

LONG TERM ACTION PLAN FOR PREVENTION AND CONTROL OF DF/DHF/DSS AND CHIKUNGUNYA IN INDIA

1. Both Dengue and Chikungunya are Vector Borne disease and are caused by viruses carried by same Mosquito [*Aedes aegypti*]. Dengue/ DHF is being managed as a part of National Vector Disease Control Programme (NVBCDP). Chikungunya fever has occurred in epidemic form in the year of 2006 after about 30 years. Chikungunya was, till now, not part of the National Vector Borne Disease Control but the strategies for its prevention and control is similar to that of Dengue prevention and control strategies as both the disease are caused by the same Vector (Mosquito) i.e. *Aedes aegypti*.

2. The long term strategies for prevention and control of DF/DHF/DSS and Chikungunya in India would be three-pronged and is as follows:

A. Early Case reporting and management:

Case reporting

- **Fever alert surveillance**
- **Sentinel Surveillance sites with laboratory support**
- **Strengthening of referral services**
- **Involvement of Private sector in sentinel surveillance**

Case management

- **Case management**
- **Epidemic preparedness and rapid response**

B. Integrated vector management (IVM)(for transmission risk reduction):

- **Entomological Surveillance including larval surveys**
- **Anti-larval measures**
 - **Source reduction**
 - **Chemical larvicide / biocide**
 - **Larvivorous fish**
 - **Environmental management**
- **Anti- adult measures**
 - **Indoor Space Spraying with Pyrethrum extract (2%)**
 - **Fogging during outbreaks**
 - **Personal protection measures**
 - **Protective clothing**
 - **Insecticide treated bed nets and repellents**

C. Supporting Interventions:

- **Human Resource Development through capacity building**
- **Behaviour Change Communication (BCC)**
- **Inter-sectoral convergence**
- **Operational research**
- **Supervision and Monitoring**
- **Coordination Committees**
- **Legislative support**

Each of the above components is described in detail as follows:

A. Early Case reporting and management:

Early Case reporting and management -

Fever alert surveillance:

For **early capture of any incipient outbreak** of a suspected vector borne disease,, it is envisaged that the health workers and grassroots level functionaries such as **ASHA (NRHM), Anganwadi worker (AWW) and Fever Treatment Depots (FTD of NVBDCP)** shall be trained in identification and reporting of fever syndrome¹ to district Vector Borne Disease Control Officer directly under intimation to respective PHCs/CHCs.

To supplement the surveillance data, a **100 seater call center** having **regional language calling** and **answering ability** is being set up under IDSP. The call center would be able to alert the concerned health facility for verification of any reported cases of unusual increase in the epidemic-prone disease.

Furthermore, information on **disease surveillance will be shared** with the **Inter-sectoral institutions** created under **NRHM** such as:

- At District level - District Health Mission;
- At Block Level - Rogi Kalyan Samiti;
- At Village level - Village Health and Sanitation Committee (VHSC).

Village Health and Sanitation Committee (VHSC) at the village level under NRHM would also provide **exceptional reporting** in the event of **emerging outbreak of fever cases**.

It is also proposed to **introduce pre-paid post cards information system for ASHA** in **selected high endemic districts** to get early information on any *upsurge in fever cases*². This system will be implemented in two states viz., Bihar and Kerala. Total 100 ASHAs/AWWs will be identified in remote and inaccessible areas in the states in the pilot phase. This mechanism would **facilitate immediate investigation** of cause of the fever followed by remedial measures.

Early Case reporting and management -

Establishment of Sentinel Surveillance sites with laboratory support:

Presently, in most states epidemics are near peak transmission before they are recognized and confirmed as dengue. By then it is generally too late to implement effective preventive measures that could have an effective impact on transmission and thus on the course of the epidemic.

