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Identifying High-Risk Areas for Dengue Transmission through Vector Distribution and Case Analysis in North Shahdara

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ABSTRACT

Dengue fever remains a significant public health concern in many urban areas, particularly in North Shahdara. This study aims to identify high-risk areas by analysing vector prevalence through the Breteau Index (BI) and correlating it with the number of dengue cases recorded in 2020 and 2021. Data collected from different localities in North Shahdara highlight patterns in vector breeding and disease incidence, allowing for targeted interventions and control strategies.

Keywords Dengue fever,Public health,North Shahdara ,High-risk areas,Vector prevalence,Breteau Index (BI),Denguecases,Diseaseincidence,Targetedinterventions,Controlstrategies,Urbanhealth,Epidemiology,Mosquito breeding,Surveillance,Prevention strategies

INTRODUCTION

Vector–borne diseases have emerged as a serious public health problem in countries of the South–East Asia Region, including India. A vector–borne disease is one in which the pathogenic micro–organism is transmitted from an infected individual to another individual by an arthropod or sometimes other animals which serve as intermediary hosts The transmission depends upon the attributes and requirements of at least three different living organisms: the pathologic agent, either a virus, protozoa, bacteria or helminth (worm); the vector, which is commonly an arthropod such as ticks or mosquitoes; and the human host.Dengue a mosquito borne infection is currently one of the most important Arboviral disease found in tropical and subtropical regions and is commonly known to pose a significant threat to public health Gubler (1978). It is mainly transmitted by *Aedes aegypti* mosquito, sometimes also by *Ae. albopictus* Gubler (1998), Whitehorn, (2010).The number of reported cases has increased continuously and spread to new areas resulting in explosive outbreaks. The female *Aedes* mosquitoes, mainly of the species *Aedes aegypti* and, to a lesser extent, *Ae. albopictus* carry on the transmission from infected symptomatic or asymptomatic humans (Bhatt et al., 2013). As there is no specific treatment or vaccine, the prevention and control of transmission of the disease depends on effective vector control measures (Gubler, 1989, WHO 1998).

Identifying areas with high vector prevalence is crucial for effective vector control. The Breteau Index (BI), a commonly used entomological measure, helps in assessing mosquito breeding potential and understanding its correlation with dengue incidence.

2. METHODOLOGY

A survey was conducted in North Shahdara across multiple localities during 2020 and 2021. Various containers were examined for larval breeding, and BI was calculated for each locality. The number of dengue cases reported in these areas was recorded. BI values were then plotted against the number of dengue cases to identify trends and anomalies.

3. RESULTS AND DISCUSSION

3.1 Vector Prevalence and Dengue Cases in 2020

In 2020, an analysis of different localities showed variations in BI and dengue cases. Although some areas with high BI had a low number of dengue cases, others showed a stronger correlation between high BI and increased cases. For instance:

- Ashok Nagar had a BI of 24.3 but reported only 5 dengue cases.
- Radhey Vihar and Sanjay Nagar had a BI of 4.3 and recorded only one case each.

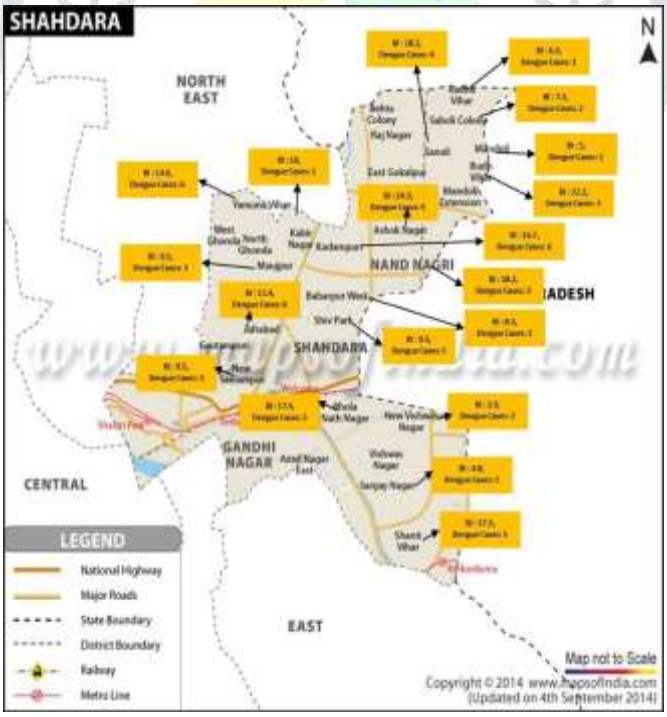

Table 1: Breteau Index and Dengue Cases in North Shahdara (2020)

