

Recent Updates on the Dengue Situation in Bangladesh



A scholarly project submitted to the Department of Pharmacy at Daffodil International University, as an integral part of the requirements for the achievement of the Bachelor of Pharmacy degree.

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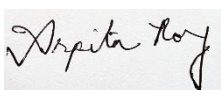
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I certify that, in order to fulfill the criteria for the Bachelor of Pharmacy (B. Pharm) degree, I independently produced this project report. Ms. Arpita Roy, a lecturer in the Daffodil International University's Faculty of Allied Health Sciences' Department of Pharmacy, oversaw this. I certify that I am the only author of this work by adding my signature. Furthermore, I declare that neither this project nor any of its parts have ever been turned in to another educational establishment in order to receive a Bachelor's degree or any other kind of academic certification.

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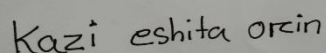
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Kazi Eshita Orin
Author

Dedication

This endeavor is dedicated primarily to the Divine, followed by my parents, educators, and companions.

Abstract

In Bangladesh, dengue fever, a virus spread by mosquitoes, has grown to be a serious public health issue. With an emphasis on significant trends, factors contributing to the disease's spread, and the effectiveness of government actions, this study aims to provide a thorough assessment of the nation's present dengue situation.

To ascertain the prevalence, incidence rates, and geographic distribution of dengue cases, data from several sources, such as the World Health Organization, the health department of the government of Bangladesh, and scholarly research papers, will be analyzed. The impact of urbanization, inadequate sanitation, and climate change on the spread of the dengue virus will also be examined.

The effectiveness of government response initiatives, including public awareness campaigns, vector control programs, and healthcare preparedness, will be evaluated in order to reduce the impact of dengue outbreaks. The social and economic repercussions of dengue on individuals, groups, and the nation at large will also be examined by this study.

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CHAPTER- 01

INTRODUCTION

1.0 Introduction

The virus known as dengue fever, which is spread by mosquitoes, has become a significant public health issue in Bangladesh and is a big threat to the people living there. With an emphasis on key trends, factors contributing to the disease's spread, and the effectiveness of government response programs, this research paper aims to provide a thorough analysis of the dengue situation as it exists in Bangladesh right now. Recent studies have highlighted the vital role that the media plays in educating the public about dengue prevention and encouraging behavioral changes among them. Islam and Ahmed [1] found that public awareness and the adoption of preventative measures may be enhanced by mass media campaigns that effectively disseminate information about dengue symptoms, transmission, and prevention strategies.

The growth of dengue is largely under the control of vector control techniques in addition to public health campaigns. Rahman and Hossain [2] looked at the effectiveness of larvicides, community-based programs, and pesticide spraying among other vector control methods in Bangladesh. The necessity of integrated vector control systems that employ a variety of strategies to get the best results was highlighted by their findings.

The current state of dengue in Bangladesh will be examined in this study, along with the frequency, incidence rates, and geographic distribution of cases. It will also look at the factors like urbanization, climate change, and poor sanitation that led to the spread of dengue. Additionally, the research will evaluate the effectiveness of government response plans that include hospital preparedness, public health campaigns, and vector management.

1.1 Risk Factors

Different indicators associated with dengue sickness in Bangladesh were discovered by Khan and Hossain . These risk factors included age (those between the ages of 15 and 44 were more likely to contract the disease), gender (females were slightly more likely to contract the disease), occupation (those who worked outside were more likely to contract the disease), education level (lower levels were associated with higher risk), marital status (those who were married were more likely to contract the disease), residential area (tightly populated areas with inadequate sanitation), and history of travel to areas where dengue was prevalent [3].

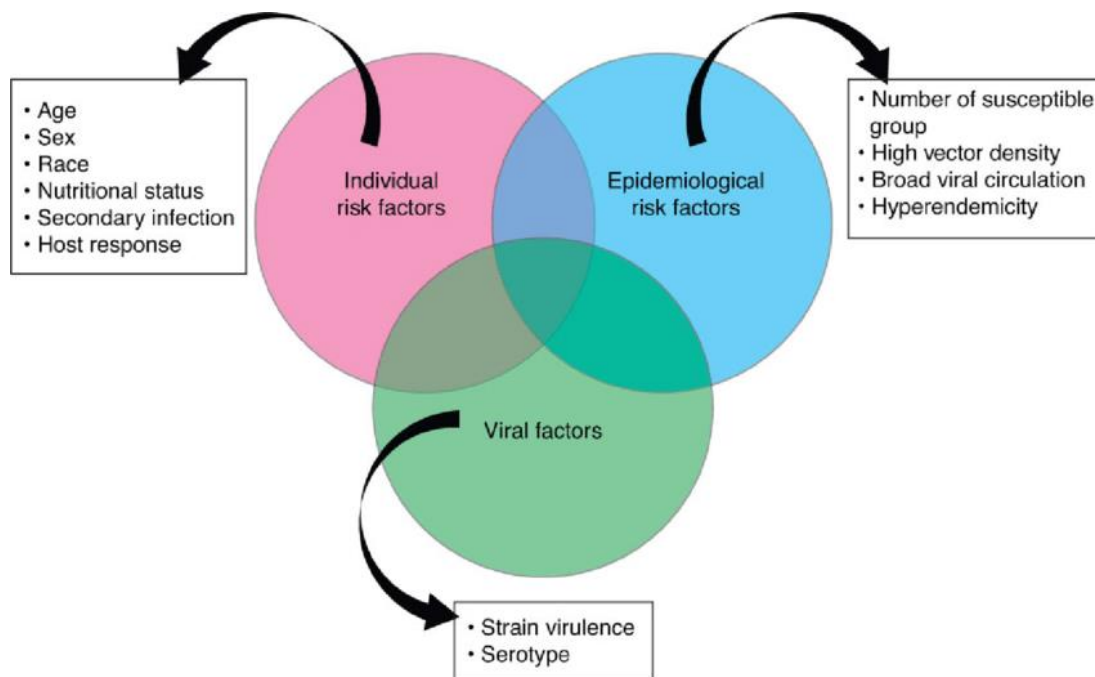


Figure-1.1: Risk factors of Dengue Fiver [4].

