

# A Brief Scenario on the Emergence and Occurrence of Dengue Fever in the Slum Dwelling Areas of Kolkata, West Bengal

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**Abstract:** *Dengue Fever is one of the most common mosquito-borne diseases caused by dengue virus. The disease is spread through the bite of the infected female Aedes aegypti and Aedes albopictus species of mosquito. These mosquitoes are usually found between 35°N-35°S latitude below 1,000 meters altitude. 18 states of India has been enlisted for endemic Dengue outbreak by the National Vector Borne Diseases Control Programme (NVBDCP), West Bengal being the state severely affected by the disease every year. . In Kolkata, dengue was first documented in 1824. According to the NVBDCP, West Bengal has 3306 confirmed dengue cases in 2012, nearly 2000 cases from the Kolkata Metropolitan Corporation areas. In recent years the disease has affected the city dwellers during monsoon and post-monsoon season with the disease incidences reaching its peak during September and October due to the scarce urban amenities including unhygienic environments of living, open drains, water logging during monsoon season, seasonal rainfall and lack of proper sanitary conditions. In 2003-2004 and 2005 NVBDCP initiated an integrated programme with other health programmes under National Rural Health Mission to control the outbreak, spread and death incidences from the disease, free treatment and blood test health camps, awareness campaigns in slum households to educate people about the disease, create public hoardings and banners across the roads, cleanliness programmes in slum areas by draining out storm water and spraying pesticides to apprehend the outbreak and spread of the disease.*

**Keywords:** Kolkata, mosquito, dengue fever, epidemic

## 1. Introduction

### 1.1. History and Etymology

Dengue is derived from the Swahili phrase "Ka-dingapepo", meaning "cramp-like seizure caused by an evil spirit". "Dinga" might possibly have originated from the Spanish word "dengue" meaning fastidious or careful, describing the posture of a person suffering joint pain of dengue fever. In the eighteenth century slaves of West Indies who got infected with dengue were said to have the posture and gait of a dandy, and the disease was also known as "Dandy Fever", Saha et al.[1].

### 1.2. Distribution and Epidemiology

The first record of dengue fever is mentioned in a Chinese medical encyclopedia from the Jin Dynasty, a "water poison" associated with flying insects, Nobuchi[2]. The first recognized occurrence of Dengue was in the 1780s from Asia, Africa, and North America. The first confirmed case report in 1789 by Benjamin Rush, who coined the term "break bone fever" because it showed symptoms of myalgia and arthralgia. The viral etiology and the transmission by mosquitoes were revealed in the 20th century with World War II spreading the disease globally. The first epidemic of the disease was reported in 1953 from Manila, Southeast Asia, spreading disease transmittance for centuries and by the late 1990s, dengue was the most important mosquito-borne disease affecting humans after malaria, with around 40 million cases of dengue fever and several hundred thousand cases of dengue hemorrhagic fever each year. Initially the outbreaks were confined to urban areas but rapidly became an epidemic in suburban and rural regions of Asia and South

America. Dengue fever spread from Southeast Asia into surrounding subtropical and tropical Asian countries of China and Taiwan, the Indian subcontinent and Sri Lanka, up to islands of Malaysia, Philippines, New Guinea, northeastern Australia, and Pacific islands of Tahiti, Palau, Tonga, and the Cook Islands, reaching hyper endemic transmission in Vietnam, Thailand, Indonesia, Pakistan, India, Malaysia, the Philippines and still continuing to extend its range, Gubler[3]. The first outbreak of Dengue fever in India was in 1780 from Chennai, Carey et al.[4]. In 1996, the disease became an epidemic in areas around Delhi and Lucknow, Balaya et al.[5]. 18 states of India has been enlisted for endemic Dengue outbreak by the National Vector Borne Diseases Control Programme (NVBDCP), West Bengal being the state severely affected by the disease every year, National Vector Borne Disease Control Programme[6].

### 1.3 Transmission and Economic Importance

Dengue Fever is one of the most common mosquito-borne diseases caused by dengue virus belonging to the family of Flaviviridae comprising four serotypes- DENV-1, DENV-2, DENV-3 and DENV-4. The disease is spread through the bite of the infected female *Aedes aegypti* and *Aedes albopictus* species of mosquito. These mosquitoes are usually found between 35°N-35°S latitude below 1,000 meters altitude. The Dengue virus has been subdivided into four subtypes, namely DV-1, DV-2, DV-3 and DV-4, Gubler[3]. The WHO[7] classified dengue fever as undifferentiated fever, dengue fever (DF) and dengue hemorrhagic fever (DHF).

In the last decade, dengue outbreaks and deaths have been reported from northern states of Haryana, Punjab and Uttar Pradesh, southern states of Andhra Pradesh, Tamil Nadu and Karnataka, western states of Gujarat and Rajasthan; and eastern state of West Bengal, Sharma et al.[8].

