

## Research Note

# Dengue, an emerging arboviral infection in Assam, northeast India

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**Abstract.** Dengue is emerging as major public health concern in northeast India and spreading with increased morbidity. Most cases were recorded in Guwahati metropolitan city of the state of Assam during post-monsoon months (September- December). These comprised all age groups of both sexes with significantly higher incidence of cases in adult males aged 26–60 years.

The global incidence of dengue is reportedly increasing with >2.5 billion people living at risk mostly in urban and sub-urban areas of tropical and sub-tropical countries with estimated 50–100 million cases annually (WHO, 2014). In India, dengue is endemic with history of disease outbreaks in big metropolitan cities and spreading on account of increased urbanization, deforestation, rapid population movement/increased air connectivity establishing foothold in areas hitherto free from the disease. As per national records there has been steady increase in cases every passing year with total confirmed cases of 75,454 in 2013 (Gupta *et al.*, 2012; India, NVBDCP, 2014; Cecilia, 2014).

In northeast India ( $22^{\circ}4'–29^{\circ}31'N$  lat;  $89^{\circ}48'–97^{\circ}25'E$  long), it was in 2010 that for the first time, 237 dengue cases and 2 deaths confirmed to be due to dengue infection were recorded in Assam state. In the following years (except in 2011) there was manifold increase with 1,058 (5 deaths) and 4,526 (2 deaths) confirmed cases in 2012 and 2013

respectively (Table 1). For each year, of the total confirmed cases, majority (69%–91%) were recorded in Guwahati ( $26^{\circ}11' 10''N$ ,  $91^{\circ}45' 3''E$ ), the capital city of Assam (Figure 1). It is the largest and fast growing metropolis (pop. 1.5 million, area 264 sq. km) and gateway for economic activities to northeast India. Over the past decade there have been massive developmental activities, population movement and increased air connectivity between Guwahati and other big metropolitan cities (reporting high rise in cases in corresponding years) resulting in increased receptivity for mosquito breeding and possible importation and spread of dengue virus through human host in the region.

Ever since 2010, patients assessed clinically to be dengue infection characterized by high fever, severe headache, muscle and joint pain, nausea, abdominal pain, respiratory distress, skin rashes and bleeding manifestations etc were subjected to dengue confirmatory test in the state

Table 1. Morbidity due to dengue in Assam, Northeast India\*

Year	No. of clinical cases	Dengue +ve cases (%)			No. of death cases
		NS1 Antigen +ve	IgM Mac Elisa +ve	Total (%)	
2010	524	237	0	237 (45)	2
2011	87	0	0	0	0
2012	1729	296	762	1058 (61)	5
2013	11969	4181	345	4526 (37)	2

\* Source: State Health Directorate of Assam, India



Figure 1. Map of India showing geographical location of Guwahati city (denoted by black dot) in northeast region of India.

sentinel sites established in the medical colleges and district civil hospitals with tertiary care facilities. The confirmation of dengue infection was reached by using NS1 (non-structural protein 1) antigen detection rapid test kit and/or IgM antibody-capture

enzyme-linked immunosorbent assay (MAC-ELISA) in human serum/plasma. During 2010-2013, combined test results employing NS1 antigen detection and/ or MAC-ELISA technique revealed infection rate that ranged from 37%-61% of the subjects screened for

