

Dengue

Changing epidemiology

Key facts

- Dengue is a mosquito-borne viral infection.
- The infection causes flu-like illness, and occasionally develops into a potentially lethal complication called dengue haemorrhagic fever (DHF) and dengue shock syndrome (DSS).
- The global incidence of dengue has grown dramatically in recent decades.
- About half of the world's population is now at risk.
- Dengue is found in tropical and sub-tropical climates worldwide, mostly in urban and semi-urban areas.
- Severe dengue is a leading cause of serious illness and death among children in some Asian and Latin American countries.
- Dengue is endemic in India and outbreaks occur every year.
- There is no specific treatment for dengue/severe dengue, but early detection and access to proper medical care lowers fatality rates.
- Dengue prevention and control solely depends on effective vector control measures.

Global burden

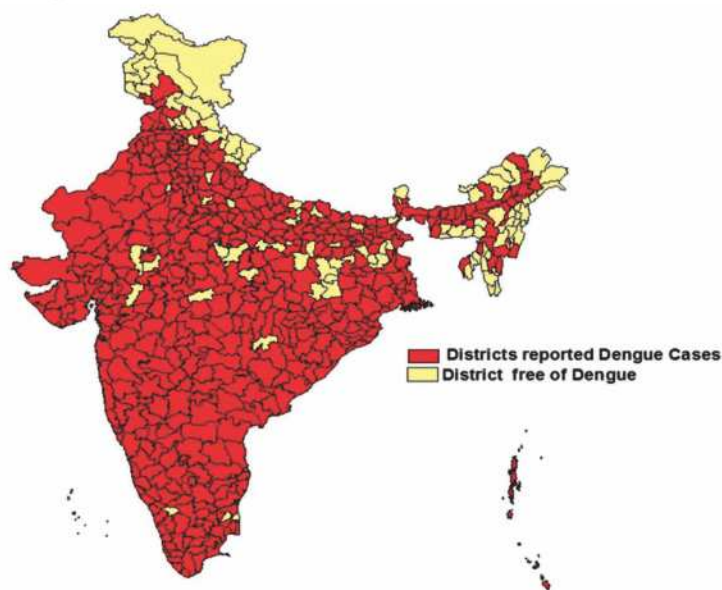
- Dengue is a mosquito-borne infection found in tropical and sub-tropical regions around the world. In recent years, transmission has increased predominantly in urban and semi-urban areas and has become a major international public health concern.
- Over 2.5 billion people—over 40% of the world's population—are now at risk from dengue, a mosquito borne infection. WHO currently estimates that there may be 50-100 million dengue infections worldwide every year.
- Before 1970, only nine countries had experienced severe dengue epidemics. The disease is now endemic in more than 100 countries in Africa, the Americas, the Eastern Mediterranean, South-east Asia and the Western Pacific.

Burden in India

- The disease is now endemic in the entire country. As per the national programme, 31 states reported 74 201cases of dengue and 167 deaths in 2013.

- Not only is the number of cases increasing as the disease spreads to new areas, but outbreaks are also occurring. Recurring outbreaks of dengue have been reported from Andhra Pradesh, Delhi, Goa, Haryana, Gujarat, Karnataka, Kerala, Maharashtra, Rajasthan, Uttar Pradesh, Odisha, Pondicherry, Punjab, Tamil Nadu and West Bengal. Cases are reported from rural areas as well.

Dengue affected areas since 1991



Source: NVBDCP

Risk factors and transmission

- The dengue viruses have four virus serotypes, which are designated as DEN-1, DEN-2, DEN-3 and DEN-4. While infection with any one serotype confers lifelong immunity to the virus serotype, all four are antigenically similar yet different enough to elicit cross-protection only for a few months. Subsequent infections by other serotypes increase the risk of developing severe dengue. All four dengue virus serotypes are isolated in India. At present DEN-1, DEN-2 and DEN-3 serotypes are widespread in India.
- Dengue is transmitted by the bite of female *Aedes* mosquito that becomes infected with dengue virus when blood meal from person during the acute febrile (viraemia) phase of dengue illness (five-six days). After an extrinsic incubation period of eight to ten days, the mosquito becomes infected and virus is transmitted when the infective mosquito bites man.
- In India, *Ae. aegypti* is the main vector in most urban areas; however, *Ae. albopictus* is also found as vector in few areas of southern and eastern India.
- The *Ae. aegypti* mosquito lives in urban habitats and breeds mostly in man-made containers. Unlike other mosquitoes, it is a daytime feeder; its peak biting periods are in the morning and in the evening before dusk.
- Female *Ae. aegypti* bites multiple people during each feeding period. Transovarian transmission (infection carried over to the next progeny of mosquitoes through eggs) and capacity of the eggs to remain viable for one year without water has made the control more complicated.



