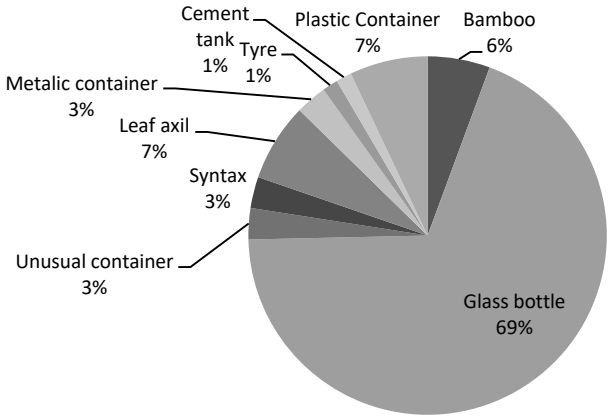
(a) Glass bottle

(b) Hole for inserting pipe

(c) Plastic coated bamboo cane drum

(d) Plastic coated soil embedded water reservoir

Distribution of breeding sources recorded during survey



From the figure, it is clear that only 12.7% of natural containers are contributing to the breeding of mosquitoes in the surveyed areas and the rest 87.3% are artificial sources contributing to mosquito breeding. The distribution of breeding habitats is given in the figure. From the figure, it is apparent that glass bottles and plastic containers were the most preferred breeding sites for mosquitoes.

Toral 39 houses were searched in Tulsirampara, Molsompara, and Twibaglai, 15 houses were found infested with larvae of *Aedes* mosquitoes. There were 155 water-holding containers, out of which 41 containers were positive for *Aedes* mosquitoes. House Index (HI): was high. In Twibaglai BI is very high. The BI of 41containers, which establishes a direct relationship between positive containers and houses, indicates a high transmission potential for dengue. Adults emerged from the larvae were *Aedes albopictus*.

Table 1: Computed larval indices of *Aedes albopictus* as observed in the surveyed areas

Study area	Total houses searched	House Index (HI)		Container Index (CI)			Breateau Index (BI)
		+ve	Index (%)	Wet Container searched	+ve	Index (%)	

Tulsirampara	15	5	33.33	34	8	23.53	53.3
Molsompara	14	6	42.86	23	5	21.74	35.7
Twibaglai	10	4	40.00	98	28	28.57	280.0

5. DISCUSSION:

The common breeding habitats observed in the study area were soil-embedded plastic-coated reservoirs, plastic-coated bamboo cane drums, glass bottles, and leaf axils. The majority of the residents of Atharobola block store supply and rainwater in containers for domestic use. Shortage of water and preference of rainwater for daily purposes storing supply and rainwater is a common practice in these areas for a long duration and these containers contributed to the major mosquito breeding sources [2]. Containers that retained water for long periods of time make good or suitable breeding habitats for mosquitoes such as artificial containers [3, 4]. *Ae. albopictus* mosquitoes breeds in the area with high vegetation cover [5]. The artificial containers were abundantly located close to human habitation and were more durable than natural containers [6]. The types of containers, water quality, and conditions of water containers are important for breeding [7]. For the control of container breeding mosquitoes, it is possible to use different methods in integration and these include covering water-holding containers [5, 8], using appropriate biological control agents [5], public health education [2, 3, 9] creating knowledge and awareness of the residents on mosquito-borne diseases [9], eliminating water-filled unused containers [2,3]. However, targeting specific types of water-holding containers would enable a more focused approach to vector control than attempting to eliminate all water-holding containers [10].

6. CONCLUSION:

In the study area, the community store water in different containers for a long period of time for domestic use. In addition to domestic containers, different discarded containers and tires hold rainwater for a long period of time. Results also showed that the study area carries a high potential for dengue outbreaks. Since dengue control in these villages of Gomati District is community-based, there is an urgent need (i) to strengthen the health infrastructure, (ii) for advocacy to sensitize local populations; and (iii) coordination with panchyaet bodies to improve water storage and management of solid waste disposal.

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