

# Exploring Eco-Bio-Social Determinants of Dengue Prevention and Control Measures across Diverse Eco-Regions of Eastern Nepal



Government of Nepal  
**Nepal Health Research Council (NHRC)**  
Ramshah Path, Kathmandu, Nepal





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**Nepal Health Research Council**

**Ministry of Health and Population**

Ramshahpath, Kathmandu

2025

The work was supported by the FA5 programme Nepal: Evidence-based vector-borne disease management and elimination of visceral leishmaniasis in Nepal (2022-2026) funded by the Directorate-General for Development Cooperation and Humanitarian Aid (DGD), Belgium.

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## **Suggested Citation**

Joshi P, Lamichhane M, Parajuli K, Ghimire N, Silwal S, Ghimire S, Dahal Khatri B, Dhimal M (2025). Exploring EcoBioSocial Determinants of Vector Prevention and Control Measures across Diverse EcoRegions of Eastern Nepal. Kathmandu: Nepal Health Research Council

ISBN: 9789937-1-9743-4





Government of Nepal  
**Nepal Health Research Council (NHRC)**  
Estd. 1991

Ref. No.:

## Acknowledgment

The Nepal Health Research Council (NHRC), in collaboration with the Institute of Tropical Medicine (ITM), Belgium, extends its heartfelt appreciation to all individuals and organizations whose valuable contributions made this study possible. It is a pleasure to present the report of the study entitled *Exploring Eco-Bio-Social Determinants of Vector Prevention and Control Measures across Diverse Eco-Regions of Eastern Nepal*.

I express my sincere gratitude to Dr. Meghnath Dhimal, Chief of the Research Section, for his guidance throughout the planning and implementation of this research project. I also wish to extend my special appreciation to Prof. Dr. Ruth Müller for her continued support and guidance. My sincere thanks go to Ms. Namita Ghimire, Chief of the Ethical Review, Monitoring and Evaluation Section, for her insightful suggestions that contributed to the successful completion of the study.

I would also like to acknowledge the contributions of Dr. Mandira Lamichhane, CoInvestigator/Social Scientist, and Ms. Kristina Parajuli, research consultant for their dedicated involvement in the project. Likewise, I am thankful to Ms. Sunita Baral, Ms. Sailaja Ghimire, Ms. Shristi Karki, Ms. Astha Acharya, Ms. Janaki Pandey, Ms. Rabina Paudel, Mr. Anup Kumar Gupta, Mr. Bhupmani Dahal, Ms. Sona Luitel, and Ms. Deepa Gautam for their diligent efforts in timely data collection. I also appreciate the contributions of Mr. Yograj Ghimire and Mr. Pashupati Khanal for their support in field data collection.

My sincere thanks go to Ms. Astha Acharya, Ms. Lumanti Manandhar, Mr. Mahesh Bhatta, Mr. Bishal Dahal Khatri, and Ms. Pratima Niraula for their work in transcribing and translating the recorded data.

Finally, I express my appreciation to the Provincial Health Directorate, Health Offices, and municipalities of the concerned districts, as well as all research participants, technical working group members, and experts who directly or indirectly supported this study. I also extend my appreciation to the accounts, administration, store, and library sections for their valuable assistance in completing the study.

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# Executive Summary

## Background

Vector-borne diseases (VBDs) remain a growing public health threat in Nepal. Dengue has become the most widespread VBD, while malaria, kala-azar, Japanese encephalitis, filariasis, and scrub typhus have declined but persist in some areas. Climate change, rapid urbanization, inadequate sanitation, and limited community awareness are accelerating the spread of mosquito vectors into new ecological zones, including hilly and mountainous regions. This study, conducted across six districts of Koshi Province, examines eco-biosocial determinants influencing vector prevention and control and identifies policy actions needed to strengthen Nepal's climate-resilient health system.

## Key Findings

1. Climate Change is Expanding Disease Risk
  - Rising temperatures and altered rainfall patterns are enabling dengue vectors to thrive at higher elevations.
  - Warmer lowland districts remain hotspots, but increasing cases in hill and mountain regions require updated risk mapping.
  - Imported cases from high prevalence areas significantly contribute to local outbreaks.
2. Gaps in Knowledge and Health System Capacity
  - Community understanding of dengue symptoms, transmission, and prevention is inconsistent.
  - Health workers in many areas lack formal training in dengue prevention and outbreak response.
  - Misconceptions persist, including reliance on traditional healers and beliefs that dengue is cyclic or mild.
3. Prevention Measures are Uneven and Often Reactive
  - Search and destroy campaigns are common but vary in quality across municipalities.
  - Fogging is widely used but perceived as less effective and potentially harmful.
  - Environmental management of stagnant water remains insufficient, especially in urbanizing areas.
4. Local Governments and Media Play Central Roles
  - Municipalities lead awareness and response efforts but face resource and manpower constraints.
  - NGO/INGO support is uneven across districts.
  - Radio and television are the most effective communication channels; digital access gaps limit social media reach.

5. Surveillance and Diagnostics Need Strengthening
  - Limited testing centers and inconsistent reporting delay outbreak detection.
  - Rapid Response Teams (RRTs) are not uniformly available or adequately trained.

## **Policy Recommendations**

- A. Integrate Climate Data into National VBD Strategies
  - Update national risk maps to reflect climate driven vector expansion.
  - Incorporate climate projections into surveillance, preparedness, and resource allocation.
- B. Strengthen Community Engagement and Behavior Change
  - Develop targeted communication strategies for high risk and low awareness groups.
  - Institutionalize dengue education in school curricula.
  - Expand community led environmental management initiatives.
- C. Build Health System Capacity
  - Provide standardized training for health workers on VBD prevention, diagnosis, and outbreak response.
  - Expand laboratory capacity and ensure timely availability of diagnostic supplies.
- D. Enhance Governance and Multi-Sectoral Coordination
  - Establish clear roles and accountability across federal, provincial, and local governments.
  - Set minimum service standards for municipal vector control.
  - Strengthen partnerships with NGOs, private sector, and media.
- E. Promote Integrated Vector Management (IVM)
  - Prioritize environmental management over fogging.
  - Develop national guidelines on safe pesticide use.
  - Encourage community based surveillance of breeding sites.

## **Conclusion**

Nepal must shift from reactive, outbreak-driven responses to a proactive, climate-informed, community-centered vector control strategy. Strengthening surveillance, enhancing local government capacity, and integrating eco-bio-social insights into national policy are essential to reduce the growing burden of dengue and other vector-borne diseases.

# Background

Mosquito borne diseases (MBDs) are considered a major health threat in Southeast Asian countries including Nepal. They account for more than 700 million infections with 1 million deaths worldwide (1). Nepal is now endemic for various MBDs such as malaria, lymphatic filariasis, Japanese encephalitis, chikungunya and dengue fever and are the major causes of morbidity and mortality (2). Malaria, one of the oldest reported tropical diseases, is transmitted by the bite of infected *Anopheles* mosquitoes. According to the Annual Report 2020/2021 of department of health service (DOHS), Malaria transmission is found to be concentrated in Karnali and Sudurpaschim Province with approximately 81% of high-risk burden and 94% of moderate risk burden. Upper hilly river valleys previously considered as 'No Malaria' risk area are increasingly being detected for malaria infection (3). Lymphatic filariasis (LF), mosquito borne parasitic disease, is transmitted by the bite of different species of mosquitoes (*Culex*, *Anopheles* & *Aedes*) and caused by a thread like filarial worms; *Wuchereria bancrofti* and *Brugia* Species. In Nepal *Culex quinquefasciatus* is the principal vector of LF. Altogether, 63 out of 77 districts of Nepal are considered endemic for LF on the basis of Immunochromatography Test card (ICT) surveys, morbidity reporting, and vector density, sanitation status of the districts and geo-ecological comparability (3). Japanese encephalitis (JE) is a mosquito-borne viral disease transmitted by *Culex tritaeniorhynchus*. After the first case of JE detection in Rupandehi district in Nepal, large number of cases have been reported in other area in every 2 to 5 years (4). Chikungunya virus infection was first detected in Nepal in 2013 (5). Since the first report of dengue case in Nepal in 2004, dengue outbreaks occur year by year, and from tropical lowland to subtropical hilly region and extended even to the mountain region which can be attributed to the rise in temperature due to global warming (6). *Aedes aegypti* and *Aedes albopictus* are the prominent vectors of both Dengue and Chikungunya virus. Dengue virus is an *Aedes* mosquito-borne single-stranded RNA virus that belongs to the genus *Flavivirus* under the family *Flaviviridae* and is responsible for causing dengue fever either without any long-term effects to life-threatening conditions such as Dengue hemorrhagic fever (DHF) or Dengue Shock syndrome (DSS) that is caused by one of the four main serotypes (DENV-1, DENV-2, DENV-3, DENV-4) of dengue virus (7,8). Due to the lack of effective vaccines and antiviral drugs, symptomatic treatment, and vector control programs are at present the only possible approaches for tackling dengue infections (9,10). There is increasing evidence about the impact of climate change on the distribution of VBDs (11). The future distribution of dengue vectors and the extent of dengue disease outbreaks will strongly depend on the extent and speed of the vector's adaptation to altered thermal conditions. At their origin, the mosquitoes need to cope with rising temperatures due to global warming, whereas they have to adapt to colder temperatures at newly invaded regions, i.e. at higher altitudes and latitudes (12,13).

## Rationale

In recent years, the geographic distributions of vector-borne diseases mostly transmitted by mosquitoes have expanded in Nepal and are the major causes of morbidity and mortality (2). However, there has been a failure to adapt disease control and surveillance strategies to this changing reality. In this context, there is an urgent need for research

to understand the epidemiology and transmission dynamics of these diseases, "in the absence of an effective vaccine and therapy, vector control is the only practical alternative". Thus, conducting qualitative research can provide valuable insights into the local context, beliefs, and practices related to dengue prevention and control in Nepal. The information gathered from these methods can help in designing effective and context-specific interventions to reduce the burden of dengue in Nepal. Moreover, the assessment of eco-bio-social aspects for vector prevention and control of mosquito vectors may serve as groundwork to decide if and what kinds of programs would be understandable and implementable in specific altitudinal regions of Nepal.

# Objectives

## General objective

To explore eco-bio-social determinants for dengue prevention and control measures in different eco-regions of eastern Nepal.

## Specific objectives

- To examine the knowledge of dengue and the extent to which preventative measures are practiced within the community.
- To understand the status of dengue and explore the factors contributing to the dengue outbreak.
- To explore the existing vector prevention and control strategies implemented in diverse eco-regions of eastern Nepal and evaluate their effectiveness in mitigating dengue.
- To understand the community's perceptions, behaviors, and challenges in combating dengue.

# Research Methods

A qualitative research design was conducted.

## Study Site

The eastern part of Nepal was purposively selected for this study. Six sites (district) was covered from the Koshi province: Taplejung, Illam, Jhapa, Sankhuwasabha, Dhankuta and Sunsari.

## Study Population

The study population comprised officials from the provincial health directorate at the provincial level, public health officers representing each district at the district level and focal persons from municipalities, health post in-charges, and Female Community Health Volunteers (FCHVs) at the local level. Additionally, socially engaged community members and individuals from the general community were included.

## Research Design

Key Informant Interviews (KII) were done among different stakeholders at provincial, district and local level. In-depth interview (IDI) were done among socially active individuals in the community and Focus group discussion (FGD) were conducted among the general community people.

## Sampling Technique

Stakeholders from provincial, district, and local levels were selected purposively. IDI and FGD was done among the among the community people. And the information was collected until the point of saturation.

## **Sample Size**

A total of 24 Key informant interviews (KII) were conducted, including vector control focal persons at Provincial Health Directorate office, public health officers, focal persons of the Municipality, health post-in-charge and FCHVs. Additionally, 24 in-depth interviews (IDIs) and 11 focus group discussions (FGDs) were conducted in the community within the district.

## **Data Collection Tools and Techniques**

Guidelines for Key Informant Interviews (KII), In-Depth Interviews (IDI), and Focus Group Discussions (FGD) were developed by reviewing extensive scientific literature, and reviewed by relevant experts to ensure appropriateness. Necessary adjustments were made based on their feedback.

Face-to-face interviews using KII, IDI and FGD guidelines were performed. A trained field enumerator was engaged to capture the required information. A letter from the Nepal Health Research Council was issued to the selected stakeholders outlining the project details. A copy of the signed letter was given to each researcher so they could show it to any relevant official. Those documents helped in gaining the confidence of the security agencies and also seeking their help in case needed. The qualitative information was recorded using a mobile phone or tape recorder.

## **Validity and Reliability of Tools**

Face and Content validity was ensured after consultation with the content experts and necessary modifications were done accordingly. Qualitative guidelines were developed in English which was later translated into the Nepali language by the experts.

## **Supervision and Monitoring**

In order to ensure the standard procedures are maintained to collect the data, the core research team monitored and supervised the data collection in the field. An update of the field-level activity was done on a daily basis.

## **Ethical Statement**

The ethics approval was taken from the Ethical Review Board of Nepal Health Research Council. All research participants took a signed written informed consent after being informed of the research subject matter and were assured that their personal information was kept private. Each participant had the right to withdraw from this study at any time.

## **Data Management and Analysis**

FGDs, KIIs and IDIs were recorded using a recorder with the approved consent. Note taking was also done simultaneously. The recorded audio file was transcribed and translated into English on the same day of the interview and checked for accuracy thoroughly for consistency. The analysis was done manually and broadly following the six stages of thematic analysis. Getting acquainted with the data, (ii) generating initial codes, (iii) searching for themes and patterns, (iv) reviewing themes and patterns, (v) defining and (vi) naming themes. Thus, themes were finalized by a group of researchers, and thematic analysis was done.

## Categories of Themes

Theme	Subtheme
Most Prevalent Vector Borne Diseases	-
Status of Dengue	Incidence of Dengue Cases
	Continual Incidence and Associated Symptoms
Factors Influencing Dengue Transmission and Outbreaks in Nepal	Emergence of Dengue due to Climate Change and Rise in Temperature
	Altitude versus Dengue
	Dengue during Festive Season
	Dengue during Monsoon Season
	Imported Dengue Cases
Knowledge of Dengue	Knowledge on Common Signs and Symptoms
	Knowledge on Causative Factors
	Knowledge on Breeding Sites
	Knowledge on Transmission
	Knowledge on Preventive Practices
Training for Health Workers	-
Collaborators for Dengue Management	NGO/INGO involvement
	Involvement of Government Agencies, Schools, Local Clubs, Medical Stores
Multisectorial Coordination	Level of integration
	Resource Allocation and Support
Role of Media in the Management of Dengue	-
Misconceptions or Myths Regarding Dengue in the Community	-

Theme	Subtheme
Prevention of Dengue	Public Health Approaches for Dengue Prevention
	Search and Destroy Activities
	Management of Stagnant Water
	Use of Spraying
	Pesticides Usage
	Fogging
	Formulation of Policies
	Conduction of Surveys
	Formulation of Rapid Response Team
	Awareness
	1. Involvement of Stakeholders for Awareness Program
	2. Awareness through Health Personal
	3. Awareness through School Programs
	4. Advocacy and Awareness through FM Radio, Brochures, Posters, Miking
5. Awareness via Social Media Platforms	
6. Awareness through Mother Groups	
7. Awareness Campaigns through Female Community Health Volunteers	
Challenges	Absence of Dedicated Ward
	Lack of Equipment, Manpower and Infrastructure
	Challenges in Spraying
	Challenges in Creating Awareness
	Challenges in Finding Breeding Sites
	Challenges in Controlling Disease Spread due to the Mobility of People
	Challenges of Accessibility and Affordability in Dengue Testing and Treatment
	Challenges with Local Governance and Community Participation
	Challenges due to Community Pressure
	Lack of Emergency Preparedness for Outbreak
	Challenges in Conducting Training
	Lack of Coordination from Central to Federal Government

Theme	Subtheme
	Impact of Federalism
	Soci-Ecnomic Problems
	Geographical and Environmental Challenges
	Challenges in Case Findings and Reporting
	Community Resistance and Lack of Awareness
	Challenges in Seeking Treatment
	Challenges in Service Delivery
Varied Budget Allocation and Resource Mobilization for Dengue Control	
Insufficient Budget Allocation	Limited Incentives for Community Engagement
	Financial Barriers to Health Information Dissemination
	Financial Limitations for Spraying
	Insufficient Financial Support Versus Need
	Limited Budgetary Flexibility
	Government Emphasis on Infrastructure over Disease Prevention
	Timing of Budget Allocation
Reporting Mechanism	Dengue Monitoring /Reporting
	Daily Online Reporting During Epidemic
	Monthly Reporting through District Health Information Software
	Surveillance through Early Warning and Reporting System
	Integration Monitoring
Challenges in Reporting	-

# Study Findings

## 1. Most Prevalent Vector-borne Diseases

The majority of omit participants stated that dengue was currently the most prevalent disease, while other vector-borne diseases such as malaria, kala-azar, Japanese encephalitis, filariasis and scrub typhus had also been reported previously. However, the number of cases of other vector-borne diseases had reduced significantly apart from dengue, with only a few cases reported in the past year.

*“Now we should talk about the district rather than our province. Dengue is what is seen in the district now. Last year there were many cases of Dengue. Even now, we are seeing cases of dengue in the initial stage. It is not seen as an epidemic as it is seen in general. Malaria was also seen last year but it is not seen now. It’s better not to be seen. Dengue has started appearing now.” (KII, Health Office, Sankhuwasabha)*

*“The case of Dengue is seasonal, that is in monsoon, and it is also increasing. We are also affected by other diseases like Kalazar and malaria. Two of our districts are affected by filariasis (I.e. Morang and Jhapa) and we are running the MDA program.” (KII, Vector-borne disease focal person, Health Director Office)*

*“Currently, dengue is one of the most common vector-borne diseases. We had 6 cases in this financial year, which were all imported. We are also giving medicines for Lymphatic filariasis, but if we talk about the case, it seems to be less due to the long incubation period. Like others, the number of kala-azar is low. The main thing is dengue. (KII, Health Office Birtamode, Jhapa)*

*“In the past two to three years, we have seen cases of malaria, but currently, due to the minimal prevalence of malaria, it is not significant. Last year, there were around 5-6 cases of kala-azar. Yes, there have been cases of dengue and kala-azar. There are two prevalent diseases in the province, like kala-azar in Okhaldhunga and scrub typhus.” (KII, Health Office, Dhankuta)*

*“In our province, especially in the Tarai districts like Jhapa, Morang, Sunsari, diseases such as malaria, dengue, and kala azar, and even elephantiasis are prevalent. Currently. In our Province 1, in places like Koshi, Dhankuta, and Dharan area has been seen as a major dengue epidemic recently, starting around 10/12 days ago.” (KII, Health Office, phungling, Taplejung)*

*“The disease mosquitoes can cause is malaria and kala-azar. Other one is Japanese Encephalitis. However, vaccination has also controlled this disease.” (KII, Health Post Incharge, Itahari, Sunsari)*

## 2. Status of Dengue

KII revealed the incidence of dengue in various districts and municipalities to varying extents. The majority of the participants stated that dengue cases were most common in Nepal's Terai belt over the past few years. As evidenced by several cases over a number of years and the steps taken to manage outbreaks indicated that dengue remained a public

health challenge in both the hilly and Terai belts of Nepal. According to the participants, climate change-related factors such as temperature changes, factors such as temperature changes, seasonal variations, people's travel histories, and imported dengue vectors all contributed to the prevalence of dengue in various parts of Nepal.

### **Incidence of Dengue Cases**

According to the interview, confirmed cases of dengue have been reported in many municipalities and districts of Nepal, indicating the widespread prevalence of dengue in Nepal. The number of cases varied by location and year, with some reporting higher numbers than others. Participants also stated that the risk and number of cases increased as the disease spread geographically and also further explained that as the rate of morbidity increased the people's lives were greatly impacted.

*"Since 2014, Dengue has been occurring in Dhankuta, and the numbers have been increasing. Previously, it was mainly in Jhapa, but now Morang, Sunsari, and Dhankuta, all 14 districts, have reported cases. Some areas have fewer cases, while others have more, but cases are happening everywhere. As the area has increased, so have the risks and the number of cases. However, compared to before, the fatality rate is lower, so people are not overly concerned, but the morbidity rate is quite high. Due to Dhankuta's proximity, we are at greater risk."* (KII, Health Office, Dhankuta)

*"Currently, I think there are about 30-35 such cases now. There was no immediate human loss due to dengue, but the rate of illness and the direct impact on people was profound."* (KII, Municipality office, Ilam)

*In Birtamode municipality, if we see the report of previous year, (Jestha to Bhadra), 54-55 patients with dengue have been admitted in different hospitals for the treatment of dengue. We have seen few cases this year as well.* (KII, HP Incharge, Birtamode-4, Jhapa)

*Dengue was widespread last year affecting up to 3 4 persons in the same household. This year too it's just the starting season Dengue has affected this ward previously and a lot more than other wards too. Many people were sick.* (FGD, Birtamode-5, Jhapa)

One of the participants from the Terai belt stated that a huge number of dengue cases was reported through HMIS (Health Management Information System). However, he further explained that because of underreporting and diagnostic challenges, the true magnitude of dengue cases in their district remained uncertain.

*"The official HMIS report shows 660 Dengue cases in the current financial year. Not only this but there are many hidden cases, some private institutions have also reported a few cases, Dengue is spreading but I can't say exactly how much."* (KII, Health Office, Birtamode, Jhapa)

A participant expressed doubt about the potential spread of dengue fever in new areas within their district, while another participant expressed a more contrasting view, stating that numerous cases of related symptoms were identified after the initial case.

*"At first, one of them was confirmed to have dengue. After that, there were many cases of related symptoms."* (KII, Khandbari Municipality office, Sankhuwasabha)

*“Has dengue been found in new places? I couldn't say exactly as we haven't looked at it that way.” (KII, Health Office, Birtamode, Jhapa)*

However, according to a few participants, there was a significant dengue outbreak in the previous fiscal year. In comparison between previous and current fiscal years, there was a decreasing trend in dengue cases. However, efforts were made to control the outbreak, which resulted in fewer cases in the current fiscal year.

*“Last year, the effect of dengue has been seen to some extent in Birtamod Municipality. There have been some dengue positive cases while death did not occur. We managed to control it as much as possible. I could not say much about the data at this moment, but many cases were found. There were fewer cases in this fiscal year than the previous fiscal year, but in the previous fiscal year, we had more positive cases than those located inside Birtamod I can't say the exact data now, but a good number of cases were seen. (KII, Birtamode Municipality office, Jhapa)*

*“Last year, I entered Sankhuwasabha in October and saw 150-200 cases of dengue at that time. After Karthik, incidence went down. It is more visible in the rainy season ”(KII, Health Office, Sankhuwashaba)*

*“About 50 cases of dengue were seen last year. This year, two positive cases were seen in this health post ten days ago.” (KII, HP-Incharge, Khadbari, Sankhuwasabha)*

*“Dengue was seen a lot last year, but this year we haven't seen much cases. Whatever it is, when it is rainy dengue will come, though this year it is not here it will appear.” (KII, HP-Incharge, Birtamode-5, Jhapa)*

*“Last year there were patients who had high fever and they used to faint as well. I don't know about this year.” (IDI, Housework, Khadbari, Sankhuwasabha)*

*“There aren't many cases now, but last year 5-6 cases were admitted to hospital. Now people have become aware. We don't have a record of dengue cases.” (IDI, Male, Teacher, Ilam-6)*

One of the participants from Itahari Sub-Metropolitan City stated that five individuals from their municipalities had dengue in the current year. He further revealed that factors contributing to Dengue outbreaks included rapid and unplanned urbanization, sub-tropical climate, presence of mosquito breeding grounds such as rivers and forests, transportation junctions, and lack of road maintenance. All of these factors created a conducive environment to the spread of dengue, leading to a higher number of cases compared to other municipalities whereas another participant from Inaruwa said that the primary cause of dengue was due to water collected in left and unused car tires in surrounding,

*“Now if we are talking about last year or even earlier there was an outbreak. This is specifically flood affected area. Here we have mainly two rivers the big one is Budhikhola and another one is khotikhola. The rapid unscientific urbanization on this low surface area and presence of sub-tropical climate provides factors necessary for growth and development of mosquitoes. Another Charkoshe bush (Forest) is also nearby us. There is*

*also a junction for transportation to various places from here. There are tyre shops that made tyre nearby. Another thing is that many roads are not repaired. Because there is a favorable condition for that, last year also a bit more cases were seen here than other municipalities.” (KII, Itahari Sub-Metropolitan City Office, Sunsari)*

*“There is a water collected area in the nearby ward. Mosquitoes come from there too. The source is the tire.” (KII, Health office, Inaruwa, Sunsari)*

However, only few participants gave contrast views and stated that cases of dengue were not reported in their areas. Few IDI participants also stated that while they were not aware of dengue cases of this year, they had heard of a few dengue cases the previous year but a proper record was not available.

