



EPIDEMIOLOGY OF DENGUE IN BALASORE DISTRICT OF ODISHA, INDIA AFTER PANDEMIC PERIOD COVID-19

Nibedita Mohapatra

P. G. Department of Zoology, Fakir Mohan University, Nuapadhi, Balasore, Odisha, 756020 India

Punyaprava Sahani

P. G. Department of Zoology, Fakir Mohan University, Nuapadhi, Balasore, Odisha, 756020 India

ABSTRACT Human illness caused by virus, bacteria and parasite that are spread through vectors are known as vector-borne diseases. Each year these diseases result in over 7,00,000 fatalities worldwide. Conditions such as Malaria, Dengue, Chikungunya and Japanese encephalitis is most prevalent. The objective of this study was to analyze the trends in Dengue-positive cases and case fatality rates over the past nine years, focusing on block-wise distribution, age, gender and regional variations in Balasore district. The study also aimed to assess the impact of the post-COVID period on the spread of Dengue, specifically looking at the percentage of indigenous Dengue-positive cases. Our survey finding indicate a gradual increase in the percentage of indigenous Dengue positive cases, particularly in blocks like Baliapal, Baleswar, Bhograi, Jaleswar, Simulia and Soro. This rise has been more pronounced after the post-COVID period. If effective control measures are not implemented, this trend may lead to the endemicity of Dengue in these regions. Other significant findings from the study include a higher vulnerability to Dengue infection among rural populations, middle-aged groups (particularly those aged 16-45 years) and males, who appear to be more susceptible to severe infections.

KEYWORDS : Vector; Dengue; Balasore; Endemic; Vulnerable.

INTRODUCTION

Living organism knows as vectors are capable of carrying and spreading infectious agents from one host to another- either between humans or from animals to humans. Many of these vectors are insects that feed on blood and acquire harmful microorganisms while drawing blood from an infected individual, whether human or animal. Once the pathogens multiply inside the vector, it can transmit the infection to other hosts. Typically, after becoming infectious, the vector continues to spread the disease throughout its lifespan with every subsequent blood meal (WHO, World vector borne disease report, 2024).

Human illnesses caused by viruses, bacteria and parasites that are spread through vectors are known as vector-borne diseases. Each year, these diseases result in over 7,00,000 fatalities worldwide. Conditions such as Malaria, Dengue fever, Schistosomiasis, African trypanosomiasis, Leishmaniasis, Yellow fever, Japanese encephalitis and Onchocerciasis are among the most prevalent (WHO, World vector borne disease report, 2024).

Climate change significantly influences the behavior of pathogens (including parasites, viruses, and bacteria) as well as the vectors and reservoir hosts that carry them. This has serious consequences for the transmission of numerous vector-borne diseases. Many vectors have extended their geographic reach-both in latitude and altitude- and are now active for longer periods each year (WHO, World vector borne disease report, 2024).

The incidence of vector-borne diseases has grown markedly since 2004, with more than one million cases recorded in the United States between 2001 and 2023. During this timeframe, the number of reported vector-borne diseases cases each year has more than doubled (Centers for Disease Control and Prevention Report, 2024).

Throughout history, diseases transmitted by insects and other animal vectors have played a major role in causing illness and death in humans. Between the 17th and early 20th centuries, vector-borne illnesses were responsible for more cases of disease and fatalities than any other health issue (Gubler, 1999).

Dengue

Dengue fever is a serious illness that resembles the flu. The *Aedes aegypti* mosquito is recognized as the primary transmitter of the Dengue virus. The virus is passed to human through bites from infected female mosquitoes. Once the mosquito has incubated the virus for a period of 4 to 10 days, it becomes capable of transmitting it throughout the remainder of its life. Human infected with Dengue act as key hosts and source of the virus, enabling its spread to mosquitoes that have not yet been exposed. Individuals with an active Dengue infection can pass the virus to *Aedes* mosquitoes for approximately 4 to 5 days following the appearance of symptoms. *Aedes aegypti* thrives in urban

environment and breeds primarily in artificial water containers (Suaya et al., 2009).

