University of Dongola

Faculty of medicine & health science

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Research Proposal

Title

Public Health Preparedness for Dengue Fever: Evaluating Healthcare Providers' KAP, Readiness, and Perceived Risk Factors in Northern State, Sudan 2026

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1. INTRODUCTION

1.1 Background

Dengue fever is a mosquito-borne viral illness, and the most common arthropod-borne viral disease worldwide. Dengue fever is caused by infection with dengue virus (DENV), a single-stranded, positive-sense RNA virus belonging to the genus Flavivirus within the family Flaviviridae. Transmitted primarily by Aedes aegypti and Aedes albopictus mosquitoes, dengue affects millions annually, with a clinical spectrum ranging from asymptomatic infection to severe, life-threatening disease. Classically referred to as "breakbone fever," this course details the clinical features of dengue fever, characterized by high fever, myalgias, arthralgias, headache, and rash, with severe forms involving plasma leakage, hemorrhage, and organ dysfunction [4]

Symptoms

Most people with dengue have mild or no symptoms and will get better in 1–2 weeks. Rarely, dengue can be severe and lead to death. If symptoms occur, they usually begin 4–10 days after infection and last for 2–7 days. Symptoms may include high fever (40°C/104°F), severe headache, pain behind the eyes, muscle and joint pains, nausea, vomiting, swollen glands, rash.

Individuals who are infected for the second time are at greater risk of severe dengue. The symptoms of severe dengue often come after the fever has gone away and may include: severe abdominal pain, persistent vomiting, rapid breathing, bleeding gums or nose, fatigue, restlessness, blood in vomit or stool, being very thirsty, pale and cold skin, feeling weak.

People with these severe symptoms should seek care immediately.

After recovery, people who have had dengue may experience fatigue for several weeks.

Diagnostics and treatment

Laboratory-based and point of care diagnostics are critical to control and manage dengue, yet global disparities in laboratory capabilities present significant challenges. The diagnostic algorithms, testing strategies and test methodologies employed vary, depending on the capabilities of national laboratory systems. The wide range of available tests – including nucleic

acid amplification tests (NAATs), enzyme-linked immunosorbent assays (ELISAs) and rapid diagnostic tests (RDTs) – vary significantly in quality and performance.

Laboratory testing for arboviruses can be accomplished through either direct detection methods such as virus isolation, molecular detection of nucleic acid or antigen testing, including rapid diagnostic tests (RDTs) within the first week of illness.

There is no specific treatment for dengue, although pain can be managed with medication such as paracetamol (acetaminophen). Non-steroidal anti-inflammatory medicines such as ibuprofen and aspirin should be avoided as they can increase the risk of bleeding.

For people with severe dengue, hospitalization is often necessary.

Global burden

The incidence of dengue has grown dramatically worldwide in recent decades, with the number of cases reported to WHO increasing from 505 430 cases in 2000 to 14.6 million in 2024. The vast majority of cases are asymptomatic or mild and self-managed, and hence the actual numbers of dengue cases are under-reported. The disease is now endemic in more than 100 countries.

In 2024, more cases of dengue were recorded than ever before in a 12-month period, affecting over 100 countries on all continents. During 2024, ongoing transmission, combined with an unexpected spike in dengue cases, resulted in a historic high of over 14.6 million cases and more than 12 000 dengue-related deaths reported. The Region of the Americas contributed a significant proportion of the global burden, with over 13 million cases reported to WHO.

Several factors are associated with the increasing risk of spread of the dengue epidemic, including the changing distribution of the responsible vectors (chiefly Aedes aegypti and Aedes albopictus), especially in previously dengue-naive countries; climate change leading to increasing temperatures, high rainfall and humidity; fragile and overburdened health systems; limitations in surveillance and reporting; and political and financial instabilities in countries facing complex humanitarian crises and high population movements.

One modelling estimate indicates 390 million dengue virus infections per year, of which 96 million manifest clinically [4]. A recent study on the prevalence of dengue estimates that 5.6 billion people are at risk of infection with dengue and other arboviruses

From January to July 2025, over 4 million cases and over 3000 deaths have been reported to WHO from 97 countries.

Dengue is spreading to new areas, including the European and Eastern Mediterranean regions. In 2024, 308 cases were reported to WHO from three European countries (France, Italy and Spain) and an additional 1291 cases and four deaths were recorded in the French overseas territories of Mayotte and Réunion.

Transmission

Transmission through the mosquito bite

The dengue virus is transmitted to humans through the bites of infected female mosquitoes, primarily the Aedes aegypti mosquito. Other species within the Aedes genus can also act as vectors, but their contribution is normally secondary to Aedes aegypti.

After feeding on a DENV-infected person, the virus replicates in the mosquito midgut before disseminating to secondary tissues, including the salivary glands. The time it takes from ingesting the virus to actual transmission to a new host is termed the extrinsic incubation period (EIP). The EIP takes about 8–12 days when the ambient temperature is 25–28°C. Variations in the EIP are not only influenced by ambient temperature but also by several other factors – such as the magnitude of daily temperature fluctuations, the virus genotype, and the initial viral concentration – which can also alter the time it takes for a mosquito to transmit the virus. Once infectious, a mosquito can transmit the virus for the rest of its life.

