

OPERATIONAL PLAN FOR PREPAREDNESS AND RESPONSE TO PREVENT AND CONTROL DENGUE IN BHUTAN 2020



**Vector Borne Diseases Control Program,
Department of Public Health,
Ministry of Health,
Bhutan**

Contents

<u>Foreword</u>	2
<u>Acknowledgement</u>	3
<u>1. Introduction</u>	4
<u>2. Goal and objectives</u>	5
<u>3. Planning and coordination framework for dengue prevention and control</u>	6
<u>3.1 Health Emergency Management Committee (HEMC)</u>	6
<u>3.1.1 HEMC Function</u>	6
<u>3.2 District/Thromde Dengue Task Force (DDTF)</u>	7
<u>3.2.1 Main functions of local task force</u>	7
<u>4. Rapid response team and its function</u>	8
<u>4.1 DRRT members</u>	8
<u>4.2 Function of DRRT</u>	8
<u>4.3 NRRT members</u>	9
<u>4.4 Functions of NHRRT</u>	9
<u>5. Institutional Dengue mortality review</u>	10
<u>6. Preparedness during inter-epidemic phase</u>	10
<u>6.1 Vector surveillance and control interventions</u>	10
<u>6.2 Dengue Surveillance</u>	11
<u>6.3 Capacity building</u>	12
<u>6.4 Social mobilization and communication</u>	13
<u>7. Response during outbreak/epidemic phase</u>	14
<u>7.1 Triggers for outbreaks detection</u>	15
<u>7.2 Establishing and declaration of the outbreaks</u>	16
<u>7.4 Outbreak investigation</u>	17
<u>7.5 Triaging and management of cases</u>	17
<u>7.6 Intensity dengue surveillance</u>	18
<u>7.7 Vector surveillance and vector control activities during outbreaks</u>	19
<u>7.8 Social mobilization and Communication</u>	19
<u>References</u>	20
<u>Annexures</u>	21
<u>Annexure 1: Roles and responsibilities of the stakeholders</u>	21
<u>Annexure 2: Triaging and management of dengue according to category of patient (Category A–C provided in clinical guidelines)</u>	24
<u>Annexure 3: SOP for outbreak investigation (Refer NADSAE, RCDC)</u>	25
<u>Annexure 4: Case Investigation Form for suspected dengue case</u>	26
<u>Annexure 5: line listing during outbreak investigation</u>	28
<u>Annexure 6: Public health Messages on dengue</u>	28

Foreword

Dengue has become a major health issue in recent years in Bhutan, with high morbidity, and considerable mortality. The operational plan for preparedness and response to dengue prevention and control in 2020 has been developed by the Vector-Borne Disease Control Program in response to the increasing incidence with intermittent outbreaks of dengue in the country. The evolving disease situation warrants re-organized and strengthened framework for prevention, control and clinical management of Dengue through an integrated and multi-sector approach. The dengue prevention and control activities is currently looked after by the VDCP as there is no separate dengue program or dedicated annual budget for the disease in the country. With dengue rapidly causing larger outbreaks with expanding geographical spread, it has become pertinent for the program to move from a reactive response to an emergency situation, to proactive risk assessment, early warning systems, and preventive measures through advocacy, strategic partnerships, capacity-building and institution of robust monitoring and evaluation system. The partnership and resources mobilization for multi-sector response to dengue is envisaged to be realized through establishment of the District/Thromde Task Force for Dengue Prevention. Close collaboration will be maintained with relevant stakeholders at both national and sub-national levels. The plan emphasizes coordinated actions among multi-sectoral partners for preparedness and epidemic response ensuring sustainable and cost-effective efforts that can build capacities and increase resilience to future outbreaks. The overall purpose of this national action plan is to adopt an integrated approach to minimize the impact of Dengue as a public health problem, with collaborative/synergistic support and commitment from relevant stakeholders.

Through the effective implementation of the key strategies outlined in this plan, it is expected to reduce dengue morbidity and mortality and outbreaks in the country.

**Dr. Ugyen Dophu,
Secretary,
Ministry of Health.**

Acknowledgement

Dengue is an important and rapidly emerging disease which has become a matter of serious concern in the country. Since the country first recorded dengue in 2004, intermittent cyclical outbreaks have occurred in Bhutan. The country witnessed major outbreaks of dengue in 2019 with loss of six unfortunate lives. Recognizing the importance of well-coordinated and multi-sector response plan for effective prevention and control of dengue in the country, this operation plan was developed by the VDCP program under the Department of Public Health. The plan is expected to be useful reference document for programme officials, district health officials and other stakeholders for planning and implementing the dengue prevention and control activities nationally and sub-nationally. The production of this document was spearheaded and coordinated by Dr. Kinley Penjor, Officer on Special Assignment, VDCP, DoPH who is gratefully acknowledged for his efforts. The other experts who provided valuable technical inputs in their area of expertise in the development of this plan are also appreciated and sincerely acknowledged.

List of Contributors	
1	Dr. Kinley Penjor, Officer on Special Assignment, VDCP, Gelephu
2	Mr. Tenzin Wangdi, Entomologist, VDCP, Gelephu
3	Dr. Sonam Wangcuk, Head/Specialist, RCDC, Thimphu
4	Dr. Tshokey, Microbiologist, JDWNEH, Thimphu.
5	Mr. Rixin Jamtsho, Chief, CDD, Ministry of Health, Thimphu.
6	Mr. Tobgyel, Program Analyst, VDCP, Gelephu

I believe this document will serve as a reference for coordinated and integrated actions with partners within the health sector and other stakeholders in strengthening and streamlining dengue preventive and control activities and improving clinical management to reduce the impact of this vector-borne disease.

Dr. Karma Lhazeen
Director,
Department of Public Health.

1. Introduction

Dengue Fever (DF) is a mosquito borne disease with public health concern worldwide, especially in the tropics and subtropics. The incidence of dengue has grown dramatically around the world. The disease is now endemic in more than 100 countries. The World Health Organization (WHO) estimates that 3.9 billion people, in 128 countries, are at risk of dengue and results in 390m infection and 22,000 deaths annually. The causative agent of dengue is a virus of the Flaviviridae family and there are 4 distinct but closely related serotypes that cause dengue (DEN-1, DEN-2, DEN-3 and DEN-4). The disease is transmitted by female mosquitoes mainly of the species *Aedes aegypti* and, to a lesser extent, *Ae. albopictus*. DF is not directly transmitted from person to person. It is transmitted to humans through the bites of infective female Aedes mosquitoes. Patients with DF are infective to mosquitoes during the febrile period. When a patient suffering from DF is bitten by a vector mosquito, the mosquito is infected and it may spread the disease by biting other people. DF can spread rapidly in densely populated areas that are infested with the aedes mosquito. Dengue usually causes two main types of clinical disease, namely dengue fever (DF) and dengue haemorrhagic fever (DHF). The disease is usually mild and self-limiting, but subsequent infections with other serotypes of dengue virus are more likely to result in severe disease, which can be fatal. Symptoms of DF include sudden onset of fever associated with headache, retro-orbital pain, severe myalgia, arthralgia and in many cases body rashes may also appear. DHF is associated, in addition to above, with bleeding manifestations. This condition may, in some cases, progress to a dangerous condition known as dengue shock syndrome (DSS).