Dengue virus was first isolated in Kolkata in 1944 from the serum of US soldiers, Sabin and Schlesinger,[9]. In the late 1990's, the dengue fever as an epidemic was first recorded in the rural areas of West Bengal. In Kolkata, dengue was first documented in 1824, since then several epidemics occurred in Kolkata in 1836, 1906, 1911, 1923 and 2005. During 2005-07, the percentage of dengue fever cases was highest in Kolkata (63.76%) and least in Jalpaiguri (0.02%). The total cases detected as dengue from August-November, 2005 by the Government of West Bengal were 6,293 and the total deaths were 34, Haiti[10]. According to the National Vector Borne Diseases Control Programme (NVBDCP), the number of DF cases in India has accelerated steadily, from 3306 in 2001 to 50222 in 2012; deaths have risen from 53 in 2001 to 242 in 2012. In West Bengal, 3306 confirmed dengue cases were reported in 2012, nearly 2000 cases from the Kolkata Metropolitan Corporation areas, Bandhyopadhyay et al.[11] (Figure 1 & 2).

#### 1.4. Pathogenicity and Control measures

Dengue is an acute mosquito transmitted disease, characterized by high fever (103-106°F), severe headache, muscle and joint pain, pain behind eyes, rashes, abdominal pain, nausea and vomiting (Ministry of Health and Family Welfare, Government of India, 2008).

There is no definite antiviral treatment for this disease. General preventions include controlling fever and pain with paracetamol and increasing fluid intake. There is also no vaccine to prevent human infection by this virus. Personal protection and the environmental management of mosquitoes are important in preventing illness. Preventing or reducing dengue virus transmission depends entirely in controlling the mosquito vectors or interruption over human-vector contact. The WHO[7] upholds an eccentric strategic approach known as Integrated Vector Management (IVM) to control mosquito vectors. Transmission control targets *Ae. aegypti* in its immature and adult stages in the household and immediate vicinity. Clothing that reduces skin exposure during daylight hours when mosquitoes are most active provides some protection from the bites of mosquitoes. Repellents may be applied to exposed skin or to clothing. Insecticide-treated mosquito nets are a good protection, household insecticide aerosol products, mosquito coils or other insecticide vaporizers may also reduce biting activity. Household fixtures such as window, door screens and air-conditioning can also reduce biting. Use of pesticides are noxious to some extent. WHO Pesticide Evaluation Scheme (WHOPES) has published specific guidelines on use of insecticides, safety measures and quality control.

## 2. Results & Discussion

Kolkata has a long history of DF outbreak among all districts of West Bengal (Figure 3). Serological surveys conducted in 1960 and re-survey in 1966 showed a high

endemicity of dengue in Kolkata, Chatterjee et al.[12]. Though the first case of DF was documented in 1824, DHF was first reported in the city during 1963-65. In recent years the disease has affected the city dwellers during monsoon and post-monsoon season with the disease incidences reaching its peak during September and October. In 1983-84 the incidence of DF involved mostly children and young adults. In 1990, the child population from the central, north-eastern and southern parts of the city was found to be suffering from acute form of the disease. The survey conducted in the Government run health institutions have revealed that the maximum patients are from neighboring states of Bihar, Jharkhand and Assam with huge number from surrounding districts of North 24 Parganas, South 24 Parganas, Haora, Purba Medinipur, Paschim Medinipur and from the city as well, Dawn[13]. The incidences of DF are high in case of slum dwellers in comparison to non-slum communities in the city, which might be due to the socio-economic and living conditions of the slum families, Biswas et al.[14]. The scarce urban amenities which include unhygienic environments of living, open drains, water logging during monsoon season and seasonal rainfall and lack of proper sanitary conditions. Their condition is even more worsened by poverty, illiteracy, low level of awareness and inability of the health workers to reach for help. Kolkata Municipal Corporation area showed frequent occurrence of Dengue and Dengue haemorrhagic fever which were 4006 in 2005, Dawn[13]. National Vector Borne Disease Control Programme started in the year 2003-2004 and in 2005 the programme was integrated with other health programmes under National Rural Health Mission. To control the outbreak, spread and death incidences from the disease the State Government has taken a number of initiatives especially in the slum areas of the city. Local clinics and blood testing health camps are run providing with ward health units for every municipal ward. Government health workers visit the slum households to create awareness among the people about the disease. Public hoardings and banners are put up at various public places and road-sides. The Government has also arranged for free treatment and blood tests of suspected dengue patients for below poverty line group of population in Government run hospitals. Proper cleaning of slum areas by draining out storm water and spraying pesticides are other noteworthy initiatives undertaken to apprehend the outbreak and spread of the disease, Halder et al.[15].