1.2 Symptoms

A virus called dengue fever is transmitted by mosquitos. After infection, symptoms often appear three to fourteen days later and might include:

- Elevated temperature.
- Severe headache.
- Ache behind your eyes
- Joint and muscle soreness.
- Vomiting as well as nausea.
- Rash nosebleeds or bleeding gums

If treatment for dengue shock syndrome (DSS) or severe dengue hemorrhagic fever (DHF) is delayed, the condition may be fatal. DHF and DSS symptoms might include:

- Pain in the Abdomen
- Continuous vomiting
- Bleeding in other bodily sites, such as the gums or nose
- Breathing quickly.
- Blood in the stool or vomiting.
- Blood pressure drop Shock



Figure-1.2: Signs and Symptoms of Dengue Fever [5].

1.3 Diagnosis

The typical approach to diagnose dengue fever is to combine scientific tests with clinical symptoms. To confirm dengue infection, laboratory testing is required. These examinations could include:

1. **Complete blood count (CBC):** To detect blood cell abnormalities such as thrombocytopenia or a low platelet count, which are characteristic with dengue.

2.

Test	Parameters	Range		unit
CBC		Male	female	
	RBC	4.35-5.65	3.92 - 5.13	10 ¹² /L
	Hemoglobin	13.2 -16.6	11.6 - 15	gm/dl
	Hematocrit	38.3 - 48.3	35.5 - 44.9	%
	Platelet count	150,000 - 450,000		cu. mm
	WBC	4000 to 11000		cu. mm
Differential Count	Neutrophils	40 to 70		%
	Lymphocytes	20 to 45		%
	Eosinophils	1 to 6		%
	Monocytes	2 to 8		%
	Basophils	0 to 1		%

Table-1.1: Summary table of CBC test [6].

3. **NS1 antigen test:** The NS1 antigen test is a rapid diagnostic process that may determine whether the blood contains the dengue virus's NS1 protein.

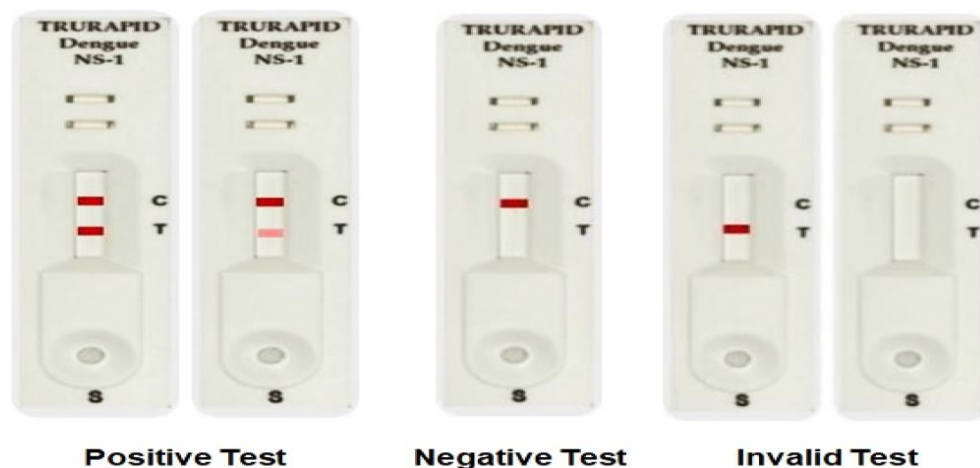


Figure-1.3: NS1 Antigen Test for dengue fever [7].

3. Tests for antibodies: Enzyme-linked immunosorbent tests (ELISAs) can detect dengue-specific antibodies in blood, which can help determine the infection's stage and confirm the diagnosis.

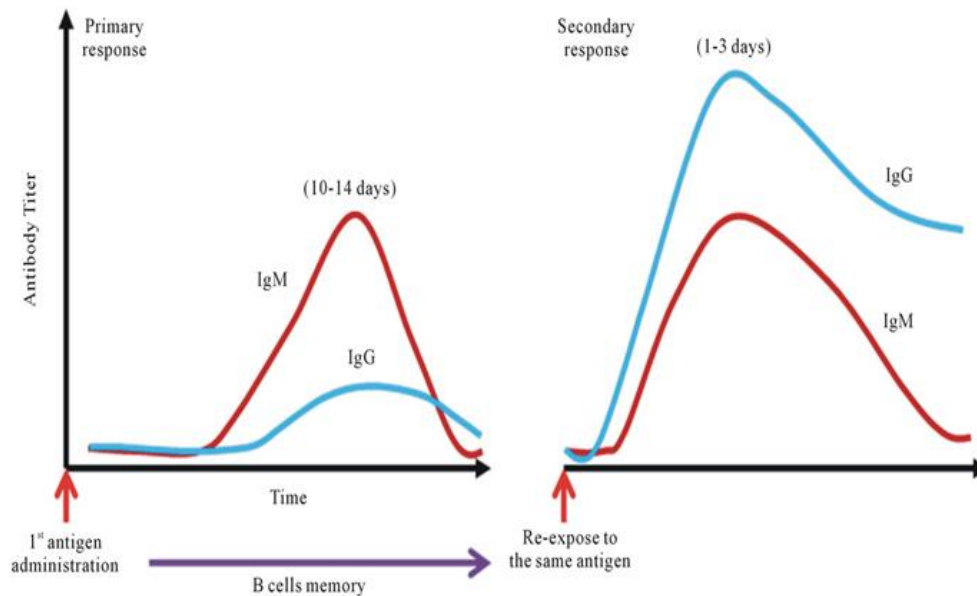


Figure-1.3: ELISA test for dengue fever [8].