Dengue is a notifiable disease of public health concern in Bhutan. However, it may be inconsistently reported due to poor reporting from health centres. In 2004, Bhutan reported the country's first dengue outbreak. Since then, it is evident that the number of DF and possibly DHF cases have continued to increase. Seasonal outbreak of dengue occurred in 2010 to 2012 and 2016 to 2017 with 500-1000 cases reported. The country witnessed the major outbreak of dengue in 2019 with more than 4,300 dengue cases reported from Phuntsholing area alone with six deaths. Cases were reported from 19 of the 20 districts in the country although most cases in other districts had travel history to epidemic areas. Phuntsholing Hospital reported 77% of the total cases and several cases reported outside Phuntsholing were linked to a travel history to Phuntsholing. The WHO expert fielded to analyse the 2019

outbreaks reported that dengue is more common in adults (20-40 years of age) with a mean age of 29.5 years. As quarter of reported cases were below 20 years of age in the outbreaks area, expert reported that Phuntsholing could be gradually advancing to a hyper-endemic state where multiple serotypes co-circulate exposing the community to dengue virus at an early age. A 2013-14 study done by RCDC found dengue virus (DENV) serotypes 1, 2 and 3 in circulation with DENV-1 being predominant. Phylogenetic analysis of DENV-1 had demonstrated genotype V, closely related to strains from northern India. The distribution of dengue vectors in Bhutan is shown (Figure below) from 2013-2014 had indicated detection of *Aedes aegypti* (primary vector for dengue) in 4 districts (Chukha, Samtse, Wangdue, Samdrup Jongkhar). Subsequently, *Ae. aegypti* were also detected in Gelephu in Sarpang district and Doksum in Trashiyangtse district during outbreak investigations and spot surveys which indicate the expansion of the primary vector into new areas. In view of the rapidly emerging nature and outbreaks occurring globally and in the region and recent explosive outbreaks in the country, there is urgent need for strengthening of dengue preparedness at all levels from programme to hospitals and community for adequate dengue outbreaks prevention and control in the country. The comprehensive operation action plan for preparedness and response has become a priority for systematic planning and implementation of interventions to manage and minimize public health impacts of the disease. The presence of aedes vectors in most of the districts in Bhutan makes our population vulnerable and there are risks of explosive outbreaks if mosquito control is inadequate. These entomological considerations along with the epidemiological situation will be used to guide the operation of preparedness and response plan for dengue. The operational plans will harmonize with the existing emergency response mechanism and plans developed by the Ministry of Health through use of already established rapid response team and incident operation centre.

2. Goal and objectives

The main goal will be to prevent and control dengue case/outbreaks, to reduce morbidity and mortality from dengue infection. The specific objectives are:

- Detect early warnings through entomological surveillance system
- Detect dengue cases early through sentinel surveillance and National Early Warning and Alert Response System (NEWARS)
- Develop capacity for early diagnosis and effective dengue case management

- Develop capacity for prevention and control of dengue outbreaks
- Strengthen well-coordinated multi-sector response to dengue prevention and control

3. Planning and coordination framework for dengue prevention and control

Dengue transmission is closely interlinked with the dynamics of human behaviour and their dwellings and socioeconomic conditions. The preparedness and response framework will require a well-coordinated efforts involving different government and non- governmental organizations towards reducing the public health impact of dengue outbreaks in the country. It will also ensure effective and clear risk communication with the public. The stakeholders to be involved is identified with clearly defined roles and responsibilities to ensure smooth implementations of the plan and minimize duplications, redundancy or contradictory prevention and control activities. To achieve this for comprehensive and multi-sectorial response for dengue prevention and control, local task force at district/Thromde level will be established. The task force will be supported, as and when required, by Health Emergency Management Committee (HEMC) established at the Ministry of Health, chaired by the Minister of Health.

3.1 Health Emergency Management Committee (HEMC)

The HEMC will support to strengthen the inter-sector coordination and collaboration for sustainable implementation of dengue prevention and control interventions at national and district level. It will provide policy directives and guidance on dengue prevention and control strategies in the country.

3.1.1 HEMC Function

- ✓ To create an enabling policy environment for effective dengue prevention and control
- ✓ To promote collaboration and coordinated among health and major stakeholders for sustainable dengue prevention and control
- ✓ To review and endorse strategic plans and policies for dengue prevention and control in the country
- ✓ Meet regularly during an outbreak to review progress and advise the government on the control measures to be taken.

3.2 District/Thromde Dengue Task Force (DDTF)

The functional local level task force will be key to effective prevention and control of dengue.

The local level task force will be constituted under chairmanship of Dzongdag/Thrompon. The collaboration of local government and community is key to achieve adequate coverage and quality of interventions which is crucial for effective control measures and sustainable impact.

The task force may issue directive and ensure implementation of dengue prevention and control activities at the local level by using IVM approach (Environmental management methods, chemical methods, biological or biochemical methods, health education and inter-sector collaboration and law enforcements). The task force members are as below at district and Thromde level.

Thromde	District
1. Thrompon, Chairman	1. Dzongdag, Chairman
2. DHO/ADHO - Member secretary	2. DHO, member secretary
3. DMS	3. DMS
4. MS/CMO	4. MS/CMO
5. OC/SP, RBP	5. OC/SP, RBP
6. BCCI Secretary	6. Representative, BCCI
7. Local DESUUPs coordinator	7. Local DESUUPs coordinator
8. TEO	8. DEO
9. Rep. private diagnostic center	9. District Environmental Officer
10. Thromde Environmental Officer	
11. RD, MoEA	

3.2.1 Main functions of local task force

- ✓ To take all administrative actions in relation to dengue prevention and control in respective district or thromde
- ✓ To coordinate, plan and implement dengue prevention and control at local level using multi-sector approach
- ✓ To support the rapid response team during outbreaks through resource mobilization eg. Additional manpower, vehicles.