*“In this area, no cases of dengue have been reported. Earlier, cases were seen but now they are not seen.” (KII, HP-Incharge, Itahari-5, Sunsari)*

*“Recently I haven't seen such cases of vector-borne disease. Before we used to see malaria cases. I haven't seen any cases of dengue here. But in other places within the municipalities, there used to be cases of such diseases.” (KII, Health Post, Ilam)*

*“There are not many cases this year, but last year 5-6 cases were admitted to hospital. Now people have become aware. We don't have a record of dengue cases.” (IDI, Male, Teacher, Ilam-6)*

### **Continual Incidence and Associated Symptoms**

Participants from the Terai belt revealed that the outbreak began in 2076 BS and had continued ever since, rising two times that year. Participants emphasized the ongoing seriousness of the dengue outbreak in Itahari and Dharan, and further elaborated that dengue cases were reported from all Palikas. Regarding the cases, severe cases had been reported, leading to fatalities and symptoms like mild to high fever, and itching were most prevalent in dengue cases as explained by participants. This implied that more people were getting dengue fever illnesses even though fewer people had passed away from the vector-born disease.

*“There was an outbreak from the beginning in the year 2076. Even now there is an ongoing outbreak and it has double peaked this year. It has occurred in both Dharan and Itahari and is seen in almost all Palikas.” (KII, Health Office, Inaruwa, Sunsari)*

*“Some areas have fewer cases, while others have more, but cases are happening everywhere. As the area has increased, so have the risks and the number of cases. However, compared to before, the fatality rate is lower, so people are not overly concerned, but the morbidity rate is quite high. Due to Dhankuta's proximity, we are at greater risk.” (KII, Health Office, Dhankuta)*

*“High grade fever and dehydration occurs in dengue.” (IDI, Male, Teacher, Ilam-6)*

*“This disease has symptoms like fever, headache, stiff hands and feet.” (KII, FCHV, Khadbari-3, Sankhuwasabha)*

*“Dengue causes loss of appetite, dizziness and fever.” (IDI, Female, Business, Birtamode-4, Jhapa)*

The potential seriousness of dengue fever was also *stated up* by the participants, especially in areas where it is common. This emphasized critical conditions caused by the dengue outbreak and highlighted the importance of effective public health measures and medical interventions to address and mitigate the impact of the disease

*“In Sunasari, deaths have also been reported due to dengue. We have had reported cases of two to three deaths.” (KII, Health Office, Dhankuta)*

*“Recently, one death case was reported from Dharan last month. After that many people from Dharan (Sunsari) are suffering from dengue fever. Many people go for tests as many do not want to visit the hospital.” (KII, Vector-borne disease focal person, Health Director Office)*

*“Severe cases have also been seen. One case has died. One had died before as well. Even now, if there is a death, the municipality will send the report here. But some people have experienced mild fever whereas some people have high fever. Some people have also experienced itching. Itching has been seen in new cases.” (KII, Health Post, Inaruwa, Sunsari)*

*“When there's onset of this disease there's high blood pressure, severe headaches, nausea, stomach cramps. After advancement of the infection, there will be blood hemorrhage in the eyes, nose and mouth then fainting.” (KII, FCHV, Dhankuta-7)*

*There is not much cases but last year 5-6 cases were admitted to hospital. Now people have become aware. We don't have record of dengue cases.” (IDI, Male, Teacher, Ilam-6)*

One participant revealed that research has confirmed the presence of *Aedes aegypti* and *Aedes albopictus*, the dengue vectors, in their respective regions, and that many people with travel history are at risk of bringing those vectors into our areas.

*“We are conducting surveys here, and there is a presence of *Aedes aegypti* and *Aedes Albopictus*, both vectors for dengue, and when only one person is infected, the disease spreads. There are many people coming from Dhankuta, which poses a significant risk. Comparing the history, we've been observing dengue in Nepal since 2004, then in Chitwan, and from 2010 onwards in Koshi Province.” (KII, Health Office, Dhankuta)*

*Before 2004, there was no case, since then it has started to appear, but the outbreak has also been happening again and again. Even in the previous financial year, besides seeing in different places the reported cases were just 660 again I think it is underreporting as we don't have an exact diagnostic tool to say that this is dengue therefore it is difficult to identify dengue. How many numbers do you think, (KII, Health Office, Birtamode, Jhapa)*

However, one participant had conflicting views and said that *Albopictus* vectors were not present in Nepal.

*“We need to know about the exact cause of vector-borne disease. As we say *Aedes albopictus* not present in Nepal and we are always running after *Aedes mosquito*. We need to conduct a survey of *Aedes mosquito* and know properly about its breeding capacity.” (KII, Vector-borne disease focal person, Health Director Office)*

### **3. Factors Influencing Dengue Transmission and Outbreaks in Nepal**

#### **Emergence of Dengue due to Climate Change and Rise in Temperature**

The majority of participants highlighted the correlation between temperature, weather, and dengue fever prevalence. Also, the participants stated that one of the aggravating factors for the spread of dengue fever was the unexpected temperature rise. Most of the participants stated that, an increase in temperature provided the ideal conditions for mosquito reproduction, which increased the prevalence of dengue carried by vectors in Nepal. The participants disclosed that one factor influencing the spread of dengue fever was the rise in temperature brought on by climate change. The warmer temperatures were causing the dengue vector to move upward, increasing the risk of dengue in hilly areas like Ilam district. Participants stated that dengue cases were more prevalent in warmer temperatures region. Additionally, a respondent from Ilam highlighted the impact of rising temperatures and global warming on dengue transmission, suggesting that mosquitoes are now spreading to mountainous regions due to climate change.

*Dengue cases are less in the cold season since it is a Himalayan district. Cases in Khandbari municipality are more because it is near Arun Valley and it gets a little hot there. After that, large number of cases are usually seen is towards Chainpur, Madi whrew. In total, more cases are seen in Khandbari Municipality.” (KII, Health Office, Sankhuwashaba)*

*“Climate change may have caused a rise in dengue because the temperature has increased these days. Now the global warming is happening. Since the temperature is increasing all over the mosquitoes is spreading to mountain areas also.” (IDI, Male, Teacher, Ilam-6)*

*“Dengue is a disease that has not been seen before, which is now appearing in Nepal since 2006 as a new emerging disease. Shifting from India itself - due to climate change and human behavior.” (KII, Health Post, Ilam)*

*“A couple of weeks ago when the temperature was rising everywhere, Ilam had not felt this hot either. It is as much as in the Terai. It went up to 35 degrees celsius, but due to climate change, this vector is moving upwards. It also happened due to the availability of the vector.” (KII, Health Post, Ilam)*

*“Here, the temperature had never risen above 35 degrees Celsius, but this time it has risen to 43 degrees Celsius. A rise of 7-8 degrees Celsius is not normal. Before that, it was up to 32-33 degrees Celsius at most. Malaria and kala-azar were more common then. Not a single case of them is visible now. But Dengue has come now.” (KII, Health Post Incharge, Inrauwa, Sunsari)*

*“It spreads more during the rainy season.” (KII, HP-Incharge, Khadbari, Sankhuwasabha)*

*“In this region, mosquitoes are abundant due to the hot and humid weather conditions. Patients often report being bitten by mosquitoes near mango trees or in their vicinity. People note a significant increase in mosquito breeding in these areas. Recently, there has been a confirmed case of dengue fever in Dhankuta, Before this, there were no reported instances of dengue fever in Dhankuta, and cases were often overlooked. Historically, the*

*district had not experienced outbreaks of dengue fever. However, presently, dengue fever cases are emerging from the early stages.” (KII, Urban Health clinic, Dhankuta)*

However, a Health Post In charge from Dhankuta gave contrast view and said that temperature was not the reason for dengue cases.

*“There may be a case of dengue, but the temperature does not affect it.” (KII, HP-Incharge, Dhankuta-5)*

### **Altitude versus Dengue**

Participants mentioned that the spread of dengue-lowercase throughout was affected by the geographical location. They believed that areas with warmer climates with higher population density experienced the dengue outbreak. They also noted that districts with lower altitudes were more favorable for vector-borne diseases compared to higher altitudes, which have colder climates. However, Dengue cases were still observed in high-altitude areas.

*“Dengue is less common in the winter season since it is a Himalayan district. Cases in Khandbari municipality are more because it is near Arun Valley and it gets a little hot there. After that, a large number of cases are usually seen towards Chainpur, Madi. In total, more cases are seen in Khandbari Municipality.” (KII, Khandbari Municipality Office, Shankhuwasabha)*

*“Our major rivers are Tamor and Kabeli, and their basins are in slightly lower altitude belts where it is warmer, and vectors can be found.” (KII, Health Office, Phungling, Taplejung)*

*“There is no significant problem with vector-borne diseases in this district because it is a high-altitude district, a Himalayan district. Due to the high altitude, there are not many vectors here. (KII, Health Office, Phungling, Taplejung)*

*“Our place Dokhu lies in Funcling Municipality-8, Taplejung. It is about 1700-1800 m high from the sea level. However, there has been no case seen in our ward 8 yet. There are no native cases even if it has been seen in the Taplejung district.” (KII, HP-Incharge, Dokhu-8, Taplejung)*

However, few KII participants gave contrasting views and stated that dengue was seen in high-altitude regions like Sankhuwasabha and Tehrathum as well.

*“Last year, among 14 hilly districts of Koshi province, Sankhuwasabha came in second place. Dengue was seen in more than 300 cases last year. This number is a huge for a hilly district. But, it was not so serious for most of the cases, except for 2-4 people who were hospitalized. We have not heard of death due to dengue in this district.” (KII, Health Office, Khadbari, Sankhuwashaba).*

*“There are a few cases in Dhankuta, one of the hilly region and as I said before, we had an outbreak last year in Terathum district- which is another hilly area” (KII, Vector borne disease focal person, Health Director Office)*

## **Dengue during Festive Season**

However, participants claimed that dengue -lower case throughout fever incidence typically peaked around the festive season *Dashain and Tihar* and the outbreak was considered a serious issue, particularly given the high number of cases reported during festive season.

*“In general, the dengue cases have slightly increased. Earlier, it was seen sporadically in Ilam, but last year, during the peak Dashain-Tihar festival in Nepal, there were 100 hospital cases reported here. After the epidemic in Dharan, 6-7 cases have been observed. More cases are observed than the previous year, there are imported cases rather than local transmissions. Like those who returned from Kathmandu during Dashain and Tihar holiday.” (KII, Health Office, Ilam)*

*“During the Dashain festival, there was an outbreak in Mahalaxmi area. We tried to control it, but reporting was delayed.” (KII, Health Office, Dhankuta)*

*There are imported cases rather than local transmissions. Like those who returned from Kathmandu during the Dashain and Tihar holiday.” (KII, Health Office, Illam)*

## **Dengue during Monsoon Season**

Participants pointed out that dengue outbreaks happen frequently, especially during the monsoon season, and that climatic conditions play a role in the spread of the disease. A participant stressed the severity of the outbreak, mentioning a significant increase in cases before and during the monsoon, especially in Dharan. Likewise, another participant from Taplejung highlighted the connection between rainfall, temperature, mosquito population, and the increase in dengue cases due to climate change affecting weather patterns. On the other hand, reports from Dhankuta and Birtamode municipalities show a variation in dengue cases each year, with more cases reported during the previous monsoon season compared to the current year.

*“There is a serious problem, because it an outbreak, and when we talk about it earlier during the monsoon, our district had most number of cases in Terai. Now again from pre-monsoon to monsoon, more cases are seen in Dharan.” (KII, Health Office, Inrauwa, Sunsari)*

*“Here the rainy season starts from Baisakh to Bhadra, and if it is hot, then more mosquitoes are present. Even if it rains, there are still a lot of mosquitoes. Likewise, now with climate change, the heat has increased. With increasing heat, it rains much, and water accumulates, and then the larvae are there.” (KII, Health Office, Phungling, Taplejung)*

*“Currently, we have 145 registered cases in Dhankuta district alone, mostly during the last monsoon season.” (KII, Health Office, Dhankuta)*

*Dengue was seen a lot last year, but this year we haven't seen much cases. Whatever it is, when it is rainy season. Dengue will come, though this year it has not been seen here however it will appear when rainy season starts. (KII, HP-Incharge, Birtamode-5, Jhapa)*

*In Birtamode municipality, if we see the report of the previous year, during monsoon season (Jestha to Bhadra), 54-55 patients with dengue have been admitted in different*

*hospitals for the treatment of dengue. We have seen a few cases this year as well. (KII, HP-Incharge, Birtamode-4, Jhapa)*

*This year too it's just the starting season (monsoon) Dengue has affected this ward previously and a lot more than other wards. (FGD, Birtamode-5, Jhapa)*

### **Imported Dengue Cases**

From the findings, it was revealed that dengue was spread both in hilly and terai regions of Nepal. But in certain hilly regions participants explained that the impact of external factors such as travel history was the reason for the occurrence of dengue in their municipalities, compared to other hilly regions of Nepal, a participant reported Ilam municipality had multiple incidences of dengue and also elaborated that a provincial hospital within the municipality made easier in treating dengue cases.

*“Currently, dengue is one of the most common vector-borne diseases, we had 6 cases in this financial year, which were all imported.” (KII, Health Office, Jhapa)*

*“There was no such case of dengue within the area of Dhankuta municipality, but it was seen in people who went out of this municipality.” (KII, Dhankuta municipality Office, Dhankuta)*

Participants reported that the number of imported cases was more rather than local transmissions. They mentioned that individuals who returned to their hometowns from areas with a high prevalence of dengue became infected and spread the disease within their own communities.

*There are imported cases rather than local transmissions. Like those who returned from Kathmandu during the Dashain and Tihar holiday.” (KII, Health Office, Ilam)*

*“This year there have been reports of 14-15 dengue cases from the district hospital, but not of the local people from here if we see their travel history they usually go to Dharan and Sunsari” (KII, Health Office, Phungling, Taplejung)*

Participants said that in the eastern part of Nepal, there was a constant daily movement of between 100 and 150 vehicles in two areas- Dhankuta and Dharan. This movement poses a substantial risk for the spread of dengue, as infected individuals can easily spread the disease to other regions. Participants further mentioned that easy access to transportation contributed to cases in the hilly regions.

*“Having worked practically in every region, I saw that we even got cases in the Himalayan region. It might be due to global warming or due to transportation. In the past days, people used to walk for 4- 5 days to migrate Himalayan region but in the present day, people can reach there within a few hours. Good transportation might be the main cause. (KII, Vector-borne disease focal person, Health Director Office)*

*“Dhankuta is in the second or third position in terms of outbreaks, with Chitwan being the first. The daily movement between Dhankuta and Dharan is constant. I have also just arrived from Dhankuta today. About 100 to 150 vehicles are moving daily, so vector control is crucial.” (KII, Health Office, Dhankuta)*

*“Officially the case of Dengue was not seen, but was seen among the residents of here who went outside from here in the course of employment.” (KII, Taplejung Municipality Office, Phungling, Taplejung)*

*“As of now, we haven't seen it here. In Taplejung, Dengue is now prevalent in many cities. It might not reach here soon, but we still need to be cautious. It takes about two days to reach here. If you travel by vehicle, it takes around 6 to 7 hours.” (IDI, Female, Housework, Phungling-4, Taplejung)*

One participant revealed that research has confirmed the presence of *Aedes aegypti* and *Aedes albopictus*, the dengue vectors, in their respective regions, and that many people with travel history are at risk of bringing those vectors into our areas.

*“We are conducting surveys here, and there is a presence of *Aedes aegypti* and *Aedes Albopictus*, both vectors for dengue, and when only one person is infected, the disease spreads. There are many people coming from Dhankuta, which poses a significant risk. Comparing the history, we've been observing dengue in Nepal since 2004, then in Chitwan, and from 2010 onwards in Koshi Province.” (KII, Health Office, Dhankuta)*

One participant expressed uncertainty about the transmission. However, further elaborated that dengue was more prevalent in urban areas.

*“I don't have much idea about it. This disease is seen in urban areas more than in rural areas. Since the dengue mosquitoes prefer living in clean water, they are seen more in the urban area due to the water from ACs and plant pots.” (KII, HP-Incharge, Birtamode-4, Jhapa)*

*“One is, it is the border to Terai. Ilam and Jhapa have a direct connection. We all know direct vehicles come from Jhapa to Ilam frequently. Through it, mosquitoes may have come. When we were kids I didn't know what mosquitoes were but now mosquitoes have spread so much I think this is due to urbanization also.” (IDI, Male, Teacher, Ilam- 4, Ilam)*

## **4. Knowledge of Dengue**

### **Knowledge on Common Signs and Symptoms**

The majority of participants Form focus group discussion and interviews mentioned symptoms, like fever, headache, joint pain, nausea, diarrhea, red eyes, body aches, weakness, dizziness and vomiting could be the common signs and symptoms of dengue. Some participants further stated that these symptoms could be life-threatening in certain cases.

*“Symptoms include fever, headache, nausea, diarrhea, eyeballs hurts, and body aches a lot.”(FGD, Khadbari-9, Sankhuwasabha)*

*“Dengue causes fever, joints pain, and diarrhea. Body pain, headache dizziness. That's the thing we hear in the community. It has been 3-4 years. Earlier there was nothing about dengue.”(FGD, Birtamode-4, Jhapa)*

*“Regarding its symptoms, I have heard that there will be high-grade fever. Weakness occurs and people can even die due to dengue.”(IDI, Male, House worker and social worker, Khandbari -9, Sankhuwasabha)*

*“When you get dengue, symptoms like headache, redness of eyes, back pain, dizziness, nausea, and vomiting are observed.”(KII, FCHV, Birtamode-5, Jhapa)*

*“As far as I understand, its symptoms are headache and dizziness, and I have also seen that the eyes get very red like they are about to cry. And I understand that the blood will flow a little more and the stool will be black.”(KII, FCHV, Khadbari-1, Sankhuwasabha)*

### **Knowledge of Causative Factors**

Some of the participants highlighted that dengue was an illness mainly spread by mosquitoes. A few individuals stated that dengue was caused by the Aedes mosquito, while others were unaware of the specific mosquito types responsible for transmitting dengue, whether male or female.

There was also a common understanding mosquitoes breed in stagnant water, especially during the rainy season which results in higher transmission and spread of disease.

*“Dengue is a contagious disease, it is transmitted by the female Aedes mosquito. Dengue, malaria, and meningitis are more common in female mosquitoes than males.” (FGD, Khadbari-9 Sankhuwasabha)*

*“Dengue is a contagious disease transmitted by a mosquito bite. And this is a communicable disease transmitted by the bite of Aedes, a female mosquito.” (KII, FCHV, Dhankuta-7)*

*“Dengue is a mosquito-borne disease. I understand that this disease is mostly transmitted by female mosquitoes. I have understood that this disease spreads a little more in places where water is stagnant, from places where there are pots and places where there is dirt.”(KII, FCHV, Khadbari-1 Sankhuwasabha)*

*“Dengue is a disease transmitted by either a male or female mosquito that infects other people. Dengue is a mosquito-borne disease. It is a kind of disease that causes fever and can even lead to death.” (KII, FCHV, Ilam-7, Ilam)*

*“Dengue is a contagious disease. It is caused by mosquitoes. The disease is also caused by female Aedes mosquitoes. It spreads more during the rainy season. This mosquito bites in the morning and evening and can spread the disease to 8-10 people at once.”(KII, HP In-charge, Sankhuwasabha-7)*

However, one of the participants had limited knowledge of dengue. Despite the comprehensive knowledge, he was aware of the disease transmission.

*I don't know much about dengue fever. But I know that it is caused by the bite of mosquitoes. (IDI, Male, House worker and social worker, Khadbari-9, Sankhuwasabha)*

### **Knowledge of Breeding Sites**

Participants shared their insights, about breeding sites of dengue-carrying mosquitoes emphasizing that they thrive in clean water such as water discharged from air conditioners or still water in potholes and containers. Some stressed the importance of preventing water stagnation by filling potholes and getting rid of still water to decrease breeding areas. While, few participants pointed out that dengue spread was more common in dirty areas where there is dust, trash, and sewage.

*“Dengue (dengue causing mosquitoes) live in clean water, water discharged from AC. This is the breeding site for dengue. When the mosquito larvae mature in about a week, they become carriers of dengue, which causes risk to humans. This is how dengue is produced.”(KII, FCHV, Birtamode-2, Jhapa)*

*“I have heard that mosquitoes breed in clean water.”(IDI, Female, Housewife, Social worker, Itahari-6, Sunsari)*

*“I have heard that it breeds in stagnant water. Potholes should be filled. So last year we filled the potholes to avoid water stagnation.”(IDI, Male, Social worker, Khandbari-9, Sankhuwasabha)*

*“I have understood that this disease spreads a little more in places where water is stagnant, from places where there are pots, and places where there is dirt.”(FCHV, Khadbari-1, Sankhuwasabha)*

*“Dengue takes place where there is dust, garbage, sewages at that place where there is collection of water then female mosquito lays eggs.”(FGD, Dhankuta-7, Dhankuta)*

### **Knowledge on Transmission**

Most of the participants were aware that dengue was transmitted by the bite of mosquitoes. A few participants emphasized that dengue is mainly transmitted through the bite of an Aedes mosquito and also stated that the peak biting time is evening. Moreover; participants pointed out that dengue can also spread from one person to another through bites. While participants from FGD mentioned that they were unaware about the transmission of dengue.

*“It is a disease transmitted by the bite of an Aedes mosquito. Its peak hour of its behavior is to bite around the evening. It is also serious and due to its severity, it has become a public health problem. This is happening even now.” (KII, Health office, Ilam)*

*“We don't know how dengue is transferred, what are its causative factors could you please enlighten us?”(FGD, Ilam-5)*

*“If a mosquito bites someone having dengue and then bite someone else, it transmits the disease.” (FGD, Birtamode-4, Jhapa)*

*“It is transmitted by the female Aedes aegypti mosquito. It is a disease if an infected mosquito bites one person and then bites another person.”(FGD, Khadbari-9, Sankhuwasabha)*

*“From what I've heard, Dengue is transmitted through mosquito bites.”(IDI, Female, Housework, Sidingwa-4, Taplejung)*

*“I don't know about that... I have heard that mosquitoes bite transmits dengue, bitten mosquitoes bite others, and this is how dengue transmits.”(FGD, Phungling-6, Taplejung)*

### **Knowledge of Preventive Practices**

Many participants shared ways to prevent the spread of dengue. They stressed the significance of removing still water sources, like puddles, and pots as they are concerned that these attract mosquitoes for breeding. Moreover, they pointed out the importance

of preventive steps such as using bed nets and wearing long sleeves at dawn and dusk to avoid mosquito bites. Participants in FGDs also mentioned that they had knowledge of taking precautions like using fans, covering water tanks, burning incense sticks to repel mosquitoes, using electric nets, applying mosquito repellent creams, and sprinkling kerosene in potential breeding sites.