Currently, more than 2.5 billion people- accounting for over 40% of the global population -are exposed to the risk of Dengue. The World Health Organization estimates that Dengue infection may exceed 100 million cases worldwide every year. Around 2.5% of those with severe Dengue do not survive. Before 1970, serious Dengue outbreaks had occurred in only nine countries. Today, the virus is endemic in more than 100 nations across Africa, the Americas, the Eastern Mediterranean, Southeast Asia and the Western Pacific regions, which collectively recorded over 2.3 million cases in 2010 (WHO, World vector borne disease report, 2014).

MATERIALS AND METHOD

Source of Data Collection

To study the epidemiology, trends and patterns of infection in different blocks of Balasore district, With the permission letter from the CDMO of Balasore, the vector-borne disease department provided the required data for epidemiological study in various blocks of Balasore district.

Based on the collected data, our study primarily focuses on the post-COVID situation of Dengue-positive cases across different blocks of Balasore district. Additionally, it examines trends and patterns in indigenous case percentage, inside state and outside state migration percentage, and the total number of cases recorded after the post-COVID period in various blocks.

Furthermore, we analyze the trends in Dengue cases and Dengue related deaths, as well as the case fatality rate (CFR) over the last ten years. Our study also focuses on other key variables, such as the age wise, gender wise, and region wise percentage distribution of Dengue cases.

RESULT

An analysis of Dengue infection cases in 2024 reveals that urban areas account for 8.82% of Dengue cases, whereas rural areas make up 91.17%, a significantly higher proportion.

The age wise analysis of Dengue infection cases in both sexes indicates that individuals aged 16-45 years are the most vulnerable, accounting for 62.44% of total cases. The percentage of Dengue positive cases slightly decreases to 30.95% in those above 45 years. Cases among the 6-15 years age group constitute 5.74% while the lowest infection rate of 0.85% is observed in children below 5 years.

Our data also reveals that the percentage of the Dengue positive cases is higher in males which is 54.46% compared to females 45.53%. Additionally, the findings indicate that males and individuals in the middle age group are more susceptible to Dengue infection.

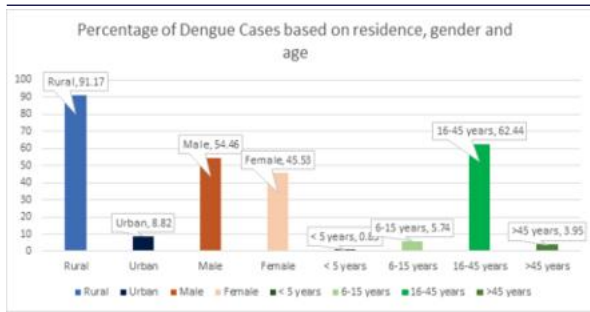


Fig 1: The Graph Shows the Percentage of Dengue Cases Based on Residence, Gender and Age

Table: Distribution of Dengue Positive Cases, Death and CFR Value Over the 9 Years in Balasore District

Year	2016	2017	2018	2019	2020	2021	2022	2023	2024
Dengue positive cases	448	1296	203	681	9	112	313	1304	940
Dengue Death	1	1	0	0	0	0	0	0	0
CFR value	0.223	0.077	0	0	0	0	0	0	0

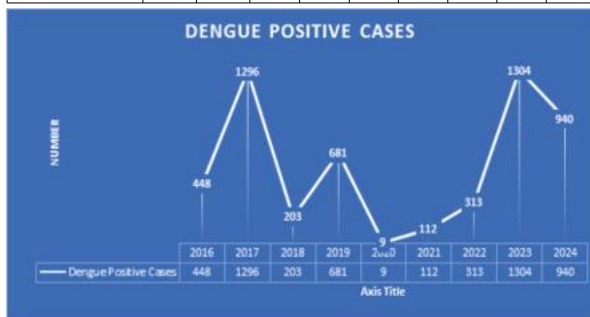


Fig 2: Graph Shows the Distribution of Dengue Positive Cases Over 9 Years in Balasore District

In 2016, Balasore district reported 448 Dengue positive cases, including one Death, resulting in a case fatality rate (CFR) of 0.223.

In 2017, a total of 1,296 Dengue -positive cases were reported with one associated Death. The recovery rate was significantly higher, while the case fatality rate (CFR) was 0.007.

