

# Dengue Fever: Unraveling the Journey from Mosquito Bite to Disease Control

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## Introduction

Dengue is a viral disease spread through the bite of infected female *Aedes* mosquitoes, commonly known as the "tiger mosquito." These mosquitoes usually bite during the daytime, especially in the early morning and late afternoon.

Today, dengue has become one of the fastest-growing mosquito-borne diseases in the world. Millions of people are affected every year, and the number of cases has increased significantly over the past two decades. The disease is now common in many tropical and subtropical countries, including India.

Dengue is most often found in cities, towns, and rapidly developing areas where stagnant water allows mosquitoes to breed. Water stored in drums, tanks, coolers, flowerpots, discarded tyres, and other containers can become ideal breeding sites for dengue mosquitoes.

Many people infected with dengue may not show symptoms or may experience only mild fever and body aches. However, some cases can become severe and life-threatening if not identified and treated early. Severe dengue may cause bleeding, breathing difficulties, shock, and organ damage. There is currently no specific medicine that cures dengue. Early diagnosis, adequate fluid intake, rest, and timely medical care are the best ways to prevent serious complications and save lives.



## Transmission

Dengue virus (DENV) is primarily transmitted to humans through the bite of infected female mosquitoes, particularly *Aedes aegypti*, which is considered the most important vector of the disease.

## Mosquito-to-Human Transmission

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## Other Modes of Transmission

In rare cases, dengue virus transmission has been reported through blood transfusions, organ transplants, and the administration of blood-derived products. Furthermore, transovarial transmission has been observed in mosquitoes, where infected female mosquitoes transmit the virus directly to their progeny. This mechanism may play a role in sustaining the virus within mosquito populations even in the absence of active human infections.

## Transmission of Dengue Virus

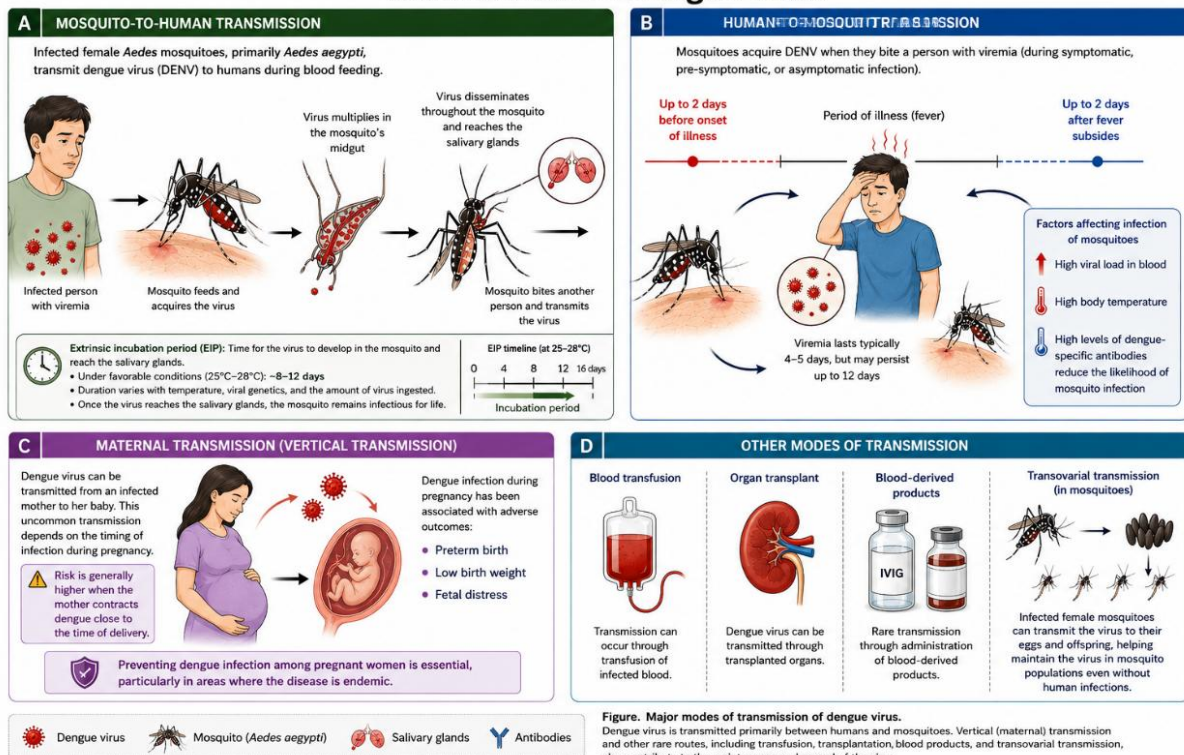
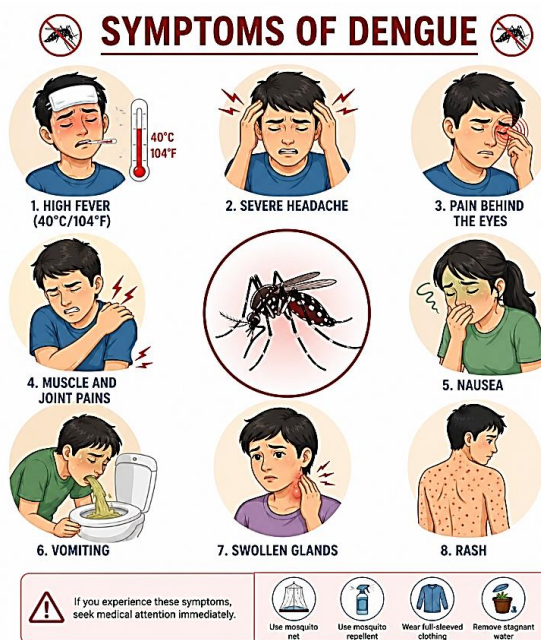