## 3. Conclusion

In the present day Dengue fever is a cause of major concern in West Bengal as well as in Kolkata. The nuisance and outbreaks of this vector borne disease continues to increase every year with Kolkata at its prime focus. Community participation is required at grass root level both in urban and rural areas of the state to combat the situation. Mass awareness should be created at a higher level for the slum dwellers and BPL (Below Poverty Line) group of population by the Government and Non-Government Organizations. The health care facilities provided at the health units should be improved in terms of infrastructure and obtainability of skilled health recruits. Methods of draining out of storm water should be a rapid process to control its outbreak in the

urban slums. It is better to change water of buckets everyday reducing the scope of mosquito reproduction. Entomological surveys should be carried out at regular interval to increase vigilance and fight the epidemic of dengue fever.

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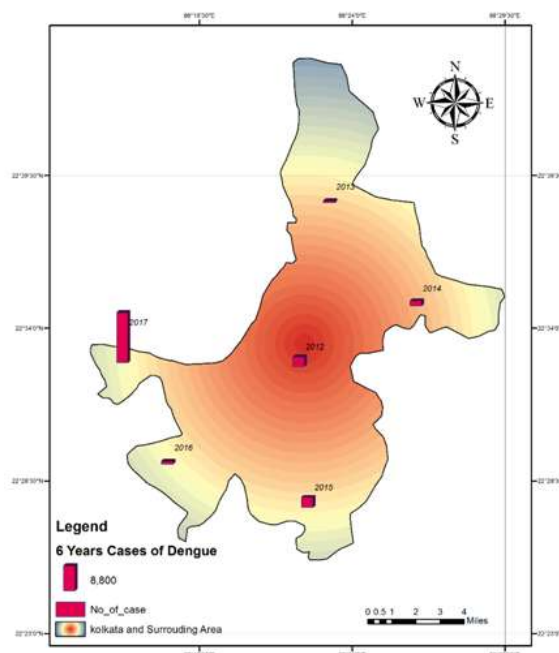
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**Figure 1:** Map showing the number of DF outbreak cases in the slums and surrounding areas of Kolkata for the past six years (2012-2017) based on literature reviews.