Aedes aegypti is a day biter and breeds mostly in man-made containers
Source: WHO

Clinical presentations

- Clinical manifestations vary from undifferentiated fever to florid hemorrhage and shock. The clinical presentations depend on age, immune status of the host and the virus strain.
- Dengue should be suspected when a high fever (40°C/104°F) is accompanied by two of the following symptoms: severe headache, pain behind the eyes, rash, muscle and joint pains, nausea and vomiting.
- Warning signs of severe dengue (DHF), a potentially deadly complication of dengue may occur in some cases three-seven days after the first symptoms in conjunction with a decrease in temperature (below 38°C/100°F). These include bleeding from internal organs, bleeding gums, severe abdominal pain, persistent vomiting, rapid breathing, fatigue, restlessness, blood in vomit etc. Due to increased vascular permeability blood pressure drops and patient goes to shock. The next 24-48 hours of the critical stage can be lethal; proper medical care is needed to avoid complications and risk of death.

Treatment

- There is no specific treatment for dengue fever. Antipyretics and cold sponging may be used to lower the body temperature. Aspirin/NSAID like Ibuprofen etc. should be avoided since it may cause platelet dysfunction gastritis, vomiting and, acidosis. Paracetamol is preferable.
- For severe dengue, medical care by physicians and nurses experienced with the effects and progression of the disease can save lives—decreasing mortality rates. Maintenance of the patient's body fluid volume is critical to severe dengue care.

Prevention and control

- There is no vaccine to protect against dengue. Developing a vaccine against dengue/severe dengue has been challenging although there has been recent progress in vaccine development.

- Dengue prevention and control solely depends on effective vector control measures, which include:
 - Preventing mosquitoes from accessing egg-laying habitats by environmental management and modification.
 - Disposing of solid waste properly and removing artificial and man-made habitats. Covering, emptying and cleaning of domestic water storage containers on a weekly basis.
 - Applying appropriate insecticides to large outdoor water storage containers that cannot be emptied.
 - Using of personal household protection such as
 - window screens, long-sleeved clothes, repellents
 - treated materials
 - Improving community participation and mobilization for sustained vector control.
 - Applying insecticides as space spraying during outbreaks is one of the emergency vector control measures.
- 7. Inter-sectoral coordination–Different ministries (Urban Development, Rural Development, Panchayati Raj Institutions, Surface Transport, Human Resource Development, Water and Sanitation)
- 8. Monitoring and supervision–Analysis of reports, review, field visit and feedback
- Diagnostic facilities (secondary and tertiary level hospitals) have been identified as sentinel laboratories under the programme (currently 394), which are linked to 14 Apex Referral Laboratories.
- ELISA based NS1 tests (antigen based) have been introduced, which can detect a case from the first day of disease in addition to existing Mac ELISA test (antibody based), which can detect a case only after fifth day of the disease.
- Under the NVBDCP, the case definitions as recommended by WHO are being followed. A national guideline is available for case management.
- The case fatality rate (deaths per 100 cases) due to dengue, which was 1.5 % in 2006 has declined to 0.2% in 2013.
- The National Institute of Virology, Pune has been identified as the nodal institute for manufacturing and directly supplying the Mac ELISA kits to the sentinel labs per programmatic requirements.
- Monitoring of vector population in vulnerable areas is being carried out. Medical officers are being trained for effective case management. Intensive social mobilization campaigns are being undertaken for behavior change communications and community participation in reducing breeding of mosquitoes.
- Outbreaks of dengue are also alerted and verified under the Integrated Disease Surveillance Project. State and district rapid teams have been sufficiently trained to effectively respond to events.

National programme strategies

- The current strategic plan for dengue under the National Vector Borne Disease Control Programme (NVBDCP) has eight key elements, called as 'Octalogue'.
 1. Surveillance–Disease and entomological surveillance
 2. Case management–Lab diagnosis and clinical management
 3. Vector management–Environmental management for source reduction, chemical control, personal protection and legislation
 4. Outbreak response–Epidemic preparedness and media management
 5. Capacity building–Training, strengthening human resource and operational research
 6. Behavior Change Communication–Social mobilization and IEC
- ## WHO recommends
- In view of increasing endemicity, WHO in 2010 grouped India in Category A countries of its South-East Asia Region, where dengue is a major public health

problem, leading cause of hospitalization and death among children, hyperendemic in urban centres, spreading to rural areas and having multiple virus serotypes circulating.

- Intensified efforts are needed for surveillance programs, coupled with improvised disease diagnostics, effective anti-dengue treatment measures, and controlling the disease transmission by following an effective implementation of vector control programs.
- Effective intersectoral coordination is one of the major challenges for prevention and control of dengue, and calls for stewardship and health in all policies.
- More needs to be done for community mobilization for prevention and control of dengue. Operational research can guide risk communication and behavior change communication for dengue prevention.

WHO Global Strategy for Dengue Prevention & Control (2012-2020) has set the goal to reduce the burden of dengue with the following objectives:

- To reduce dengue mortality by at least 50% by 2020;
- To reduce dengue morbidity by at least 25% by 2020, and
- To estimate the true burden of the disease by 2015.

(Baseline 2010)



Source: NVBDCP



Controlling dengue is everyone's responsibility

- Discard/destroy unused items (cups, tyres etc.)
- Do not allow stagnation of water more than a week. Drain out water from various containers, by regular changing of water plus cleaning flower vases and other items.
- Cover all water storage containers, tanks tightly.