Figure. Major modes of transmission of dengue virus. Dengue virus is transmitted primarily between humans and mosquitoes. Vertical (maternal) transmission and other rare routes, including transfusion, transplantation, blood products, and transovarial transmission, also contribute to the maintenance and spread of the virus.

## Symptoms


Most dengue infections are either asymptomatic or cause only mild illness, with most individuals recovering completely within one to two weeks. However, in a small proportion of cases, the disease can progress to a severe form that may result in life-threatening complications or death. When symptoms develop, they typically appear 4–10 days after infection and persist for approximately 2–7 days. Common clinical manifestations include:













Individuals who are infected for the second time are at greater risk of severe dengue. The symptoms of severe dengue often come after the fever has gone away and may include:




## WARNING SIGNS OF SEVERE DENGUE




Seek immediate medical attention if you or your loved one has any of these symptoms.


<b>1</b> SEVERE ABDOMINAL PAIN 	<b>2</b> PERSISTENT VOMITING 	<b>3</b> RAPID BREATHING 	<b>4</b> BLEEDING GUMS OR NOSE 	<b>5</b> FATIGUE 
<b>6</b> RESTLESSNESS 	<b>7</b> BLOOD IN VOMIT OR STOOL 	<b>8</b> BEING VERY THIRSTY 	<b>9</b> PALE AND COLD SKIN 	<b>10</b> FEELING WEAK 




**Do not wait for symptoms to get worse. Seek medical care immediately.**




Cover water containers




Use mosquito repellent



Wear long sleeves and pants



Use screens on windows and doors



Remove stagnant water

People with these severe symptoms should seek care immediately. After recovery, people who have had dengue may experience fatigue for several weeks.

### Diagnosics and treatment





Although dengue is a major public health concern, there is currently no specific antiviral drug available to treat the infection. Therefore, treatment mainly focuses on managing symptoms and preventing complications. Fever and body pain can be safely relieved with paracetamol (acetaminophen). However, medications such as ibuprofen and aspirin should be avoided because they can increase the risk of bleeding, a serious complication associated with dengue. In cases where the disease progresses to severe dengue, hospitalization is often required. These patients need careful monitoring, proper fluid management, and supportive medical care to reduce the risk of severe complications and improve recovery outcomes.

## Diagnosics and Treatment of Dengue





### A. DIAGNOSIS


Accurate and timely diagnosis is essential for effective management and control of dengue. The choice of diagnostic methods depends on the stage of illness and the resources available.

**1. Diagnostic Approaches and Common Tests**

Nucleic acid amplification tests (NAATs)	Enzyme-linked immunosorbent assays (ELISAs)	Rapid diagnostic tests (RDTs)	Virus isolation
 Detect viral RNA (eg, RT-qPCR). High sensitivity and specificity. Useful in early infection.	 Detect NS1 antigen (early) or IgM/IgG antibodies (from day 5 onward). Used in laboratories.	 Detect NS1 antigen or IgM/IgG antibodies. Quick and easy to use at point of care; lower sensitivity than ELISA/NAATs.	 Isolation of live virus in cell culture. Gold standard but time-consuming; mainly used in reference laboratories.

**2. Timing of Detection During Illness**



Days of illness	0–2	3–5	6–7	>7
Virological and immunological profile	 Viremia (high)	 Viremia (declining)	 IgM appears; IgG begins to rise	 IgG persists; IgM declines
Preferred diagnostic tests	NAATs, NS1 antigen RDT, virus isolation	NS1 antigen (early), NAATs	IgM ELISA/RDT (± IgG)	IgG ELISA (confirmation)



 The availability and quality of diagnostic services vary across countries due to differences in healthcare infrastructure and laboratory capacity. Testing strategies should be adapted to local resources and epidemiological context.

### B. TREATMENT


There is currently no specific antiviral drug for dengue. Treatment is supportive and focused on relieving symptoms and preventing complications.


**1. Symptomatic Treatment (Mild Dengue)**


 **Safe medication**  
  
Paracetamol (acetaminophen) can be used to relieve fever and body pain.