1.4 Dengue serotypes

The dengue virus consists of four different serotypes: DENV-1, DENV-2, DENV-3, and DENV-4. Each of these serotypes can lead to dengue fever, and being infected with one serotype does not grant immunity against the others. This is particularly important because contracting different serotypes can lead to more severe cases.

In 2020, DENV-2 emerged as the dominant serotype, resulting in significant outbreaks that caused an increase in hospitalization rates. The overall number of dengue cases was lower than in prior years, likely due to the effects of the COVID-19 pandemic and the associated public health interventions.[77].

In 2021, there was a rise in cases, with DENV-3 becoming the dominant serotype along with DENV-2. This year experienced a notable rise in severe dengue instances, highlighting the dangers posed by the simultaneous presence of multiple serotypes.[77].

In 2022, DENV-1 emerged as the predominant serotype during a major outbreak, recording an unprecedented number of cases. The healthcare system faced significant challenges due to both the dengue and COVID-19 outbreaks.[79].

In 2023, DENV-2 made a strong comeback, leading to elevated incidence rates during the monsoon season. Surveillance data indicated a combination of serotypes in circulation, which complicated the clinical management of dengue cases.[75].

By 2024, initial data suggests that all four serotypes were in circulation, with an increase in cases linked to DENV-1 and DENV-2. Improved public health initiatives were observed to lower mosquito populations and increase understanding of preventive strategies.[7].

1.5 Survival Rates

Bangladesh's dengue fever survival rates have skyrocketed in recent years due to improvements in public health initiatives and medical care. Although dengue may be a deadly virus, especially in young people and the elderly, the overall death rate has decreased. Improved treatment options, timely access to healthcare, and early diagnosis have all contributed to this positive trend.

The provision of supportive care and treatment for severe patients has increased the survival rate of dengue fever in Bangladesh, according to study by Rahman [9] and Islam as well as Ahmed and Islam [10]. But it's important to keep in mind that the survival percentage fluctuates depending on things like the severity of the illness, treatment accessibility, and underlying medical conditions.

1.6 Epidemiological Updates

- **Recent Outbreaks:** Over the past few years, Bangladesh's dengue condition has fluctuated, with major outbreaks occurring at various periods. There was a significant dengue epidemic in the nation in 2019 with over 100,000 confirmed cases and a 0.16 percent death rate [11]. Dengue reports may have been impacted by the COVID-19 epidemic in 2020, however records show an increase in cases in 2021. Between 2019 and 2022, there were fewer instances of dengue, but the mortality rate stayed high at 0.45% [12]. In 2023, there was still another significant outbreak, with over 320,000 confirmed cases and a 0.53% death rate [13].

Table-1.2: Dengue cases in Bangladesh [14]

Table-1.3: Dengue deaths in Bangladesh [14]

(January 01 – August 03, 2024)

Age Group	Male	Female	Total Cases
00-05	379	298	677
06-10	249	226	475
11-15	278	218	496
16-20	493	290	783
21-25	567	291	858
26-30	503	298	801
31-35	399	220	619
36-40	306	203	509
41-45	232	148	380
46-50	168	124	292
51-55	152	92	244
56-60	140	81	221
61-65	106	50	156
66-70	69	54	123
71-75	34	14	48
76-80	21	16	37
80+	22	10	32
Grand Total	4118	2633	6751

Dengue Cases & Dengue Deaths

Age Group	Male	Female	Total Cases
00-05	01	02	03
06-10	01	04	05
11-15	00	00	00
16-20	05	01	06
21-25	03	01	04
26-30	01	03	04
31-35	03	01	04
36-40	00	01	01
41-45	02	03	05
46-50	04	05	09
51-55	02	01	03
56-60	01	01	02
61-65	01	03	04
66-70	01	01	02
71-75	01	01	02
76-80	01	02	03
80+	01	00	01
Grand Total	28	30	58