- ✓ To draw annual plans of action for reduction of breeding source in the areas through multi-sector participation “Source reduction initiatives”
- ✓ To plan and implement public awareness and advocacy for dissemination of information related to health education and community participation.
- ✓ Monitoring of dengue situation in the local area and response plan implemented

The task force meeting will be convened twice in a year prior to dengue season or when the situation demands at the call of chair. The DHO/DMS will be the member secretariat to the national dengue task force. The minutes of meeting and annual work plan of the task force should be shared through the task force chairman to the Director, DoPH. The specific roles and responsibilities of the key stakeholders and officials are provided in annex.

4. Rapid response team and its function

The Rapid Response Team for any disease outbreak investigation in the country is detailed in National disease outbreak investigation manual 2015 and Health emergency and Disaster Contingency plan 2016. The overall function, scope and team composition of District RAPID response Team (DRRT) and National Rapid Response Team (NRRT) will be similar as stipulated in the above plans but flexibility in member composition may be made to meet the requirement to undertake dengue outbreak investigation and response measures.

4.1 DRRT members

The DRRT will comprise of the following multidisciplinary members:

1. Dzongkhag Health Officer – Team Leader
2. Chief Medical officer
3. DMS/MLT
4. Laboratory personnel
5. BHU In charge of the affected areas
6. Extended members (need based) – Epidemiologist, entomologist, Environmental officer, Thromde/District disaster focal point, Other relevant agencies (BAFRA)

4.2 Function of DRRT

- ✓ Assessment of preliminary outbreak situation in terms of vector densities, number of cases, places affected to confirm outbreaks (Anticipatory targeted response)

- ✓ Anticipatory targeted vector control measure and case treatment around a case (100m radius) if epidemiological and entomological surveillance indicate risk with evidence of peridomestic transmission
- ✓ Carry out full scale outbreak Investigation if outbreak is declared
- ✓ Implement prevention and control measures
- ✓ Carry out risk communication (As per Risk communication guidelines)
- ✓ To liaise with local government/Thromde for cleaning up campaign and environmental cleaning of “hot zones”
- ✓ Produce detailed report of the outbreak and disseminate the reports to the relevant authorities

4.3 NRRT members

The NRRT at the national will be activated if required by HEMC chair on the recommendation of Director, Department of Public Health. The NRRT shall comprise of the following multidisciplinary members:

1. Medical Epidemiologist (Team Leader)
2. Microbiologist/Virologist
3. Laboratory technologists/technicians
4. Clinicians
5. Entomologist
6. Dengue Focal point, VDCP
7. Other relevant agency need based

4.4 Functions of NHRRT

- ✓ To review, verify and advise the disease investigation and control measures implemented by DRRT
- ✓ If requested/needed, support DRRT in conducting detailed field investigation of the outbreak including confirmation of the outbreak
- ✓ Provide technical backstopping in disease investigation and containment activities to the DRRT
- ✓ Recommend/Provide additional resources for rapid response including supplies and medicines.

- ✓ Make a detailed investigation report with recommendations for follow up by the concerned authorities
- ✓ Provide risk communication

5. Institutional Dengue mortality review

All dengue death should be reviewed and investigated within 48hrs of death. The institutional dengue mortality review and investigation will be conducted by the pre-identified team. This will help identify any preventable deficiencies during the pre-hospital or hospital course of management. The members for committee can existing committee or may comprise of:

1. CMO/Medical specialist
2. Paediatrician
3. Epidemiologist
4. ADMO, Hospital
5. Chief Nurse
6. Laboratory expert

6. Preparedness during inter-epidemic phase

The prevention and control strategy for dengue can be divided into inter-epidemic and epidemic phase. The priority to implement prevention and control intervention will be in high risk transmission districts and urban centres located along the southern region of the country.

6.1 Vector surveillance and control interventions

Vector surveillance for *Ae. aegypti* and *Ae. albopictus* will be planned and conducted by the malaria technicians, and supported by entomologist from VDCP. Two types of surveillance viz, routine surveillance and spot surveys will be carried out based on guidelines. Routine surveillance will be carried out in selected sentinel clusters and spots surveys will be conducted in institutions, public places, public conveyances, construction sites, automobile workshops and scrap dealers or any high risk localities informed through epidemiological and entomological surveillance data. The main objective of vector surveillance will be to determine and monitor the distribution, density and major breeding habitats of *Ae. aegypti* and *Ae. Albopictus* in and around premises. The surveillance report should be submitted fortnightly to the District Health Office and the Chief Medical Officer. The latter should analyse the report, and in consultation with the vector control team decide necessary measures (such as community wide source reduction campaigns) required to curb the

growing Aedes infestation. The DMS/MLT in consultation with CMO/DHO will plan and implement local control measures as required.

As reactive vector control measures are not effective in dengue control, integrated and proactive vector control strategies will be planned and implemented. The local task force coordinated by DMS/DHO will plan and closely monitor the implementation of interventions. The main strategy will be focussed on larval source reduction. Larval source reduction should be done through community wide source reduction campaigns. Community wide source reduction campaign is a community based control program to prevent or reduce proliferation of dengue vector habitats during inter-epidemic and epidemic periods. It is envisaged to instill a sense of community ownership to address the dengue menace. Active community participation is required to conduct the campaign through effective community mobilization. Community mobilization should be initiated with the involvement of local government and other relevant organizations and sector heads.

Adult control by space spray - Space spraying with the use of thermal fogger will be used to prevent and control vector during outbreak situations or when a trigger has been detected. The outbreak area has to be divided into operationally manageable areas and the spray effectively applied within a few days (based on cluster map provided to the districts). The follow-up spray should be conducted after 5-7 days of first spraying. The timing of spray is another important component to consider for the operation, which should coincide with the vector's peak activity. The VDCP and local task force will monitor the implementation of the integrated vector control interventions. The health centres will report on the activity through DHO to VDCP using standard reporting forms.

6.2 Dengue Surveillance

Passive surveillance

All health centres shall report dengue fever cases on weekly basis in National Early Warning Surveillance and Response System (NEWARS) through web-based or mobile SMS in the Royal Centre Disease Control (RCDC) website using weekly reporting platform based on case definition provided in NEWARS guideline. All health centres shall report any severe dengue (Dengue Haemorrhagic fever or Dengue Shock Syndrome) case immediately in NEWARS through web-based or mobile SMS in the RCDC website using immediately reporting platform based on case definition provided in NEWARS guideline.

Event surveillance

All health centres shall report dengue fever event if dengue fever number is in excess of normal threshold based on local dengue epidemiology in NEWARS through web-based or mobile SMS in the RCDC website using event reporting platform as per the NEWRAS guideline. The event report will be used as one of the alert signal to detect outbreaks early.