*“I have understood that this disease spreads a little more in places where water is stagnant, from places where there are pots, and places where there is dirt. To prevent this, we should not keep stagnant water puddles near our places, clean the place with bushes, keep it clean, cover the areas of stagnant water puddles, and do not let the water stay stagnant.” (KII, FCHV, Khadbari-1, Sankhuwasabha)*

*“We have used fans to control dengue, we don't allow water to freeze in the pits, we cover the Hilltake water tank, we light incense sticks to repel mosquitoes. And at home, apart from the fans, we use an electric net, use liquid, burn incense, and apply creams. And around the house, kerosene is sprinkled in the holes.” (FGD, Khadbari-9, Sankhuwasabha)*

*“ I think that we should not let the stagnant water remain in the house, put the Mobil in the stagnant water and destroy stagnant water, and in the morning and evening we should wear full clothes and cover our body ourselves while doing the work.”(FGD, Ilam-5)*

*“For the prevention of dengue, we should not allow water to get stagnant. We should use precautions to kill mosquitoes.” (IDI, Male, Social worker/business, Dhankuta-6)*

*“Filling the potholes, removing the types or such type of things where water can get stagnant.” (IDI, Male, Agriculture, Phungling municipality-9, Taplejung)*

One participant from the KII also mentioned the importance of using mosquito nets in the afternoon but this lack of usage of mosquito nets during afternoons was believed to be one of the factors contributing to the rise in dengue cases highlighting the necessity for continuous implementation of preventive measures all day long.

*“People usually protect themselves from mosquito-borne diseases at dawn. They use bed-nets however they don't use them during the afternoon. They walk with no precautions during the daytime. This is the reason why dengue cases have increased.” (KII, HP-Incharge, Phungling-8, Taplejung)*

## **5. Training for Health Workers**

A majority of participants said that no specific training was given to health personnel, despite the establishment of a Rapid Response Team. Further elaborated that sensitizing the Rapid Response Team was a proactive measure they implemented to prepare for potential outbreaks. The PHD interviewee added that training programs were not conducted in all the districts due to lack of adequate funding. However, orientations regarding management of severe cases of dengue were being planned.

*“We are not conducting these program in all the 14 district as budget is not distributed for all district. We are planning to conduct clinical orientation for management of severe patients of dengue.” (KII, Vector borne disease focal person, Province Health Directore Office)*

*“Now in the case of dengue, we do not have provision of training separately, but we have sensitized the Rapid Response Team before the outbreak of dengue here. It also has two domains, one is the clinical part which is led by an entomologist and the other is the comprehensive part, which is led by the Department of Health. We are mobilizing the Rapid Response team and FCHV too for its notification on such matters.” (KII, Itahari Sub-Metropolitan City Office, Sunsari)*

*“From the existing budget, we have been doing 2-3 orientations every year. And also from the orientation of RRT, we have been talking about dengue. We have formed an RRT team. There is also a RRT committee and a team in the municipality. There are also budgets for the orientation of the same team. In their program, we call the people's representatives that there may be an epidemic of dengue. We have also incorporated dengue in the same orientation.” (KII, Health Office, Ilam)*

A few participants also shared that they had undergone training once before. One Health Post Charge further stated that the training should be conducted by the concerned department.

*“We were given training only once. Since then, we haven't received any training.” (KII, FCHV, Birtamode-5, Jhapa)*

*“The training should come from the department.” (KII, HP-In charge, Dhankuta-5)*

*“Training is provided under the leadership of municipality once a year for a couple of days.” (KII, HP-In charge, Birtamode-5)*

*“We did it once from the health post itself. The municipality made us participate. It was last year. We had one day of training.” (KII, FCHV, Itahari-3, Sunsari)*

Though some participants stated training and orientation programs was provided for effective dengue prevention and control however few of them disclosed that they had not undergone formal training, but participated in orientation programs or informal discussions, which they did not consider to be comprehensive training sessions.

*“The District Health Office has been providing orientation and training to the health workers of the municipality and giving orientation to the public representatives and people of the Toll Development Committee. We have a small package, but we have not been able to give it to many people, while giving training, we teach a little bit of how to do this. We have not given it for clinical management, but we have given the information in small quantities”. (KII, Health Office, Birtamode, Jhapa)*

*“I have been working as a FCHV since 2068, since than I have not received any training specially focused for dengue.” (KII, FCHV, Dhankuta-6, Dhankuta)*

*“No training on dengue has been provided but we are informed during health group meetings like- not allowing water to stay stagnant around the houses, wearing fully covering clothes in the evening, sleeping under mosquito nets in the evening and keeping the water covered. Due to lack of budget for any program from the ward, we have not been able to conduct any program.” (KII, FCHV, Khadbari-3, Sankhuwasabha)*

*“We haven’t got much apart from a simple orientation program which is organized by the municipality. Even that orientation program has not been organized this year.” (KII, HP-Incharge, Birtamode-4, Jhapa)*

*“We gave training to one health workers team on vector-borne diseases and we mobilize same team to school to conduct program and also to give training to other people.” (KII, HP-Incharge, Itahari-6, Sunsari)*

Most of participants said that having a hospital close by was helpful for treatment, also stated that local health facility lack the resources and knowledge to handle complicated cases. According to the participants, it was not essential to give training to the staff of health post; nevertheless, if necessary, they would provide through internal resources.

*“Here is currently no training at the health facility level. But as many cases of dengue as we get, the hospital is also in our area and also the dengue test kit is not available in the local health institution, so they used to visit this hospital. And since we also have a hospital, there is no problem for treatment. And we don’t need training. ” (KII, Ilam Municipality office, Ilam)*

*“We did not provide training, we did not have any training. If there is such a need, we will provide its training and orientation from our internal resources. Why we did not focus on it is because we are not that far from the hospital, and also have road access to all of them. When there are severe cases, they are brought to the hospital immediately, so we are paying more attention to management of cases than prevention.”(KII, Khandbari Municipality office, Khandbari, Sankhuwasabha)*

Furthermore, the interviewee mentioned that there hadn't been any formal training conducted yet for the vector control program. However, they stated that there was a unified vector program in their place as part of a larger health initiative.

*“We haven't conducted training yet; it's a unified vector program which is part of a small program. We held a one-day meeting the last fiscal year. Now, we will do it again when the program comes. The health workers are asked to check if the person has a fever and get tested, if necessary, otherwise refer for tests. Test kits are available in hospitals. We circulate each and every one of them internally in the palika.” (KII, Health Office, Phungling, Taplejung)*

One participant further highlighted there was a need for training and protective gear to enhance their capacity to serve communities while another participant stated the importance of training and education in tackling health problems. The basic training they were provided enhanced their knowledge about various illnesses, empowering them to effectively assist their community.

*“It's challenging to cover our large Ward 7, and we often need transportation to reach remote areas. We go as far as we can, but we require training and protective clothing to expand our efforts.” (KII, FCHV, Dhankuta-7)*

*“We have also recently undergone basic training. We had to read about many types of diseases and one of them is dengue. I have studied from that. There are not many challenges like that in our community. If we had more knowledge, I feel that we could*

*have saved our community from many other diseases if we had understood more.” (KII, FCHV, Dhankuta-6)*

Moreover, a need for skilled manpower as was also mentioned was by one of the Key Informant Interviewees. Few participants from the interview shared that trainings, seminars and conferences were important for production of skilled volunteers and upgrading the knowledge of older volunteers. In addition, one of the Key Informant Interviewees also reported that levels of support provided by different ward offices to volunteers varied.

*“I may have a degree but not all volunteers are educated. It would be better if they could hold a one-day conference and send us to the field before any disaster occurs. And some of those who have been volunteering since 2046 BS are getting old, some are reaching the age of 60, and some are reaching retirement age. Conducting training, seminars, and conferences once a year is good. Another thing is that the ward office does not seem to know the volunteers, however, there are some wards who love the health volunteers very much. Some wards support the volunteers saying that any ward office will fully support them as the pitch road made by the ward will be meaningful only if a citizen can walk healthy on the road the ward made. But many ward offices, even the ward office where I live, I would like to say, have not supported volunteers that much.” (KII, FCHV, Itahari-5)*

*“In terms of manpower, it seems that we do not have skilled manpower. I think these things should be solved at the policy level. The work that is being done is in coordination with the local government. But there are a few things missing in the policy.” (KII, Health Office, Khandbari, Sankhuwasabha)*

Furthermore, a few (2) participants highlighted the importance of keeping women of the villages informed and including them in training regarding dengue prevention and awareness.

*“We think we can create more awareness about dengue and prevent it if we get training regarding it. Instead of taking training only for the volunteers, it is necessary to keep the women informed of the village as well. If someone is there to provide the training, we can do public awareness programs.” (KII, FCHV, Ilam-6)*

*“If only one mother from each area attends training, then that mother can inform her area there. I am a community health volunteer, I would tell the mothers' group, but mothers who know about dengue can inform in every house. That's why I say training is also needed.” (FCHV, Khadbari-1, Sankhuwasabha)*

## **6. Collaborators for Dengue Management**

The interviews highlighted the various degrees of engagement of NGOs/INGOs in dengue control efforts within different regions of Nepal, with some district receiving little to no support while some districts reported receiving assistance from organizations such as SUAHARA Nepal, Nepal Red Cross Society, local groups, and school and community people. Government institutions, such as district health offices and public health offices, municipalities played a vital part in coordinating activities, despite facing resource constraints.

## **NGO/INGO Involvement**

According to interviewees support from NGOs and INGOs for Dengue control programs within the province, and municipalities was found limited, the interview revealed that few (NGO/INGO) organizations were involved in eradicating dengue outbreaks, while others received no assistance from any organization. Also, one participant pointed out that the municipality held the primary responsibility for Dengue control efforts. However, by recognizing the constraints of those organizations he further revealed that relying on such organizations for support poses challenges in controlling the dengue outbreak.

*“Before you arrive, there's a project called NSI According to their research, there are still some areas where vectors haven't been eliminated. They found vectors in ward numbers 6, 7, and 9, apart from ward number 8. Vectors are found in homes, animal sheds, flowerpots, on rooftops, in tanks, and many other places. So, it's not just limited to one area. This is how it is; when it comes to discussing private, there's only one organization, which is working in the field of MNH. Otherwise, there are no organizations here, especially concerning vectors. Save the Children is here in the Far West since there haven't been any cases of malaria. So, there isn't much here.” (KII, Health Office, Dhankuta)*

*“When talking about the multi-sectoral approach, the resources are in the municipality itself. As there is only one organization that supports kits. It has its limitations on how much to spend and what to do. They support our dengue program only in a little part. That's the problem with such organizations.” (KII, Health Office, Inaruwa, Sunsari)*

*“We have received support from SAHARA Nepal. Have you received financial help from anywhere? The financial support is not much as the municipality is self-sufficient in conducting a search and destroy program and I think that it doesn't need that much money.” (KII, Health Office, Birtamode, Jhapa)*

*“So far, no partner organizations have come up for Dengue disease. For this research, you have come for the first time as any partner organization. Once they had come to collect samples from VBDRTC and BPKIHS. Apart from this, the Health Office is not aware of any other NGO/INGO that has come for Dengue. I don't know if they went directly to the municipality, but they have not come to the health office.” (KII, Health Office, Sankhuwasaba)*

The community members also indicated that they were unaware of any activities or interventions organized by Non-Governmental Organizations (NGOs) specifically addressing dengue prevention and control.

*But we are not aware of it. It would be great if they cleaned the drainage, sprayed medicines, and distributed mosquito nets. (IDI, Female, business, Birtamode-4, Jhapa)*

*I don't have information about that, and I haven't heard about any such initiatives. (IDI, Male, Housework, Sidingwa 4, Taplejung)*

## **Involvement of Government Agencies, Schools, Local Clubs, Medical Stores**

Whereas beside the government office, there was also found the involvement of the Nepal Red Cross Society, various clubs and local clubs, for dengue control. Similarly, in

order to successfully address public health and disaster management concerns in their community participants from Itharari Sub-Metropolitan City highlighted the importance of cooperation and coordination with numerous stakeholders, including health authorities, environmental agencies, and security forces.

*“We are supported by various people's representatives and various clubs and local clubs, so we have no problem. Our health related NGO, INGO is not with us, there is a Nepal Red Cross Society, and we coordinate with the district hospital, and health office and we at the local level and when we work, we do our work.” (KII Khandbari Municipality Office, Sankhuwasabha)*

*“We should cooperate with the health office and conduct the programs according to their advice. Now, like others, environment and disaster management activities are done in consultation with the environment section, and the other thing is that we are also having coordination with security agency, armed police force and army as well.” (KII, Itahari Sub-Metropolitan City office, Itahari, Sunsari)*

In order to provide vector control measures to Jhapa, Morang, and Sunsari, a Public Health Office (PHO) representative stated that they were actively cooperating with medical stores.

*“In the current situation, we have a medical store which coordinates with the supplies we provide to Jhapa, Morang, and Sunsari for vector control measures they are implementing.” (KII, Health Office, Taplejung)*

Additionally, several stakeholders, including government agencies, non-governmental organizations, and community groups, expressed a specific interest in preventing dengue at Ilam which reveals a collective commitment to public health and disease prevention.

*“Dengue has always been of concern. Other organizations of the district, the district administration office also take special interest. Still, we hesitate at first. There is also involvement of them in campaigns.” (KII, Health Office, Ilam)*

*“Since we have a school in the village. So we had to coordinate with the school. Coordination with the school is done by the health post, the ward president does it and we have to facilitate it.” (KII, Health Office, Itahari, Sunsari)*

## **7. Multisectorial Coordination**

The interview revealed that there was consistent collaboration between health offices and local levels, such as municipalities and community health workers. This coordination included communicating with people's representatives, preparing health personnel, and ensuring operational readiness. However, the extent of coordination varies, with some municipalities using more formal approach in collaborating and while others relying on mutual understanding to eradicate the dengue outbreaks.

*“What we do from the side of the health office is that we coordinate with the local levels. Our direct involvement does not happen because the health office is not responsible for this, now the local level does it. However, our role is to coordinate and monitor. Technical*

*Support has not been possible due to lack of manpower. It is not so mandatory that the local levels have to coordinate with the health office. They have been doing their work in their own way, but sometimes we are interested. We are doing our part. Now, the health office does not make such policies and roadmaps, it is done through mutual understanding. (KII, Health Office, Khandbari, Sankhuwasaba)*

### **Level of Integration among Stakeholders**

The majority of Participants from PHD, District stakeholders, and municipality stakeholders highlighted the existence of good collaborative efforts, from federal governance to local authorities in addressing the threat of dengue outbreak. Additionally, participants from PHD further stated that emergency budget allocations, and awareness programs and coordinated approach to public health management was best approach they adopted to mitigate the challenges of dengue outbreak.

*“Every federal department (province government, district government, local government) is sensitive about dengue outbreak. We have also managed the emergency budget for the dengue outbreak and even local governments are conducting awareness programs for the dengue outbreak. To date, I have not seen any department doing negligence in case of dengue management.” (KII, Vector-borne disease focal person, Health Director Office)*

*“Cooperation is very good. For example, we have got good support from the municipality and the district office.” (KII, Health office, Birtamode, Jhapa)*

One of the participants remarked that multi-sectorial coordination in combating dengue was vital and not difficult.

*“If necessary; they will help, working in multi-sectorial coordination is not challenging its good here in Taplejung.” (KII, Health Office, Taplejung)*

### **Resource Allocation and Support**

The majority of the participants stated that the allocation of resources for dengue control was done by collaborating from the central to local government and between various levels of government, health institutions, and community stakeholders which included the distribution of test kits, coordination of spray programs, mobilization of funds, awareness campaigns, testing initiatives, and distribution of educational materials. Some have direct financing for dengue prevention from their own budgets, whereas others depend on support from higher levels of government or external agencies.

*Now what we have done for this is that we coordinate with the hospital and test it by creating a cluster in 2-3 places in our community level. It is being conducted in areas where there are PHCs, and where there are labs. In the case of quality, there may be a separate issue. In that, we will supply the logistics, they will test and send the report to us. According to this, we send a Daily Report to the Directorate of Health. They have also bought the test kit and we have been supplying it regularly.” (KII, Health Office, Sankhuwasabha)*

*"We have not been financed directly. But through the province and as I said before, we have 400-500 kits supported for that" (KII, Health Office Itahari, Sunsari)*

*"It has been informed to the municipalities from the health office, and we have sent around 50 kits to hospitals, and we have distributed 10/12 of the kits we have with us. If you have a query like this and if it seems like its dengue, then you must be tested we have informed you in such a way." (KII, Health Office, Taplejung)*

*"Without coordination, we cannot work. In the meantime, we brought the kit, and after bringing the kit, some municipalities talked to us, it has been sent to the health office now, and it was said to coordinate from there. And on the second time, we did not have spray medicine from the health office Jhapa, we got it directly from the federal Government "Patlaiya" supply center. We directly made a transfer form in the name of Birtamod Municipality." (KII, Birtamod Municipality office, Jhapa)*

In addition, participants mentioned that the municipality coordinated with health institutions at the district and local levels through orientation and information exchange programs, and also they emphasized the significance of provincial-level coordination and planning through the interaction meeting.

*"Now it is being done with health institutions at the lower level through our various programs. At the higher level, the health office also conducted an orientation and interaction program yesterday. A program was held with the participation of all the 7 municipalities of this district Along with that, we are coordinating with the district hospital and laboratory too. They have also said that we need help, cooperation, and support. We have also said that such cases may come to you and we have also made an agreement on this." (KII Dhankuta Municipality office, Dhankuta)*

A participant highlighted the support received from various levels of government for dengue prevention, focusing on short chain spray, technical support, and kit provision. Even with initial efforts by the district health office in limited areas, consistent support to control dengue was found inadequate.

*"Right now, there are 3 levels of government. One of the district's focus is short chain spray, the other one is to provide technical support. It provides technical support. Another, kit is also supplied by it. That district health office did in 2-3 places but it is not sufficient. What that means is that after doing this, the work in all the wards is now the responsibility of the municipality. In that, the program was done in coordination with the municipalities." (KII, Health Office, Itahari, Sunsari)*

## **8. Role of Media**

Many individuals have emphasized the significant role of the media in spreading information. They noted that such information-sharing is valuable within their communities. Participants highlighted the effectiveness of receiving information through various media, such as radio, television, and social media in controlling mosquitoes and preventing dengue. However, some felt that the information provided was insufficient. On the other hand, there were those who believed that social media could be somewhat helpful, but its impact was limited due to unequal access to television, radio, or mobile

phones among people. Despite this, the awareness raised by social media was evident, as even health post-in-charges became more cautious upon encountering dengue-related news online. Social media can make a big impact, but only if everyone can access it.

*“I think it has helped a lot. Many people cannot go to health posts. But they can listen to it on social media even while cooking. More importantly, we have meetings every month where we discuss about what diseases might spread in the current hot weather. It has also helped a lot.” (IDI, Female, Vice-secretary of Mother's group, Birtamode-5, Jhapa)*

*“Not all the houses have radio, television or even they don't have mobile. So, it is better to have door to door visit in order to make people aware.”(IDI, Male, Houseworker, Khadbari-7, Sankhuwasabha)*

*“I have to say it is quite effective. We have got much information from Facebook and Television. We also got to know its preventive measure so we don't allow water stagnation and also avoid storing the water. Health workers don't come to give the information so social media is the only source of information.”(IDI, Male, House worker and social worker, Khadbari municipality ward-9, Sankhuwasabha)*

*“It is quite effective. It is better to have something than to not have anything. At least we can be aware of the information provided on social media. There is no television in this village. We see it from face book, and also hear from the radio. But I don't think it this will be enough to generate public awareness.”(IDI, Female, Agriculture, Phungling-9, Taplejung)*

*“It's not that it cannot be done through social media, but it can only be done to a certain level. But all locals here do not use social media. Many don't have mobile phones and many don't have access to the internet to use Facebook. So, social media might be helpful to a certain level but in the local level, we should be done using other mediums.” (KII, HP-Incharge, Birtamode-4, Jhapa)*

*“The coverage of media is high currently. The coverage here in our village is also abundant. There are plenty of advertisements on the radio about information on spreading of the dengue fever and preventive measures. We hear from the media that the disease is not only present in Terai region but it has increased at the hilly region as well. We get to know about this information as we have Facebook and other social media within our reach. I saw on the news yesterday that 14 individuals had died as a result of dengue. We are not necessarily unaware of it because it was shared on Facebook. When we see such news, it signifies that we are becoming more conscious of the disease. This is the impact of social media.” (KII, HP-Incharge, Phungling-9, Taplejung)*

## **9 Misconceptions or Myths Regarding Dengue in the Community**

During in-depth interviews, participants emphasized the seriousness of dengue fever as a health problem, highlighting its impact on the lives of community members. They also mentioned that the COVID-19 pandemic has increased awareness among people regarding communicable diseases like dengue. However, older individuals often view these types of illnesses as cyclic and less severe. One participant expressed that he was unaware of people's misconceptions, about dengue noting that their community had not experienced anyone they knew falling ill with the disease.

*“There is not any misconception, they take it very seriously because it has killed people.”  
(IDI, Female, bussiness, Birtamode-4, Jhapa)*

*“We are not aware because people around us aren't infected and there are no programs.”  
(IDI, Female, Former President of Jaycees, Dhankuta-6, Dhankuta)*

*“Sometime back corona occurred and it has made the people aware. After that if the community people hear that any communicable disease is spreading in the district than they become aware. Some old age people says that the disease comes and go so some old aged people don't take it seriously due to lack of awareness, education.”(IDI, Female, Agriculture, Phungling-9, Taplejung)*

The health post in-charge mentioned that there was a lack of awareness among people regarding dengue, which makes it difficult for them to recognize the illness. Additionally, they noted that superstitions surrounding various diseases, including dengue, were prevalent in the community. It was common for people to seek help from traditional healers like Dhami/Jhakri before visiting health posts or hospitals, as this has become ingrained in their cultural practices. A health professional from the Health director's office also highlighted that there was a misconception among people regarding the impact of mosquitoes in spreading diseases. However, when provided with accurate information, people become more aware of the causes and impacts of mosquito-borne illnesses like dengue.

*“No, there aren't any. First of all, people do not recognize dengue fast. It is mainly due to the less knowledge that the people have.” (KII, HP-Incharge, Birtamode-4, Jhapa)*

*“Not only dengue but in case of any kind of disease there are superstitious beliefs regarding the disease in some places. In some cases, the family used to think the treatment of the vital diseases wasn't a big deal as it could be treated by the jhaarfook. That kind of misbelief still persists.”(KII, Health Post Incharge, Ilam-5, Ilam)*

*“At the first stage, when the people are sick then they prefer to go to the Dhami's place as it has become their culture whether it be the fever or any other illness. Be it the fever or any illness here is the culture that they once go to the Dhami's place. It is the old culture. Even if there is a cut or a wound then before stitching that also the community people first go to the Dhami place.”(KII, Urban Health clinic, Dhankuta)*

*“People have a misconception of mosquito that it do not affect them due to lack of awareness but when people talk with health professionals who visit them to aware than they get to know about the mosquito and how they affect the human body. After that they start cleaning the area where water is stored and also we have seen them doing so.”(KII, Vector borne disease focal person, Provincial Health Director Office)*

## **10. Prevention of dengue**

### **Public Health Approaches for Dengue Prevention**

The interview showed that participants had different views on dengue prevention efforts. Community involvement, especially women's engagement was highlighted by many participants. Many used a multifaceted approach such as spraying campaigns, larval

destruction activities, fogging, search and destroy campaigns, and stronger coordination among government agencies as preventative approaches. Proactive strategies like reducing stagnant water sources, regular assessments, and using social media for awareness campaigns were emphasized. Rapid Response Teams were formed with adequate budget allocation were done. Resource allocation and capacity building were done to reduce the risks in a few places.