It is therefore proposed that the **surveillance for dengue should be proactive**. The Programme envisages employing a **proactive surveillance system that will permit**

¹ **Fever syndrome** could include any of the conditions like only fever, fever with rashes, fever with breathing manifestations, fever with severe joint pain and swelling, fever with altered sensorium or semi-consciousness /unconsciousness

² **Upsurge in fever cases** will be treated in case at any point of time *more than five cases (clustering)* in a week in about 500 – 1000 population of the village

prediction of dengue outbreak. The most important component of this proactive system is serological/ virological surveillance, which will monitor **the dengue virus transmission especially during inter-epidemic periods and to continually provide information** on where transmission is occurring, what virus serotype or serotypes are involved and the type of complications associated with dengue infection. It will also permit to differentiate whether the illness is dengue or Chikungunya, as the initial symptoms are similar in both the disease.

It is proposed that a **network of sentinel surveillance hospitals at regional and district levels, will be monitoring dengue virus activity during the inter-epidemic period and alert the programme managers for effective** remedial measures in areas with viral activity. **It is aimed to have at least one sentinel surveillance site in each district of the country.** But to begin with Dte of NVBDCP has identified and notified **80 sentinel surveillance sites³** in consultation with state governments in the country. A **contingency grant of Rs 50,000/- shall be made available to each of these hospitals** to meet out the expenditures towards laboratory reagents, internet, stationery, data management and travel cost for attending meetings by the In-charge of sentinel laboratory.

The sentinel surveillance hospitals will carry out various activities⁴ like **taking blood samples** from the suspected patients with viral syndrome, **maintaining line-listing** of positive cases of dengue and Chikungunya and **capacity building** of PHCs/CHCs within the district etc.

As soon as a dengue case is confirmed by serological test (IgM Capture ELISA Test), the district vector borne Disease Control Officer/ District Chief Medical Officer or Municipal Health Officer would be **intimated** by telephone, e-mail or speed post so that he/she can **immediately initiate remedial measures** in respect of **vector control** in the affected area(s). The **time lag** between intimation received and actions initiated by the district/Municipal authorities should not be more than **24 hrs** in order to effectively interrupt dengue transmission.

Each **sentinel surveillance hospital** will have **ELISA reader, ELISA washer and other necessary equipment for conducting dengue serology.** In case, the equipment is not available with the hospital, the State Programme Officer will immediately arrange the equipment in consultation with the Dte of NVBDCP to ensure that the facility is made available. **The IgM MAC ELISA capture test kits will be supplied by NIV, Pune under the instructions/guidance of Dte of NVBDCP. The States would prepare the technical requirements of the kits based on the previous epidemiological data and could be sent directly to NIV Pune under intimation to Dte. of NVBDCP.** The payment for these kits will be made by the Dte. of NVBDCP out of the funds available under the commodity grant.

³ **Sentinel surveillance sites:** Tamil Nadu (13), Delhi (11), Andhra Pradesh (11), Gujarat (8), Karnataka (6), Uttar Pradesh (6), Maharashtra (3), Rajasthan (8), Pondicherry (3), Goa (2), Haryana (2), Chandigarh U.T.(2), Kerala (1), Sikkim (1), West Bengal (1), Punjab (1) and Madhya Pradesh (1).

⁴ **Activities to be undertaken by sentinel surveillance hospitals:**

- (i) **Blood samples from the suspected patients with viral syndrome will be collected.** These samples will be processed on a weekly basis to detect the presence of dengue /Chikungunya specific IgM antibody. The second set of samples will be sent to the identified laboratory for virus isolation/PCR test. *For details refer to the head of strengthening of apex referral labs in subsequent pages.*
- (ii) These hospitals will also **maintain line-listing of dengue and Chikungunya positive cases.**
- (iii) Sentinel surveillance hospitals will also help in the capacity building of PHCs/CHCs within the district.