Sentinel Surveillance

Five dengue sentinel sites shall be selected from southern districts based on dengue cases reported over the years and prevalence of dengue vectors based on vector survey mapping data available from Vector Borne Disease Control Programme. Sentinel sites are Samtse hospital, Phuntsholing hospital, Gelephu regional referral hospitals, Nganglam BHU-I and Samdrupjongkhar hospitals. Sentinel sites shall enrol dengue case based on case definitions and fill up case investigation form as per the protocol of dengue sentinel surveillance. Blood samples shall be collected from enrolled cases and test for complete blood count (CBC) and rapid test in respective sentinel sites. Blood samples shall be shipped to RCDC every week and test by ELISA assays to determine primary and secondary dengue infection, and PCR to determine dengue serotypes. Serotype positive samples shall be shipped to collaborating center (Armed Force Research Institute for Medical Sciences) in Bangkok annually for genotyping.

6.3 Capacity building

The hospitals should plan and build surge capacity as part of developing Hospital emergency contingency plan coordinated by the Emergency Medical Service Division (EMSD), Department of Medical Services. The Ministry of Health will plan and organize regular trainings and refresher workshops to doctors and all the relevant health workers to enhance their skills, knowledge and competency on dengue diagnosis and case management, outbreak investigation and response, entomological surveillance and vector control and risk communication for behavioural change.

- Training of laboratory staff on samples collection, diagnosis and shipments of samples.
- Training on patient triaging and monitoring, diagnosis, case management and referral to clinicians and nurses as per national/WHO treatment protocol

- The triaging and surge capacity development in hospitals (stock-piles of necessary supplies and equipment) will be reviewed and developed by EMSD, DMS
- Training on outbreak response, simulation exercises and COMBI risk communication will be provided to relevant health workers
- Training and refresher workshops on vector surveillance and control to DMS/MLT and DHO

6.4 Social mobilization and communication

Social mobilization or community participation will be a key component for sustainable dengue prevention and control. Community participation will be promoted through inter-sectoral task force for public awareness and social mobilization. The Health Promotion Division will lead and facilitate the social mobilization and community awareness activities. The local malaria unit in collaboration with local task force members will plan and coordinate these activities in respective thomde/district. The WHO COMBI model for social mobilization and communication will be adopted and used to achieve community involvement for dengue prevention and control activities. The model consists of the following components:

- Public relations and advocacy to target healthy behaviour in the community through mass media such as BBS news coverage and talk shows and mass awareness campaigns
- Sustained Appropriate Advertising and Promotion - An effective media program should be developed and implemented that is massive, repetitive, intense and persistent advertising via radio, television, newspapers and other available media to engage the people in recommended behaviour change and the health cost of not changing the behaviour Example: Personal protection and household source reduction messages through local TV channels
- Community mobilization - The approach here is to use participatory research, group meetings, partnership sessions, school activities, community drama and home visit to distribute leaflets, posters, pamphlets and video for personal protection
- Law enforcement using legal tools at national or LG level - Monitoring compliance on source reduction activities implementation by the sanitary inspector of Thomde, Registration of new construction for monitoring activities.

- Regular communication through press briefing and press communiqué on the situation of the outbreaks

The task force and VDCP should develop a risk communication plan that includes communication and social mobilization activities for:

- pre-outbreak (Advocacy for political commitment, preparation of IEC messages and supply to stakeholders, identification of appropriate communication channels, training of spokespersons, organization of social mobilization activities- “mosquito control week”);
- outbreak (dissemination of messages, call to action to reduce mortality, increase personal protection practices and prevention of mosquito breeding);
- Recovery phases (dissemination of messages informing affected populations the outbreak is over, acknowledging their efforts to contain the outbreak, and encouragement of the broader population to maintain prevention actions).

7. Response during outbreak/epidemic phase

Dengue outbreaks can evolve quickly and require emergency actions to immediately control to interrupt or reduce transmission and to reduce or eliminate the breeding sites. The outbreak response team constituted by the Ministry of Health as NRRT (National level) and DRRT (District level) will be deployed with additional team members as required by the nature and type of outbreak. The NRRT may be activated if the magnitude and scale of outbreaks is beyond the coping capacity of the DRRT as per the broad criteria provided below. The local level Dengue task force (District/Thromde DTF) under Dzongdag/ Thrompon will issue directives and co-ordinate activities aimed at control of outbreaks through emergency vector control measures. The multi-sector response will be directed and coordinated as specified under the functions of the task force.

If any of the following criteria is fulfilled, DRRT can request for activation of NRRT

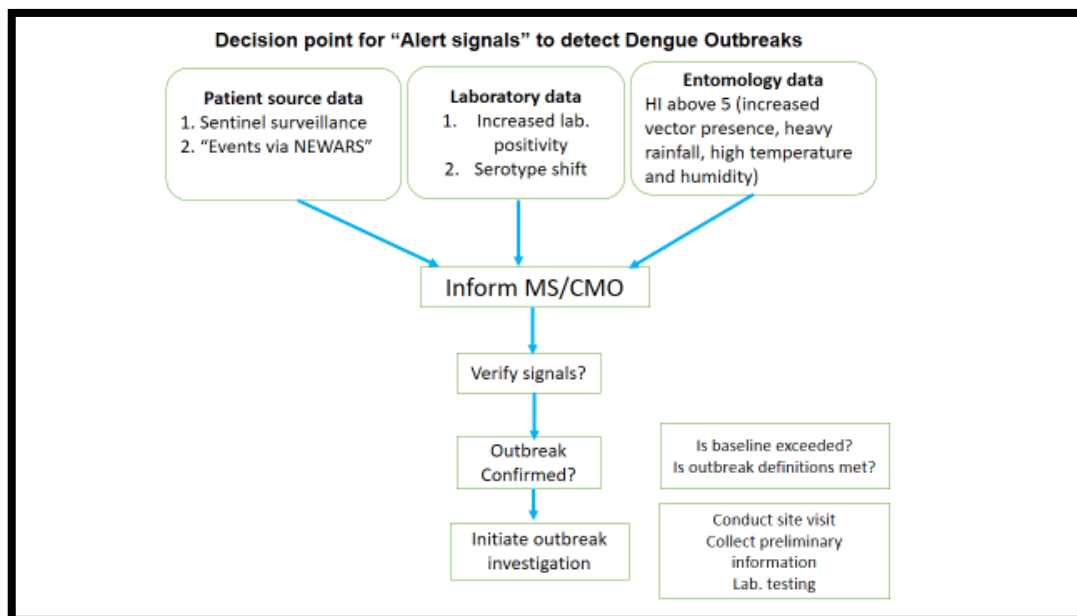
1. The size and impact of outbreak is beyond the coping capacity of DRRT
2. The DRRT is unable to meet the technical expertise to respond to outbreaks effectively

