

# Epidemiological and Environmental Drivers of Dengue Fever: A Case Study of Bareilly District, Uttar Pradesh India

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**Abstract-** Dengue fever is an emerging mosquito-borne viral disease and a significant global public health concern, particularly in tropical and subtropical regions. The present study investigates the dynamics of dengue fever in Bareilly district, Uttar Pradesh, India, with special emphasis on epidemiological patterns, environmental factors, and clinical manifestations. The study was conducted during the peak transmission period from August to October 2014 through surveys of ten hospitals and pathology laboratories. Data were collected on suspected and confirmed dengue cases, including variables such as age, sex, symptoms, and diagnostic methods. Blood samples were analyzed using ELISA, rapid diagnostic kits, and microscopy. The results revealed a considerable number of dengue cases across all age groups, with both males and females equally affected. Common clinical features included high fever and thrombocytopenia (low platelet count), while mortality remained below 1% due to timely medical intervention. Environmental and socio-economic factors such as rapid urbanization, poor waste management, water stagnation, and favorable climatic conditions (temperature, humidity, and rainfall) were identified as major contributors to dengue transmission. Comparative analysis with the 2010 nationwide.

**Keywords-** Dengue Fever, *Aedes aegypti*, Dengue Virus (DENV), Dengue Hemorrhagic Fever (DHF), Epidemiology, Vector-borne Disease.

## I. INTRODUCTION

*Aedes* a genus of Diptera, family culicidae (Nematocera: Diptera) belongs to subfamily culicinae. This genus is originally found in tropical and subtropical zones but has spread by human activities to all the continents. This is a day biter mosquito and bites human beings repeatedly in domestic and peridomestic situations. In most of the states of India *Aedes aegypti* is the major vector for the transmission of Dengue Fever. The virus, which is responsible for the Dengue fever is flavivirus whose four serotypes (DEN V-1, DENV-2, DENV-3, DENV-4) are present. The first infection with any serotypes produces a self limiting disease (classical dengue) with about a week's course of illness. However subsequent infection with a different serotype produces severe form of illness (Dengue Hemorrhagic fever DHF). *Aedes* a genus of Diptera, family culicidae (Nematocera Diptera) belongs to subfamily culicinae. This genus is originally found in tropical and subtropical zones but has spread by human activities to all the continents. This is a day biter mosquito and bites human beings repeatedly in domestic and peridomestic situations. In most of the states of India *Aedes aegypti* is the major vector for the transmission of Dengue Fever. The virus, which is responsible for the Dengue fever is flavivirus whose four serotypes (DEN V-1, DENV-2,

DENV-3, DENV-4) are present. The first infection with any serotypes produces a self limiting disease (classical dengue) with about a week's course of illness. However subsequent infection with a different serotype produces severe form of illness (Dengue Hemorrhagic fever DHF)

## II. CLIMATE AND GEOGRAPHY

Bareilly is located at 28° 10'N 78° 23'E, and lies in northern India. It borders Pilibint and Bareilly lies entirely in the Ganges plains. The low-lying Ganges plains provide fertile alluvial soil suitable for agriculture, However, these some lower part of plains are prone to recurrent floods Bareilly lies on the bank of river Ramgangs and there are seven rivers passing through this district. The lower Himalayan range is just 40km from it and it lies in north of it,

Bareilly has humid subtropical climate with high variation between summer and winter temperature. Summer is long from early April to October, with the monsoon season in between Winter starts in October and peaks in January and is notorious for its heavy fog. Extreme temperatures range from 4° C to 44° C. The annual mean temperature is 25°C (77°F), monthly mean temperature range from 14°C to 33°C (58°F to 90°F). The

average annual rainfall is approximately 1714 mm (28.1 inches), most of which is during the monsoons in July and August

**Demographics**

According to the 2005 census report of the Government of India, the total population of Bareilly City Region, Bareilly Municipal Corporation and Bareilly Cantt.) is 875,165 having distribution as 53% males and 47% females nearly. The area under the city region is 123.46km<sup>2</sup>. The density of the population is among the high country touching 5000 per km<sup>2</sup>.

**Factors influencing Dengue transmission.**

The factors responsible for the emergence of this mosquito borne disease are complex. Major global demographic and societal changes of the past 50-60 years have directly affected the emergence of vector borne infectious diseases. Population growth, movement in people, unplanned and uncontrolled urbanization, inadequate housing deteriorating water, sewage and waste management systems produce ideal conditions for the transmission of Dengue other societal changes such as agricultural practices and deforestation increase risk for the vector-borne disease transmission. The ideal cities for Aedes Mosquito breeding are domestic buckets, coolers, Drums, tyres etc which are discarded as waste items in public places and rain water remains collected in them. Climate change, Global warming, temperature, humidity and rainfall etc are also the factors which affect the density of mosquitoes and the diseases caused by them.