Each such centre **shall have a trained microbiologist and a laboratory technician.** The training of the microbiologists/technicians of the sentinel surveillance hospitals will be conducted at **identified apex referral labs.**

Early Case reporting and management – *Involvement of Private sector in sentinel surveillance:*

In addition to sentinel surveillance hospital identified in public sector, the **states shall also identify private clinics/Nursing Homes in endemic districts for establishing sentinel surveillance sites.** However, they can avail the existing laboratory facilities of the public sector for confirmation of dengue cases. The States shall issue directives in this regard. These sites in private sector shall also maintain line listing of cases. The district vector borne disease control officer shall be in contact with the private sentinel surveillance clinics/hospitals to update his database for rapid response. The MOs/Physicians from these centres shall also be included in the training programme organized for sentinel hospital in public sector. The state should take the help of professional bodies like IMA, IAP, etc. in identification of sentinel surveillance hospitals/clinics in private sector.

Early Case reporting and management – *Case Management:*

The case definitions of DF/DHF/DSS⁵ and chikungunya⁶ are described in the annexure.

Treatment of both DF and Chikungunya is **symptomatic and supportive⁷.**

⁵ **Clinical symptoms/case definition of Dengue Fever(DF):** An acute febrile illness of 2-7 days duration with two or more of the following manifestations: headache, retro-orbital pain, myalgia, arthralgia, rash, haemorrhagic manifestations, leucopenia.

Clinical symptoms/case definition of Dengue Haemorrhagic Fever (DHF): positive tourniquet test, petechiae, ecchymoses or purpura, bleeding from mucosa, gastrointestinal tract, injection site, nasal bleeding or other sites, haematemesis or melaena, and thrombocytopenia i.e platelet count (1lakh cells per mm³ or less) and evidence of plasma leakage due to increased vascular permeability.

Clinical symptoms/case definition of Dengue Shock Syndrome(DSS):

All the above criteria for DHF **plus** evidence of circulatory failure manifested by rapid and weak pulse, and narrow pulse pressure (≤ 20 mm Hg) **or** hypotension for age, and cold, clammy skin and restlessness.

⁶ **Clinical symptoms of Chikungunya :** Sudden onset of flu-like symptoms including fever, chills, headache, nausea, vomiting, severe joint pain (arthralgia) and rash. The rash is most intense on trunk and limbs and may desquamate. Migratory polyarthritis usually affects the small joints. The joints of the extremities in particular become swollen and painful to the touch. Haemorrhage is rare and all but a few patients recover within 3-5 days. Residual arthritis, with morning stiffness, swelling and pain on movement may persist for weeks or months after recovery.

⁷ **Technical guidelines for Treatment of DF or Chikungunya:** It is symptomatic and supportive. Bed rest is advisable during the acute febrile phase. Antipyretics like paracetamol or sponging are required to keep the body temperature below 38°C. *Aspirin should be avoided*, since it may cause gastritis, bleeding and acidosis. Analgesics and mild sedatives may be required for patients with severe pain. Liberal intake of oral fluids and electrolytes should be encouraged.

In case of DF the symptomatic treatment should go on until the patient become afebrile and platelet counts and haematocrit determination are normal. Such patients could be managed in OPD clinics and do not require admission in the hospital. Patients cared in an outpatient setting must be carefully followed for **haemorrhage** or any deterioration and **onset of shock**, which usually appears towards the end of the febrile period. In case of such signs of *haemorrhage or shock the patient needs immediate admission and intensive care.*

Similarly, treatment of Chikungunya is also symptomatic and patients should be **monitored** until they become afebrile and get **relief of the joint pains**.

Early Case reporting and management – Epidemic preparedness and rapid response:-

A **contingency plan** dealing with **emergency hospitalization** shall be prepared by each endemic state for making the most effective use of hospital and treatment facilities in case of DHF/DSS or Chikungunya outbreak occurs.

Based on the previous year's epidemiological data on DF/DHF, **the state should estimate requirements for inpatient hospital facilities**. Generally, in the worst scenario, the incidence of seriously ill patients requiring hospitalization may be one case per 100 dengue infections.

The endemic states⁸ shall estimate the number of beds required during the period of three months of high transmission of DF/DHF. If adequate number of beds are not available in the endemic districts, **plans for additional temporary beds** shall be made in advance. Contingency plans should also be developed to convert schools or public buildings to handle the excess of indoor patients, if necessary.