3. The number of cases is increasing despite the adequate and full implementation of outbreaks response
4. The outbreak is spreading to more local communities
5. Increasing number of complicated cases requiring hospitalization

7.1 Triggers for outbreaks detection

Forecasting and recognizing an outbreak at the outset is important for early response to contain and reduce the full impacts of the outbreak. The following source of information will be used as “alert/alarm signals” to trigger local level response and to confirm or verify outbreak:

1. Patient source data from sentinel surveillance or NEWARS
2. Event surveillance reported from the health centre in NEWARS
3. Biological surveillance – evidence of serotypes shift in samples collected from sentinel sites
4. Laboratory data showing increased laboratory request or positivity rate
5. Entomological – Household Indices > 5 (increased vector presence) together with climatic variables like heavy rainfall, temperature and high humidity



Action to be taken when alert signal (trigger) is detected

When the above criteria for alarm/alert signal is observed, the health workers should inform the CMO/MS or in-charge. The concerned health center should initiate preliminary investigation and targeted anticipatory responses as follows;

- Survey of all households within 100m of index case household for aedes breeding grounds and mosquito prevention measures in place
- Larval surveys within 24hours of notifications
- Spraying of houses within 100m radius
- Search for any fever or suspected dengue cases around the area and any additional information to establish or rule out any possibility of outbreak

7.2 Establishing and declaration of the outbreaks

Clinical Case definitions

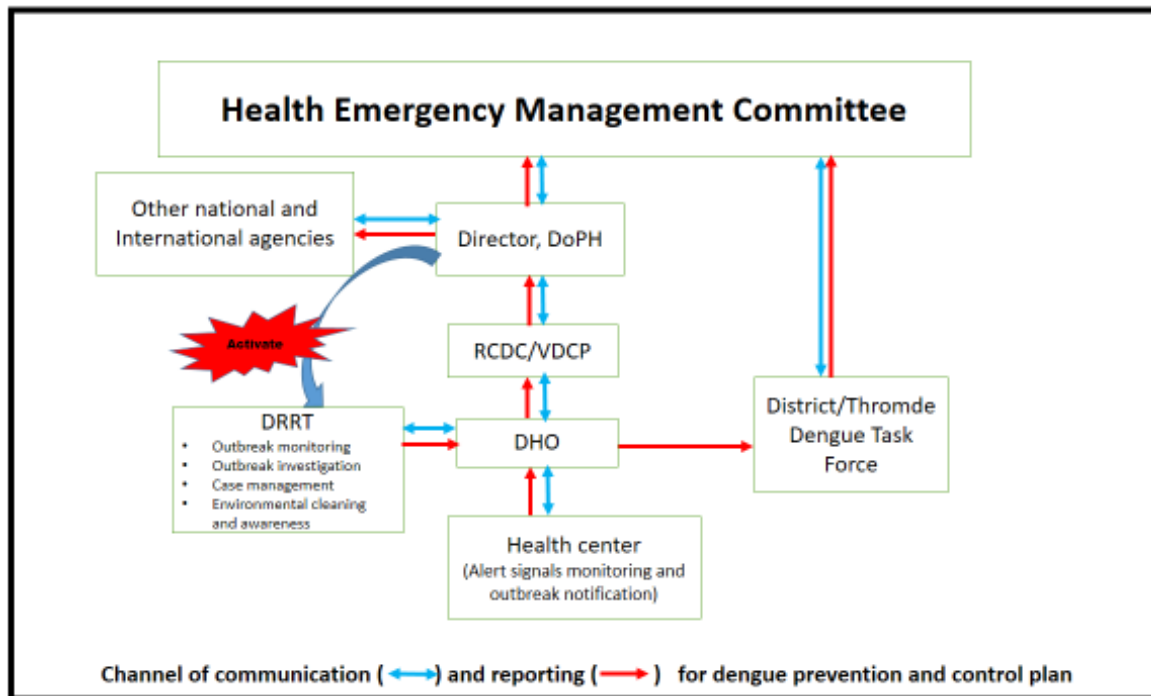
1. *Suspected DF: Any person living in dengue endemic area or history of travel within 14days who present with acute febrile illness of 2-7 days duration with two or more of the following: Headache, Retro- orbital pain Myalgia/ Arthralgia/ Rash/ Haemorrhagic manifestations/Tourniquet test positive.*
2. *Severe Dengue or Dengue hemorrhagic fever (DHF): Any person characterized by one or more of the following; positive tourniquet test; petechiae, ecchymoses, or purpura; bleeding (mucous, GI, or other); hematemesis or melena; thrombocytopenia; or evidence of plasma leakage. The plasma leakage is manifested by one or more of the following features: (Equal or less than 20% rise in average hematocrit for age and sex; equal or more than 20% drop in hematocrit following volume replacement treatment is the signs of plasma leakage*
3. *Confirmed case of DF/DHF: A suspected case with positive laboratory result from ELISA tests (NS1 or IgM antibody).*

High risk areas – Areas where dengue transmission has been reported within last 3 years	Low risk areas – Areas with no dengue transmission reported within last 3 years
Occurrence of five or more suspected or confirmed dengue cases in a cluster in a locality	Occurrence of single confirmed case of dengue in a locality with presence of <i>Aedes aegypti</i> (but without travel history to dengue risk area)

An outbreak will be officially declared if above definitions are met by the Director, DoPH as per recommendation and in consultation with RCDC and VDCP. The concerned DHO/CMO will be informed to activate DRRT within 6 hours of outbreak notification and confirmation as follows:

1. Instruct by email/phone to activate the DRRT
2. Activate district level operation centre in DHO office and Health Emergency Operation Centre (HEOC), if NRRT is activated for daily outbreak situation monitoring and reporting

3. Assist in logistic arrangement for full outbreak operation
4. Procuring any missing equipment and supplies
5. Arrange for additional staff or redeployment of staff



7.4 Outbreak investigation

The DRRT will carry out outbreak investigation and provide assessment as to whether the outbreak can be managed by the DRRT or require the activation of NRRT. If activation of NRRT is required, the DHO shall inform the DoPH which in turn will inform HEMC, following which the NRRT will be activated. It is important to adhere to the defined roles and functions of each stake holder as defined in planning and coordination during outbreak response. The outbreak investigation will be conducted as per the step by step outbreak investigation guidelines provided in the disease outbreak investigation and control manual 2015 available in RCDC website. It is the responsibility of DRRT who are involved in the outbreak investigation to carry out responsibilities in compliance with the standard operating procedures outlined in the above manual.