*“We are also destroying the breeding of mosquitoes and reducing stagnant water sources, conducting regular assessments and also conducting public awareness programs through different Media (internet, social media, radio). But we are not conducting these programs in all the 14 districts, as the budget is not distributed for all districts.” (KII, Vector-borne disease focal person, Provincial Health Director Office)*

*Now, the special thing for dengue prevention is that we have to go through integrated vector management approaches. For that, environmental modification is the main thing. In the same way, by finding out the risk zones, like EDCD identifies its area and design the program accordingly and if this can be done, the budget would have been properly utilized.”(KII, Itahari Sub-Metropolitan City office, Itahari, Sunsari)*

“In contrast, most of the participants mentioned that there haven't been any specific activities carried out due to budget constraints besides an awareness program which shows a significant gap in resource allocation for essential preventive measures. Those living in hilly areas further pointed out that since dengue cases are less in their regions so, there might not be much emphasis on preventive measures. Instead, people rely on informal communication during gatherings to share information about how to control and prevent dengue.

*“No any measures has been adopted since there are no much cases seen in Ilam.”(IDI, Female, Mother's group representative, Ilam- 5)*

*“There are not much cases in Dhankuta. That's why also these activities have not been conducted but we randomly talk with friends and family to avoid mosquitoes, wear full sleeve clothes.”(IDI, Male, Social worker/bussiness, Dhankuta-7)*

*“No any program or activities have been done from ward, municipality or other organization. Sometimes FCHVs provide information. And we on our own tole ask people to use mosquitos' nets, keep the house and the surroundings clean and also tell them not to store water.”(KII, IDI, Male, Houseworker, Khadbari-7, Sankhuwasabha)*

*“There are no control measures applied.”(IDI, Male, Social worker/bussiness, Dhankuta-7)*

*“No, there is nothing, it is like this because there are no dengue patients in our community, we have not done any program, dengue is not epidemic in the areas where we live, even if we get one person, it will be discussed, there are 19 cases here in Taplejung district as of yesterday evening. The cases have come from other areas.”(FGD, Phungling-6, Taplejung)*

*“They haven't organized anything yet. Programs happen regularly but not about dengue yet. Once, the ward sprayed mosquito-killing medicine. No-one has advised us to do anything till today, we are doing this by our own will.”(FGD, itahari-12, Sunsari)*

*"Till now I have not known about any of the programs conducted at the local level, not even from health posts. We hear the information on the radio. Maybe it is conducted from the health office but they have not come to the community and conducted the program." (IDI, Female, Agriculture, Phungling-9, Taplejung)*

### **Search and Destroy Activities**

The majority of participants expressed that the primary approach to combat dengue was through the widespread implementation of "Search and Destroy" campaigns in coordination with different stakeholders, including municipalities, health workers, and community volunteers. Additionally, participants said that campaigns were conducted, with a primary focus on high-risk areas like marketplace to eradicate the larvae. In contrast one participant pointed out the inconsistent larva destruction implementation and emphasized the need for more work in dengue prevention. This shows acknowledgment of the existing challenges and the necessity for enhanced strategies in dengue prevention.

*"Mainly we have done it based on search and destroy. Even in this order, we have campaigned. We have also requested the municipalities to give priority to search and destroy." (KII, Health Office, Illam)*

*"The main thing to do from the district level is to orient the municipalities regarding search and destroy and municipalities are responsible for destroying the larvae. And we believe that the toll development committee should be installed." (KII, Health Office, Birtamode, Jhapa,)*

*"Last year we had a program to destroy mosquito larvae- by going to the market, dumping the frozen water, filling the potholes. We ran a program to destroy larvae by doing such types of activities." (KII, HP-Incharge, Khandbari-5 Sankhuwasabha)*

*"Search and destroy programs will be done in coordination with various municipalities. We are doing what needs to be done." (KII, Health Office, Sankhuwasabha)*

*"Damp places like mosquito habitats - such trees should be cut or uprooted in places where dengue can spread." (KII, FCHV, Dhankuta-7, Dhankuta)*

*"We also sensitized the public and conducted a search and destroy campaign in coordination with the community development Committee." (KII, Itahari Sub-Metropolitan City office, Itahari, Sunsari)*

*"Now, we are doing that here as well. Recently, we coordinated with health coordinators and conducted search and destroy activities once in the bazaars of Tamor Basin, Dobang Bazaar, Satlakhu area. We are planning to conduct that at Phungling bazaar tomorrow or the day after tomorrow." (KII, Health Office, Taplejung)*

*"During the first week of June and July, because we had to do a special search, especially in the places where there were tires. We went to the garage and looked at the tires. We did the spray program in every ward with the aim of how to control dengue." (KII, Birtamode Municipality Office, Jhapa)*

*“Municipality during the first week of June and July, because we had to do a special search, especially in the places where there were tires. We went to the garage and looked at the tires. (KII, Birtamode Municipality Office, Jhapa)*

*At first, there should have been the activity of destroying all the larvae by the municipality which is still not happening. Those activities have only been happening in few places which are helping to control the disease to some extent. We still have a lot of work to do.” (KII, HP-Incharge, Birtamode-4, Jhapa)*

*“We also conducted a search and destroy program within the municipal area and in the market too. Last year we conducted a Search and Destroy Program in October and we are still preparing for it at this time.” (KII, Health Office, Illam)*

Similarly, many of the participants mentioned the search and destroy campaign conducted on a wide scale where manpower from different sectors like the army, police, municipality, and wards were involved.

*“Since 3 days, we have started the search and destroy program of Aedes Mosquito.” (KII, Vector-borne disease focal person, Health Director Office, Koshi Province)*

*“From the point of view of public health management, the municipality did the “Search and Destroy” campaign for the larvae. We did that campaign widely, from the core team of the municipality to all the wards, and members of the executive hotel association. The army, the police, and teachers were all there, we did a mass campaign in Bhedetar. In order to reduce larvae, we have repeatedly told the people's representatives of our Sagurigarhi village and from the head of the health institution in the municipality to other staff. Still, they could not do anything.” (KII, HP-Incharge, Dhankuta-5, Dhankuta)*

One participant emphasized the significance of actively participating in the "Search and Destroy" program to eliminate mosquitoes. Moreover, he further highlighted the importance of knowing the local mosquito species and their habitats, as well as intervention strategies to eradicate the mosquito.

*“All of us should be involved in this search and destroy and should have knowledge of everything such as which species have their habitat here, how many wards are there and which intervention is appropriate, how much manpower is needed, how much budget is required.” (KII, Itahari Sub-Metropolitan City office, Itahari, Sunsari)*

### **Management of Stagnant Water**

Many participants emphasized the importance of reducing stagnant sources of water to prevent dengue and further stated the importance of conducting assessments of water sources and regular tap water supply in their areas. They also mentioned that the risk would remain high until alternative sources of water supplies were managed and shared that efforts were made to fill potholes and cover water storage units as well.

*“The stored water units should be covered or else the water should be discarded.” (KII, Vector-borne disease focal person, Health Director Office, Koshi Province)*

*Of course sir, now that team is paying more attention to prevention we have done sanitation program, under the leadership of the wards, and under the leadership of*

health institutions. We were able to clean the pits, clean the sheds, etc.” (KII, Dhankuta Municipality Office, Dhankuta)

“To prevent water puddles from forming, to prevent any form of accumulation of water in any area, to maintain cleanliness around houses are some of the things that we’ve done in order to prevent dengue. (FGD, Itahari-10, Sunsari)

“But we some socially active people gathered and filled the potholes” (IDI, Male, House worker and social worker, Khadbari 9, Sankhuwasabha)

“We use mosquito nets and do not let any water puddles form in and around our houses and clear any bush where mosquitoes might live. What we do is clean any forms of water puddles or habitat of mosquitoes in our land. I also own 15 dhur land and I make sure that there are no water ponds forming within thrown bottles as well as puddles. I also clean and destroy the bushes where these mosquitoes might stay.”(FGD, Birtamode-5)

“For prevention, we don't let water fill the potholes and we use mosquito net while sleeping.” (IDI, 42 Years, Female, bussiness, Birtamode-4)

Similarly efforts to improve environmental conditions, such as providing continuous water supply and assessing water conditions in high-risk areas, as important strategies for prevention were highlighted by participants.

“Since it is also related to water, it may also be related to the environment. There aren’t anything specific environmental improvement programs done by the district either. As much as possible, we campaign with a message saying that water should not remain stagnant. There is regular tap water now. But no matter how far away Illam is, there is still a high risk. Although the population is low, there is still a high risk. There is no alternative in such a place. We have to see what the water condition is in Sandakpur. No assessment has been done anywhere. If there's assessment and then provision of water, dengue will not spread as much. We tell them not to keep water stagnant, but if we can't provide a continuous supply of water, our intervention will not be successful.” (KII, Health Office, Ilam)

Moreover, participants further highlighted that communities were involved, to conduct proactive measures, and cleanliness initiatives were promoted, all of which played a vital role in reducing the spread of dengue and protecting public health.

“After the federalization, we go to the community level and also go house to house to make them do things like destroying the mosquito breeding sites. Also, we instructed the waste water from the AC, fridge to be thrown. We did not allow water to get stagnant in tyres and other places which could be the breeding site for mosquitoes. Since we have informed people that stagnant water is the breeding site for mosquitoes, people have started to fill the potholes not allowing water to get stagnant.” (KII, HP-Incharge, Itahari-6, Sunsari)

“We clean the surrounding environment and also ask the people to clean their surroundings.” (IDI, Male, Houseworker, Khadbari-6, Sankhuwasabha)

## Use of Spraying

The interviews revealed contrasting approaches between municipalities, where one prioritized larva destruction and minimizing pesticide use, while the other emphasized spraying in order to control dengue outbreaks. Additionally, some municipalities were hesitant to use pesticides due to concerns about pollution, but after consulting EDCD they conducted spraying campaigns, only for a limited frequency.

*"We do not prefer pesticides. That means we don't use pesticides. However, that is not the desire of the people's representatives either. People's representative's want to control through insecticide or larvicide program." (KII, Health Office, Itahari, Sunsari)*

*"Local government also have used insecticides spray to prevent and kill mosquitoes" (FGD, Itahari-10, Sunsari)*

*"Larva was destroyed. We did not do our spraying plan before, as we thought it would cause a little more pollution, after that we also contacted EDCD and when we contacted them, they said that only 1-2 times can be done and we did that. On the other hand, we also do larva destruction works at the community level using our local health institutions." (KII, Khandbari Municipality office, Sankhuwasabha)*

Whereas, one of the participants revealed that spraying and larva destruction were done by targeting breeding sites at the same time to control the dengue outbreak, and before spraying, an orientation was conducted to reduce any potential dangers. Likewise, it was found that the spraying program in Birtamod Municipality appeared to be well-managed and well-organized, with an awareness campaign and the inclusion of local authorities.

*"We did the spray program in every ward with the aim of controlling dengue. It took us about one and a half months to conduct the spraying program in ten wards of all the districts, spending three to five days in one ward. Before spraying, orientation was done with the representatives of the city and planning was done. We started the spray campaign and we it took a little longer in larger wards but in smaller wards, it took less time." (KII, Birtamod Municipality office, Jhapa)*

Furthermore, one of the participants from Dhankuta Municipality noted that spraying insecticides was found difficult due to the mountainous terrain. Despite this problem, the municipalities have taken a proactive approach, focusing on public awareness programs, particularly in high-population locations like hospitals and city centers.

*"Spraying insecticides is a bit of a challenge as it is a mountainous area. Once we sprayed in the past. We were concentrated towards the hospital area, like in a crowded place within the city. We have given more importance to awareness than spraying insecticides." (KII, Dhankuta Municipality Office, Dhankuta)*

The participant mentioned that the municipality sprayed insecticide twice last year as part of dengue prevention efforts. This showed that they took action to control mosquitoes and stop dengue from spreading in the past. However, the participant noted that such activities have not been carried out this year.

*"Municipality sprayed insecticide twice last year. But this year they haven't done such activities." (IDI, 42 Years, Female, business, Birtamode-4)*

## **Pesticides Usage**

Many participants suggested the need for the utilization of pesticides as a priority measure to control dengue. They collectively emphasized the perceived effectiveness and importance of pesticide use, particularly in densely populated or high-risk areas, in combating vector-borne diseases such as dengue.

*"We have to use pesticides once in a while. Please write it as a priority - it must be sprayed. Since it is a market area, it is not possible to tell everyone."(KII, FCHV, Birtamode-2, Jhapa)*

*"The disease can be reduced by spraying insecticides by coordinating at our local level. Mainly it seems that it can be reduced only by spraying insecticides." (KII, FCHV, Dhankuta-7, Dhankuta)*

*"Pesticides have to be sprayed and tanks have to be covered, pots have to be cleaned. That's it." (KII, FCHV, Dhankuta-6, Dhankuta)*

## **Fogging**

Few of the interviewees stated fogging had been conducted in some areas, and felt that fogging might not be the most effective or sustainable intervention. Also, they were compelled to use fogging after pressure from higher-level officials, which had negative consequences on people's health.

Participants collectively highlighted the use of fogging as a challenging approach to vector control measure and the importance of considering alternative strategies and regulatory measures in disease prevention efforts.

*"We also conducted fogging. Now, it is not a reliable intervention specifically, but we have taken that program along with it in terms of reassurance and comfort to the people. We coordinated with different wards and the basic health centers."(KII, Itahari Sub-Metropolitan City Office, Sunsari)*

*"Now the pressure of the people's representatives was so high that they had to do fogging. We should also remind them that fogging has more disadvantages than advantages, that it is poison. That's why there was no instruction specifically about fogging dengue in the beginning, but later it came from EDCCD. That's why we focus on search and destroy as much as possible. Since there have been many cases since the guidelines came out, we used I.R.S. in high risk areas." (KII, Health Office, Illam)*

*"The municipality is about to do fogging. Fogging will not reduce the infection, now certain short chain spray should be done. I had a talk with the director general in a meeting. I talked about is that the fogging should also be stopped. It was decided to put in a guideline that the permission of the health service department should be obtained to use any pesticides." KII, Inaruwa,*

## **Formulation of Policies**

From the interview, the majority of the participants shared that no preventive guidelines were implemented by them Furthermore, recognizing global warming's

role by participants in mosquito spread showed how the environment affects disease transmission. Also, stressing the need to follow government guidelines, like wearing long sleeves and using mosquito nets, was crucial to avoid mosquito bites. Furthermore, one participant stated that the reason for the absence of preventive measures was the lack of documented dengue cases.

*"No strategies have been made specifically for Dengue. If we want to control Dengue, first of all, we have to reduce the number of mosquitoes. Global warming is also contributing to the increase the number of mosquitoes. Along with this, to control mosquitoes that have arrived now, we need to follow the protocol of our Nepal government like wearing long-sleeved clothes, wearing a net while sleeping at night, sanitation and hygiene, and during the rainy season, taking precautions by identifying the risky areas where Dengue may occur." (KII, Ilam Municipality Office, Ilam)*

*"No, there aren't any preventive strategies. The reason is that we don't have any cases so we have not implemented policies in a systematic manner." (KII, Health Office, Taplejung)*

*"Public health has not done anything yet. We have been told that it will be done by the municipality." (KII, FCHV, Phungling-5, Taplejung)*

Another participants revealed that dengue as a public health concern and suggested that policies related to dengue may be formulated as an epidemic response.

*Dengue is being put forward as a public health program. Due to the fact that it will take the form of an epidemic, there will be a policy related to the epidemic." (KII, Health Office, Ilam)*

*"Policymakers have done nothing of the sort. People come from the province and we do it accordingly." (KII, Health Office, Ilam)*

*"Until now, we have not prepared any sorts of any guidelines." (KII, Phungling Municipality Office, Talejung)*

In contradiction to the above statements, participants reported that preventive strategies were made by the central and state governments whereas a Municipal official revealed that they were in the process of implementing policies prepared by themselves. They also emphasized that mosquito control should be prioritized by following the protocols given by the Nepal Government.

*"Now, the policy is made by the higher authority and then it is sent to us. We do not formulate any of the policies. We only conduct activities according to them." (KII, Health Office, Sankhuwasabha)*

*"Policies have been formulated by either the central government or the state government." (KII, Health Office, Taplejung)*

### **Conduction of Surveys**

One participant also reported that while conducting entomological surveys for kala-azar, dengue vectors were found and included in it as well.

*"The provincial government has conducted entomological surveys in two districts primarily for kala-azar and we had such surveys in our district as well. We also gave the data to EDCD. Since many vectors of dengue were found, we included it as well."* (KII, Health Office, Dhankuta)

### **Formulation of Rapid Response Team**

Few participant additionally discussed about the formation of a multispecialty Rapid Response team to combat dengue.

*"We have formed a Rapid Response team. We involve every one like health workers, political parties, province government, and volunteers, if necessary. In case of identifying mosquito and destroying them, we want epidemiology department but we do not have enough resources. We are conducting awareness program in the community. Until and unless every individual is aware about dengue, we are unable to control it."* (KII, Vector borne disease focal person, Health Director Office, Koshi Province)

*"Now in the case of dengue, we do not have provision of training separately, but we have sensitized the Rapid Response Team before the outbreak of dengue here. It also has two domains, one is the clinical part which is led by an entomologist and the other is the comprehensive part, which is led by the Department of Health. We are mobilizing the Rapid Response team and FCHV too for its notification on such matters."* (KII, Itahari Sub-Metropolitan City Office, Sunsari)

### **Awareness Program**

Majority of the participants from PHD, PHO, HO, Health In-charge, FCHV stated that they had approached a comprehensive strategy such as community conducting health education programs through various channels such as radio FM, brochures, miking, and school education programs, utilizing local media and social media platforms, involving health volunteers, teachers, and local representatives in orientation programs to raise awareness about dengue and its preventive measures, organizing door-to-door campaigns, dramas, and rallies to educate communities about dengue prevention strategies, and also sensitizing municipalities and local authorities to promote community participation and advocacy campaigns to disseminate information about controlling dengue with the maximum utilization of local resources.

*"This is not the first time we have faced a dengue outbreak but it has been years since we have tackled dengue cases. The awareness program is conducted in districts and the public about vector-borne diseases from different levels. We are also destroying the breeding of mosquitoes and conducting public awareness programs through different Media. However, we are not conducting these programs in all 14 districts as the budget is not distributed for all districts. We are conducting an awareness, search, and destroy program. We are planning to conduct clinical orientation for management of severe patients of dengue disease."* (KII, Vector-borne disease focal person, Province Health Directorate Office)

*"We use mass media to reach the community. It is not enough for everyone. Some listen, some don't. We have used this one medium. Another is through our students. It reaches the*

house through the students. Another thing that can be improved is whether women can go through health volunteers. We are also doing this by keeping people's representatives, teachers and women health volunteers, or by conducting orientations. We have not been able to cover all these places. We had to look at the budget as well.”(KII, Health Office, Ilam)

However, a few didn't know about any awareness programs from any sources despite receiving information from the radio. One IDI participant said that they were not aware if programs were conducted specifically for dengue.

“Till now I have not known about any of the programs conducted by the local level, not from health post also. We hear the information on the radio. Maybe it is conducted from the health office but they have not come to the community and conducted the program.”(IDI, Female, Agriculture, Phungling 9, Taplejung)

No, any awareness program has been conducted. There is a mother's group that makes people aware about pregnancy-related things. But no one does that for dengue. (IDI, Female, business, Birtamode-4, Jhapa)

“House to house visit is conducted for vaccination programs and at the same time information about dengue is given and the health workers also ask people to gather and give awareness programs. Health institutions have conducted school health programs but I don't know if it was only for dengue. They have given information on NCD and tobacco control but not specific for dengue.” (IDI, Male, Teacher, Ilam-6)

### **Stakeholder's Involvement in an Awareness Program**

The majority of the participants stated that the municipality had engaged various stakeholders, including local citizens, like members of community development organizations, public representatives (ward presidents and members), heads of health institutions, and health workers as channels for spreading awareness for dengue prevention and control.

For the awareness program, we ask ward office, tole development committee and political bodies to disseminate in community. We also conducted awareness program in this fiscal year. We did it 3-4 places. One we did in ward office, other is in tole development committee and the other among the political bodies. We didn't distribute phamplet but we did miking. (KII, HP-Incharge, Itahari-5, Sunsari)

“Rather than calling the community people for orientation and discussion, we spread awareness through the people's representatives and community development organizations. After that, there were health workers in each ward, we oriented the health workers. They went to the community and informed about it, together with the people's representatives, the ward presidents, then the ward members, community development, etc. We conduct public awareness programs in each ward.” (KII, Birtamode Municipality office, Birtamode, Jhapa).

An IDI participant also revealed that health sector representatives visited them every six months to raise awareness about dengue.

*“Not very regularly, but representatives from the health sector visit us in around six months. They help us understand what dengue is and how it can be controlled.” (IDI, Female, Vice-secretary of Mother's group, Birtamode-5, Jhapa)*

Also, the FCHV (Female Community Health Volunteer) expressed a desire for positive change in her area and the importance of the involvement of people’s representatives. She acknowledged the significance of working together and proposed that if the ward residents actively engaged in organizing initiatives and raising awareness about dengue, it would be beneficial.

*“I want my area to be good. For this purpose, if the residents of the ward also conduct the same programs and bring dengue programs to spread awareness about dengue to the residents.” (KII, FCHV, Dhankuta-6)*

### **Awareness through Health Personal**

A few participants also revealed that health sector representatives visited them every six months to raise awareness about dengue. In contradiction to this, other IDI participants said that they were not aware if programs were conducted specifically for dengue.

*“House to house visit is conducted for vaccination program and at the same time information about dengue is given and the health workers also ask people to gather and give awareness program. Health institution has conducted school health program but I don’t know if it was only for dengue. They have given information on NCD, Tobacco control but not specific for dengue.” (IDI, Male, Teacher, Ilam-6)*

*“Wherever there are more affected areas, we deployed our health workers in those areas and conducted awareness programs. We went to different groups in that area, like mother groups, village development organizations, and schools also worked to inform them about it. We sensitize people on how to avoid Larva blooms, and how to destroy them. Along with this, we also did information broadcasting on FM, placing posters in public places, making pamphlets, and distributing them. At present, we are doing the work of giving information through FM, and that is also effective.”(KII Khandbari Municipality office, Khandbari, Sankhuwasabha)*

*“Not very regularly, but representatives from the health sector visit us in around six months. They help us understand what dengue is and how it can be controlled.” (IDI, Female, Vice-secretary of Mother's group, Birtamode-5)*

*“Health institution awareness program I don’t know if it was only for dengue. They have given information on NCD, Tobacco control but not specific for dengue.” (IDI, Male, Teacher, Ilam-6)*

*“There are also a lot of awareness programs in collaboration with local government, Health post, and other concerned authorities. The cleanliness program is not very effective sometimes because people downright refuse to participate in those and people without much awareness are not ready to fight against dengue.” (FGD, Itahari-10, Sunsari)*

## School Programs

The majority of participants revealed that health education programs were conducted in schools, which was the strategic approach to reaching children and their families with important health information about dengue. Participants stated that school students were actively engaged in awareness-raising activities. According to participants students received orientation, participated in rallies, and were sensitized about the importance of cleaning areas with stagnant water, which are breeding grounds for mosquitoes. This approach not only educates students about disease prevention but also encourages them to take action in their communities. However, the efforts were limited to only a few places, indicating the need for broader coverage.