For outpatient department, certain minimum of diagnostic materials⁹ and therapeutics¹⁰ shall be ensured. **For indoor patient's management the hospitals should have the same** diagnostic materials, Supplies & Equipment and Diagnostic materials as for outpatient department, plus some additional facilities.¹¹

Monitoring and treatment of all these patients should follow **guidelines on Dengue Haemorrhagic Fever and Chikungunya which are outlined in our website at www.nvbdc.gov.in**

⁸ **Dengue endemic states/UTs** are: Andhra Pradesh, Bihar, Chandigarh, Delhi, Goa, Gujarat, Haryana, Karnataka, Kerala, Maharashtra, Sikkim, Punjab, Rajasthan, Tamil Nadu, Pondicherry, Uttar Pradesh, D & N Haveli, West Bengal

⁹ **Minimum of diagnostic materials should be :**

- Blood pressure cuffs (adult and paediatric)
- Thermometers
- Haematocrit centrifuge
- Haematocrit supplies (lancets, capillary tubes, reader)
- Compound microscope and materials for white blood cell and platelet counts
- Vacutainers or syringes/needles for obtaining dengue and diagnostic test samples

¹⁰ **Minimum of diagnostic therapeutics:**

- Paracetamol
- WHO oral rehydration solution
- Lactate Ringer's solution; 0.9% saline; 5% glucose
- Tubing and needles for intravenous therapy

¹¹ **Additional facilities for in-patients:**

Hospitalized patients could require some amount of **intravenous fluid therapy**. **Approximately 20% of all hospitalized patients will require intravascular volume expanders such as dextran 40, plasmanate or plasma and about 10% will require the administration of whole blood. Usually, platelet concentrates are not recommended.**

The endemic states should estimate the requirement of the above supplies and equipment and therapeutic materials based on the estimated number of DHF cases, which may require hospitalization.

**Early Case reporting and management –
*Strengthening referral services:***

For advanced diagnostic facilities such as PCR, Virus isolation in Dengue and other viral vector borne diseases, 12 apex laboratories in the country¹² have been identified at present.

These laboratories will also be helping capacity building of Regional and District sentinel surveillance hospitals as well as **quality control of laboratory services.**

These apex laboratories **should have advanced diagnostic test facilities** such as PCR and virus isolation in a period of three years. Some of the laboratories are already having adequate infrastructure viz: NICD, Delhi; AIIMS, New Delhi, NIV, Pune; NIMHANS, Bangalore and NICED, Kolkata.

Other laboratories will be strengthened and the states have been requested to submit proposal. A sum of **Rs 25.0 Lakhs (Rupees Twenty five lakhs only) shall be provided as one time grant** to the participating institutions and the amount could be enhanced further which needs to be strengthened.

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- Laboratory test equipment and supplies for blood typing and cross-matching for measuring arterial blood gases and pH and for measuring serum electrolytes
 - Portable X-ray and ultrasound equipment
 - Central venous pressure monitoring kits
 - Intake-output monitoring charts

Therapeutic materials will be same as that of outpatient department plus:

- Intravascular volume expanders (Dextran 40, plasmanate, platelet concentrates, fresh frozen plasma, whole blood)
- 7.5% sodium bicarbonate for injection
- Chloral hydrate
- Oxygen

¹² The **12 apex laboratories** will be as follows:

- (i) National Institute of Virology, Pune.
- (ii) National Institute of Communicable Diseases, Delhi.
- (iii) National Institute of Mental Health & Neuro-Sciences, Bangalore.
- (iv) Sanjay Gandhi Post-Graduate Institute of Medical Sciences, Lucknow.
- (v) Post- Graduate Institute of Medical Sciences, Chandigarh.
- (vi) All India Institute of Medical Sciences, Delhi.
- (vii) National Institute of Cholera & Enteric Diseases, Kolkata.
- (viii) Regional Medical Research Centre (ICMR), Dibrugarh, Assam.
- (ix) King's Institute of Preventive Medicine, Chennai.
- (x) Institute of Preventive Medicine, Hyderabad.
- (xi) B J Medical College, Ahmedabad.
- (xii) State Virology Institute, Allappuzha, Kerala

B. Integrated Vector Management (IVM) (for transmission risk reduction):

Entomological Surveillance: Although entomological surveillance is being carried out by some of the states where the infrastructure is available, strengthening of this component would be required in all the States/UTs.