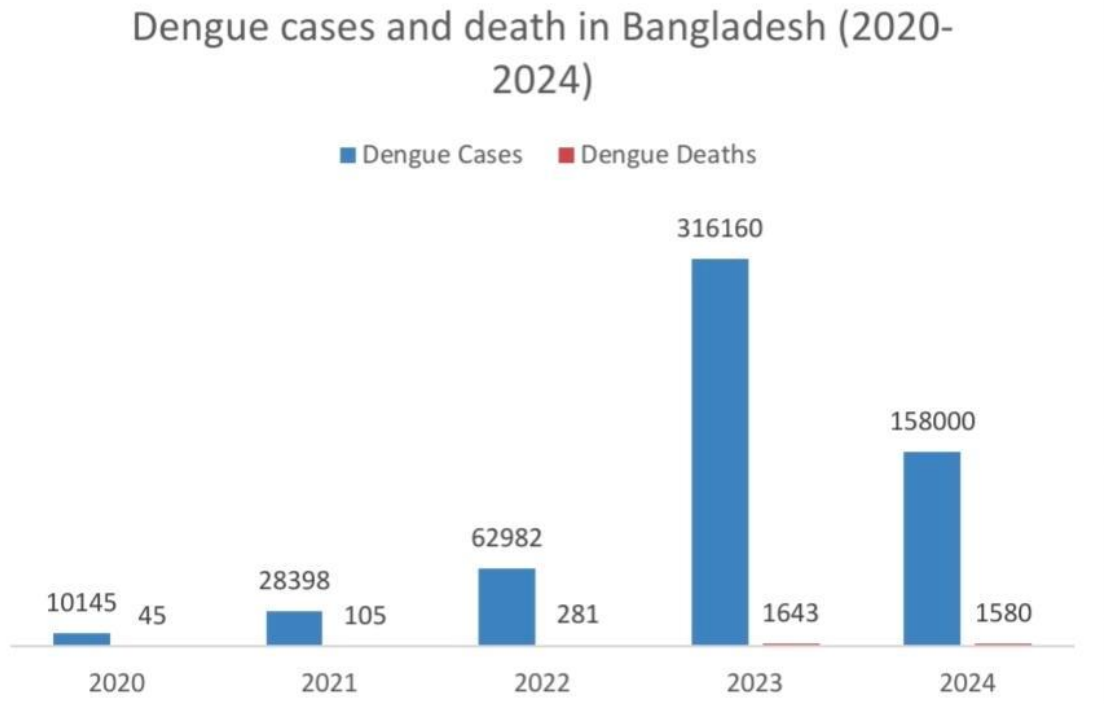


Figure-1.6: Dengue cases & deaths in Bangladesh last (2020-2024) [15]

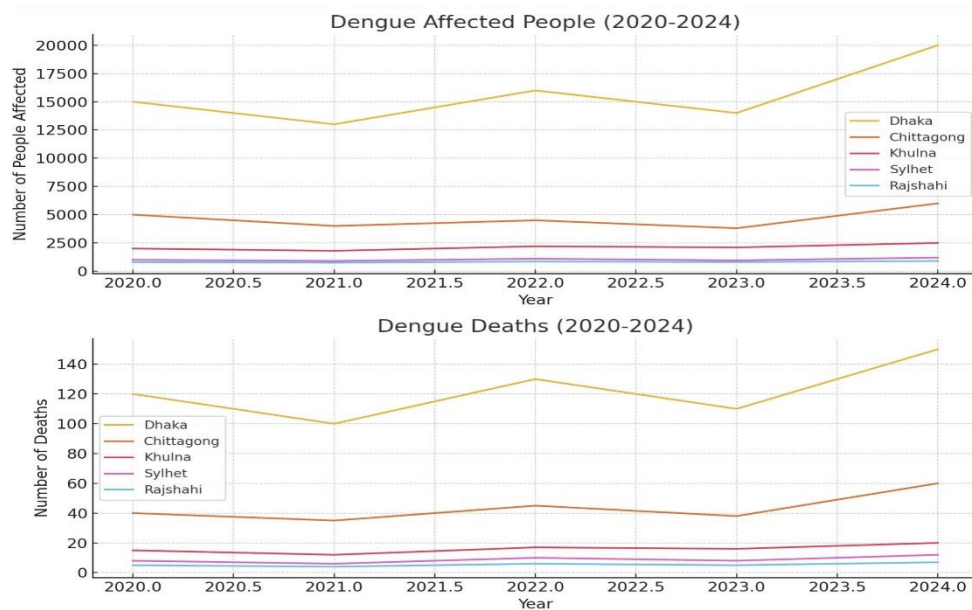


Figure 1.6:Dengue Affected Cases and Deaths in Bangladesh by Division (2020-2024)[2]

In 2020, Dhaka has the most cases roughly 15,000 while the other Divisions have much fewer cases mostly less than 5,000 patients. In 2021, the number of cases in all divisions Somewhat decrease, although Dhaka continues to be the most impacted, with Chittagong coming in second[64]. In 2022, there is a slight rise in instance, with Dhaka continuing to lead. Dengue cases in Chittagong and Dhaka increase in 2023[62]. Small increases are also seen in other divisions. Dengue cases in Dhaka have significantly increased in 2024, reaching almost 20,000 cases, while Chittagong has also seen a notable surge. In contrast Rajshahi, sylhet and Khulna are still far lower. Every year, Dhaka has the most dengue cases and the number has been steadily rising over time.

In 2020, Dhaka has the highest number of dengue related deaths (over 100), whereas other divisions have significantly lower numbers. In 2021, Deaths have decreased slightly throughout divisions, although Dhaka continues to top with a considerable count. In 2022, Deaths rise Again, with Dhaka continuing to lead, followed by Chittagong[61]. In 2023, Dengue deaths continue to grow in Dhaka and Chittagong, with lower rises in the other divisions[62]. Dhaka death toll exceeds 140 in 2024 and Chittagong also sees a significant increase, while other divisions remain low. Dhaka has the largest number of dengue -related deaths each year, with a rising tendency, particularly in 2024.

- **Trends and Patterns:** In Bangladesh, dengue epidemics often happen in the monsoon and post-monsoon seasons (June to September). These outbreaks follow cyclical trends. This is probably because the weather is perfect for mosquito breeding at these times of year, with lots of rain and still water in the pools [16]. Furthermore, throughout time, Bangladesh's dengue case distribution has shifted geographically. Although historically more affected were metropolitan areas like Dhaka, the recent epidemics have spread throughout the nation, underscoring the necessity of national prevention and control measures [17].