*“We have conducted health education programs in schools during the epidemic. And concerned stakeholders have also been given information about the cleaning program of the government of Nepal on every Friday. (KII, Illam Municipality office, Ilam)*

*“We have organized different awareness campaigns like dengue awareness programs and processes to dispose of wastes which have helped in minimizing the disease. We organize different meetings and awareness programs. We also organize different levels of programs about this disease like school health programs. In school health programs, we go to different schools and give kids information about the disease and how it transmits.” (KII, HP-Incharge, Birtamode-4, Jhapa)*

*“Recently in ward no. 7 we have been running health education through schools. We have given more importance to awareness than spraying insecticides. That was a case of referral. Seeing this, we did public awareness campaigns in Ward No. 5 and 9 because we also felt that we have the causative agent.” (KII, Dhankuta Municipality Office, Dhankuta)*

*“We also organize different levels of programs about this disease like school health programs. In school health programs, we go to different schools and give kids information about the disease and how it transmits.” (KII, HP-Incharge, Birtamode-4, Jhapa)*

*“We have conducted health education programs in schools during the epidemic. And concerned stakeholders have also been given information about the cleaning program of the government of Nepal every Friday.” (KII, Ilam Municipality office, Ilam)*

## Advocacy and Awareness through FM Radio, Broachers, Posters, Miking

The majority of the municipality, district health office collaborates with FM radio stations to broadcast dengue-related messages and utilizes FCHVs to disseminate information and engage with communities, rather than relying only on insecticide spraying. The PHD interviewee also stated that conducting awareness programs, removing breeding areas of mosquitoes as well as social awareness via radio and social media was done in efforts in preventing dengue.

*“Awareness program is conducted in district and in public about vector borne disease from different levels. We are also destroying the breeding of mosquito and also conducting public awareness program through different media like social media and the radio.” (KII, Vector borne disease focal person, Health Directorate Office, Koshi Province)*

*“And another is through brochures. We also conduct miking sometimes to create awareness.”(KII, Health Office, Sankhuwasab)*

*“We broadcast dengue related messages in coordination with FM here.” (KII, Itahari Sub-Metropolitan City Office, Itahari, Sunsari)*

*“We are conducting awareness through radio as well by also engaging female community health volunteers and with the management committee of the ward, people's representatives and other stakeholders.”(KII Phungling Municipality office,Phungling, Taplejung)*

*“And we are preparing to transmit information about dengue, malaria and other epidemic diseases through local FM.”(KII, Illam Municipality office, Ilam)*

*“I think it was 2-3 months that “miking” was done by district health office.” (IDI, Female, Former President of Jaycees, Dhankuta-6)*

*“At the same time, we have been giving information on the radio to posting it on social media. However, citizens want to spray but they do not work in dengue, nor have we been giving any priorities, we are also conducting a cleanliness campaign every Friday at 10:30 pm from the District Administration Office and the District Health Office. During the monsoon season, we preach daily on the radio, such as how to avoid it and we do orientation in the dengue growing area.”(KII, Health office, Jhapa)*

One participant stated the limitations of traditional methods like using a microphone (miking) in one place. Instead, they suggested exploring alternative means such as recording messages on pen drives for playback in different locations and performing drama.

*“The mic shouldn't just be played in one place. If there was some means of transport, it would be possible if we could record what we said on a pen drive and play that. But it would not be enough to do “miking” at one place. We can do better by making small street dramas. We can gather the people and inform them about causes of dengue and inform them in detail about the disease.” (KII, FCHV, Dhankuta-7)*

One participants stated that the information was given through newspaper but it was not much effective.

*“The other part is our FMs. Now it is printed in the newspaper as well but has no effectiveness. If you read a renowned magazine, you will read Kantipur. Now it is used by others. Now they come with advertisements. Print ads but not social marketing. Social media should do social marketing. There is no such custom here. One happened from FM. Others are from pamphlets that we distribute. We sometimes do demonstrations. The other is in executive meetings.”(KII, Health Post Office, Ilam).*

On the other hand, participants expressed that awareness activities, like miking, were not very common. One participant noted that miking was done in previous years, suggesting that there might have been some awareness campaigns in the past. However, there appeared to be a decline in miking activities in the current year.

*I don't know any program that has been conducted here for dengue. I think it was 2-3 months that miking was done by the district health office. (IDI, Female, Former President of Jaycees, Dhankuta-6)*

*In previous years, there used to be miking around the place about dengue. They used to come on tempo for that. But, this year no one has come yet. But the miking was done after when the infection has spread and the hospital beds started filling. (FGD, Birtamode-4, Jhapa)*

### **Awareness via Social Media Platforms**

Furthermore, it was revealed by one of the interviewees that a Facebook Messenger group had been created for dissemination of information in their social circle while one participant also suggested uploading educational content videos on social media would help to create awareness.

*“Currently, there haven't been any cases of dengue, but we have a Messenger group from which information is distributed and gained. If they find larvae, they should immediately inform us. If they haven't found any larvae, they need to spread awareness about it. However, we continue to raise awareness during monthly meetings.” (KII, Health Office, Dhankuta)*

*“Nowadays, even uneducated people are on social media, so making videos in a small dramatic way may work.” (KII, FCHV, Dhankuta-7)*

### **Awareness through Mother Groups**

Many of the participants further revealed that awareness was spread during monthly meetings, through various groups and that few municipalities had been influenced to take up such awareness programs.

*“We continue to raise awareness during monthly meetings. They also go to “Mothers' Groups” to discuss how to search for dengue and how to eliminate larvae. They also teach how to store water. Now, some municipalities are willing to take it, and we need to work on others.” (KII, Health Office, Dhankuta)*

*“Now we have also formed a new Mothers' Group. It seems that if they can be made aware, they can spread awareness and reduce the spread of the disease. If we tell the women when they gather, they will tell the others.” (KII, FCHV, Ilam-7)*

*Once a month, we compulsorily organize a meeting in the mother's group. There is a management committee as well, with whom we organize meetings about these health problems.” (KII, HP-Incharge, Birtamode-4, Jhapa)*

*There have been several such programs here in this ward. Mother's Group once conducted such an awareness program in collaboration with the Local Government.” (FGD, itahari-10, Sunsari)*

### **Awareness Campaigns through FCHVs**

Most FCHVs reported that their primary focus was on educating the public about the risk of mosquito bites and their consequences and also promoting preventative measures like

maintaining cleanliness in surroundings, avoiding stagnant water in discarded bottles, garage tires, and pits and raising awareness about the potential breeding grounds for mosquitoes. They further explained that they also conducted dramas, and door-door campaigns, and encouraged people to seek medical attention if they experienced any symptoms such as fever, headache, stiff hands and feet. A few FCHVs also educate households about the importance of using flower pots instead of leaving containers vacant to prevent water stagnation. They also advised people to keep kerosene in empty containers.

*“FCHV go door-to-door to educate people about eliminating larvae and provide information about dengue. If they find any cases, they refer them to us.” (KII, Health Office, Dhankuta)*

*“We are organizing orientations and providing advice to the community, focusing on issues like the improper disposal of hospital bottles without caps, small containers, and garage tires.” (KII, FCHV, Birtamode 5, Jhapa)*

*“We also performed a drama in front of mother's group to work on dengue control. I have done that in this area. We have done the same by going to the community.” (KII, FCHV, Birtamode 2, Jhapa)*

*“House to house visit is conducted for vaccination program and at the same time information about dengue is given and the health workers also ask people to gather and give awareness program.” (IDI, Female, Mother's group representative, Ilam-6)*

*“Yes, for public awareness. And we did miking too. We made a song about keeping the houses clean and sang it while miking. We were even teased a bit about singing that song. This is how we did the campaign through social media and by visiting physically.” (KII, FCHV, Itahari-5, Sunsari)*

*“We are aware the community people telling them to keep clean around the house, do not allow potholes, do not allow water to stay stagnant, spray phenol and do not keep weeds growing around the house.” (KII, FCHV, Ilam-7)*

*“We filled the potholes with soil and did not allow the water to stay stagnant so that no mosquitoes could spread there. And we also aware the community people aware that it is safe to sleep under mosquito nets in the hot summer, and they should walk around in full-sleeved clothes.” (KII, FCHV, Ilam-6)*

*“Rather than prevention, we informed the general group that this is what happens after dengue and told them to maintain cleanliness, keep the area around the house clean, and do not keep water stagnant in nearby areas. We also told them that there is a possibility of mosquitoes coming from garbage. Once they were trained, we went to the mothers' group and advised them to stay away from litter to avoid dengue.” (KII, FCHV, Khadbari-1 Sankhuwasabha)*

*“We do an awareness program for example, for the tyres in garages, we ask them to tear up and throw them or use it as a roof. We go house to house and tell people to plant flowers in pots instead of keeping them vacant and also keep kerosene in that containers as well t avoid the breeding site for mosquitoes.” (KII, FCHV, Birtamode-5, Jhapa)*

*“We tell mothers who come to us. Even now the weather is rainy. We tell them not to keep potholes around the house, not to keep a place for water to stay stagnant, and not to keep water on the vessels.” (KII, FCHV, Itahari-3, Sunsari)*

*“In our ward, we conduct awareness sessions for mothers' groups, informing them about dengue symptoms and the importance of seeking immediate medical attention. We also have a program called Bahumukhi Paathshala where we educate 100-150 children about dengue. It's crucial to raise awareness at a young age. We advise children to take paracetamol for fever and recommend visiting the hospital. We extend our education efforts to teenagers, as they can pass on this knowledge to others.” (KII, FCHV, Dhankuta-7, Dhankuta)*

*“We gather the mothers of children during the monthly meeting. At that time, we conducted a public awareness program - we should do this and that, stay safe this way, not leave children unattended, clean the river and drains, keep the toilet clean if there is a toilet in the house and along with that, we will make them aware that they should make the children to wear clothes that cover the body as they won't be knowing about it.” (KII, FCHV, Phungling-5, Taplejung)*

Moreover, a few FCHVs stated even though the number of mosquitoes has dropped in the Himalayan region, an awareness program was conducted focusing on using mosquito nets and maintaining cleanliness.

*“Since this is the Himalayan region, there are not many mosquitoes anymore. However, we have made people aware that children should only sleep inside mosquito nets, use mosquito nets, and maintain cleanliness around the house.” (KII, FCHV, Phungling-5, Taplejung)*

*“We inform community people, that if there is a possibility for the community to get affected by mosquitoes, we tell them to put up mosquito nets and light mosquito coils at night. We haven't had such a specific program here. When we meet the community around here, we tell them to avoid it by putting up mosquito nets, and burning mosquito coils. And nowadays there are some electric things as well.”(KII, FCHV, Phungling-7, Taplejung)*

Few FCHV interviewees expressed their interest in conducting door-to-door awareness campaigns, organizing awareness dramas, public awareness programs by using mic at several places and suggested that the Village Development Organizations and wards to conduct meetings.

*“We, the female health volunteers, will go door to door. It would be very good if the ward or every village development organization had a meeting and organized a public awareness program on health, dengue and did “mic-ing”. “Miking” is a must.” (KII, FCHV, Birtamode-2, Jhapa)*

*“I think it was 2-3 months that “micing” was done by district health office.” (IDI, Female, Former President of Jaycees, Dhankuta-6)*

*"The mic shouldn't just be played in one place. If there was some means of transport, it would be possible if we could record what we said on a pen drive and play that. But it would not be enough to do "micing" at one place. Nowadays, even uneducated people are on social media, so making videos in a small dramatic way may work. We can do better by making small street dramas. We can gather the people and inform them about causes of dengue and inform them in detail about the disease." (KII, FCHV, Dhankuta-7, Dhankuta)*

*"I want my area to be good. For this purpose, if the residents of the ward also conduct the same programs and bring dengue programs to spread awareness about dengue to the residents." (KII, FCHV, Dhankuta-6, Dhankuta)*

Many of the participants further revealed that awareness was spread during monthly meetings, through various groups and that few municipalities had been influenced to take up such awareness programs.

*"We continue to raise awareness during monthly meetings. They also go to "Mothers' Groups" to discuss how to search for dengue and how to eliminate larvae. They also teach how to store water. Now, some municipalities are willing to take it, and we need to work on others." (KII, Health Office, Dhankuta)*

*"Now we have also formed a new Mothers' Group. It seems that if they can be made aware, they can spread awareness and reduce the spreading of the disease. If we tell the women when they gather, they will tell the others." (KII, FCHV, Ilam-7, Ilam)*

*"We have organized different awareness campaigns like dengue awareness program and process to dispose wastes which have helped in minimizing the disease. We organize different meetings and awareness programs. We also organize different levels of programs about this disease like school health program. In school health programs, we go to different schools and give kids information about the disease and how it transmits. Once a month, we compulsorily organize a meeting in the mother's group. There is a management committee as well, with whom we organize meetings about these health problems." (KII, HP-Incharge, Birtamode-4, Jhapa)*

*"Authorities have made a wide public awareness on this issue at the village level. We have conducted classes as a school health program. We got the heads of the health institutions to come and involved the school health nurse as well. I think we have been doing it for about 5-6 months since the last 6 months." (KII, HP-Incharge, Dhankuta-5)*

Furthermore some FCHVs stated that since no any program has been conducted from local level the FCHVs personally shared the information about dengue in the community.

*"I inform people about things to be done during the day - even if it's hot during the day, I tell them "you should wear clothes to cover your body, and even if you go to bed, you should put the children under the mosquito net." In our ward, we pulled out all the weeds, cleaned the small holes, cleaned the places where the water stays stagnant, cleaned the corners, and we collected all the bottles and broken pots and disposed of them in one place. However, ward have not conducted any activities. We have done awareness program on our own." (KII, FCHV, Dhankuta-7, Dhankuta)*

*“Nothing major has happened in the community from the ward. But we on our own talk with people about dengue when we go from house to house, wherever we go, wherever we meet, and especially, from the mothers' group to all houses in the village. A few symptoms such as fever, headache, stiff hands and feet, we suggest them go to the health center as soon as they notice it. If we think it is dengue - in the rainy season if they don't sleep with mosquito nets in place where there's spread of dengue - that's when we pressurize them to go to health institutions. Then the health institution looks after it.”(KII, FCHV, Khadbari-3, Sankhuwasabha)*

However, one participant mentioned that there was a decrease in the awareness program compared to last year.

*“We did awareness program last year together with wards and basic health care centers, together with female health volunteers and local bodies. But we have not done this program in recent days.” (KII, FCHV, Itahari-3, Sunsari)*

## **11. Challenges**

The Key Informant Interview (KII) revealed numerous obstacles in the control and prevention of dengue. These included a lack of dedicated treatment facilities, insufficient equipment and infrastructure, manpower shortages, coordination issues, and insubstantial community engagement. Problems also existed in reporting, identifying breeding sites, preparedness for potential outbreaks, and handling community pressure. Local representatives often offered little support, and budget constraints also possessed a significant challenge.

### **Absence of Dedicated Ward**

The participants stated concern about the lack of a dedicated ward for dengue treatment, emphasizing the need for intervention from the provincial level. Furthermore, explanation of not seeking treatment from the hospitals remained unclear as stated by participants.

*“Regarding treatment, there is no separate ward for the treatment of people with dengue, the state should pay attention to this. Some people are financially weak and are unable to come to the hospital, they should be made accessible to the hospital.” (KII, Health Office, Sankhuwasabha)*

*“If they get dengue, they are staying at home even if there is a severe case. They may not be able to come to the hospital for various reasons. These things should be addressed. The state must come up with some policy to increase their treatment in the hospital.” (KII, Health Office, Sankhuwasabha)*

### **Lack of Equipments, Manpower and Infrastructures**

Some of the health offices and municipalities were experiencing a number of difficulties. These included a lack of laboratories, inadequate staffing, and unsuitable equipment. They also highlighted the need for policy-level changes to effectively manage and control dengue outbreaks.

*“I also said earlier we have challenges in terms of manpower, medicine, facilities and budget.” (KII, Dhankuta Municipality, Health Coordinator.)*

*“One challenge is that every health office has a vacancy for lab technician but there is no lab manpower. Despite having manpower in some, the health office does not have lab-related equipment. Even microscope is not available in many offices. There are no labs, no manpower and no equipment even in the municipality. I think it should be addressed from the policy level. Due to lack of manpower in the office, there is a little challenge, otherwise, there is no such problems.” (KII, Health Office, Sankhuwasabha)*

*“If they found it relevant, they would say its dengue. Otherwise, if it seems like a common fever only then one must get tested, as kits are not available for everyone. The challenges have not come up so far. They have addressed them as they come up, and the challenges have been managed systematically.” (KII, Health Office, Taplejung)*

*“There is a huge shortage of manpower in the health post. There are sub-centers and urban health clinics in our municipality. Only one or two are there to look after the vaccination, the urban health center as well as the maternity services. We cannot give full time to one area as the work remains incomplete. We are being told to perform one work here and when we go to another place then we are told to do another work that is why we are facing a shortage of human resources.” (KII, Health Post Incharge, Ilam-6, Ilam)*

*“We found out during the monitoring that the test team has a technical problem. There is a problem in testing it correctly. Sometimes the microscope is not able to work properly. Due to this, the efficiency of the health workers may be reduced.” (KII, Health Office, Taplejung)*

*“It would be easier if test kits were available because we don't have to buy them.” (KII, Khadbari municipality office, Sankhuwasabha)*

*“There is no supply of dengue kits. Since there is no supply. It comes from state supply. This year, the state government has set aside a separate budget for the epidemic. From that, we have used maximum for dengue.”(KII, Health Office, Ilam)*

Similarly, participants expressed their disappointment in the inavailability of the dengue kits, lab equipment's by highlighting the necessity of the supplies from the government to tackle dengue outbreak.

*“Also, we are not getting enough dengue kit. It seems that the government should provide these goods easily.” (KII, Health Office, Sankhuwasabha)*

A participant from Dhankuta Municipality mentioned that the lack of a medical laboratory created difficulties but he further clarified that establishing lab would not be practical due to the low stream of patients, as most preferred to seek treatment at the nearby district hospital.

*“In reality, we do not have a municipal lab. Even if we were to operate the laboratory, we could not do it because the patient flow is low as there is a district hospital nearby, so people go there. Now there is also a thing that there are specialist doctors there to check. That is why we are not planning to take the case from the health institution which*

*is under us because we have the district hospital to look after that. Rather refer to such cases to hospital.” (KII Dhankuta Municipality office, Dhankuta)*

One participant from the central level shared differing views. He claimed that many patients go to B.P. Koirala Institute of Health Sciences (BPKIHS) for treatment and stated that there were no issues with resources for managing dengue.

*“Talking about the recent scenario there are many cases of dengue fever. Whereas, the maximum cases are going to zonal hospitals and BPKIHS. There are many cases in Dharan so most people go to BPKIHS for treatment so we have enough resources in BPKIHS.” (KII, Vector-borne disease focal person, Health Director Office, Koshi Province)*

### **Challenges in spraying**

The primary issue faced by the presented was efficiently managing the spray team and their supplies like gumboots, masks and body robes and arranging accommodation and food for the spraying team. It was found that spray tanks presented a maintenance challenge as they often need repair or clearing. Participants also mentioned that hiring human resources for spraying insecticides was quite challenging due to the limited budget.

*“The main challenge for us was the management of the people who spray or the spray man. It was difficult for us to do that. We hired the team from Kachankawal Village. We faced difficulty in managing everything from gumboots to masks and body gowns for them. It was a bit difficult for us to manage Dengue, the tanks would get damaged, the holes of the spray tanks would be closed, and there were many challenges.” (KII, Birtamode Municipality office, Birtamode, Jhapa)*

*“There is a shortage of manpower for using insecticides. We also lack spraying machine. For this, well-trained manpower and a separate department for epidemic control will be more effective.” (KII, Ilam Municipality office, Ilam)*

*“Now 15-25 people are needed for spray. We have to make arrangements for food, snacks, and accommodation, including rooms. For everything, the budget is not enough. The previous year was very difficult in managing the budget, this year that budget will be separated.” (KII, Birtamod municipality)*

*“Also in the case of the search and destroy program we have a demand for manpower (volunteers) we have to pay them for transportation. It would be difficult for us to manage that situation so we want a budget and it is important.” (KII, Vector-borne disease focal person, Provincial Health Director Office)*

### **Challenges in Creating Awareness**

A few participants noted the inadequate public knowledge in their area, which posed a barrier to controlling the spread of dengue. They also emphasized the importance of using multimedia channels for the continuous delivery of health information.

*“We have seen a slight decrease in health education in this cluster. There seems to be a slight lack of public awareness at the community level.” (KII, Health Office, Taplejung)*

*It is not enough for only the dengue information to be circulated. Everything must be reported. For these 2-3 years, we have only been giving information about epidemics. The notification of the regular program is not even done. That's why we focus on the epidemic. Even after doing that, we still haven't been able to deliver the information. And the local level also has a very low budget. For the information that came from the association, we have been working on it. Budgets have not been managed according to additional needs. Maybe it is not a priority. There is no budget for spraying. Especially not for dengue. We are searching in malaria prone areas. Even in Ilam, when there is a high risk of dengue, it is sprayed in high risk areas.” (KII, Health Office, Ilam)*

*“We tell people to use mosquito nets, to keep the house clean, to cover the potholes. Some don't even do that. They can also be infected for the same reason. Currently the focus is more on children and mothers' health. Many people do not know that if they are bitten by a mosquito, they might get dengue. They don't comply with what we say. We are getting to know about dengue just now. (KII, FCHV, Khadbari-1, Sankhuwasabha)*

*“People here are not educated. They take fever very lightly.” (IDI, Male, House worker and social worker, Khadbari 9, Sankhuwasabha)*

Additionally, participants revealed despite attempts to eliminate mosquito breeding areas, challenges occurred in improving human behavior.

*“While conducting search and destroy program we were unable to get success by 100%. We tried to make the environment cleaning the water but people were filling water and store water for a long time.” (KII, Vector-borne disease focal person, Provincial Health Director Office)*

In addition, one participant also stated that the public's lack of trust in FCHV's credibility was also an obstacle to creating awareness. Differing views were stated by another KII participant who stated that they found it easy to create awareness in their community.

*“As we visit the villages, we inquire about anyone who might be unwell, and in response, they inquire, “Do you have enough knowledge?” or “What resources do you bring for treatment?” It is very difficult for people to make aware.” (FCHV, Dhankuta-7) It's challenging to cover our large Ward 7, and we often need transportation to reach remote areas. We go as far as we can, but we require training, protective clothing, and essential tools to expand our efforts.” (KII, FCHV, Dhankuta-7, Dhankuta)*

*“It is not difficult to say in our own community. We have also recently undergone basic training. We had to read about many types of diseases and one of them is dengue. I have studied from that. There are not many challenges like that in our community.” (KII, FCHV, Dhankuta-6, Dhankuta)*

Lack of trust in the knowledge of health post personnel while treating patients with dengue was highlighted by one of the Key Informant Interviewees who said that when they gave paracetamol to treat fever to dengue patients, they went to higher centers.

*“A problem is present in a person who doesn't understand what is going to happen to him after getting dengue. People who are sick with dengue come with their relatives. There is no specific medicine for dengue, paracetamol can reduce the fever only. If a*

*distant person comes to the health post, the rest of the people in his community give him a suspicious reaction knowing he has come back with paracetamol tablets only. They think we have done this to them unknowingly. If they go to the clinic without checking for dengue, they will take medicine. It is said that when we explain that this happens when he is taking unnecessary medicine, he tries to go to a higher center than us.” (KII, HP-Incharge, Sankhuwasabha)*

### **Challenges in Finding Breeding Sites**

The participant noted the difficulty in identifying and eradicating breeding zones. They emphasized the necessity for collective action and strategic planning and suggested the need for an awareness program facilitated by the municipalities.