Infected people can infect mosquitoes with dengue virus 24 - 48 hrs prior to onset of symptoms. In addition, asymptomatic people may also infect mosquitoes. The high mobility of the population in cities/towns and the local dispersal of mosquitoes mean that the virus may be widespread in the community before it is reported.

During the inter-epidemic period the extremes of temperature have adverse impact on the survival of vector mosquitoes resulting in such a low level of the density that conventional methods of assessing vector populations such as the house index may no longer be sufficient. New and innovative means of the detecting the presence of the mosquito (ovi-traps) are required during inter epidemic period. **Efforts to reduce mosquito population during inter epidemic periods may be highly effective in preventing epidemic transmission.** Cost effective dengue vector control necessitates a largely **preventive approach to transmission control rather than a reactive one** that responds to epidemics.

For of effective control require application of the key elements of integrated vector management, involvement of community through advocacy, social mobilization and collaboration within the health sector and with other sectors, implementation of legislation to prevent mosquito breeding. For sustainability of vector control affords also need capacity building of district/PHC level officials engaged in entomological activities for taking evidence based decision making in terms of vector control methods.

Effective mosquito control is virtually non-existent in many dengue endemic cities/towns. It has been observed that during the epidemic outbreaks, fogging operations are resorted to invariably. **Fogging is unlikely to have any impact on the adult vector mosquito population, except when applied indoors.**¹³

Larvivorous fish, a biological approach to mosquito control needs to be propagated. This needs to be scaled up to achieve substantial coverage of water bodies.

Use of **chemical repellents is encouraged for personal protection** measures such as chemical repellents on exposed skins. However, there are **no good data to show that this has impact on dengue transmission** including use of symptomatic patients. Use to insecticide treated curtains also envisaged in the houses. Insecticide treated bed nets could be used for the young children sleeping in the day time¹⁴ and in the hospitals.

All States/local bodies should **ensure cleanliness and proper sanitary conditions** to make sure that mosquitoes do not breed. Routine cleanliness should be ensured by local bodies and institutions in their own premises and around. In addition to routine cleanliness, surprise inspections by supervisory officers should be done.

¹³ The vector (mosquito) transmitting both dengue and Chikungunya viz. *Aedes aegypti* breed in the containers in & around the households and invariably rests inside the houses and therefore indoor space spray only will have an impact on the adult vectors (mosquitoes)

¹⁴ *Aedes aegypti*, the vector of both dengue and Chikungunya bites during the day time.

Routine mosquito control will not reduce vector population below the threshold levels required for epidemic transmission and there is “lag time” of one to six months between the introduction of a new dengue virus and peak epidemic transmission. Therefore, it is envisaged that each endemic district shall have rapid response emergency vector control teams that will carry out the following activities:

- (i) when surveillance data suggest **increased dengue transmission** or introduction of new dengue virus serotype or strain, the situation should be **investigated immediately**. Epidemiological data should be collected in an attempt to determine where the infection or infections occurred and where it or they may have been transported.
- (ii) at the same time, fully **integrated mosquito control efforts need to be launched** on the basis of information obtained from survey results, the control activity should be directed at the whole community (ward/village).
- (iii) **mass media** such as radio, television and newspaper announcements to inform the people of the problem and what is required to do.
- (iv) **a targeted source reduction programme** undertaken that emphasizes removing those larval habitats that are most productive (tyre dumps, scraps, water storage tanks, cisterns, air coolers, solid waste, coconut shells, etc) and **treating** those that cannot be removed with **Temephos**.
- (v) **Periodic household spray with Pyrethrum 2% extract (0.2% ready to spray solution with kerosene oil)** where the case was detected. In addition, Ultra Low Volume (**ULV malathion spraying of the entire ward/village**), may be carried out using **vehicle mounted equipment in case of clustering of cases involving a large area**.
- (vi) other government and civic organizations such as urban development ministry, local self bodies, ministry of HRD/education (especially schools), urban development, civil aviation, social welfare, defence, scouts, panchayats, Rotary clubs, civil society organizations etc. should be used in dissemination of information, distribution of education material and providing the public with information where mosquitoes can be found and how to control them so as to prevent transmission.