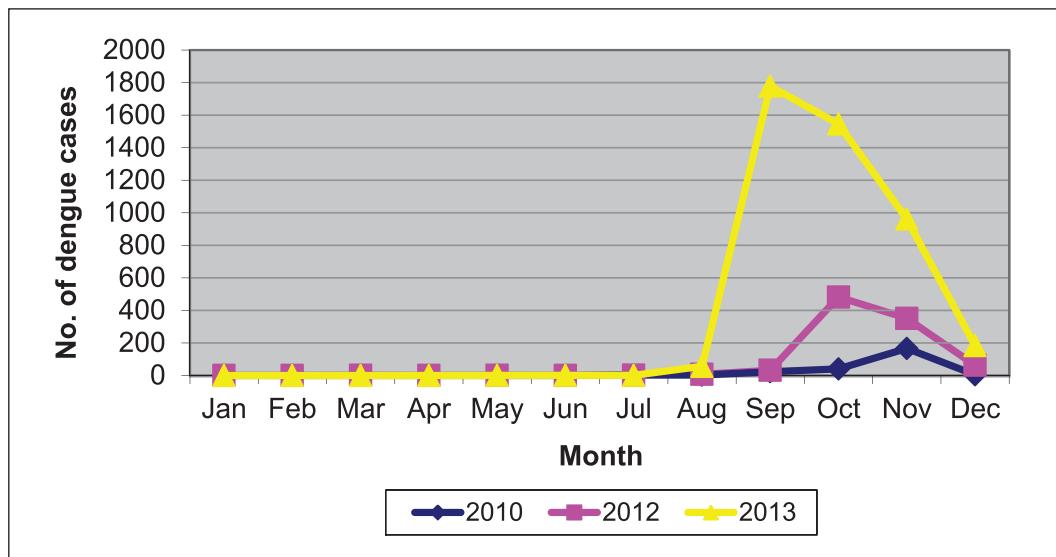


Figure 2. Monthly distribution of dengue cases and transmission trends in Assam, Northeast India.

Table 2. Distribution of dengue cases by age and gender in Assam, Northeast India for data based on 2013\*

Age group in years	Males	Females	Total cases
≤14	229	167	396
15 – 25	924	504	1428
26-60	1611	929	2540
>60	97	65	162
Total	2861	1665	4526

\*Source: State Health Directorate of Assam, India

circulating dengue virus (Table 1). The actual disease burden is estimated to be higher for many cases diagnosed and treated in the private/public sector establishments not included in the state surveillance. Seasonally dengue started appearing at the beginning of March with the onset of pre-monsoon showers but cases were few and far up until July/August (months of heavy rainfall), and majority of cases and reported deaths were recorded in post-monsoon season during September–December (Figure 2). These comprised all age groups of both sexes with significantly higher incidence of cases in adult males aged 26–60 years (Table 2). The disease is currently spreading to semi-urban areas of other districts of Assam and adjoining

states of northeast supported by serological evidence for circulating dengue virus serotypes (Khan *et al.*, 2013; Dutta & Mahanta, 2006).

Both *Aedes aegypti* and *Ae. albopictus*, the implicated disease vectors are reportedly prevalent breeding in variety of resources (Dev *et al.*, 2014). *Aedes aegypti*, however, was the most common species in city premises predominantly breeding in discarded tyre dumps. *Ae. albopictus* instead was the common mosquito species in suburbs breeding preferably in tin/plastic containers, flower vases, cut-bamboo stumps etc. Given the reported seasonal abundance of disease vectors and case incidence in city areas, *Ae. aegypti* is held the most probable

mosquito vector transmitting dengue virus (Dev *et al.*, 2014), and recently has been incriminated for circulating dengue virus 2 serotype (P. Dutta, personal communication). *Aedes aegypti* is invading suburbs and other town areas in the state competitively displacing *Ae. albopictus* populations evidenced by relatively higher relative abundance in tyres both in urban and suburban areas (Dev *et al.*, 2014). With the available data for prevalence of disease vectors and case incidences, there is a strong possibility of local transmission happening evidenced by listing of cases without any travel history.

With the continued phenomenon of urbanization, and prevailing climatic conditions of high humidity, extended monsoons (April–September), and increasing distribution range of *Ae. aegypti*, it is projected that dengue will emerge as a major public health concern in northeast India. Since there is no vaccine and active surveillance at present, the state control program has embarked on intensive health awareness campaign for enhanced community level action for prevention and control of mosquito breeding in collaboration with the local civic bodies. Other intervention measures included malathion thermal fogging operations, source reduction and promoting personal protection measures to contain the spread of the disease. For strengthening healthcare services and targeting interventions, there remains scope for instituting active surveillance and research on vector incrimination, seasonal infectivity, co-circulation and concurrent infection of dengue virus serotypes and Chikungunya virus helping the control program in formulating appropriate policy in time and place to avert disease outbreaks (Dutta *et al.*, 2011).

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