 **Avoid these medications**  
  
Ibuprofen, aspirin and other NSAIDs should be avoided as they can increase the risk of bleeding.


**2. Management of Severe Dengue**  
Hospitalization is often required when the disease progresses to severe dengue.


  
Careful monitoring of vital signs and clinical status

  
Appropriate fluid management

  
Monitoring of hematocrit and platelet counts

  
Supportive care to maintain organ function and prevent complications

  
Early detection and management reduce the risk of severe outcomes and improve recovery

 **Key supportive measures:** adequate hydration, rest, and close follow-up. Avoid self-medication, especially NSAIDs and aspirin.

 Early diagnosis and appropriate supportive management are critical to reduce complications and mortality from dengue. Integrated clinical care, laboratory support, and public health surveillance are essential for effective dengue control.


### Risk factors


Previous infection with DENV increases the risk of an individual developing severe dengue.

## FACTORS THAT INFLUENCE DENGUE RISK

#### PREVIOUS INFECTION INCREASES RISK


Previous infection with DENV increases the risk of an individual developing severe dengue.





 People with a previous dengue infection are at higher risk of severe dengue if infected again with a different DENV serotype.


#### URBANIZATION AND DENGUE TRANSMISSION


Urbanization (especially rapid, unplanned urbanization), is associated with dengue transmission through multiple social and environmental factors:



  
Population density


  
Human mobility


  
Access to reliable water source


  
Water storage practices


#### COMMUNITY KNOWLEDGE, BEHAVIOURS AND ACTIONS MATTER


Community risks to dengue also depend on population knowledge, attitudes and practices towards dengue, as exposure is closely related to behaviours such as water storage, plant-keeping and self-protection against mosquito bites.

  
Water storage practices

  
Plant-keeping practices

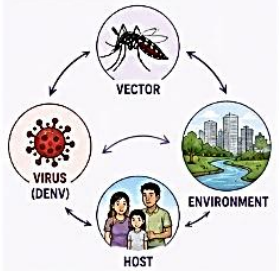
  
Self-protection against mosquito bites




 Routine vector surveillance and control activities and targeted community engagement greatly enhance resilience.

#### CLIMATE CHANGE, ENVIRONMENT AND DYNAMIC RISKS

Vectors can adapt to new environments and climate. The interaction between the dengue virus, the host and the environment is dynamic.




 Consequently, disease risks may change and shift with climate change in tropical and subtropical areas, in combination with increased urbanization and population movement.


 **UNDERSTAND THE RISKS. TAKE ACTION. PREVENT DENGUE. PROTECT OUR COMMUNITIES.**


## Prevention and control

















Prevention control includes the following:



# TOGETHER, LET'S FIGHT DENGUE!




The mosquitoes that spread dengue are active during the day.

PROTECT YOURSELF FROM MOSQUITO BITES	PREVENT MOSQUITOES FROM BREEDING	IF YOU GET DENGUE, IT'S IMPORTANT TO:
<p>To lower your risk of getting dengue, protect yourself from mosquito bites by using:</p> <div style="display: flex; flex-direction: column; gap: 10px;"> <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;">Clothes that cover as much of your body as possible.</div> </div> <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;">Mosquito nets, ideally sprayed with insect repellent, if sleeping during the day.</div> </div> <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;">Window screens.</div> </div> <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;">Mosquito repellents (containing DEET, Picaridin or IR3535).</div> </div> <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;">Coils and vaporizers.</div> </div> </div>	<p>To prevent mosquitoes from breeding:</p> <div style="display: flex; flex-direction: column; gap: 10px;"> <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;">Implement environmental management and modification practices to stop mosquitoes from accessing egg-laying habitats.</div> </div> <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;">Dispose of solid waste properly and remove artificial habitats that can hold water.</div> </div> <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;">Cover, empty and clean domestic water storage containers on a weekly basis.</div> </div> <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;">Apply appropriate insecticides to water storage outdoor containers.</div> </div> </div>	<div style="display: flex; flex-direction: column; gap: 10px;"> <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;">Rest.</div> </div> <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;">Drink plenty of liquids.</div> </div> <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;">Use acetaminophen (paracetamol) for pain.</div> </div> <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;">Avoid non-steroidal anti-inflammatory medication such as ibuprofen and aspirin.</div> </div> <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;">Watch for severe symptoms and contact your doctor as soon as possible if you notice any.</div> </div> </div>
 <p><b>BE SMART. BE PREPARED. STAY PROTECTED.</b> <b>TOGETHER, WE CAN STOP DENGUE!</b></p>		 <p>If you have severe symptoms such as severe abdominal pain, persistent vomiting, bleeding or difficulty breathing, seek medical attention IMMEDIATELY.</p>

At present, one dengue vaccine, QDenga, has been approved and is available in several countries. Its use is currently recommended primarily for individuals between 6 and 16 years of age living in areas with high dengue transmission. Several additional vaccines are under evaluation.

*\*All the Information is adopted from the source WHO website.*

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