As most transmission occurs at home, therefore, ultimate success of the programme will depend on community participation and co-operation. Therefore, considerable efforts should be placed on community education through advocacy and social mobilization. To develop effective community participation, the people should be informed about Dengue fever/DHF/DSS & Chikungunya and the fact that major epidemics can be prevented by taking effective preventive measures, the **message that must be communicated to all people that:**

- **Dengue fever/DHF is endemic in the area (city/town/village);**
- **city/town/village is at high risk of epidemic DF/DHF and Chikungunya because of high *Ae aegypti* density;**
- **most dengue transmission occurs in and around the houses, surroundings, schools, hospitals, workplaces, market areas, other places of congregations, etc;**

All states should develop innovative health education materials and approaches that can effectively communicate the above messages.

C. SUPPORTING INTERVENTIONS:

SUPPORTING INTERVENTIONS - Capacity Building

One of the primary problems in management of dengue is misinterpretation and resultant confusion because of the term “haemorrhagic fever”, and panic caused by fluctuations in platelet count. Our training programme envisages to reach to a wider audience to be effective in imparting the bigger picture as well as nuances in dengue management. The doctor managing a dengue patient has to make evaluations of the haemodynamic state at several points of time. Further, Chikungunya disease has re-emerged in the country after a gap of three decades, which also necessitates orientation of medical officers on its treatment and management.

It is proposed that Dengue/ Chikungunya treatment teams should be fully trained and available at all CHCs, district hospitals and tertiary care hospitals. Training should also be imparted to dengue treatment clinics and hospitals in private sector. The following reorientation training programmes shall be organized and completed by 30th April:

- (i) Training of National Trainers for tertiary level Dengue/ Chikungunya Treatment Teams:**
All India Institute of Medical Sciences, New Delhi shall be identified as a nodal Institute for organizing National level trainers’ training for Dengue Treatment Teams.
- (ii) State level training for Dengue Treatment Teams:**
National Dengue Training Teams trained at Delhi shall be responsible to train state level dengue treatment teams.
- (iii) District Level Trainers for Dengue Treatment Teams:**
The state level trainers’ teams for dengue treatment should train teams from each of endemic districts on the same line as recommended for state level trainers’ teams.
- (iv) Training of teams at CHC/BPHC:**

Each district shall organize this training in the month of May-June.

Funds available with the state under NRHM (NVBDCP) shall be utilized by states as per norms of NRHM (NVBDCP) guidelines for training. For the national level training WHO, SEARO, New Delhi Office, will be requested to sponsor the National level trainers’ training programme for treatment of DF/DHF/DSS.

The responsibility for timely implementation of above training plans will be with the respective state governments.

SUPPORTING INTERVENTIONS - Behaviour Change Communication:

The Directorate of National Vector Borne Disease Control Programme would be issuing advisories and guidelines for prevention and control of vector borne diseases during inter-epidemic period, before floods/rainy season and during transmission season of vector borne diseases. The epidemiological situation of the disease would also be conveyed by the Directorate of NVBDCP.

Health education shall be conducted through different channels of personal communication, group educational activities and mass media. For personal communication and group educational activities, states shall prepare a plan for every endemic district by involving women’s groups, Residents’ Welfare Associations, school teachers, informal community

leaders and health workers/informal service providers. In every town/city, the elected representatives, other local 'influencers' shall be holding advocacy meetings in their respective constituencies for participation of the people for mass clean-up campaigns, source reduction and environmental sanitation. Such meetings should be started from the month of January and should be intensified before the commencement of dengue transmission. The months of June and July should be observed as Anti - dengue months in every endemic area. Emphasis would be on a 'weekly dry day', when the families, community would be advised to clean and dry all water containers. For mass media, states shall develop a media plan for electronic & print media in regional languages. Most of the states have already prepared TV/Radio spots for this purpose. The messages through various media should be intensified during the month of May, June and July and continue till mid-November.