From 2018 to 2024, the reported Dengue positive cases in Balasore district were 203 in 2018, 681 in 2019, 9 in 2020, 112 in 2021, 313 in 2022, 1304 in 2023, 940 in 2024. All patients recovered and no death were reported due to Dengue during these years, resulting in a case fatality rate (CFR) of 0. Clinical and laboratory-based diagnostic techniques are necessary to control future outbreaks.

DISCUSSION

An epidemiological survey was conducted in 2017, to evaluate Dengue burden in India from 1998 to 2014 which shows from 1998 to 2009, a total of 82,327 Dengue cases were reported, corresponding to an incidence rate of 6.34 cases per million population. During a more recent period from 2010-2014, this number surged to 213,607 cases, reflecting an incidence rate of 34.81 cases per million population. This represents a roughly 2.6-fold increase compared to the 1998-2009 period (Mutheneni et al., 2017).

Based on our survey of Dengue infection trends and patterns in various blocks of Balasore district, primarily we analyzed the post COVID situation of Dengue positive cases which indicates that individuals aged 16 to 45 years are the most vulnerable group, accounting for 62.44% of total reported cases. The proportion of Dengue positive cases decreases to 30.95% among individuals over 45 years of age. In contrast, the 6-to-15-year age group accounts for 5.74% of cases, while the lowest infection rate, at 0.85% is observed in children below 5 years.

From our study conducted across Balasore district aimed to assess the trends and patterns of Dengue-positive cases along with case fatality rates from 2016 to 2024. The findings reveals that in 2016, 448 Dengue-positive cases were reported, with a case fatality rate of 0.223. This figure surged threefold in 2017, reaching 1296 cases, through the

case fatality rate declined to 0.007, indicating a significant outbreak. In 2018, following the implementation of various control measures, the number of Dengue -positive cases dropped to 203. However, this trend reversed in 2019, with the number rising to 681. The lowest count was observed in 2020, with only 9 cases, likely due to impact of COVID-19 restrictions. As these restrictions eased, the number of cases gradually increased, reaching 112 in 2021, 313 in 2022, 1304 in 2023 and 940 in 2024. Notably, from 2017 to 2024, no Dengue-related deaths were reported, resulting in a case fatality rate of 0 during this period.

CONCLUSION

From the spatial-temporal analysis of Dengue infection in various blocks of Balasore district, it is evident that after 2020, there has been a sharp increase in Dengue-positive cases. This rise is accompanied by a gradual increase in the percentage of indigenous Dengue cases, particularly after the post- COVID period, in blocks like Baliapal, Baleswar, Bhograi, Jaleswar, Simulia and Soro. This trend may be attributed to various factors, including increased movement of peoples from inside and outside state with Dengue infection to these regions post-pandemic, a lack of awareness and poor sanitation facilities, which have hindered effective vector control, especially against Aedes mosquitoes.

In support of this, the Government of India has launched the National Vector Borne Disease Control Programme (NVBDCP) in 2003, aimed at preventing vector-borne diseases through surveillance, capacity building, outbreak response and vector management.

REFERENCES

1. CDC, C. (2020). Centers for Disease Control and Prevention (CDC). Obtenido de Centers For Disease Control and Prevention CDC: <https://www.cdc.gov/dpdx/strongyloidiasis/index.html>.
2. Gubler, D. J., & Meltzer, M. (1999). Impact of dengue/dengue hemorrhagic fever on the developing world. *Advances in virus research*, 53, 35-70.
3. Mutheneni, S. R., Morse, A. P., Caminade, C., & Upadhyayula, S. M. (2017). Dengue burden in India: recent trends and importance of climatic parameters. *Emerging microbes & infections*, 6(1), 1-10.
4. Suaya, J. A., Shepard, D. S., Siqueira, J. B., Martelli, C. T., Lum, L. C., Tan, L. H., & Halstead, S. B. (2009). Cost of dengue cases in eight countries in the Americas and Asia: a prospective study. *The American journal of tropical medicine and hygiene*, 80(5), 846-855.
5. World Health Organization. (2023). WHO Malaria Policy Advisory Group (MPAG) meeting report, 18–20 April 2023. World Health Organization.
6. World Health Organization. (2024). World malaria report 2024. World Health Organization.