Locality	BI	Dengue Cases
Radhey Vihar	4.3	1
Saboli Colony	7.3	2
Sanoli	18.2	4
Mandoli	5.0	2
Budh Vihar	22.2	2
Ashok Nagar	24.3	5
Nand Nagri	18.2	3
Kadampuri	16.7	6
Babarpur West	8.3	2
Shiv Park	9.5	4
Yamuna Vihar	13.6	6
Kabir Nagar	10.0	1
Maujpur	9.5	3
Jafrabad	11.4	6
New Seemapuri	9.5	3
Bhola Nath Nagar	17.5	5
New Vishwas Nagar	2.9	2
Sanjay Nagar	4.8	1
Shanti Vihar	17.5	5

3.2 Vector Prevalence and Dengue Cases in 2021

In 2021, an overall increase in both BI and dengue cases was observed in several localities. While most areas with high BI also had more cases, exceptions included Babarpur West and Jafrabad, where BI was high but dengue cases remained relatively low. Conversely, Nand Nagri had a low BI but a higher number of cases, suggesting possible factors beyond vector prevalence contributing to transmission.

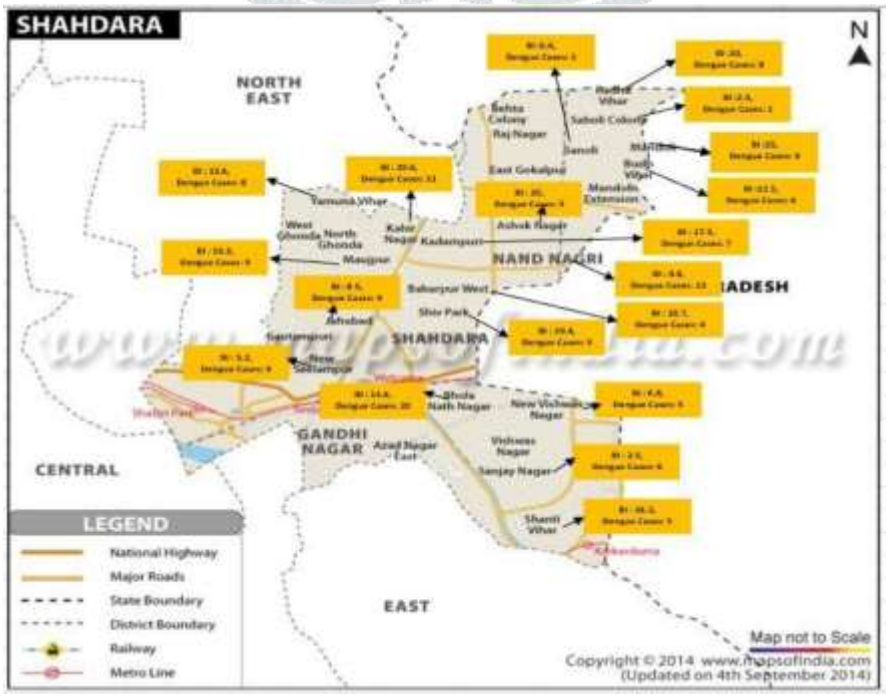

Table 2: Breteau Index and Dengue Cases in North Shahdara (2021)

Locality	BI	Dengue Cases
Radhey Vihar	10.0	8
Saboli Colony	2.4	1
Sanoli	5.6	5
Mandoli	15.0	4
Budh Vihar	12.5	6
Ashok Nagar	20.0	5
Nand Nagri	4.8	13
Kadampuri	17.5	7
Babarpur West	10.7	4
Shiv Park	19.4	9
Yamuna Vihar	13.6	8
Kabir Nagar	29.6	11
Maujpur	33.3	9
Jafrabad	8.5	4
New Seemapuri	5.2	4
Bhola Nath Nagar	11.6	20
New Vishwas Nagar	6.8	5
Sanjay Nagar	2.5	6
Shanti Vihar	16.3	5

3.3 Interpretation of Results

Our studies have shown correlation between vector indices and number of Dengue cases. Areas showing high vector indices had higher number of Dengue cases though there were some exceptions where bruteau index was low but number of dengue cases was high this could probably be attributed to low immunity of residents. Our study is in correlation with similar study carried out by Bowman et al (2014).

The findings indicate a general trend where high BI correlates with increased dengue cases. However, exceptions such as Babarpur West and Nand Nagri suggest additional factors influencing transmission, such as human movement, environmental conditions, or reporting inconsistencies. These insights highlight the need for comprehensive dengue control programs that consider both vector prevalence and socio-environmental factors.

4. Conclusion This study underscores the importance of mapping vector distribution and dengue cases to identify high-risk areas effectively. While the Breteau Index serves as a valuable tool in predicting potential outbreaks, anomalies observed suggest that additional epidemiological factors must be considered. Future research should focus on integrating climate, sanitation, and human behavioral patterns to enhance dengue prediction models.**5. 5.Recommendations**

- Strengthening surveillance in high BI areas to pre-empt potential outbreaks.
- Conducting further studies to explore socio-environmental contributors to dengue transmission.
- Increasing public awareness and community involvement in mosquito control measures.
- Implementing targeted vector control programs in high-risk areas based on both BI and case distribution.

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