**III. MATERIALS AND METHODS**

To conduct the present studies the survey of the Bareilly district was done. Survey was specially centralized on the clinical and Pathological laboratory investigations. Ten leading hospitals and pathology Labs were visited at regular intervals from 15th August, 2014 to 15th October 2014, which was the peak time of disease transmission in Bareilly district. U.P. During the survey we emphasize on Sex, Age, duration of illness and symptoms of patients. All the sera (Blood samples) were tested for the detection of Dengue Fever by Rapid. Diagnostic kits, ELISA Test Kits & microscopy

**IV. RESULTS & DISCUSSION**

Collected pooled data revealed that in Bareilly, District and its surrounding areas there is epidemic of viral fevers and Dengue cases. The males and females both from all the age groups were reported, as the patients of Dengue. The common symptoms observed were high fever with sudden fall in number of platelets. But it was observed that death due to dengue was less than 1% only. With the immediate action and platelets transfusion and treatment patients recovered very fastly. The following table shows the number of suspected cases, cases of DHF, Age and sex ratio reported from leading hospitals & Pathology labs of Bareilly city & surrounding areas.

TABLE NO. 1

S No	Lab/Hospital	No of suspected case	No of detected case	sex M	SEXF	Age group	Basis of diagnosis
1	A	234	42	13	29	5-4	ELISA
2	B	113	12	02	10	22-47	RAPID Diagnosis
3	C	67	05	-	05	35-57	ELISA
4	D	92	10	01	09	12-50	ELISA
5	E	102	16	04	12	22-48	DHF Test
6	F	217	32	10	22	17-67	ELISA
7	G	315	65	11	54	13-56	RAPID Diagnosis
8	H	22	04	-	04	5-28	ELISA
9	I	47	02	02	-	14-19	ELISA
10	J	98	18	07	11	07-63	ELISA

Its outbreak was previously reported in 2010 in all over the India from early September to late Nov. 2014. The first case was reported from New Delhi in early September and by the end of month other states also reported Dengue cases. By early October more than 590 cases were reported from Delhi and over 367 case from neighbouring states who had come to New Delhi for treatment (1) From Rajasthan by September 12 more than 35 patients were reported, from Chandigarh 159 case were reported, from Uttar Pradesh 214 cases were reported, west Bengal over 30 people were reported. Over all by Oct 3, 2010,

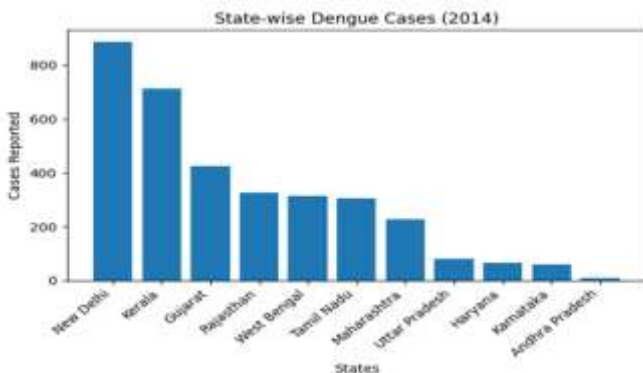
more than 50 deaths were reported to dengue fever and more than 3613 patient were treated for the disease. The 2014 Dengue case data for Bareilly District has been organized, with confirmed cases totaling 206, comprising 50 males and 156 females across ten facilities. The table includes suspected cases (1,307), specific age groups, and diagnostic methods (ELISA, Rapid, DHF) for improved accuracy in the research paper.

TABLE: 2

State wise Data on Dengue outbreak in 2014 (Released by Ministry of Health G.O.):

State	Cases Reported
New Delhi	886
Kerala	713
Gujrat	424
Rajasthan	326
West Bengal	314
Tamil Nadu	306
Maharashtra	226
Uttar Pradesh	79
Haryana	65
Karnataka	59
Andhera Pradesh	09

**GRAPHICAL REPRESENTATION OF STATE WISE DATA ON DENGUE OUTBREAK 2014**



**V. CONCLUSION**

Dengue fever has emerged as a serious and rapidly increasing public health problem in Bareilly district, reflecting the broader national and global trends observed up to 2014. The present study indicates a significant rise in dengue cases during the peak transmission period, affecting individuals across all age groups and both sexes. Environmental conditions such as stagnant water, improper waste disposal, rapid urbanization, and favorable climatic factors like temperature, humidity, and rainfall have played a crucial role in the proliferation of *Aedes aegypti* mosquitoes and subsequent disease transmission.

Despite the increasing number of cases, the low mortality rate (less than 1%) highlights the importance of early diagnosis, improved healthcare facilities, and timely medical intervention. However, the growing incidence of dengue suggests that the disease is becoming endemic in the region.

Therefore, there is an urgent need for integrated vector control strategies, effective waste management, public awareness programs, and community participation to minimize mosquito breeding and reduce disease transmission. Strengthening surveillance systems and adopting preventive measures at both individual and community levels can significantly help in controlling future outbreaks. This study provides valuable baseline data for understanding dengue dynamics and can support public health planning and policy formulation in the region.

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