*“Controlling dengue is a challenging task. While we were working in the field or in the place where we were working through the information transmission done by our Manpower we did mass mobilization and cleaning campaigns. Besides that, the vector of dengue was in places where there was stagnant water such as in our house, in the refrigerator, and in the flower vessels which we could not reach easily in those places which posed a challenge in controlling the disease. And together with the municipality, it is very necessary to increase public awareness here.” (KII, Ilam Municipality office, Ilam)*

*“Sometimes while doing our work, the main thing is removing or destroying the breeding sites, not allowing water to stagnate. We are doing that but sometimes we don’t see such places or we miss it because the area is like this.” (KII, HP-Incharge, Itahari-6)*

### **Challenges in Controlling Disease Spread due to the Mobility of People**

A participant pointed out the difficulties in controlling dengue outbreaks as he elaborated that these difficulties are intensified by problems linked to breeding locations for the disease and population mobility from one place to another.

*“Another thing is that Dhankuta municipality is a market area and Dengue is a disease that is concentrated in the market rather than the village. Also, there are tires in the market area, there are pots and there are also a little more people coming and going. For example, since the people of Terai can travel back and forth in less than an hour, the possibility of the outbreak of the disease is high and it remains a challenge to manage it, as we saw during the time of COVID-19.” (KII, Dhankuta Municipality Office, Dhankuta)*

Furthermore, a KII participant mentioned that individuals get frustrated when they have to dispose of water they had saved due to lack of knowledge, and also shared that if one person reacts negatively to a situation, then the whole community group tends to respond in a similar way.

*“People often are furious when we ask them to discard the water they and there were objections. Throwing away around 200-300 liters of collected water makes people angry. They don't understand that there are worms in the water rather than larvae. Most of the time, if one person talks negatively in that mass, then the mass itself gets worse.” (KII, HP-Incharge, Sankhuwasabha)*

## **Challenges of Accessibility and Affordability in Dengue Testing and Treatment**

One of the participant expressed about the financial difficulties experienced by individuals undergoing dengue testing and treatment at the same time unavailability of bed also posed inconvenience for the people suffering from the dengue. Participants also discussed the issue of limited medications available at the health post, and they further mentioned that the provincial authorities have not delivered the dengue kits.

*“At that time, the problem was also that the labs took 2500-3000 rupees for dengue test. After that, if the economic burden happens to someone, those who stay without money, they are trapped, they don't have money. The hospital no longer has that bed, there is no room in the hospital. Yes, there is such a problem.” (KII, Health Office, Itahari, Sunsari)*

*“Since this is a health post, we only have limited medicines.” (KII, HP-Incharge, Birtamode-4, Jhapa)*

*“They could not deliver our kits at the time when we had a very high demand for dengue, and the province did not deliver any kits through the health office, health service department, center for control of epidemic diseases. We didn't get proper logistics as well.” (KII, HP-Incharge, Dhankuta-5, Dhankuta)*

## **Challenges with Local Governance and Community Participation**

Most of participants encountered various difficulties related to community involvement, and collaboration between local government and health authorities when dealing with control of Dengue. Also, most of participants encountered reluctance to address challenges from local representatives

*“The person who does it is a different one. Now the mayor doesn't want to understand, that's our problem. We can't do it with direct health post, we could, but now when we mobilize direct health post, we have to notify the municipality and the municipality does it in its own way. We do not have that authority. That is why there is a problem in decision making.” (KII, Health Office, Itahari, Sunsari)*

*“When we call the people of a certain community, sometimes they do not come. I have personally experienced this. We have an oral health program for the mother's group where we interact as well. Even though we call them many times by walking in their area, people from that community do not come.” (KII, HP-Incharge, Dhankuta-5, Dhankuta)*

Participants pointed out the significance of personal accountability and community involvement in disease prevention. Also, participant further explained that every household need to take responsibility for cleanliness and become aware of disease prevention strategies rather than depending on government or authority-led programs.

*“Our experience was of the last outbreak, like many meetings were held in Dharan with all the concerned bodies and after that meeting all fogging and after that went to short chain spray. It is not our aim to go before the leader, to clean the drains, to clean the roads. In my opinion, every house should be cleaned and every individual should be sensitized. It is not enough that 2-4 people go and perform it. That house cannot be cleaned all the time. Even though we tried to do it in many places, a peak of dengue came*

and went. He had used all the methods in that situation in Dharan.” (KII, Health Office, Itahari, Sunsari)

“In that dengue control, health is not the only responsible but it needs the support of all other areas. Health's role is to suggest the technical diagnosis and help to treat the diagnosed person. Everyone has to do it from their own side, it should not be left for others. It's the major problem here.” (KII, Health Office, Itahari, Sunsari)

### **Challenges due to Community Pressure**

According to the participant, municipality encountered complications due to social pressures, especially from local residents and village leaders, while executing public health actions. One FCHV also stated that they were accused of taking allowances over actual care.

“Another challenge was about pressure. Neighbors from village to village would put pressure sometimes, saying “it has been done here, it is not something that should be done here”, “it must be done, you did it, why didn't you do it”? “You did it here, why not here?” Even though there is little pressure from the people's representatives, what happened was we had planned before, for example, we could do it in Ward No. 9 in 5 days and then go to Ward 2. But they would say “it has not been finished, add 2 more days” and so on. Because we have made the schedule for the next day in another ward, but when their pressure comes, we would do it at the end.” (KII, Birtamode Municipality office, Birtamode, Jhapa)

“More than a problem, a challenge is that they tell us to come and look at them, to check them if they have dengue, and they think that they may die gradually. Some people accuse us of taking allowances.” (KII, FCHV, Itahari-5, Sunsari)

### **Lack of Emergency Preparedness for the Outbreak**

One participant noted a lack of readiness at the time of the outbreak. Even with the establishment of a team, there remained uncertainty and an absence of clear guidance on the next steps.

“For instance, when a major outbreak occurs, as it did recently, we're left without a plan. At that point, we formed a group, but even then, there wasn't much clarity on what to do.” (KII, Health Office, Dhankuta)

However, other participant held a different view by emphasizing the determination and readiness of the health workers and officials and provided clear direction on the steps to be taken for implementing solutions.

“Another positive aspect of us is that we have really done a lot of work regarding dengue. We brought the medicine on our own initiative, after being told that we did not coordinate with the health office, we brought the kit ourselves and managed it. The only thing that needs to be improved is coordination, but now when it comes to the budget, the budget is managed. If we can manage a sufficient budget, if we can solve it and if we have to mobilize medical personnel, there are many health workers, We operated the hospital

*when there were 10-12 health workers, and now we have a team of 30-40 health workers, a team including 4 doctors, we are very ready to fight for this.” (KII, Birtamod municipality office, Jhapa)*

### **Challenges in Conducting Training**

The municipal representative mentioned that it was challenging to carry out training sessions without a predefined plan. Also, health officer at district level mentioned that could not be conducted in all the municipalities due to budget constraints.

*“I think this training at municipal level is difficult to conduct. We have no plans to do it ourselves. But what support we have is that since we have a health office and a hospital, those people who have a high probability of getting dengue are sent to the hospital immediately, and the hospital is also managing them like testing them and treating them according.” (KII Dhankuta Municipality office, Dhankuta)*

*“Training of epidemic cannot be done for more than two or three municipalities due to budget limitation.”(KII Health Office, Ilam)*

### **Lack of coordination among Three Tiers of Government**

Most of the participants identified a lack of coordination between different levels of government. Additionally, they found inconsistency between the community's actual situation and the decisions made by top-level experts.

*“After the formation of this local government, there are many obstacles or challenges. The perspectives of the province and ministry differ. There is a team of experts at the top level and decisions are made accordingly. There seems to be some lack of coordination on the matter of budgeting at the local level.” (KII, Dhankuta Municipality office, Dhankuta)*

*“In terms of coordination, there is a little lack. There is not much challenge for the budget, but many problems were/are being seen while designing the program.” (KII, Itahari Metropolitan City office, Itahari, Sunsari)*

According to a participant, provincial-level had their own programs which didn't not aligned with municipality level. Also municipality believed that they were considered less important by the province which had caused difficulties for the municipality to execute dengue control initiatives.

*“Another thing is that there are many provincial level structures in Dhankuta which are beyond the control of the municipality and all of them have their own programs which are not compatible with the municipality. We will do our own program, but the perspective of the province will be different. As there is a provincial hospital here, the province gives less priority to the municipality. Because of this, it is a challenge for us to work. We have conducted various support programs by the state government, but we are facing a challenge because there is no coordination between what the states will do and what we will do.” (KII, Dhankuta Municipality Office, Dhankuta)*

Similarly, the challenges faced in managing resources, coordination, and assigning responsibilities by municipality were highlighted by the participants. These problems

occurred when expanding healthcare facilities and initiating dengue prevention programs under federalization. Additionally, the lack of segregation of healthcare institutions from the higher authority poses difficulties in executing dengue prevention activities in those area.

*“Another thing is that there are only 10 wards in Dhankuta city and before federalization there were only two health institutions, but now we have added 4 more institutions and are running the program. Now, if everything like manpower, logistics management is not done from the higher level it becomes difficulty to manage it by the municipality. Also, there is no division of health institutions based on population and geographical area, so it is a challenge to carry out the program. However, we are advancing the program through the FCHV, health institutions and through the mother group. These things happened.” (KII, Dhankuta Municipality Office, Dhankuta)*

### **Impact of Federalism**

Likewise, the transition to federalism had impacted the distribution of funds for controlling epidemics, thereby constraining activities at the municipal level, as indicated by a participant from Dhankuta District.

*“Earlier, whenever there was an epidemic, the municipality would allocate funds to solve it, but now, due to federalism, that's not possible anymore. Earlier, we used to work on it, but now, even if we want to do something, there's no budget for it.” (KII, Health Office, Dhankuta)*

*“Moreover, this year, we didn't have our budget; we relied on the budget from the Rapid Response Team (RRT) and spread awareness. All of this is what the federal government and central level government has done.” (KII, Health Office, Dhankuta)*

### **Geographical and Environmental Challenges**

From the interview it was revealed that Geographic factors worsen these challenges even more as households are spread out, making it difficult to gather people for awareness campaigns and impractical to spray pesticides in these regions. Few of participants reported that water stagnation in garages in such areas during the rainy season increased mosquito breeding.

*“When its rainy season, it's hard to walk from place to place for awareness program. The road is not as good as we would like it to be, so we have experienced a lot of challenges from walking to communicating with them.” (KII, FCHV, Khadbari-3, Sankhuwasabha)*

*“There are many garages in this area. During the rainy season, water freezes everywhere. Now this should happen because there is little awareness that it spreads mosquitoes.” (KII, HP-Incharge, Khand bari, Sankhuwasabha)*

*“The houses are far from one another. So, it is difficult to gather people to give the awareness program. It is also difficult to go door to door. Spraying pesticides would be easier if the houses were close to each other. So, it is also quite challenging. Geographically and economically, there is a challenge in this area.” (IDI, Male, House worker and social worker, Khadbari-9, Sankhuwasabha)*

## **Socioeconomic Problems**

A few participants also mentioned that people who were financially weak could not purchase mosquito nets and often viewed attending awareness programs as a burden. In contrast, providing incentives such as refreshments or transportation costs, as well as screening documentaries, might motivate people to attend awareness activities which showed that financial incentives, even tiny ones, can greatly improve engagement.

*“But there are some people who can't buy mosquito nets and don't know much about it. They don't comply with what we say.” (FCHV, Khadbari-1, Sankhuwasabha)*

*“If we were able to show documentaries about this disease to the people, it would be easier for us to make them aware about it. If there were a few banners for its promotion, people would have felt more motivated. The major obstacle is to motivate people to come to the programs. If they don't see any financial gain for them, they won't attend the programs. If we were able to provide at least Rs. 100-200 as transportation expense, they would be more motivated to attend the events. If we want to provide them even a cup of tea as our guest, it's a challenge for us. That's our obstacles as of now.” (KII, HP-Incharge, Birtamode-4, Jhapa)*

## **Challenge in Case Finding and Reporting**

A participant stated that obtaining accurate and timely data from peripheral areas was difficult, and they felt compelled to gather information through personal calls. Besides the difficulties in gathering and sharing data, there were major problems with identifying cases in Illam. The requirement for people to pay for testing makes the issue worse, resulting in numerous cases going undetected and unreported. This causes a significant gap in disease monitoring, as cases are not accurately identified and monitored.

*“It is difficult to receive regular and actual data from the peripheral areas. We have to call and ask for it and collect it. In some cases, there is a situation where the dengue patient is in the OPD and they won't know whether to make an entry. It was only the previous year that they provided training for entry, so the challenge of reporting there. There is also a situation where you have to make a personal call and ask. Dengue fever always needs to be reported. And there is also problems in case findings. People have been testing it by paying money. That is why neither testing nor reporting has been done.” (KII, Health Office, Ilam)*

## **Community Resistance and Lack of Awareness**

The most of participants have mentioned facing difficulties when organizing awareness programs as there was found sense of reluctance, among people to come and acquired information. Furthermore, community involvement, as evidenced through Key Informant Interviews (KIIs), appeared to be limited, with some refusing to cooperate after several calls.

Whereas as stated by the participant's community members objections to disease prevention programs and involving behaviors such as water collection indicate a lack of

awareness of disease transmission. Resistance from the community, towards carrying out mosquito control activities like search and destroy operations was also notable driven by a belief that mosquitoes didn't posed a threat.

*"When we call the people of that community, sometimes they do not come. I have personally experienced this. Even when I am walking in this area, even though we call them many times, people from that community do not come. On top of that, it's difficult to meet the male members. There are mothers' groups. When we called, I have seen that many times the members of mothers' groups did not have the expected involvement in the health program of their communities."* (KII, HP-Incharge, Dhankuta-5, Dhankuta)

*"There is objection from the people during the search and destroy campaign. People have practice of collecting and storing the water. They don't understand that dengue can breed in those water. Most of the time, if one person talks negatively in that Mass, then the Mass itself gets worse. Such problem comes."*(KII, HP-Incharge, Sankhuwasabha)

*"Since this is rural area and to conduct search and destroy programme it is difficult to maintain cleanliness. First thing is it is quite different in theoretical and practical. Public are also much careless. People think that they cannot die so easily with the mosquito's bite."* (KII, HP-Incharge, Itahari-5, Sunsari)

Similarly, FCHVs have highlighted the difficulties in convincing people to attend awareness program and stated about the difficulties in ensuring about people's understanding the information provided by them.

*"As we visit the villages, and try to provide the information they in return inquire us, by saying "Do you have enough knowledge?" or "What resources did you bring for treatment," It is very difficult for people to make understand."* (KII, FCHV, Dhankuta-7, Dhankuta)

*"When we call for awareness program in certain area people hesitate to come. We try to convince as much as possible and we also say them that they will be provided with tea.' That's when some of them will come. They feel burdened to come."*(KII, FCHV, Phungling-5, Taplejung)

### **Challenges in Seeking Treatment**

The local residents have stated that because of the lack of health facilities nearby they frequently find themselves needing to go to the district hospital for treatment. This suggests that even though some health facilities don't encounter issues, with acquiring supplies, the accessibility and standard of healthcare services continue to be worries, for community people leading them to visit district hospitals for treatment which ultimately lead to higher expenses.

*"It may be a bit difficult to manage medicine here, it is difficult to manage it at the health post like a health institution, why we have no place to admit them, we have to send them to the district hospital for that, if there is a complication, there is no good hospital here to manage it, from here I had to refer and send it to Jhapa or Dharan BPKIHS."*(FGD, Phungling-6, Taplejung)

*“It affects very much. If the people suffers from dengue fever, then their expenses will also increase. Dengue treatment is not done here they have to go far. After the dengue is suspected one has to be provided with the vaccine. Till now we haven’t suffered from the dengue fever if we will suffer from it then it will be very dangerous.” (FGD, Dhankuta-7, Dhankuta)*

### **Challenges in Service Delivery**

A few interviewees revealed the different perspectives on healthcare access by the people in rural areas. A participant mentioned that many are hesitant to visit higher-level referral clinics and preferred to have their exams done locally. However, in certain circumstances, local facilities lacked the capacity to provide comprehensive care, creating complications for patient management. In contrast, another participant stated that having nearby hospitals minimizes the problems of managing medicine and helped them for prompt referrals when necessary.

*“In case of referral if we have to refer some of the patients (high fever) to the upper level then the patients hesitate there to go. At that time, it is difficult. The patients insist us to do their checkup what so ever instead of going at the referral centers. At that condition we don’t have other enough facilities so it’s quiet difficult.” (KII, Urban Health clinic, Dhankuta)*

*“We don’t have such challenges as this area is near to the hospital. Therefore, there is refer done. We are not lacking in the general medicines till now.” (KII, Urban Health clinic, Dhankuta)*

Similarly it was also revealed that despite the availability of medications such as paracetamol, some patients misinterpreted the treatment and seek unnecessary care at higher-level institutions which resulted issues in patient treatment and management.

*“There are no such obstacles, but what happens is people don’t understand that there is no specific medicine when we give them paracetamole. They think we have done this to them unknowingly. When we explain that this happens when he is taking unnecessary other medicine, they don’t believe us tries and goes to a higher center.” (KII, HP-Incharge, Sankhuwasabha)*

## **12. Varied Budget Allocation and Resource Mobilization for Dengue Control**

From the interview varying levels of budget allocation for dengue control was found across different districts of Nepal. While some participants reported receiving budgets from the provincial government from various sources for dengue-related activities, others expressed concerns about the lack of dedicated budgetary provisions for dengue control whereas, few of the KII participant’s provided details budget allocation for dengue-related activities, revealing the sources of financing and the mechanisms for collaboration between different government bodies.

*“Yes, the provincial government has provided some budget which is around 5-6 lakh.” (KII, Health Office, Birtamode, Jhapa)*

*“Regarding the budget it's uncertain; but if requested to the municipality to increase the budget for dengue prevention, they won't say no, as we coordinate with the palika to do any work in the community” (KII, Health Office, Taplejung)*

*“We received a budget for Rapid Response Teams (RRTs), mainly for dengue.” (KII, Health Office, Dhankuta)*

*“Yes, the provincial government has provided some budget which is around 5-6 lakh.”(KII, Health Office, Birtamode, Jhapa)*

*“We talk about last year, about Nrs 3,00,000 was allocated for dengue related interaction program from our conditional program. Along with that, we have allocated a budget of 5,00,000 from the Health department and the remaining lacking budget from disaster management fund . And considering that ward office also provided money for fuel. For example, lunch expenses were given for the people working in it. Looking at it like this, it has been seen that the budget has been allocated from the ward, the budget has been allocated from the health division, and the budget has been allocated from the environment and disaster management section.”(KII, Itahari Sub-Metropolitan City office, Itahari, Sunsari)*

*“Last year during outbreak there was no any financial support from government. There was no any distribution of budget for management of dengue outbreak but was only for critical stage management and at that time we somehow managed dengue that critical stage budget plan. But now, we have informed in upper level about the budget so we have got some budget to manage dengue.” (KII, Vector borne disease focal person, Provincial Health Director Office)*

Conversely most participants stated that there wasn't a dedicated budget for dengue control with one municipality using its disaster management emergency fund for controlling an outbreak while another utilized funds from a wider vector-borne disease management program. Also the few participants emphasized the low budget provided by government budget for controlling dengue and expressed doubts about whether this low budget is sufficient.

*“Last year during outbreak there was no any financial support from government. There was no any distribution of budget for management of dengue outbreak but was only for critical stage management and at that time we somehow managed dengue that critical stage budget plan. But now, we have informed in upper level about the budget so we have got some budget to manage dengue. (KII, Vector borne disease focal person, Provincial Health Director Office)*

*“The province has kept a small amount of emergency fund so that fund can be mobilized for the next epidemic. We mobilize the fund from that as well. Even at the local level, a separate fund has been kept for epidemics.” (KII, Health Office, Ilam)*

*“What has been done so far is we have not allocated budget specifically for dengue. It has been allocated in the budget as a lump sum under Vector Borne Disease. Also In the coming days we have not specifically requested for dengue.”(KII, Dhankuta Municipality office, Dhankuta)*

*“We do not allocate our budget to this, we have a disaster management fund, and in case of any kind of disaster we can spend and control it because our fund is prepared so that we can spend from that fund. We do everything from that and it is called disaster management fund.”(KII,Khandbari Municipality office, Khandbari, Sankhuwasabha)*

Similarly, according to the participant, municipality hadn't specifically allocated funds for dengue control. Rather, they had submitted proposal to manage the dengue outbreak.

*“Budget is not allocated in this context. They says the budget is not enough. We have submitted the proposal.” (KII, phungling Municipality office, Taplegunj)*

*“We have submitted a proposal in the policy and program of municipality. I have noted down in the copy and have to see exactly how much have been allocation.”(KII, Ilam Municipality office, Ilam)*

Similarly, Birtamode Municipality managed to secure funding for dengue control despite limitations in their own budget.

*“We brought the fund directly from the state government, direct in our name. Even though there is no transfer form in our name, we made it in the name of the health office and brought it.”(KII, Birtamode Municipality office, Birtamode, Jhapa)*

Participants mentioned that by establishing a community fund and contributing money to it, the residents of the community had voluntarily made emergency preparations. They highlighted the lack of external financial support prompting them to pool resources for the community initiatives. Additionally they noted a low dengue cases in hilly regions urging for budget allocations, across different regions to implement preventive measures and underscored the significance of timely action.

*“We community people have opened a fund and some of us have deposited some amount of money in the fund, and we utilize the money from the fund in the emergency situation for our society as well. If any of the family got emergency, in that case, the family is assisted through the budget kept in the fund.”(IDI, Male, Mother's group representative, Ilam-6)*

*“Till now we have not got any budget either from any organizations or government. We 8-10 people collected some amount of money and worked for our community.”(IDI, Male, House worker and social worker, Khandbari 9, Sankhuwasabha)*

*“Since, dengue cases are not seen in this community. So any program has not been conducted till now. Focus should be given from now only, budget should be allocated from upper level for conducting the program. Even the local level should allocate budget for these kind of diseases.” (IDI, Female, Agriculture, Phungling-9, Taplejung)*

### **Insufficient Budget Allocation**

Most participants highlighted budget constraints as a major obstacle in implementing effective dengue prevention programs. They emphasized the lack of funds for essential activities like awareness campaigns, spraying, and manpower management. Participants

mentioned that the allocated budgets are insufficient to meet the needs of their districts, with having high prevalence of dengue. Participants stated limited flexibility in budget allocation and fund management challenges make them hard to carry out planned activities efficiently. Participants also noted a government focus on infrastructure construction rather than preventive health measures. Furthermore, budget allocation time coinciding with dengue outbreaks make them difficulty in managing outbreaks effectively in a short time. The shift to federalism had affected fund distribution for epidemic control, limiting activities at the municipal level.

However, in contrast only one participant view stated that they received enough budget to execute their action plan.

*"It's a challenge. There is a problem because the budget is also low and the internal revenue is also low. There is also a situation where the employees working in the health institutions within this municipality have to be paid low salaries. In this context, the budget for conducting preventative programs is not enough." (KII, Phungling Municipality, Taplejung)*

*"Our main obstacle is funding; without it, it is hard to carry out needed tasks to handle" (KII, FCHV, Dhankuta-7, Dhankuta)*

*"Due to lack of budget for any program from the ward, we have not been able to conduct any program." (KII, FCHV, Khadbari-3, Sankhuwasabha)*

*"No there will be no problems after we make our action plan, the budget will be allocated accordingly." (KII, Khandbari Municipality Office, Sankhuwasabha)*

Participants in in-depth interviews (IDIs) also expressed similar concerns, claiming that they offered their services voluntarily due to a lack of fund in dengue management .In the absence of proper financial support or structured programs, they carried out these tasks independently. This highlights the urgent necessity for adequate funding and resources to effectively support community health initiatives.