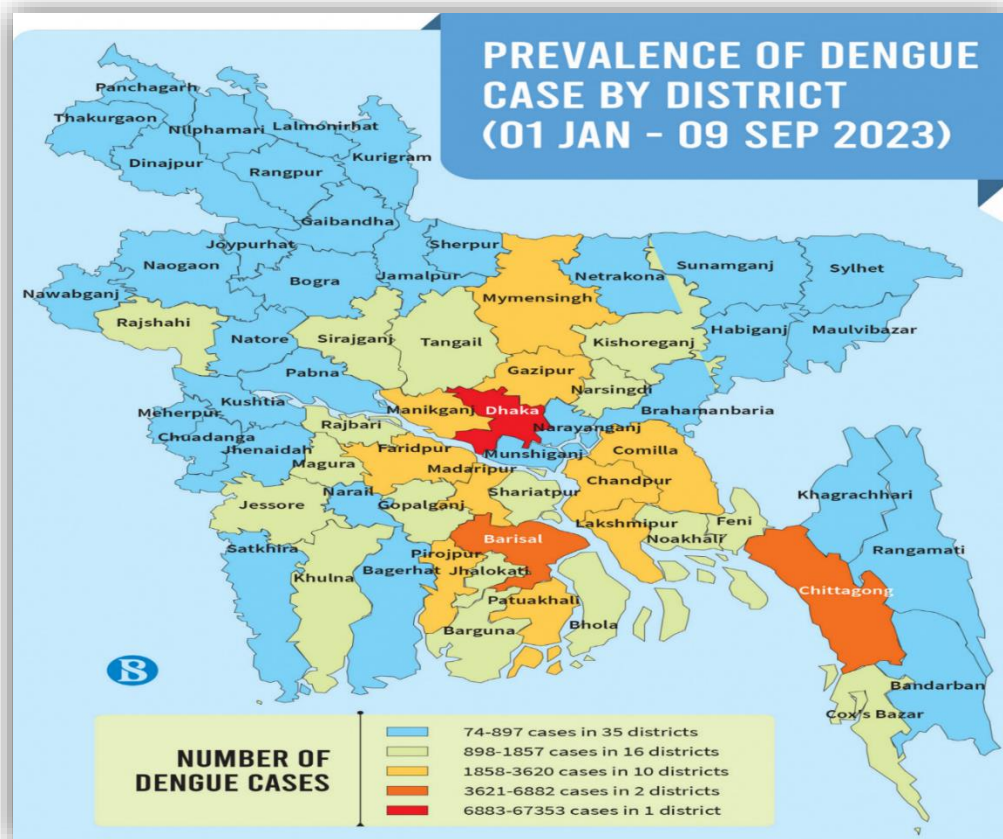


Figure-1.6: Prevalence of dengue case high risk areas [18].

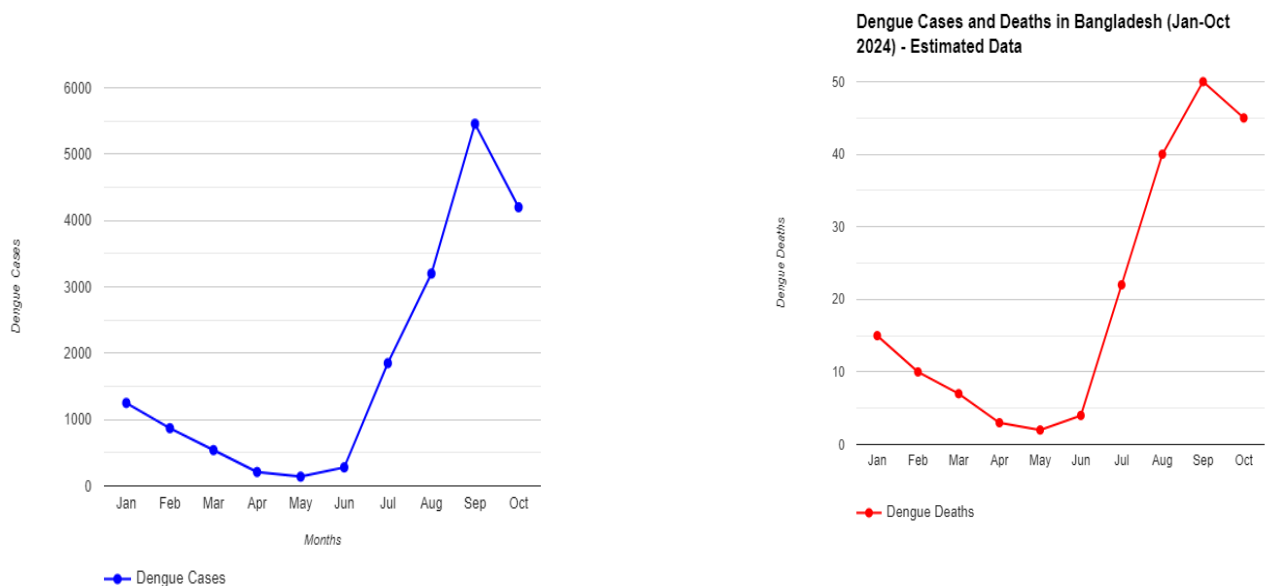


Figure-1.6: Seasonal Patterns of Dengue Cases & Deaths in (Jan-Oct, 2024) [20].

1.7 Contributing Factors

- **Climate and Environment:** Bangladesh's dengue situation is greatly influenced by climatic and environmental factors. The primary vectors of dengue illness, *Aedes aegypti* and *Aedes albopictus* mosquitos, find ideal breeding grounds during the nation's monsoon season, which is characterized by high rainfall and still water bodies [21]. Deforestation, habitat degradation, and the creation of new mosquito breeding grounds, such as abandoned containers and construction trash, have all grown as a result of rapid urbanization and industrialization [22,23]. Additionally, in urban areas, waterlogging and poor drainage systems can encourage mosquito breeding, exacerbating the dengue pandemic.