Activities during anti-dengue/chikungunya months (June-July):

Month of June has already been declared as anti-malaria month all over the country. Messages on Dengue and Chikungunya would also be added up in the campaign. In addition, the month of July shall also be observed as cleanliness month in all cities/towns/Panchayats, following activities should be undertaken.

- (i) Messages from Chief Ministers and Governors
- (ii) 1st week of July could be observed as **cleanliness week** by all institutions both in public-private sector. Wide publicity of such campaigns should be disseminated through local newspapers, radio and cable TV on each day.
- (iii) Maintenance division of Urban Development Ministry/Local self government shall **ensure checking of all over head tanks, undergrounds tasks cisterns**, etc, to ensure that lids in the water containers are tightly closed and there are no holes for the entry of the mosquitoes.
- (iv) Besides routine checking of breeding of mosquitoes by municipal corporations, a **random check of all water containers/potential breeding places** could be conducted to assess the impact of cleanliness week in the 2nd week of July
- (v) All **identified construction sites** in cities and towns shall be identified by the local bodies and regular check up for mosquitoes shall be organized. The contractors and owners of the building shall be **motivated to maintain cleanliness** at the sites of construction and ensuring mosquito free premises.
- (vi) **Residents Welfare Associations** shall organize **week long cleanliness campaigns** in respect of their premises and ensure that all coolers and water storage tanks are free of mosquito breeding. They shall organize house to house check of mosquitoes breeding in co-ordination with the functionaries of local bodies.
- (vii) Discarded tyres (cycle, scooter and motor vehicles) are potential source of Aedes mosquito breeding. The **local bodies shall identify such places or repair shops and educate the owners for proper storage of all such tyres.**
- (viii) **Schools/colleges/university campuses shall organize cleanliness drive** by involving school children/students. The volunteers of the National Service Scheme (NSS) should be involved in organizing cleanliness drive in every school and college premises. Some of the volunteers shall be trained to check the breeding of mosquitoes. The insect collectors of the local bodies shall make a random check of schools in each ward of cities and towns to assess whether breeding of mosquitoes exist. The outcome of such survey shall be disseminated through newspapers, Cable TV and Radio so that others schools are motivated to ensure proper cleanliness and mosquito free environment in their school premises.

- (ix) In rural areas, the volunteers of NYKS shall be involved in dissemination of information and organizing cleanliness drive in co-ordination with Panchyats and functionaries of Rural Development Departments.
- (x) Under the **National Rural Health Mission, untied funds** have been made available to each village **for environmental sanitation and hygiene** which will be spent through village health and hygiene committee constituted under the leadership of Gram Pradhan. At the village level, ASHA, AWW and other members of village health and hygiene committee should be sensitized by the area Health Worker (ANM/MPW) on prevention and control of Dengue.
- (xi) All the **perennial water bodies in wards/villages** should be **identified and mapped for seeding with larvivorous fish**. Functionaries of the Fisheries department at block level shall maintain hatcheries for supply of larvivorous fish to village health and hygiene committee. The committee should monitor percentage of water bodies seeded with larvivorous fish. In urban areas, the activity should either be conducted by Departments of Health or Fisheries. During the month of June, a drive should be organized to ensure coverage of all water bodies with larvivorous fish.
- (xii) On **pilot basis, impregnation of curtains with deltamethrin liquid** will be carried out in NCR Delhi. Requirement of deltamethrin per house should be calculated @15 ml and requirement should be estimated accordingly. Government of India will forward approved rates for deltamethrin liquid to MCD & NDMC and Railway, Cantonment area for procurement of SP liquid. Expenditure towards procurement of SP liquid will be reimbursed to NCT and NCR of Delhi by Government of India. Health authorities of the respective organization shall make an action plan for impregnation of curtains in the month of May and June. For monitoring of the coverage, ward-wise and household-wise number of curtains should be estimated in order to ensure more than 60% coverage.
- (xiii) Print and electronic media shall be informed on day to day activities for control of Dengue and Chikungunya. Besides these meetings, information on dengue and Chikungunya will also be posted on websites at the above mentioned frequently.