7.5 Triaging and management of cases

Proper patient management is critical for reduction of case fatality and limiting the spread of through mosquito in the community at large. Hospitals and health centres should activate its contingency plan to manage surge of cases during dengue outbreaks. The triaging mechanism

for management of dengue cases is provided in the **Annexure 2**. The details on the patient severity category and recommended case management should be referred to in the dengue clinical case management guidelines. The health centres should consider the following.

- The triage strategy as provided in **Annexure 2** should be followed to reduce the surge capacity on the hospitals and reduce morbidity and mortality of the patient
- Be aware of the standard case definition to suspect, report and manage dengue cases
- Patients suffering from dengue fever and receiving treatment can be managed in health centre or in their home based on the patient category provided in the treatment guidelines.
- The clinical guidelines, SOPs and decision tree algorithm should be available in the hospitals.
- Additional beds and mosquito nets should be available and provided for in hospitals

7.6 Intensity dengue surveillance

Passive Case detection - Passive surveillance for case detection must be enhanced from all health facilities and diagnostic centres. The identified focal points will be responsible for reporting. The focal point should be supplied with documentation and complete instruction on case definition and case investigation form including laboratory collection. Regular communication should be maintained with the focal points.

Active case detection - Whenever an index case is detected, active case search will be undertaken for all close contacts around the case. The following procedure will be used:

1. Interview the index case to enumerate a list of immediate contact using CIF **Annexure 4**
2. Draw a map of the location of all contacts
3. Trace the contacts and complete line listing form **Annexure 5**
4. Collect acute blood sample and sent for testing
6. Observe the contacts for 7 days

Laboratory Surveillance – The hospital labs. supported by RCDC will be responsible for virological surveillance. The main roles of the virology unit will be as follows:

1. To confirm the first and initial suspected cases by the most rapid test (ELISA)
2. Submit daily report to RCDC/DoPH in a standard format by email
3. To provide magnitude of the disease and the viral serotypes as the epidemic progresses

7.7 Vector surveillance and vector control activities during outbreaks

The vector surveillance and control will be scaled up in response to dengue outbreaks. The operational response will be implemented in collaboration with local task force member to be coordinated by DHO/DMS as follows;

- Divide the outbreak area into operational management areas where control measures can be effectively applied within few days; repeat as needed to reduce adult or larval density.
- Conduct door-to-door inspections and mosquito control in an area-wide fashion (reach >80% coverage of the control area within a week).
- Generate spot map of Aedes (aegypti & albopictus) habitats
- Organize community wide source reduction campaigns targeting disposable containers, including large junk objects that accumulate water (broken washing machines, refrigerators, toilets) in buildings, public areas, backyards etc.
- Combine outdoor spatial and residual spraying with source reduction and larviciding (including residual spraying of container surfaces and adjacent mosquito resting areas). Remember to treat storm drains, roof gutters, and other often overlooked cryptic water sources.

7.8 Social mobilization and Communication

The risk communication and social mobilization activities should be scaled up, targeted and more intense during outbreaks. The local Dengue Task Force should be convened and risk communications team should be triggered to initiate outbreak messages and materials are ready (for example, radio/TV spots, messages for release via social media, pamphlets, posters, school-based activities, workplace-based activities, etc.) for the implementation of risk communication and dengue risk-reduction activities. The team should identify the groups/communities/leaders to be prioritized for intervention and their specific information needs using most effective channels. The key messages for dissemination to public through different channels is provided in **Annexure 6**.

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Annexures

Annexure 1: Roles and responsibilities of the stakeholders

Ministry of Health

- Lead and coordinate with other relevant government & non-government sectors to carry out dengue control /prevention activities
- Provide technical resources and support to the stakeholders involved in dengue prevention and control
- Optimum clinical management of dengue patients
- Support emergency contingency fund for disease outbreaks through DDM

Local government (District/ Dungkha/ Thromde)

- Coordinate intersector approach to planning and implementation of dengue prevention and control
- Implement the intersectoral environmental cleanliness initiatives for reduction of mosquito borne diseases
- Oversee and support the functions of district RRT
- Provide administrative directives and support to the district RRT
- Identify and provide dump sites for receiving segregated wastes
- Regular inspection and monitoring of waste management and breeding sites in the local jurisdiction
- Direct and organize regular cleaning campaigns
- Support and facilitate the recommendation of the outbreak report for future outbreak prevention and preparedness plan.
- General cleaning campaigns in collaboration with DHO/Hospitals
- Assist in larviciding and fogging in collaboration with Ministry of Health
- Active involvement and mobilizing local governments in dengue control and preventive activities
- Promote to maintain area of public places without mosquito breeding
- Facilitate inter-sectoral coordination for necessary support during management of outbreak.

District/Thromde Education Officer (DEA/TEO)

- Maintain all government, private schools, and training colleges free of mosquito breeding by
 - Inculcating a behavioural change in school children to keep the environment free of mosquito breeding
 - Collaborating with respective District Health sector to maintain schools, surrounding premises free of mosquito breeding
 - Providing necessary guidance through school children to keep their home environment free of mosquito breeding
- Ensure a clean environment within their premises
- Incorporate health promotion in the school curricula
- Implement the intersectoral environmental cleanliness initiatives for reduction of mosquito borne diseases
- Provide manpower support during outbreaks

Environmental unit/officer

- Active involvement in dengue control/ prevention activities
- Enforcement of policies for proper disposal of solid waste
- Promote and step up clean up campaigns by providing waste litter bins in high risk areas

- Provide additional workforce when necessary
- Coordinate and integrate HIA with EIA
- Liaise with DHO/ DMS to support vector surveillance and control in the local area
- Ensure compliance in the municipal areas especially in construction sites, automobile workshops, scrap dealers for Aedes source free environment
- Reinforce enforcement of appropriate legislation

BCCI/ Trade/NGOs

- Support the national awareness campaign - sensitize hotels for the need to identify cases and refer within their premises
- Support the vector control activities
- Support the cleaning campaign
- Empower workers for a clean working environment

Private diagnostics center

- Detect and report any suspected cases
- Implement the Ministry of health protocol for case detection and surveillance

DESUUPS/ BRCS

- Support the national awareness campaign
- Provision of additional work force for vector control and community awareness activities

Media

- Support the national awareness campaign
- Support dengue taskforce in telecast/ broadcast of advertisements in relation to dengue including clinical features, treatments and prevention & control (Under the technical guidance of Ministry of Health)

District Health Officer (DHO)