Mosquito Lifecycle

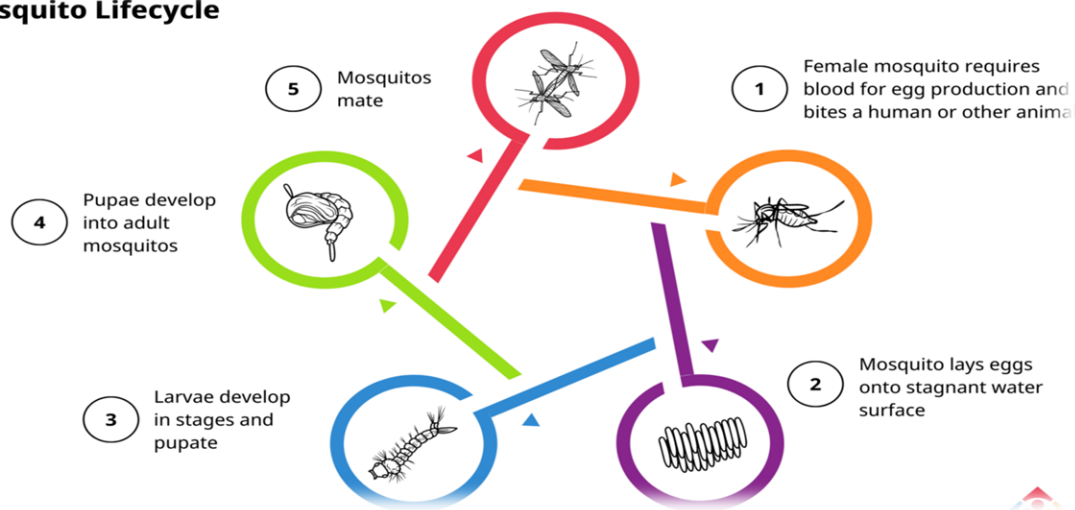


Figure-1.7: Mosquito Lifecycle [24].

- **Public Health Infrastructure:** Although Bangladesh's public health system has improved significantly to contain dengue outbreaks, issues persist. The country has implemented surveillance systems to monitor dengue cases and identify outbreaks in a timely manner

[25,26]. Moreover, medical facilities are prepared to handle and treat dengue-related issues. Bangladesh's public health system is not without flaws, though, especially in rural areas where resources and care are few. This may make it more difficult to diagnose and treat conditions early, increasing morbidity and mortality rates. Moreover, problems with vector management, such as inadequate funding and execution, may make it more difficult to lower mosquito populations and stop the spread of dengue [27,28].

1.8 Challenges in Treatment

In Bangladesh, treating dengue fever is still challenging due to a number of factors, even with advancements in medical care. Effective treatment requires early diagnosis; unfortunately, symptoms of dengue can mimic those of other illnesses, delaying diagnosis and treatment. Moreover, many locations, particularly rural ones, may have limited access to skilled healthcare personnel and specialized medical facilities. Access to essential medications and diagnostic tools can be challenging, especially for marginalized populations. Additionally, the emergence of dengue hemorrhagic fever (DHF), a severe form of the illness, may make treatment more difficult and increase the chance of fatality. A complex approach is required to address these problems, one that involves improving the healthcare system, raising public awareness and early identification, and facilitating access to essential medical supplies [29,30].

1.9 Response Strategies

- **Government Initiatives:** The Bangladeshi government has implemented many nationwide initiatives in an effort to lessen the dengue epidemic. A crucial element of dengue prevention strategies is public awareness campaigns, which include community outreach programs and mass media (radio, television, and newspapers) campaigns to inform people about dengue prevention practices such as proper waste management, minimizing mosquito breeding places, and donning mosquito nets [31]. Initiatives for vector control are another crucial strategy; they focus on applying pesticides, enhancing hygienic conditions, and promoting the use of larvicides to kill mosquito larvae [32]. In order to improve early

detection, appropriate treatment, and consistent care across the nation, the government has also created dengue treatment guidelines and procedures for healthcare facilities . However, problems with program execution, resource allocation, and community engagement continue, requiring ongoing evaluation and modification of these measures to maximize success [33].

- **Community Involvement:** To stop the spread of dengue in Bangladesh, community involvement and education are essential. Research indicates that communities have a significant impact on the adoption of vector control strategies and behavior modifications aimed at reducing mosquito breeding sites [34]. Mass media can effectively disseminate information about dengue prevention, symptoms, and early diagnosis through public awareness campaigns [35]. Moreover, community-based initiatives that include individuals in trash management, mosquito breeding area elimination, and source reduction operations can significantly reduce mosquito populations [36]. In the fight against dengue, empowering communities with knowledge and tools can foster a sense of responsibility and ownership . This cooperative approach, along with financial support and official endorsement, might make Bangladesh's dengue management initiatives more successful.

1.10 Treatment Modalities

Although there isn't a specific treatment for dengue fever, supportive care is the main focus of treatment in Bangladesh in order to reduce symptoms and prevent complications. This comprises:

❖ **Supportive Care:**

1. **Fluid Management:** Strict fluid management is one of the cornerstones of dengue treatment in Bangladesh [37]. Dengue can induce blood vessel plasma leakage, which can lead to dehydration and potentially deadly outcomes. Thus, maintaining appropriate fluid balance is essential. This often involves the infusion of fluids intravenously (IV), under the watchful supervision of medical professionals. The degree of the patient's sickness

determines the kind and number of fluids that are given . Improving patient outcomes and preventing complications need prompt and sufficient fluid resuscitation [38].

2. **Pain Management:** Especially when the disease is still febrile, pain management is crucial to the treatment of dengue fever. The dengue virus cannot be cured, however managing pain and suffering can significantly improve patient outcomes and reduce the chance of complications. Here are some common pain management strategies used in Bangladesh:

- **Over-the-counter analgesics:** Acetaminophen, also known as paracetamol, is commonly administered for the treatment of dengue fever and muscle aches. It is imperative that prescribed dosages be adhered to and misuse is avoided [39].
- **Steer clear of NSAIDs:** Aspirin and ibuprofen are two examples of nonsteroidal anti-inflammatory drugs (NSAIDs) that should be avoided because they may raise the risk of bleeding in dengue patients, especially those with low platelet counts [40].
- **Rest:** Getting enough sleep helps speed up healing by easing pain and fatigue.
- **Cold compresses:** You can momentarily reduce heat and pain by applying cold compresses to your joints and forehead [41].