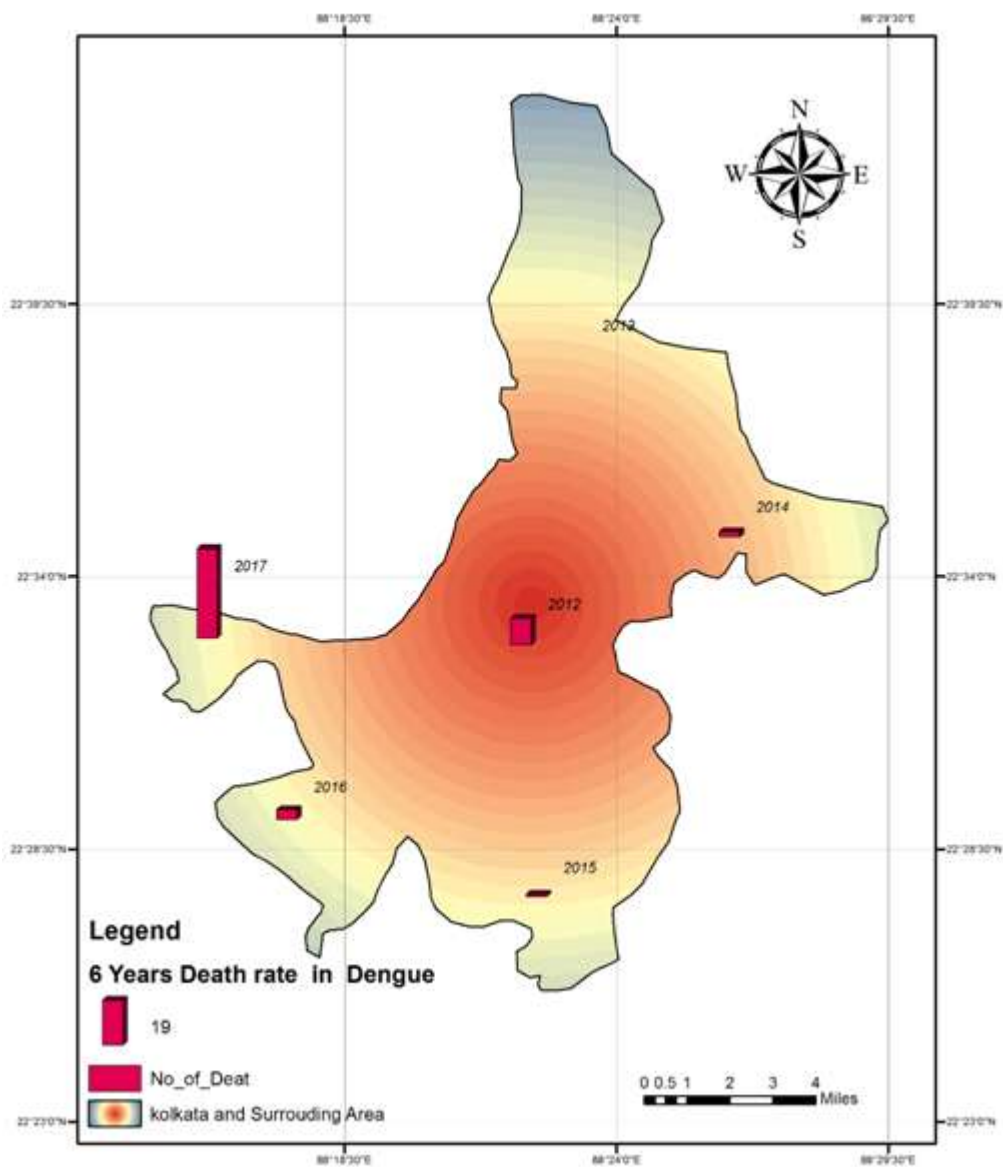
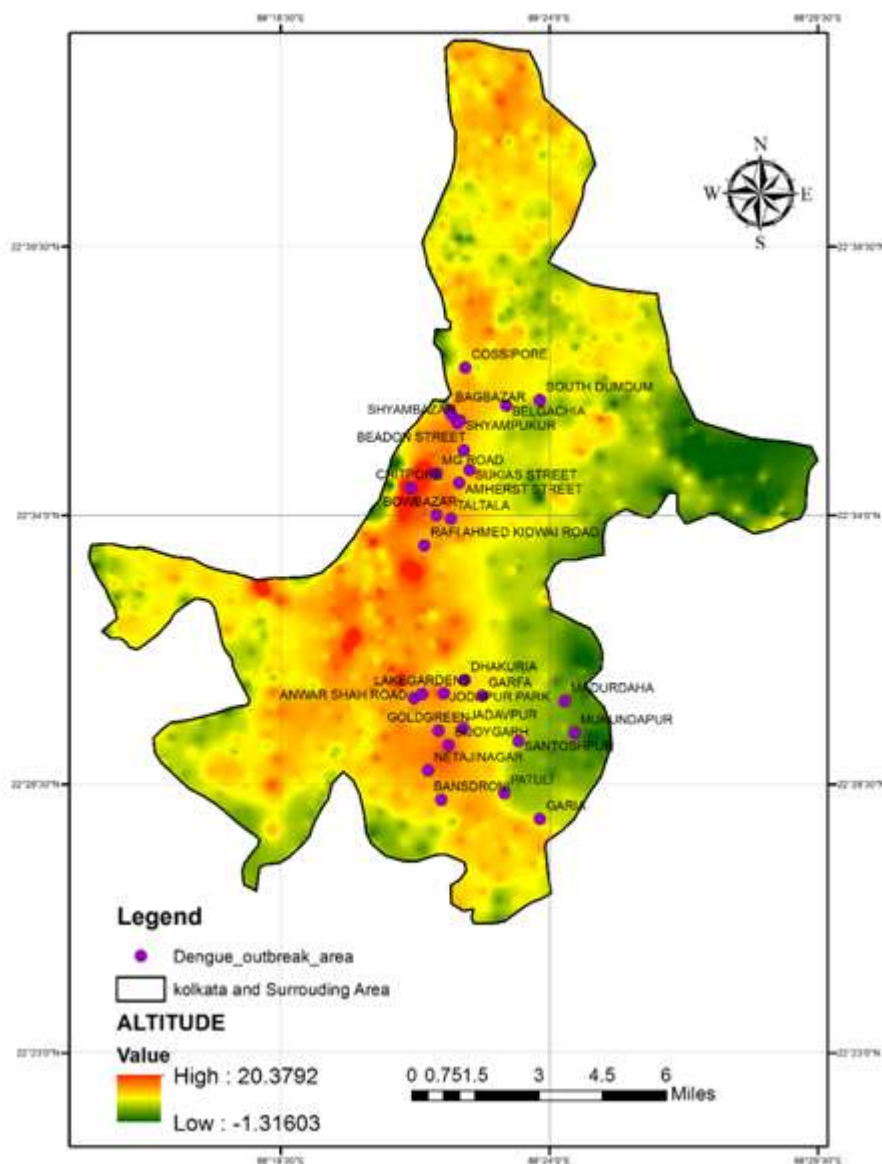


Figure 2: Map showing the number of DF outbreak deaths in the slums and surrounding areas of Kolkata for the past six years (2012-2017) based on literature reviews





**Figure 3:** Map showing the location of Dengue Fever (DF) outbreaks in the slums and surrounding areas of Kolkata for the past six years (2012-2107) based on literature reviews.