- Coordinate and oversee all activities pertaining to outbreak prevention (Preparedness plan, capacity building, surveillance, case management and all aspects of outbreak investigation)
- Monitor dengue control and source reduction activities conducted in the affected area as well as analyze the trend of the disease in person, place and time for early detection and response to outbreaks
- Disseminate updated information for action to all task force and DRRT members on dengue prevention and control measures
- Monitoring of operational plan and its implementation
- Ensure submission of daily technical report to the district task force and Director, DoPH

Chief Medical officer/ Medical officer

- Review and establish contingency plan for management of dengue outbreaks
- Carry out effective dengue surveillance as per the guidelines to detect dengue signal for early outbreak response
- To direct or conduct field investigation of the outbreaks according to SOPs
- To report daily to the DRRT team leader
- To construct an epidemic curve of the disease
- To analyze the prevalence of the disease in different risk groups and geographic areas
- To guide vector control operations on the basis of epidemiological evidence \

Clinician (Medical Officer/ HA)

- Apply case definition for classifying cases
- Collect clinical and demographic information
- Advise appropriate investigation
- Analyze the data for person, place and time

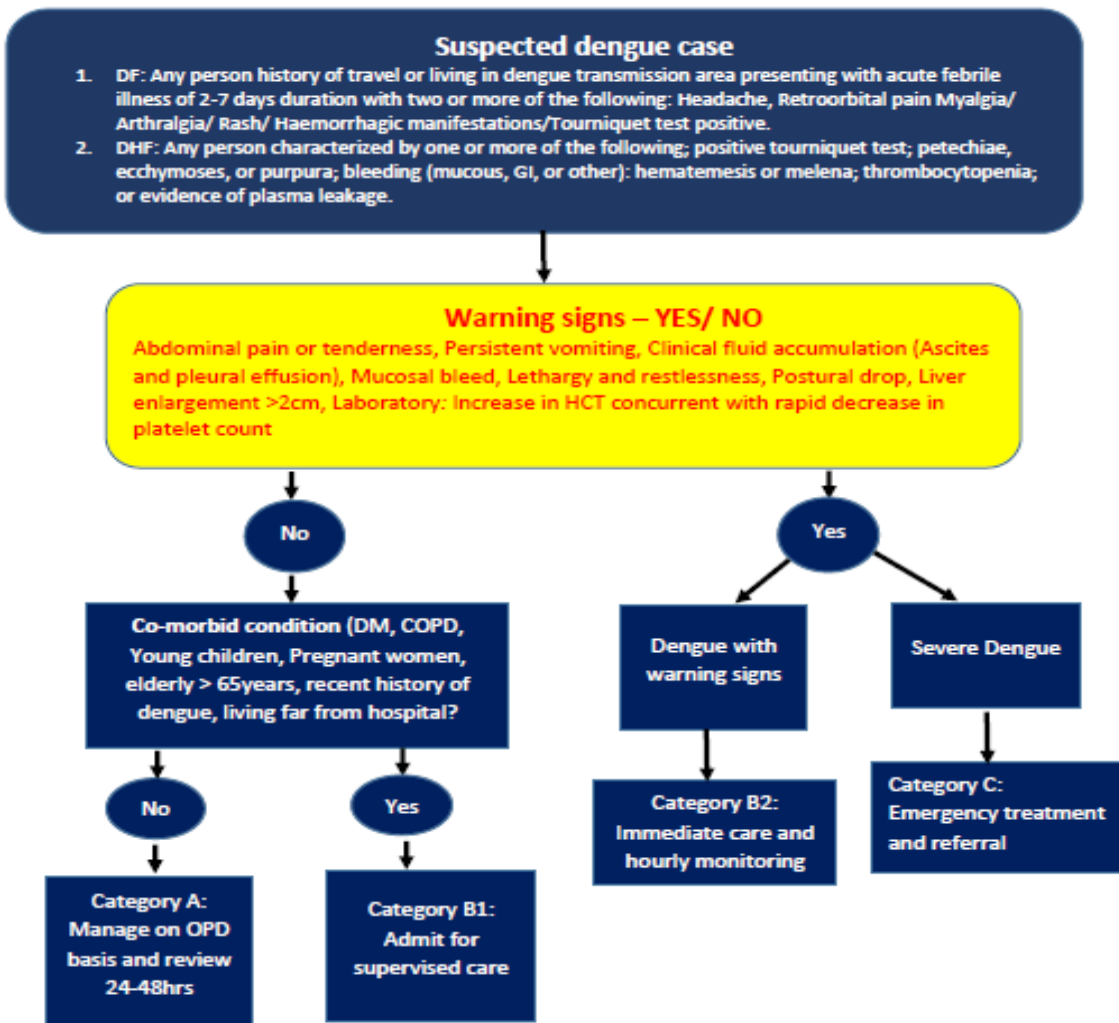
DMS/ Malaria technician

- Conduct entomological surveillance to generate entomological indices from epidemiological hotspots
- Carry out environmental survey of breeding places of vectors (interepidemic phase)
- To send daily report of the entomological indices to the CMO/DHO
- Assist in active and passive case detection and contact tracing
- Liaise and assist with entomologist for undertaking larval and pupal survey
- Direct and conduct vector control operations
- To give technical advice for sensitizing the community and distribute information pamphlets
- To map the density of the larvae, pupae and adult mosquitoes by the various entomological indices
- To participate in the multi-sectoral meeting for fogging and larviciding operation
- If the technical back up is required, request support from entomologist in VDCP

Laboratory technologist/technician

- Advises on the collection, storage and transport of specimens
- Collect and ship specimens for laboratory confirmation of etiologic agents

Annexure 2: Triaging and management of dengue according to category of patient
(Category A–C provided in clinical guidelines)



For details of patient category and management recommended, refer the national guidelines on diagnosis and clinical case management of dengue.

Annexure 3: SOP for outbreak investigation (Refer NADSAE, RCDC)

- NADSAE, RCDC will verify within 6 hours upon notification of an outbreak in the National Early Warning and Alert Response System (NEWARS).
- Depending on the magnitude and category of risk, NADSAE will coordinate the events at district and national levels.