❖ **Disease-Specific Management:**

1. **Dengue Hemorrhagic Fever (DHF):** DHF is a serious type of dengue that has lethal potential. DHF patients often need intensive supportive care and close observation, which is often given in a hospital environment [42]. Here are a few primary treatment choices:

- **Intravenous Fluids:** To treat hypovolemia and preserve hemodynamic stability, prompt fluid resuscitation is necessary. Crystalloids like regular saline or Ringer's lactate are commonly used [43].
- **Platelet Transfusions:** Blood transfusions may be necessary to prevent excessive bleeding in cases of severe thrombocytopenia (low platelet count).
- **Monitoring for Shock:** To identify early indications of shock, careful monitoring of vital signs such blood pressure, heart rate, and breathing rate is necessary. Quick fluid resuscitation and other supportive measures could be required if shock strikes [44].

- **Monitoring Liver Function:** It's important to keep an eye on liver enzyme levels and adjust medication as necessary because DHF can damage liver function.
- **Antibiotics:** While they are useless against the dengue virus, antibiotics can be used to treat sporadic secondary bacterial infections.

2. **Dengue Shock Syndrome (DSS):** DSS is a potentially fatal dengue fever complication that requires immediate medical attention. Intense fluid resuscitation, vital sign monitoring, and addressing any underlying issues are typically part of the treatment [45].

The following are some crucial DSS therapeutic options:

- **Intravenous Fluid Resuscitation:** The prompt injection of intravenous fluids is crucial for restoring blood volume and enhancing circulation. Crystalloids like regular saline or Ringer's lactate are frequently used [46].
- **Monitoring Vital Signs:** Keeping an eye on vital signs It is essential to closely monitor blood pressure, heart rate, breathing rate, urine output, and consciousness to ascertain fluid balance and identify indicators of shock [47].
- **Platelet Transfusions:** Blood transfusions may be necessary to lower the risk of bleeding in cases of severe thrombocytopenia (low platelet count).
- **Electrolyte Balance:** Keep an eye on your electrolyte levels and top off any deficits as needed.
- **Management of Organ Dysfunction:** Specialized interventions may be required if DSS results in damage to an organ (such as liver or renal failure).

❖ **Preventive Measures:**

1. **Vector Control:** In Bangladesh, controlling vectors is crucial to preventing dengue. Targeting the *Aedes aegypti* and *Aedes albopictus* mosquito populations, which are known to transmit the dengue virus, can help lower dengue fever cases [48].

The following are some crucial vector control tactics:

- **Removal of breeding sites:** It's important to locate and get rid of potential mosquito breeding areas, such as open water bodies, abandoned tires, and standing water in containers. Public awareness campaigns, government initiatives, and community-based activities can all help achieve this.
 - **Larval control:** One efficient method of vector management is to kill mosquito larvae in breeding areas by using larvicides. Water bodies can be treated with *Bacillus thuringiensis israelensis* (Bti), a biological larvicide [49].
 - **Adult mosquito control:** Adult mosquitoes can be killed with pesticides. Personal protection methods including mosquito nets and repellents, indoor residual spraying (IRS), and space spraying can all help achieve this [50].
 - **Environmental changes:** Improving drainage systems and filling potholes will help make the environment less conducive to mosquito reproduction, which can help lower the number of mosquitoes [51].
2. **Community Awareness:** Community involvement and knowledge are crucial for the prevention of dengue disease. People can take proactive steps to protect themselves and their communities by learning about the disease, its symptoms, and preventive measures [52].

The following are some crucial strategies for encouraging preventive behavior and increasing community awareness:

- **Public health campaigns:** Public health campaigns can reach a wide audience and raise awareness about dengue prevention by disseminating information via a variety of media, including as radio, television, newspapers, and social media [53].
- **Educational activities:** Detailed information about dengue, its symptoms, and preventative measures can be obtained through workshops, seminars, and school programs.

- **Community mobilization:** Involving nearby communities in dengue prevention efforts, such as cleanup drives and mosquito control strategies, may give them a greater sense of accountability and ownership [54].
- **Health worker training:** The skills needed to identify, treat, and prevent dengue must be taught to medical personnel.

1.11 Challenges and Future Directions

In Bangladesh, dengue fever is still a serious public health concern that is made worse by an intricate web of interrelated causes. With rising temperatures and altered rainfall patterns brought about by climate change, the conditions have been perfect for the growth of mosquitoes, particularly *Aedes aegypti* and *Aedes albopictus*, which are the main vectors of dengue transmission [55]. The problem has been made worse by the rapid urbanization and population growth, which has increased the number of mosquito breeding sites in populated areas and unofficial communities.

Insufficient resources, particularly in remote areas, hinder the effective execution of preventive and remedial actions. Inadequate funding, a shortage of trained workers, and inadequate infrastructure can all be obstacles to early detection, surveillance, and response efforts. The emergence of drug-resistant mosquito strains presents a new obstacle that calls for constant modification of vector control strategies [56].

Bangladesh should take a comprehensive strategy that addresses these many issues and incorporates the following crucial areas:

1. Strengthened Surveillance Systems:

- ✓ Invest in efficient monitoring systems to track illness trends, detect high-risk areas, and keep an eye on dengue outbreaks.
- ✓ Expand the lab's capacity to guarantee prompt and precise diagnosis.
- ✓ Install early warning systems to swiftly identify and address potential epidemics.