*We voluntarily work. There was no budget. We didn't get fund to carry out such activities so all people didn't work voluntarily. We were few who wished to work voluntarily so it was difficult to cover all the areas/ward. We worked in specific tole only. (IDI, Male, Houseworker, Khadbari-6, Sankhuwasabha)*

While in constrast few participants focused on dengue awareness and prevention efforts despite limited budget resources. They also stated the importance of coordination with stakeholders increased funding to support health campaigns for more effective dengue control measures.

*"We are just informing people about dengue and its prevention. The future plan is to control the mosquitoes itself. Even though the budget is low for this, we have to do the same awareness program. And coordination with stakeholders is the key for this." (KII, Phungling Municipality Office, Talejung)*

*"The budget is not that much. We don't need allowances, we can at least ask for them to release the budget for the conference, at least we will be better with the health campaign."*

*This is the challenge, if they implement these challenges, success will be achieved.” (KII, FCHV, Itahari-5, Sunsari)*

Moreover, a few participants further elaborated that while coordination was done with other agencies after that, budget was still a factor that was not adequately addressed to conduct an effective preventive program for dengue.

*“Coordination with other agencies is done and a roadmap is made to coordinate how it can be controlled. I don't think this is enough if we look at the budgetary program we have received for dengue control while playing the role of the head of the health office. The budget is too small to control an epidemic like dengue. We are not even able to conduct the programs. We are repeatedly telling the higher authorities about this.” (KII, Health Office, Sankhuwasabha)*

In addition, few participants also highlighted their strong commitment to control mosquitoes and conducting conferences despite low budget.

*“We are just informing people about dengue and its prevention. The future plan is to control the mosquitoes itself. Even though the budget is low for this, we have to do the same awareness program. And coordination with stakeholders is the key for this.” (KII, phungling Municipality, Taplejung)*

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## Limited Incentives for Community Engagement

Most of the participants faced challenges in dengue management due to funding limitations in reaching remote areas, lack of financial incentives for community participation and participants experiencing difficulties in covering communication costs to spread awareness. Participants mentioned that they were unable to complete the task successfully due to a lack of funding because they were having trouble paying for their transportation, particularly when it came to traveling to remote areas. They also emphasized the need for additional logistical materials such as protective gear and necessary tools to carry out the awareness program.

*It's challenging to cover our large Ward 7, and we often need transportation to reach remote areas. Our main obstacle is funding; without it, it's hard to carry out these tasks. We go as far as we can, but we require training, protective clothing, and essential tools to expand our efforts. (KII, FCHV, Dhankuta-7, Dhankuta)*

Additionally, the absence of financial incentives discouraged community people from participating awareness programs. Moreover participants stated providing refreshments during these activities was also challenging due to budget limitations and they further explained small rewards like tea or travel expenses can increase people engagement in conducting the programs and enhance the efficacy of a program.

*"The major obstacle is to motivate people to come to the programs. If they don't see any financial gain for them, they won't attend the programs. If we were able to provide at least 100-200 Rs. as transportation expense, they would be more motivated to attend the events. If we want to provide them even a cup of tea as our guest, it's a challenge for us." (KII, HP-Incharge, Birtamode-4, Jhapa)*

A participant indicated that due to funding limits, due to difficulties in contacting families during the monsoon season, they had to communicate via mobile phones to address cleanliness and dengue transmission, but they were challenged in paying the communication costs which showed that economic barrier had hindered the awareness program.

*"Due to lack of budget for any program from the ward, we have not been able to conduct any program. There are many challenges. Since it is not possible to meet them face to face, we need to communicate through mobile phones to say about cleanliness around the house and dengue is very widespread during monsoon. This is also a challenge. It's the rainy season, it's hard to walk from place to place, the road is not as we want, and so we have experienced a lot of challenges, from walking to communicating with them." (KII, FCHV, Khadbari-3, Sankhuwasabha)*

## Financial Barriers to Health Information Dissemination

Participants mentioned that budgets are not enough to raise awareness about diseases. Using newspapers and television to spread information requires payment, making it hard for organizations with limited budgets to reach the public effectively. This highlights the importance of increasing budget allocation and coming up with new strategies to overcome financial obstacles in disseminating crucial health information with the public.

*“When it comes to budget, we create awareness through newspapers, television, and through mobile phones. But nowadays, unless it's economically viable, no newspaper would print it without payment. If we had a budget, we could spread awareness through newspapers and radio, Nepal government has its channel, it could also be done through that. Earlier, whenever there was an epidemic, the municipality would allocate funds to solve it, but now, due to federalism, that's not possible anymore.” (KII, Health Office, Dhankuta)*

*“I say that the budget for creating awareness is not enough. It is not enough for only dengue information to be circulated. Everything must be reported. For these 2-3 years, we have only been giving information about epidemics. The local level has a very low budget. For the information that came from the association, we have been working on it. Budgets have not been managed according to additional needs. Maybe it is not a priority.” (KII, Health Office, Ilam)*

Another participant further said that without finances, no media would update people.

*“If we have to provide awareness program in a socioeconomically efficient matter then, without payment, any radio and media will not update to the people.” (KII, Vector-borne disease focal person, Health Director Office, Koshi Province)*

### **Financial Limitations for Spraying**

Participants highlighted the need for enough funding and resources to fight vector-borne diseases effectively and also discussed about budget limitations preventing the successful implementation of spraying programs.

*“There is no budget for spraying. Especially not for dengue. We are searching in malaria prone areas. We are doing work in Jhapa. Even in Ilam, when there is a high risk of dengue, it is sprayed in high risk areas.” (KII, Health Office, Ilam)*

*“It seems to be a little expensive to spray and this measure was adopted in Birtamode as well. It was said that there was a lot of expenditure, so we never did it due to budget constrains” (KII, Health Office, Birtamode, Jhapa)*

*“In the case of the search and destroy program we have a demand from manpower (volunteers) to pay for their transportation. It would be difficult for us to manage that situation so we want budget and it is important.” (KII, Vector borne disease focal person, Health Director Office, Koshi Province)*

### **Insufficient Financial Support versus Need**

Similarly, the participants pointed out that the budget assigned was insufficient to handle the needs of their districts, particularly with the high number of people suffering from dengue fever.

*“The provincial government has provided some budget which is around Rs. 5-6 lakhs. Rs. 5-6 lakh will not be sufficient for such a big district and if there is an epidemic somewhere, then it will cause problems or else it is fine. There is financial support but it is not sufficient.” (KII, Health Office, Birtomode, Jhapa)*

*“Challenges remain as the budget is considerably low. Specifically for dengue, the affected population is huge, and those affected aren't being adequately addressed.” (KII, Health Office, Dhankuta)*

*“We work voluntarily. There was no budget. We didn't get funds to carry out such activities so all people didn't work voluntarily. We were the few people who wished to work voluntarily so it was difficult to cover all the areas/ward. We worked in specific Toles only.” (IDI, Male, Houseworker Khadbari-6, Sankhuwasabha)*

### **Limited Budgetary Flexibility**

Few participants expressed that the local government in Nepal faced issues when using budget given by the national government, which had certain conditions and limitations. Also, the municipality encountered trouble with managing the funds correctly, causing them to move budget title one to another which caused disruption in some planned activities.

*“When we allocate budget for search and destroy then we cannot mobilize that amount for fogging and such other program.” (KII, Itahari Metropolitan city office, Itahari, Sunsari)*

*“The problem with the budget was that the government of Nepal had a federal conditional budget and municipality. There was a problem with the budget, and now while solving it, it was pulled from another title. Then the work of another title could not be done at this time. The budget has come very low” (KII, Birtamode Municipality office, Birtamode, Jhapa)*

*“The kind of problem here is that after the last of Ashar 15th or 20th of the financial year, no budget can be used; there is no budget. The government can't even give a budget, and in such a situation, we are confused about how to proceed with the program. Where the problem is that, even if the ministry gives us a budget now, we cannot spend it. Because it has limitations.” (KII, Health Office, Itahari, Sunsari)*

### **Government Emphasis on Infrastructure over Disease Prevention**

A participant revealed that focus of government on budget segregation was more on building infrastructure than providing health services which proved that government had given emphasis more to development projects rather preventive health measures .

*“The budget is more focused on other areas than the health sector, such as infrastructure construction. They think that the preventive measures in the health sector are doing things on their own and hence don't need a lot of budget. This creates problems. Like us in the past, we had proposed a budget for Vector Borne Disease through the Executive Committees, but the budget was not allocated. If this happens, there is a problem.” (KII, Dhankuta Municipality office, Dhankuta)*

*“As budget wasn't sufficient and we received less budget than our expectations. Buildings have been built in all our wards, but it could not be done due to other management's difficulties. However, even though we could not run all the institutions this time, we have added two more. In terms of budget, it is effective if the budget comes from the same organization, allocate it by themselves and use it.” (KII, Dhankuta Municipality office, Dhankuta)*

## **Timing of Budget Allocation**

Moreover, the findings also showed that budget allocation times and dengue outbreaks occur simultaneously, making it difficult to manage the outbreak effectively within short periods.

*“Since the time for dengue and budgeting is the same, the problem of budgeting or dengue control has become a problem due to time constraints. What concerned authorities says is that let's allocate it under dengue control and prevention in a comprehensive way so that it can be mobilized anywhere as per the need. That is why the debate continues.” (KII, Itahari Sub-Metropolitan City office, Itahari, Sunsari)*

## **13. Reporting Mechanism**

### **Dengue Monitoring /Reporting**

The interview revealed an organized system for disease reporting and surveillance, including daily, monthly reporting procedures through Google sheet and DHIS-2 in government institutions of Nepal. Whereas PHD identified issues in reporting and managing health data, including the difficulty of sustaining daily reporting and the complexity of managing overlapping cases.

*“There is challenges like we are unable to report on a daily basis and also if it overlaps than it would be difficult to be managed. System needs to be improved for it.” (KII, Vector-borne disease focal person, Provincial Health Director Office)*

### **Daily Online Reporting During Epidemic**

Most of the participant stated that daily reporting was done during epidemics of dengue through Google Sheets initially and shifted in to DHIS-2 which helped them understanding real-time of the disease scenario .Nevertheless, they still found challenging to give daily updates.

*“Even now, we have online reporting for our dengue cases. We send them the report that they sent to us.: Reporting is done monthly through DHIS2 but currently, we have online reporting daily for dengue and it is also done form hospital now about 10/15 cases have been reported they inform us if they have cases. We've started using Google Sheets for daily updates, in this province and later, after a month, we incorporate it into DHIS2. Dengue reporting is good from the province now; it is updated daily on a Google Sheet. Daily updates are a big deal. After daily reporting, we know the scenario.” (KII, Health Office, Taplejung)*

*In the case of reporting, it is said to do Daily Reporting during the epidemic. Otherwise, monthly reporting is done. Daily reporting is not entered in DHIS-2. (KII, Health Office, Sankhuwasabha)*

Similarly, dengue cases are reported from the ward level to the municipality (Palika) level, and finally to the Department of Health Services. Reports on vector-borne diseases were also submitted to the district's focal person. This suggests a structured reporting system for tracking and monitoring dengue cases at many administrative levels.

*“Since now the cases are normal. The number of cases of dengue to ward. From ward it is reported to palika level. And from there it is sent to DoHS. Also, from ward it is reported to focal person of district vector borne disease.” (KII, HP-Incharge, Itahari-5, Sunsari)*

*“We require monthly reporting at the health post. We submit the monthly report there. But we don’t report specifically for dengue only.” (KII, FCHV, Dhankuta-6, Dhankuta)*

### **Monthly Reporting through DHIS-2**

The participants stated that monthly reporting was routine procedure for all the disease, that data was placed into DHIS-2, and that each municipality was given access to submit monthly reports and they independently entered into DHIS-2.

*“Access is given to every municipality for monthly reporting and they enter it themselves in DHIS-2. Now every health institution reports on DHIS-2. And we forward it to the higher authority. Daily Report does not go to DHIS-2.” (KII, Health Office, Sankhuwasabha)*

*“Dengue reporting is not done separately. We use form 9.3. And we do entry in DHIS-2 for the early reporting system we will inform them and send a copy of the report to the municipality immediately. We also send it in the monthly report.” (KII, HP-Incharge, Sankhuwasabha)*

### **Surveillance through EWARS**

According to the participants surveillance was carried out by EWARS (Early Warning and Reporting System), particularly for dengue which have the potentiality to spread. Participant also added that municipalities also contribute to surveillance, there are some delays due to reporting channels.

*“Surveillance specifically goes through one of the EWARS. EWARS has several sentinel sites from which it operates on a regular basis. The surveillance here is based on data rather than sentinel. As they do monthly entry and not everyone does. Now we have good coordination in terms of our recording with big hospitals like BPKIHS. Until yesterday, we have sent all the line listings correctly and it happens regularly and immediately. And the municipalities also had to report. However, our monitoring is stronger than this method. Now the newly built municipal hospital also reports, but because it comes through the municipality, it is late. There is direct reporting, not all reporting. This type of reporting, if any new disease with the possibility of outbreak is seen, it will be reported.” (KII, Health Office, Itahari, Sunsari)*

*“We have two ways one is from EWARS which is done from Damak and provincial hospital and the other is reported by the private institution. (KII, Health Office, Birtamode, Jhapa)*

### **Integration Monitoring**

A participant stated that integrated monitoring was done where various diseases, including dengue, and measles are discussed in monitoring rather than separate monitoring. However, in a few place there was lack of dedicated monitoring for dengue, and focus on dengue remain insufficient.

*“There is no need for separate monitoring for dengue. When we do integrated monitoring, we also talk about dengue and how it is in the area. Next, we have a monthly meeting with the chief, and we talk about whether there is something about dengue or a problem. At the same time, we also give the kit. That is why the municipality has purchased and used dengue kits. We have not been able to do the monitoring very well. We have not yet focused on dengue.” (KII, Health office, Ilam)*

Similarly, participants from Jhapa responded that they prioritized proactive surveillance rather than supervision and monitoring. Furthermore, despite efforts to engage business organizations and developed information systems under EWARS, commercial organization response appeared unsatisfactory.

*“We usually don’t do supervision and monitoring if we find that the cases are increasing in huge numbers we go to that certain place and observe the situation and act according to it. The information system is updated and there is talk of EWARS we have also asked the private organization to update after seeing the case, but there is not much from there.” (KII, Health office, Birtamode, Jhapa)*

### **Challenges in Reporting**

Participants noted that dengue reporting faced fewer issues compared to other challenges. While another participant indicated that reports mostly came from major hospitals rather than private health institutions. Furthermore, they highlighted that the lack of reporting from standard labs was identified as a challenge in the existing surveillance system.

*“Dengue reporting does not require much. It is a different part of entering the entire DHIS-2. Since this is a focused program, there is not much of such a challenge.” (KII, Health Office, Sankhuwasabha)*

*“Well, there are different things in this virus. What are your symptoms/signs? But it is generally seen recurrently. Those who are tested are only reported to us. Reporting does not come from a private health institution, but it does come from a big hospital. But there is no reporting from normal lab.” (KII, Health Office, Itahari, Sunsari)*

The PHD participant identified issues in the daily reporting of dengue fever cases and managing cases by emphasizing an immediate need for system enhancement.

*“We are unable to report daily and also if it overlaps then it would be difficult to manage. System needs to be improved for it.”(KII, Vector-borne disease focal person, Provincial Health Director Office)*

# Conclusion

This study highlights dengue as the most pressing vector-borne disease in the region, driven by rising temperatures, changing weather patterns, and climate-induced expansion of mosquito vectors into higher altitudes. Seasonal mobility during monsoon and festive periods further amplifies transmission, with imported cases playing a significant role. Limited public understanding of climate change's influence on mosquito ecology underscores the need for stronger climate-health communication strategies.

Community knowledge of dengue symptoms and prevention remains uneven, and misconceptions about transmission persist. Although many households adopt preventive behaviors, gaps in awareness, inconsistent access to information, and limited training for frontline health workers weaken community-level preparedness. Strengthening health worker capacity and ensuring equitable access to risk communication platforms are essential.

Local governments, health institutions, and community groups have made notable contributions through awareness campaigns, door-to-door outreach, and collaborative initiatives. However, coordination varies across municipalities, and resource constraints limit the scale and consistency of interventions. The absence of clear preventive guidelines and standardized protocols at local, provincial, and federal levels further hampers effective action. Establishing Rapid Response Teams and formalizing integrated vector management approaches would enhance outbreak readiness.

While “Search and Destroy” campaigns are widely practiced, implementation inconsistencies and overreliance on fogging—despite concerns about effectiveness and health impacts—highlight the need for evidence-based, environmentally sustainable vector control strategies. Persistent misconceptions and traditional beliefs continue to influence careseeking behavior, reinforcing the importance of targeted health education.

Critical system-level barriers—including inadequate treatment facilities, budget limitations, staffing shortages, and weak infrastructure—impede timely diagnosis and care, particularly for vulnerable populations. Challenges in identifying breeding sites, population mobility, and low public compliance contribute to ongoing transmission. Weak surveillance systems, reporting gaps, and trust issues among health workers further limit early detection and response.

To reduce the growing burden of dengue, Nepal requires a coordinated, multisectoral approach that strengthens surveillance, expands diagnostic access, enhances community engagement, and integrates climate-informed strategies into vector control policies. Effective dengue prevention will depend on strong collaboration between government agencies, health providers, community leaders, and the public, supported by clear guidelines, adequate resources, and sustained political commitment.

# Recommendations

- **Establish dedicated vector control units in every municipality**, staffed with technical experts and equipped to take rapid action during outbreaks and other emergency situations.
- **Strengthen coordination across local, provincial, and federal governments**, ensuring seamless collaboration among health offices, ward officials, FCHVs, community leaders, NGOs, health posts, and municipal authorities for prevention, surveillance, and awareness campaigns.
- **Expand public awareness initiatives** through schools, community meetings, local media, and digital platforms. Promote community participation and introduce community-based reporting systems. Deploy health workers for house hold level education on dengue risks and preventive behaviors.
- **Enhance the capacity of healthcare workers** through regular training on updated vectorborne disease management and prevention. Provide comprehensive training for FCHVs to strengthen their role in community education and early detection.
- **Integrate dengue prevention and climate-health education into school curricula** to reach children, families, and broader communities.
- **Improve environmental management** by ensuring regular drainage cleaning, proper waste disposal, and reliable drinking water systems to reduce household water storage and eliminate mosquito breeding sites.
- **Implement targeted mosquito control measures**, including evidencebased insecticide spraying in highrisk urban and densely populated areas, while ensuring environmental safety and community acceptance.
- **Strengthen monitoring of water storage practices and breeding sites** through municipal and districtlevel inspection teams responsible for enforcing regulations and supporting community compliance.
- **Upgrade diagnostic capacity at peripheral health facilities**, especially health posts, by providing essential laboratory equipment and training staff in early dengue detection and case management.
- **Institutionalize a routine reporting and surveillance system**, such as weekly updates on dengue cases and control activities, to support timely interventions and track disease trends.
- **Allocate dedicated funding for vector-borne disease management** at all levels of government, ensuring adequate resources for prevention, capacity building, training, and emergency response.
- **Develop outbreak preparedness plans**, including prepositioning supplies, mobilizing rapid response teams, and allocating contingency budgets to enable swift and effective action during dengue surges.

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# Annex

## Exploring Eco-Bio-Social Determinants of Vector Prevention and Control Measures across Diverse Eco-Regions of Eastern Nepal

Demographic characteristics:

Name:

Age:

Gender:

Post:

Year of Service:

Organization:

District:

### Provincial Level

1. What is most common vector-borne/mosquito-borne diseases in your province?  
१. तपाईंको प्रदेशमा सबैभन्दा बढी भेक्टर-बर्न /लामखुट्टेबाट लामने रोगहरू के- के हुन् ?
2. What is the status of dengue in this province? How serious health issue has been considered by Dengue fever?  
२. यो प्रदेशमा डेंगुको अवस्था कस्तो छ ? डेंगु ज्वरोलाई कति गम्भीर स्वास्थ्य समस्या मानिएको छ ?
3. Could you please elaborate spatial and temporal pattern (distribution over place and time) of dengue fever in your area (province/district/municipality)? Furthermore, what are the drivers of changes?  
३. तपाईंको आफ्नो प्रदेशमा डेंगु ज्वरोको प्रकृति कस्तो रहेको छ ? बृस्तित रूपमा बताईदिन सक्नुहुन्छ ? (प्रोब: डेंगु लामखुट्टे कुन स्थान र समयमा सक्रिय हुन्छन)? परिवर्तनका सूचकहरू के के होलान ?
4. What are polices and plans including institutional framework for prevention and control of dengue in your province/district/municipality etc?  
४. तपाईंको प्रदेश/जिल्लामा डेंगुको रोकथाम र नियन्त्रणका लागि के-कस्ता संस्थागत ढाँचा लगायतका नीति र योजनाहरू छन् ?
5. Have you observed any changes in the incidence or impact of dengue fever over the years in this district? If yes, what could be the reasons?  
५. यस प्रदेशमा डेंगु ज्वरोको घटना वा प्रभावमा कुनै परिवर्तन आएको छ ? यदि परिवर्तनहरू भए, कारणहरू के हुन सक्छ ?
6. How are essential medicines diagnostics, and technologies for dengue made accessible to the affected population?  
६. डेंगुको लागि आवश्यक औषधि र प्रविधिहरू कसरी प्रभावित जनसंख्याको लागि पहुँचयोग्य बनाइन्छ ?
7. What are the eco-socio-bio measures adopted from the Provincial level to prevent dengue outbreak? (Use of insecticide, use of dragon fly, beetle larvae as Vector control activities, coordination, use of unnecessary containers and other breeding sites)

७. डेंगुको प्रकोप रोक्नको लागि प्रादेशिक स्तरबाट अपनाइएको पर्यावरण-सामाजिक-जैविक उपायहरू के छन् ? (कीटनाशकको प्रयोग, ड्र्यागन फ्लाईको प्रयोग, भ्याक्टर नियन्त्रण गतिविधिहरूको रूपमा बीटल लार्वाको प्रयोग, समन्वय, अनावश्यक कन्टेनर र अन्य प्रजनन साइटहरूको प्रयोग)
8. What are the challenges in terms of affordability, availability, or quality of these essential tools for dengue prevention and control?
८. डेंगु रोकथाम र नियन्त्रणका लागि अपनाईएका यी आवश्यक उपायहरूको किफायती, उपलब्धता वा गुणस्तरको सन्दर्भमा चुनौतीहरू के छन् ?
9. How are healthcare workers trained and equipped to effectively manage and respond to dengue cases?
९. डेंगुका बिरामीहरूलाई प्रभावकारी रूपमा व्यवस्थापन र प्रतिक्रिया दिन स्वास्थ्यकर्मीहरूलाई कसरी तालिम र सुसज्जित गरिन्छ ?
10. How is coordination and collaboration between different sectors and stakeholders ensured in addressing the dengue burden? Are there any governance mechanisms specifically focused on dengue?
१०. डेंगुको रोगलाई सम्बोधन गर्न विभिन्न क्षेत्र र सरोकारवालाहरू बीचको समन्वय र सहकार्य कसरी सुनिश्चित गरिएको छ ? के त्यहाँ डेंगुमा विशेष ध्यान केन्द्रित कुनै शासन संयन्त्र छ ? डेंगुमा विशेष केन्द्रित कस्तो सुशासन प्रक्रिया छ ?
11. How is dengue prevention and control program being financed? Are there dedicated funds or what is the specific financing mechanisms?
११. डेंगु रोकथाम तथा नियन्त्रण कार्यक्रमलाई कसरी आर्थिक सहयोग भइरहेको छ ? कुनै विशेष कोषहरू छन् वा कुनै विशेष वित्तिय प्रक्रिया छन् । विस्तृत रूपमा बताई दिनुस् ।
12. What are the major challenges in terms of financial resources for dengue prevention and control? How are these challenges being addressed?
१२. डेंगु रोकथाम र नियन्त्रणका लागि आर्थिक स्रोतको सन्दर्भमा प्रमुख चुनौतीहरू के के छन् ? यी चुनौतीहरूलाई कसरी सम्बोधन गरिँदै छ ?
13. How is health promotion activities conducted to promote prevention and control of dengue in your province/district/municipality?
१३. तपाईंको प्रदेश/जिल्लामा डेंगुको रोकथाम र नियन्त्रण गर्न स्वास्थ्य प्रवर्द्धन गतिविधिहरू के-कसरी सञ्चालन गरिन्छ ?
14. What is the reporting mechanism? What are the challenges in terms of surveillance, monitoring, and reporting of dengue cases? Are there any efforts to improve the health information systems specifically for dengue from the provincial level?
१४. रिपोर्टिङको प्रकृया कस्तो छ? डेंगु रोगको सर्भेलेन्स, अनुगमन र रिपोर्टिङको सन्दर्भमा चुनौतीहरू के-कस्ता छन् ? प्रदेश तहबाट विशेष गरी डेंगुका लागि स्वास्थ्य सूचना प्रणालीमा के कस्ता सुधारको प्रयासहरू भइरहेको छ ?
15. Based on your experience and expertise, what additional measures or approaches would you recommend to improve dengue prevention and control efforts?
१५. तपाईंको अनुभव र विशेषज्ञताको आधारमा, तपाईंको विचारमा डेंगु रोकथाम र नियन्त्रणका प्रयासहरूमा कस्ता सुधार गर्न आवश्यक छ जस्तो लाग्छ ?