At District level

- NADSAE will consult with relevant laboratory/ies in RCDC to collect all the necessary information for sample collection, testing, storage and shipment from the health centre or incident area to RCDC.
- Depending on the need, relevant programme/s in the MoH will be consulted for responding to an outbreak. Any information to be delivered to the DRRT will be collected by NADSAE from the programme.
- After collecting all necessary information, NADSAE will provide recommendations to DRRT through NEWARS within 6 hours of notification. Risk characterization and recommendation alert will be received by concerned health centre, DHO, Programme, Chief (CDD/NCDD), Head, RCDC, Director (DoPH).
- DRRT will initiate the outbreak investigation immediately within 6 working hours after receiving the recommendations and prepare the preliminary report.
- DHRRT will submit the preliminary investigation report to NADSAE within 48 hours. NADSAE will verify and validate the preliminary outbreak report and submit to the Chief CDD/NCDD, with copy to relevant programme for onward submission to the Director (DoPH).
- NADSAE will follow-up for an event related information and update the situation on daily basis to Chief (CDD/NCDD), Head, RCDC, Director (DoPH) .
- DRRT will inform and seek support from other relevant district sectors/agencies like DOL, BAFRA or NEC based on the need.
- Relevant laboratory in RCDC will share their laboratory result of clinical and/or environmental samples to NADSAE.
- NADSAE will monitor the status of outbreak and declare the status of outbreak after two incubation periods from the date the last case was reported.
- DRRT will upload the final report and any accompanying pictures/supporting documents to NEWARS.
- NADSAE will compile and share the report to all relevant stakeholders within and outside the Ministry of Health.

At the National level

- In consultation with the head of RCDC, NADSAE will coordinate and convene a meeting with relevant members of NRRT including concerned programme if the event is beyond the coping capacity of DRRT or upon the request for the support by DHO or if the event occurs in the capital. For events occurring in the capital, concerned DHO or Thromde public health officer will be involved in the entire period of investigation.
- NADSAE will plan and coordinate outbreak investigation in consultation with other members of NRRT.
- Team leader of NRRT in consultation with concerned Chief (CDD/NCDD) or Director DoPH will conduct risk communication to the public and media.
- NADSAE will update the situation periodically to the Head, RCDC, Chief (NCDD/CDD) and Director (DoPH) (Annexure 2).
- NADSAE will coordinate daily meeting with members of NHRRT to review outbreak situation, develop investigation and intervention plans for the following day.

- NADSAE will prepare preliminary outbreak report and submit it to Chief (NCDD/CDD), and relevant programme for onward submission to the Director (DoPH) within 48 hours of initiating an investigation (Annexure 1).
- NADSAE will follow-up with relevant stakeholders on the implementation of recommendations at least for a week or till adequate actions are taken.
- NADSAE will monitor the status of outbreak and declare the status of outbreak after two incubation periods from the date the last case was reported.
- NADSAE in consultation with NHRRT will prepare a final report and share with all the relevant stakeholders.
- The same report will be uploaded in the NEWARS by NADSAE.
- NADSAE will coordinate and conduct the After Action Review (AAR) meeting with NRRT, concerned Programme, Chief (CDD/NCDD), Head, RCDC, Director (DoPH), and relevant stakeholders after completion of investigation.

Annexure 4: Case Investigation Form for suspected dengue case

1. IDENTIFICATION

Name: -----

Age in years & in months: Year [] Month [] Sex: Male [] Female []

Health center where detected: -----

Residential Address: -----

Recent travel history in past 2 weeks: -----

Occupation: -----

2. CLINICAL DATA

[] Fever Date of onset: -----/-----/----- Duration

[] Rash Date of onset: -----/-----/----- Duration

[] Joint pains (arthralgia) Date of onset: -----/-----/----- Duration

[] Retro-orbital pain Date of onset: -----/-----/----- Duration

[] Headaches Date of onset: -----/-----/----- Duration

[] Neck stiffness/Disorientation/ Confusion/convulsion

Date of onset: -----/-----/----- Duration

Admitted: Yes [] No [] Date of Admission: -----/-----/-----

If Yes, Name of Health centre -----

3. EPIDEMIOLOGICAL DATA

History of travel overseas: -----

Date of travel: ----- duration of travel: -----

Countries visited: -----

Place of work: -----

Was/Is there another case in the same household having similar symptoms? Yes [] No []

4. LABORATORY DATA

Blood sample taken? Yes ☐ No ☐

If yes, date of sample collection and sent to the laboratory: ----- Results of the blood samples: -----

Types of tests: ----- virus type: ----- date of results: -----

VIRAL RESULTS

	Virus Type	Date of Results
☐ ELISA for IgG	-----	-----
☐ ELISA for IgM	-----	-----
☐ ELISA for Antigen	-----	-----
☐ PCR for viral genomes	-----	-----
☐ Cell culture	-----	-----

5. BLOOD RESULTS

☐ Blood counts

☐ WBC ----- Platelets ☐ -----

☐ ESR ----- Hb ☐ -----

6. DIAGNOSIS

☐ Suspected

☐ Epidemiologically linked/ contacts

☐ clinically confirmed

☐ Lab. Confirmed

7. OUTCOME

☐ Alive and well

☐ Alive and hospitalized

Date of discharge-----/-----/-----

☐ Dead

☐ Unknown

☐ Lost to follow up

8. CASE MANAGEMENT

☐ Paracetamol ☐ NSAIDS ☐ Self-medications _____

Investigating officer: -----

Date: -----/-----/-----

Name of health centre: -----

Annexure 5: line listing during outbreak investigation

ID	Name	Age	Sex	Address ¹	Case types ²	Clinical findings	Onset date	Outcome ³	Samples taken
1.									
2.									

1. *provide full address*

2. *case can be: suspected OR confirmed, not known*

3. *outcome can be: dead, alive, hospitalized, lost to follow up*

Annexure 6: Public health Messages on dengue

The local taskforce members should reinforce household level control measures and intensify and create awareness about dengue for communities and seek cooperation for the removal of breeding places.

Household/ Individual

- Dengue vectors bites during day times only. Kill adult mosquitoes by using commercial sprays at household levels during peak biting times of the Ae. aegypti mosquito, e.g., early morning or late afternoon. Spray bedrooms, including closets, bathrooms and kitchens (by removing/covering all food items properly) for a few seconds and close the room for 15-20 minutes.
- Use mosquito repellents during day time
- Intensified efforts to reduce actual or potential larval habitats in and around houses.
- Cover water containers in the house to prevent fresh egg laying.
- Have infants sleep under bed nets during the day.
- Wear protective clothing (full sleeves shirts & full pants during day time).
- Use tight-fitting screens/wire mesh on doors and windows.
- Clogged gutters and flat roofs that may have poor drainage need to be checked regularly.
- Water in bird baths and plant pots or drip trays should be changed at least twice each week.
- Avoid unessential travel to affected areas during outbreaks

In schools

- Teach how to detect and destroy the breeding of Ae. aegypti in and around the schools, in their homes and in the neighborhood.
- Initiate weekly dengue source reduction activity in school premises
- Advised to wear protective clothing - full sleeves shirts & full pants during day time
- Weeds and tall grasses should be cut short; adult mosquitoes may look for these shady places to rest during the hot daylight hours.