2. Better Techniques for Vector Control:

- ✓ Larvicides, adulticides, and environmental modifications can all contribute to a decrease in mosquito populations.
- ✓ Promote neighborhood-based initiatives to get rid of breeding grounds and to put personal safety precautions into action.
- ✓ Examine state-of-the-art vector control methods including sterile insect technique and genetically engineered mosquitoes.

3. Improved Public Health Education:

- ✓ Organize extensive public health campaigns to inform the public about preventing dengue, recognizing its symptoms early, and how urgent it is to get medical attention.
- ✓ Inspire communities to take preventative measures like eliminating nesting locations, using mosquito nets, and dousing themselves in insect repellent.
- ✓ Boost community involvement and involvement in dengue prevention initiatives.

4. Expanded Access to Healthcare:

- ✓ Guarantee equitable access to medical care, particularly for underprivileged and rural communities.
- ✓ Enhance primary healthcare facilities to guarantee timely diagnosis, treatment, and assistance with referrals.
- ✓ Expand the availability of essential drugs and testing equipment.

5. Research and Development:

- ✓ Spend money on research to develop fresh dengue vaccinations and therapies.
- ✓ Examine cutting-edge methods for controlling vectors and the potential for genetically modified mosquitoes.
- ✓ Research should be done to learn more about the variables that affect dengue transmission and the effectiveness of different preventative and control measures.

6. Global Cooperation:

- ✓ To exchange information, resources, and best practices for dengue prevention and control, strengthen regional and global cooperation.

- ✓ Take part in coordinated surveillance operations and cooperative research projects.

By tackling these issues and implementing a comprehensive strategy, Bangladesh would be able to significantly reduce the impact of dengue and safeguard public health.

CHAPTER- 02

PURPOSE OF THE STUDY

2.0 Purpose of the Study

This thesis' main objective is to provide a thorough and up-to-date analysis of Bangladesh's dengue status. In particular, the research aims to:

1. **Assess the current prevalence and burden of dengue fever in Bangladesh:** Examining current epidemic patterns, case counts, mortality rates, and regional dispersion are all part of this process.
2. **Determine the following important risk factors for dengue transmission:** Urbanization, socioeconomic status, climate change, and personal characteristics all contribute to the spread of dengue.
3. **Evaluate the effectiveness of government responses and public health interventions:** This entails assessing the application of surveillance systems, healthcare services, community engagement initiatives, and vector control methods.
4. **Explore the socioeconomic impact of dengue fever on households and communities:** This entails looking into the dengue epidemics' financial costs, healthcare burden, and psychological effects.
5. **Identify challenges and opportunities for future dengue prevention and control efforts:** This entails assessing the limitations of current strategies and offering suggestions for improving Bangladesh's reaction to dengue.

By tackling these goals, this thesis will contribute to a better knowledge of Bangladesh's dengue situation and assist direct evidence-based policy decisions for successful prevention and control measures.

CHAPTER- 03

METHODOLOGY

3.0 Methodology

Literature Review: A thorough literature search was carried out using many platforms such as Google, Google Scholar, PubMed, CrossRef, and others. After a thorough investigation, more than 28 documents were obtained, including a variety of research and review publications. A carefully constructed paper was created, which included a thorough examination of these sources, specifically concentrating on locating pertinent literature. The paper specifically cites works published from 2004 to 2024.

Data Analysis: The data was analyzed rigorously to synthesize information and derive relevant insights. The material was systematically organized thematically to align with the study's aims, resulting in separate sections dedicated to each facet of the topic.

CHAPTER- 04

DISCUSSION

4.0 Discussion

This review provides a thorough analysis of the dengue situation in Bangladesh, emphasizing the key factors that contribute to the disease's development as well as the challenges associated with management and prevention. Urbanization, inadequate public health infrastructure, and climate change have all greatly increased the incidence of dengue in the nation. Although the government has taken a number of actions to battle dengue, a long-term and comprehensive plan is required due to ongoing barriers and the disease's dynamic nature [84]. Future research should focus on:

Developing innovative prevention strategies: Creating cutting-edge preventative measures including dengue immunizations, improved vector control methods, and genetically modifying mosquitoes [85]

Enhancing surveillance systems: Having more monitoring power can help in tracking disease trends, identifying outbreaks early, and directing focused actions [86].

Enhancing Public Health Infrastructure: The capacity to contain dengue outbreaks will be enhanced by funding medical facilities, training medical staff, and expanding access to essential medical supplies [87].

Encouraging community involvement: Including communities in dengue prevention and control initiatives can increase awareness, improve adherence to preventive measures, and foster a sense of pride in the community [88].

Addressing socioeconomic disparities: Reducing socioeconomic disparities may assist those who are less fortunate become less susceptible to dengue [89].

Bangladesh has the potential to effectively mitigate the effects of dengue and maintain public health by addressing these challenges and allocating resources towards sustainable remedies.

CHAPTER- 05

CONCLUSION

5.0 Conclusion

This thesis offers a thorough analysis of the dengue situation in Bangladesh, highlighting the key factors that contribute to the disease's development as well as the challenges associated with management and prevention. Urbanization, inadequate public health infrastructure, and climate change have all greatly increased the incidence of dengue in the nation. Although the government has taken a number of actions to battle dengue, a long-term and comprehensive plan is required due to ongoing barriers and the disease's dynamic nature. Subsequent investigations ought to focus on developing innovative preventive methods, improving surveillance frameworks, strengthening public health infrastructure, and promoting community engagement. Bangladesh has the potential to effectively mitigate the effects of dengue and maintain public health by addressing these challenges and allocating resources towards sustainable remedies [90].

CHAPTER- 06

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