A **detailed calendar for health alerts** will be worked out. Mass media like newspapers, TV and Radio would also be used to display alerts on Dengue/Chikungunya. A long term action plan for Dengue/Chikungunya is being finalized

Supporting Interventions

Inter-sectoral collaboration:

The prevention and control of vectors and vector borne diseases require close collaboration and partnership between the health and non-health sectors (i.e. Government, Private, NGOs, etc.).

The committees under NRHM viz District Health Mission, Rogi Kalyan Samitis and Village Health and Sanitation Committee (VHSC), by making use of the flexi-pool would be allowed to take up any activity for preventive works as well as treatment if they are not covered under any of the regular schemes.

Inter-sectoral task force could be established at the state and district level for a coordinated action to prevent vector breeding and assist the health department in control efforts. At the national level high powered steering committee should be constituted under Chairmanship of Hon'ble Prime Minister with Hon'ble HFM as Vice-Chairman and members from other ministries, private sectors and NGOs.

Detailed guidelines of NRHM and NVBDCP will be integrated to make them simpler and user friendly. These guidelines would be translated into **actionable bullet points** in local languages.

Furthermore, suggestive list of actions to be taken by various Ministries/Departments are listed in the annexure. It is not an exhaustive list and any activity focusing on removing/avoiding development of mosquito-genic conditions could be undertaken.

Supporting Interventions

Operational research

ICMR institutes involved in vector borne diseases research and Medical colleges shall be involved in operational research for effective prevention and control of dengue/DHF outbreaks.

Supporting Interventions

Supervision, Monitoring and evaluation:

NICD and its field units and ICMR institutes, including National Institute of Malaria Research (NIMR), involved in vector borne diseases research shall be involved in monitoring and evaluation of dengue control programme.

In addition, States may identify medical colleges and other institutes for monitoring and evaluation of Dengue Control Programme. The plan for monitoring and evaluation should include:

- a. Periodic operational assessments to determine the progress of work and actual inputs received by the programme in terms of materials and manpower, and
- b. Periodic entomological assessments to determine the success or failure of the control measures applied to the vector population and/or epidemiological analyses.

The NIMR, Delhi shall develop a protocol for monitoring and evaluation of dengue control programme which will be adopted by all institutions involved in such activities.

Geographical Information System (GIS) based maps of dengue should be prepared for effective monitoring of the prevention and control measures.

Supporting Interventions

Co-ordination committee:

States shall ensure that in each endemic district, a coordination committee is constituted under the Chairpersonship of District Magistrate with Chief Medical Superintendent of the district hospital as convenor and district vector borne disease control officer and chief/district medical officer of health as members. The committee should ensure that emergency hospitalization plan, including availability of diagnostics and therapeutics and oversee usage of supplies and outcome of the clinical care programme. The Committee should advise the community during the outbreak situation

and provide them necessary information on the availability of diagnostic and treatment services for DF/DHF and chikungunya.

Supporting Interventions

Legislative support:

It is necessary to have legislation which ensures prevention of mosquitogenic conditions. Legislation should cover all aspects of environmental sanitation in order to effectively contribute to the prevention of all vector-borne diseases. Existing byelaws of some local bodies like Mumbai Municipal Corporation, New Mumbai Municipal Corporation, Municipal Corporation of Delhi, Chandigarh and Goa could be studied and adopted by the states. Wherever the legislation exists, it lacks effective implementation at the ground level and therefore it is essential to strictly implement these provisions. Legislative support is essential for the success of dengue and chikungunya control programme.

As dengue is endemic in many states Dengue should be added in the list of diseases that require **mandatory notification** by each state.