## District Level

1. What is most common vector-borne/mosquito-borne diseases in your province?
१. तपाईंको प्रदेशमा सबैभन्दा बढी भेक्टर-बर्न/लामखुट्टेबाट लाग्ने रोगहरू के- के हुन् ?

2. What is the status of dengue in this district? How serious health issue do you consider dengue fever to be in this district?
२. यो जिल्लामा डेंगुको अवस्था कस्तो छ ? यो जिल्लामा डेंगु ज्वरो कति गम्भीर स्वास्थ्य समस्या भएको मान्नुहुन्छ ?
3. Could you please elaborate spatial and temporal pattern (distribution over place and time) of dengue fever in your area (province/district/municipality)? Furthermore, what are the drivers of changes?
३. तपाईंको आफ्नो प्रदेशमा डेंगु ज्वरोको प्रकृति कस्तो रहेको छ? वृत्तित रूपमा बताईदिन सक्नुहुन्छ ? (प्रोब: डेंगु लामखुट्टे कुन स्थान र समयमा सक्रिय हुन्छन्) ? परिवर्तनका सूचकहरू के के होलान ?
4. What are policies and plans including institutional framework for prevention and control of dengue in your province/district/municipality etc?
४. तपाईंको प्रदेश/जिल्लामा डेंगुको रोकथाम र नियन्त्रणका लागि के- कस्ता संस्थागत ढाँचा लगायतका नीति र योजनाहरू छन् ?
5. What are the eco-socio-bio measures adopted from the district level to prevent dengue outbreak? (Use of insecticide, use of dragon fly, beetle larvae as Vector control activities, coordination, use of unnecessary containers and other breeding sites)
५. डेंगुको प्रकोप रोक्नको लागि प्रादेशिक स्तरबाट अपनाइएको पर्यावरण-सामाजिक-जैविक उपायहरू के छन् ? (कीटनाशकको प्रयोग, ड्र्यागन फ्लाईको प्रयोग, भ्याक्टर नियन्त्रण गतिविधिहरूको रूपमा बीटल लार्वाको प्रयोग, समन्वय, अनावश्यक कन्टेनर र अन्य प्रजनन साइटहरूको प्रयोग)
6. What are the challenges in terms of affordability, availability, or quality of these essential tools for dengue prevention and control?
६. डेंगु रोकथाम र नियन्त्रणका लागि अपनाईएका यी आवश्यक उपायहरूको किफायती, उपलब्धता वा गुणस्तरको सन्दर्भमा चुनौतीहरू के छन् ?
7. What are the process of informing public about the control and preventive measures against dengue? Are district level involved in this process?
७. डेंगु नियन्त्रण र रोकथामका उपायहरूबारे जनतालाई जानकारी दिने प्रक्रिया कस्तो छ? के जिल्ला तह यस प्रक्रियामा संलग्न छ ?
8. What are the mulsector approach for the dengue control management? (Involvement of different organization, Financial and other support)? How is coordination and collaboration done?
८. डेंगु नियन्त्रण व्यवस्थापनको लागि मलसेक्टर पहुच कस्तो छ ? (विभिन्न संस्थाको संलग्नता, आर्थिक र अन्य सहयोग) ? र सो को लागि समन्वय र सहकार्य कसरी हुने गरेको छ ?
9. How are healthcare workers trained and equipped to effectively manage and respond to dengue cases?
९. डेंगुका बिरामीहरूलाई प्रभावकारी रूपमा व्यवस्थापन र प्रतिक्रिया दिन स्वास्थ्यकर्मीहरूलाई कसरी तालिम र सुसज्जित गरिन्छ ?
10. What is the reporting mechanism? What are the challenges in terms of surveillance, monitoring, and reporting of dengue cases? Are there any efforts to improve the health information systems specifically for dengue from the district level?
१०. रिपोर्टिङको प्रकृया कस्तो छ? डेंगु रोगको सर्भेलेन्स, अनुगमन र रिपोर्टिङको सन्दर्भमा चुनौतीहरू के-कस्ता छन् ? प्रदेश तहबाट विशेष गरी डेंगुका लागि स्वास्थ्य सूचना प्रणालीमा के कस्ता सुधारको प्रयासहरू भइरहेको छ ?

11. How is dengue prevention and control program being financed? What are the major challenges in terms of financial resources for dengue prevention and control? How are these challenges being addressed at the district level?
११. डेंगु रोकथाम तथा नियन्त्रण कार्यक्रमलाई कसरी आर्थिक सहयोग भइरहेको छ? डेंगु रोकथाम र नियन्त्रणका लागि आर्थिक स्रोतको सन्दर्भमा प्रमुख चुनौतीहरू के के छन् ? जिल्ला तहमा यी चुनौतीहरूलाई कसरी सम्बोधन भइरहेको छ ?
12. Based on your experience and expertise, what additional measures or approaches would you recommend to improve dengue prevention and control efforts?
१२. तपाईंको अनुभव र विशेषज्ञताको आधारमा, तपाईंको विचारमा डेंगु रोकथाम र नियन्त्रणका प्रयासहरूमा कस्ता सुधार गर्न आवश्यक छ जस्तो लाग्छ ?

## PHC/ Health Post/Municipality

1. What is most common vector-borne/mosquito-borne diseases in your province?
१. तपाईंको प्रदेशमा सबैभन्दा बढी भेक्टर-बर्न/लामखुट्टेबाट लाने रोगहरू के-के हुन् ?
2. Let's discuss in particular about dengue fever. How is the situation of dengue fever in your area?
२. डेंगु ज्वरोको बारेमा विशेष कुरा गरौं । तपाईंको क्षेत्रमा डेंगु ज्वरोको अवस्था कस्तो छ ?
3. Have you observed any changes in the incidence or impact of dengue fever over the years in this ward? If yes, what could be the reasons?
३. तपाईंले यस वडामा डेंगु ज्वरोको प्रभावले कुनै परिवर्तन देख्नुभएको छ ? यदि भए, कारणहरू के हुन सक्छ ?
4. What are some common misconceptions or myths about dengue fever that you have come across? How has it been overcome?
४. यस क्षेत्रमा डेंगु ज्वरोको बारेमा केहि सामान्य भ्रम वा अन्धविश्वासहरू छन् ? यसलाई कसरी परास्त गरिएको छ ?
5. Are the required medicines for dengue treatment readily available in local health facilities?
५. डेंगु उपचारका लागि आवश्यक औषधि स्थानीय स्वास्थ्य संस्थामा सजिलै उपलब्ध छ ? यस्का लागि कस्ता समस्या वा चुनौतीहरू छन् ?
6. How is information about dengue fever disseminated in your community?
६. तपाईंको समुदायमा डेंगु ज्वरो बारे जानकारी कसरी दईन्छ ?
7. How are healthcare workers trained and equipped to effectively manage and respond to dengue cases?
७. डेंगुका बिरामीहरूलाई प्रभावकारी रूपमा व्यवस्थापन र प्रतिक्रिया दिन स्वास्थ्यकर्मीहरूलाई कसरी तालिम र सुसज्जित गरिएको छ ?
8. What are the measures adopted from PHC/HP for the prevention and control against mosquitoes?
८. लामखुट्टे विरुद्धको रोकथाम र नियन्त्रणको लागि एज्र/ज् बाट अपनाएको उपायहरू के हुन् ?
9. Are there any specific challenges or barriers to implementing effective prevention and control measures for dengue fever?
९. डेंगु ज्वरोको प्रभावकारी रोकथाम र नियन्त्रण उपायहरू लागू गर्न कुनै विशेष चुनौती वा अवरोधहरू छन् ?
10. What are the challenges faced in delivering dengue-related health services, and how are they being addressed?
१०. डेंगु सम्बन्धी स्वास्थ्य सेवाहरू प्रदान गर्दा के-कस्ता चुनौतिहरू आउछन् र तिनीहरूलाई कसरी सम्बोधन गरिएको छ ?

11. What strategies or initiatives do you believe would be most effective in reducing the burden of dengue fever in your community?

११. तपाईंको विचारमा तपाईंको समुदायमा डेंगु ज्वरोको प्रभाव कम गर्न कुन रणनीति वा पहलहरू सबैभन्दा प्रभावकारी हुने जस्तो लाग्छ ?

12. What is the reporting mechanism? What are the challenges in terms of surveillance, monitoring, and reporting of dengue cases?

१२. रिपोर्टिङको प्रकृया कस्तो छ ? डेंगु रोगको सर्भेलेन्स, अनुगमन र रिपोर्टिङको सन्दर्भमा चुनौतीहरू के-कस्ता छन् ?

13. What recommendation do you have for improving dengue fever prevention and control efforts in the future?

१३. भविष्यमा डेंगु ज्वरो रोकथाम र नियन्त्रण कार्यक्रम सुधार गर्नका निम्ति तपाईंले के- कस्ता सुझाव दिन चाहनुहुन्छ ?

## Focus Group Discussion Guidelines

लिखित मन्जुरीनामा लिईसकेपछि यस अनुसन्धानमा भाग लिने सहभागीहरू सम्बन्धित तल उल्लिखित सामाजिक जनसांख्यिक विवरण भरिने छ ।

तालिका: लक्षित समूह छलफल मा संलग्न सहभागीहरूको सामाजिक जनसांख्यिक विवरण:

क्र.सं	सहभागीको नाम	ठेगाना	उमेर	लिङ्ग	वैवाहिक स्थिति	परिवार संख्या	शैक्षिक योग्यता	पेशा	परिवारको वार्षिक आमदानी
१									
२									
३									
४									
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६									
७									
८									
९									
१०									

मिति:

स्थान:

समय :

### परिचय र अभिवादन:

सहभागीहरूलाई अभिवादन गर्दै, छलफल गरिएका विषयमा प्रकाश पार्ने, सबैलाई अनुकूल हुने नियम बनाउने ।

### मुख्य सत्र:

छलफललाई मुर्त रूप दिन देहाय बमोजिमका प्रश्नहरू सोधिने छन् ।

१. अध्ययन गर्ने क्षेत्रको वातावरण र सामाजिक आर्थिक अवस्था बारे छलफल गर्ने ।

२. विगत ५ वर्ष देखि १० वर्ष भित्रको वातावरण र पर्यावरणीय परिवर्तनका कारण देखापरेका असरहरू बारे सहभागीहरूको धारणा लिने ।

३. पारिवारीक स्वास्थ्य, घरधन्दा, र व्यवस्थापन जस्ता कुराहरूमा जानकारीको स्रोत र पहुँच ।
४. स्वास्थ्यसेवा प्रणाली ।
५. डेङ्गु, र तिनीहरू सार्ने (भेक्टर) लामखुट्टे बारेमा जानकारी ।
६. रोगको संक्रमण, लक्षण र उपचारका बारेमा जानकारी लिने ।
७. डेङ्गु नियन्त्रणका लागि आफुले गरेको प्रयास बारेमा जानकारी लिने ।
८. डेङ्गुद्वारा हुन सक्ने खतरा र स्वास्थ्य खोज व्यवहार (निवारणका उपायहरू) ।
९. पानीको उपलब्धता, स्रोत र वितरण प्रणाली
१०. पानी जम्मा हुने, पानीको स्थानीय र अस्थायी वितरण तथा लामखुट्टेको बिगबिगीबीचको सम्बन्ध ।
११. डेङ्गु व्यवस्थापनका लागि समुदायमा भएका कार्यक्रम
१२. डेङ्गु व्यवस्थापनमा गरिनु पर्ने थप कार्यबारे सल्लाह, सुझाव लिने
१३. लामखुट्टे र लामखुट्टेद्वारा सार्नेरोगहरूको नियन्त्रण तथा रोकथाम बारे अनुसन्धानकर्ताहरूको सिफारिस ।
१४. छलफलमा उठेका विषयहरूलाई 'टुङ्ग्याउँदै' छुटेका विषयवस्तुमा कुनै सुझाव भए सहभागीहरूसँग अनुरोध गर्दै धन्यवाद ज्ञापन गर्ने ।

## समाप्त

## IDI Guidelines:

1. Have you heard about Dengue Fever? If answer is no after probing no need to take interview.
१. के तपाईंले डेंगु ज्वरोको बारेमा सुन्नुभएको छ ? छैन भने अन्तर्वार्ता लिनु पर्दैन ।
2. Can you briefly explain what dengue fever is? (Probe: common signs and symptoms, Cause, Transmission pathway (Mode of transmission), Vector, Breeding sites, preventive practice)
२. डेंगु ज्वरो के हो भनी छोटकरीमा बताउन सक्नुहुन्छ? (प्रोब: सामान्य लक्षणहरू, कारण, ट्रान्समिसनको माध्यम, भेक्टर, प्रजनन साइटहरू, रोकथाम अभ्यास)
3. Have you encountered any dengue fever cases in our community? If yes, how did you respond to those cases?
३. तपाईंको समुदायमा कुनै डेंगु ज्वरोको केसहरू कति को छ ? ती केसहरूको व्यवस्थापन यस समुदायमा कसरी भएको छ?
4. What are the sources of information about dengue fever available to the public in your community?
४. तपाईंको समुदायमा डेंगु ज्वरोको बारेमा जानकारीको स्रोतहरू के के हुन् ?
5. Are there any specific programs or activities focused on dengue prevention and control in your community? If so, what activities has been carried out?
५. तपाईंको समुदायमा डेंगु रोकथाम र नियन्त्रणमा केन्द्रित कुनै विशेष कार्यक्रमहरू वा गतिविधिहरू भएका छन् ? यदि त्यसो हो भने, के कस्ता गतिविधिहरू भएका छन् ?
6. How do government health departments or public health organizations play a role in disseminating information and conducting control program about dengue fever? If yes, how effective are their efforts?
६. सरकारी स्वास्थ्य विभाग वा जनस्वास्थ्य कार्यालयहरूबाट डेंगु ज्वरोको बारेमा जानकारी फैलाउन वा रोकथामका कार्यक्रम गर्न यस क्षेत्रमा कस्ता कार्यहरू गर्नु भएको छ ? र ती प्रयासहरू कतिको प्रभावकारी भएको छ ?
7. How do you see role of media such as radio and television as well as social media such as Facebook in prevention and control of dengue fever in Nepal?
७. नेपालमा डेंगु ज्वरोको रोकथाम र नियन्त्रणमा रेडियो, टेलिभिजन र फेसबुकजस्ता सामाजिक सञ्जालको भूमिकालाई कस्तो छ ?
8. What is the role of community-based organizations, NGOs, or local initiatives that provide information on dengue fever?
८. डेंगु ज्वरोको रोकथाम वा नियन्त्रण कार्यक्रमका लागि समुदायमा आधारित संस्थाहरू, गैरसरकारी संस्थाहरू वा स्थानीय पहलहरूको भूमिका के-कस्तो रहेको छ ?
9. Do you believe that individuals in your community or the general public take dengue fever as a serious health issues. Why or why not?
९. तपाईंको समुदायका व्यक्ति वा आम जनताले डेंगु ज्वरोलाई गम्भीर स्वास्थ्य समस्याको रूपमा लिन्छन् ? गम्भीर स्वास्थ्य समस्याको रूपमा लिनु या नलिनु को कारण के हुन सक्छ ?
10. Are there any existing initiatives or programs in your community aimed at preventing dengue fever? If yes, please describe them.

१०. तपाईंको समुदायमा डेंगु ज्वरोबाट बच्नका लागि कुनै पहल वा कार्यक्रमहरू भएका छन् ? यदि हो भने, बृस्तिरूपमा बताई दिनसक्नु हुन्छ ।
11. What are the eco-socio-bio measures adopted from your area to prevent dengue outbreak? (Probe: Use of insecticide, any vector control activities, destroying the vector sites)
११. डेंगुको प्रकोप रोक्नको लागि तपाईंको क्षेत्रबाट अपनाईएका पर्यावरण-सामाजिक-जैविक उपायहरू के छन् ? (प्रोब: कीटनाशकको प्रयोग, कुनै पनि भेक्टर नियन्त्रण गतिविधिहरू, भेक्टर साइटहरू नष्ट)
12. What are the challenges in providing dengue management activities in your community?
१२. तपाईंको समुदायमा डेंगु व्यवस्थापन गतिविधिहरू गराउनमा कस्ता किसिमका चुनौतीहरू छन् ?
13. How is dengue prevention and control program being financed? (Probe: Any dedicated Funds, financing mechanism)
१३. डेंगु रोकथाम तथा नियन्त्रण कार्यक्रमलाई कसरी आर्थिक सहयोग भइरहेको छ ? (प्रोब: कुनै पनि कोष, वित्तिय प्रक्रिया)
14. What recommendation do you have for improving dengue fever prevention and control efforts in the future?
१४. भविष्यमा डेंगु ज्वरो रोकथाम र नियन्त्रण कार्यक्रम सुधार गर्नका निम्ति तपाईंले के- कस्ता सुझाव दिन चाहनुहुन्छ ?

# Informed Consent Form

## नेपाल स्वास्थ्य अनुसन्धान परिषद्

रामशाहपथ, काठमाडौं

### सहभागी जानकारी शीट

अध्ययनशीर्षक: नेपालका विविध जलवायुयुक्त ठाउँहरूमा भेक्टरहरूको म्यापिङ र उक्त भेक्टरहरूलाई प्रभाव पार्ने वातावरणीय, जैविक तथा सामाजिक कारक तत्वहरू सम्बन्धी अध्ययन

### पृष्ठभूमिको जानकारी

#### परिचय

नमस्कार। मेरो नाम.....हो। म नेपाल स्वास्थ्य अनुसन्धान परिषद्को प्रतिनिधित्व गर्दछु। नेपाल स्वास्थ्य अनुसन्धान परिषदले बज्रउपलन या खभअतयचक बलम भअय(दष्य(कयअष्वर्षा मभतभकष्लबलतक गलमभच खबचथप्लन अष्वितष्व अयलमप्लतलक प्ल ल्भउबू शीर्षकमाअध्ययन अनुसन्धान गर्न गइरहेको छ। यस अनुसन्धानमाविभिन्न सहभागीहरू ९स्वास्थ्यकर्मी र सरकारी प्रतिनिधि० समावेश गर्न गइरहेका छौं। यो अध्ययनलाई नेपाल अनुसन्धान परिषद्को भ्तजष्वअर्षा च्भखष्वध घयबचमबाट स्विकृतगरिएको छ। यस अध्ययनमाभागलिनु अगाडि यो जानकारी पढ्न र बुझ्न महत्वपूर्ण हुनेछ।

#### अध्ययनको उद्देश्य

यस अध्ययनको मुख्य उद्देश्य भनेको नेपालका विविध जलवायुयुक्त ठाउँहरूमा भेक्टरहरूको म्यापिङ र उक्त भेक्टरहरूलाई प्रभाव पार्ने वातावरणीय,जैविक तथा सामाजिक कारक तत्वहरू सम्बन्धी अध्ययन गर्नु हो।

#### फाइदा र जोखिमहरू

यस अध्ययनमा सहभागिले केवल प्रश्नहरूको जवाफदिनुपर्ने भएको हुनाले सहभागिलाई कुनै प्रत्यक्षलाभवा जोखिमहुनेछैन। यहाँलाई प्रत्यक्षफाइदानपाएतापनि यस अध्ययनबाट प्राप्तविवरणबाटभविष्यमाडैंगुप्रकोपको लागिव्यवस्थापन, नियन्त्रण र रोकथामविधिहरूमा सहायताहुनेछ।

#### स्वेच्छिक सहभागिता

यस अध्ययनको प्रश्नावलीभर्नको लागि लगभग २०-३० मिनेट लाग्नसक्छ र यहाँको सहभागिता पूर्णतया स्वेच्छिक हुनेछ। यदि अन्तरवार्ताको क्रममा तपाईंले कुनै पनि बेला कुनै पनि प्रश्नको उत्तर दिन नचाहेमाबीचमै अन्तरवार्ता समाप्त गर्न स्वतन्त्र हुनुहुन्छ।

#### गोपनीयता

तपाईंले दिनुभएको जानकारीहरू अध्ययनको लागि मात्र प्रयोग गरिनेछ र गोप्य रहनेछ। कुनै पहिचान योग्य जानकारी संकलनगरिने छैन। तपाईंलाई यो विश्वास दिलाउन चाहन्छु कि अध्ययनको क्रममातपाईंको नामकतै पनिउल्लेख गरिने छैन।

#### थप जिज्ञाशाको लागि सम्पर्क ठेगाना

मलाई बिश्वास छ, यस सुचनाफारममातपाईंलाई बताइएका सम्पूर्ण जानकारीहरू तपाईंले राम्ररी बुझ्नु भएको छ। यस अध्ययन सम्बन्धितथप केहि कुरा सोध्न चाहनुहुन्छ भने कृपयानहिचिकाइकन सोध्न सक्नु हुनेछ। कुनै जिज्ञासा वाथपजानकारीको लागीतपाईंले तलदिइएको सम्पर्क फोन नम्बरमा सम्पर्क गर्न सक्नुहुनेछ।

### सुसूचित मञ्जुरीनामा पत्र

- माथि उल्लिखित अध्ययनसम्बन्धी जानकारी पत्र मैले पढेको/बुझेको छु । म यस अध्ययनका बारेमा कुनै पनि कुराको जिज्ञासा भएमा जुनसुकै बेलामा पनि सर्वेक्षण टोलीलाई राख्न सक्नेछु ।
- यस अध्ययनमा मेरो स्वेच्छिक सहभागिता हुनेछ । मलाई मेरो स्वेच्छाले कुनै पनि बेला यो अनुसन्धानबाट अलग हुन सक्ने कुरा जानकारी छ । यसबाट मलाई कुनै क्षति हुने छैन, कुनै हर्जाना तिर्नु पर्ने छैन, तथा अन्य कुनै पनि असर पर्नछैन ।
- मैले यस अध्ययनको लागि अन्तर्वार्ता लिन स्वीकृति दिएको छु ।

वडा नम्बर \_\_\_\_\_

सहभागीको नाम \_\_\_\_\_

सहभागीको हस्ताक्षर \_\_\_\_\_

कार्यालय \_\_\_\_\_

मिति:

\_\_\_\_\_

दिन / महिना / वर्ष

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