Human-to-mosquito transmission

Mosquitoes can become infected by people who are viremic with DENV. This can be someone who has a symptomatic dengue infection, someone who is yet to have a symptomatic infection (those who are pre-symptomatic), and also someone who shows no signs of illness (those who are asymptomatic).

Human-to-mosquito transmission can occur up to 2 days before someone shows symptoms of the illness, and up to 2 days after the fever has resolved.

The risk of mosquito infection is positively associated with high viremia and high fever in the patient; conversely, high levels of DENV-specific antibodies are associated with a decreased risk of mosquito infection. Most people are viremic for about 4–5 days, but viremia can last as long as 12 days. [5]

1.2 Problem Statement

There is a growing gap in controlling the transmission of dengue fever, driven by a continuous increase in the global disease burden a trend that has reflected locally through a distinct outbreak recording 369 confirmed cases in the Northern State, Sudan.

This escalation is fueled by the insufficiency of proactive forecasting and biological control mechanisms to counter major drivers, such as climate change, high population density, and unplanned urbanization. Furthermore, temporary containment disruptions (e.g., during the COVID-19 pandemic) have failed to achieve a sustainable reduction in disease transmission.

Left unaddressed, this situation threatens to deplete local medical resources in the region and significantly elevates the risk of the disease transitioning into a resilient, endemic threat within densely populated urban environments.

1.3 Justification

Despite the escalating threat of dengue fever in Sudan, particularly with the recently recorded outbreaks in the Northern State, there remains a critical shortage of empirical data regarding the local healthcare system's capacity to respond. This study is justified based on the following pivotal dimensions:

Addressing the Knowledge and Practice Gap:

Effective management and containment of dengue fever rely heavily on the clinical acumen and proactive practices of frontline healthcare workers. Currently, there is a substantial gap in understanding the actual levels of knowledge, attitudes, and practices (KAP) among healthcare providers in the region, as well as their clinical readiness to manage cases and assess epidemiological exposure factors. Identifying these gaps is crucial for preventing misdiagnosis and delayed reporting.

First-of-its-Kind Baseline Data (Geographical Novelty):

To the best of our knowledge, this is the first comprehensive study to evaluate both healthcare provider readiness and health facility infrastructure regarding dengue fever specifically within the Northern State, Sudan. By mapping the strengths and vulnerabilities of local hospitals and primary health centers, this study establishes a vital baseline that has been entirely missing from the local literature.

Evidence-Based Support for Health Authorities:

The findings of this study will provide actionable, data-driven insights for the Ministry of Health in the Northern State. By highlighting specific deficiencies in provider knowledge or facility readiness (such as diagnostics, training, or vector control resources), this research will serve as a practical guide for policymakers to optimize resource allocation, design targeted training programs, and strengthen the overall health system resilience against future outbreaks.

2. STUDY OBJECTIVE

2.1 General Objective

To assess the knowledge, attitudes, practices, and readiness of healthcare providers regarding dengue fever, and to evaluate their perceptions of epidemiological and exposure factors, as well as the readiness of health facilities and the health system to prevent and control dengue fever in Northern State, Sudan.

2.2 Specific Objectives

1. To assess the level of knowledge of health-care providers about dengue fever, its transmission, symptoms, and prevention.
2. To evaluate the attitudes of health-care providers toward dengue fever and its public health importance.
3. To examine the preventive and clinical practices of health-care providers related to dengue fever.
4. To determine the individual readiness of health-care providers to identify, manage, and respond to dengue cases.

5. To assess the readiness of health facilities, hospitals, and the Ministry of Health to prevent, detect, and manage dengue fever.
6. To explore health-care providers' perceptions of epidemiological patterns, risk factors, and exposure variables associated with dengue fever in Northern State.
7. To identify perceived barriers and proposed solutions for improving dengue prevention and control in health-care settings.

3. STUDY HYPOTHESES

3.1 Primary Hypothesis

H1: Health-care providers with higher knowledge scores will demonstrate more positive attitudes, better preventive practices, and higher readiness to manage dengue fever.

3.2 Secondary Hypotheses

H2: Health-care providers who report adequate facility and system readiness will have higher individual readiness scores.

H3: Perceived high epidemiological risk (seasonality, breeding sites, exposure patterns) will be associated with higher readiness and more proactive dengue-related practices.

H4: There is a significant association between years of experience and knowledge, attitude, and practice scores regarding dengue fever.

H5: Facilities with reported shortages in diagnostics, supplies, or vector control activities will be associated with lower provider readiness scores.

3.3 A null hypothesis for statistical testing

- **H0:** There is no association between knowledge, attitude, practice, and readiness of health-care providers regarding dengue fever.
- **H0:** Facility/system readiness does not influence provider readiness or practices.

4. LITERATURE REVIEW

1. In 2025, Ekhlas Monir Ali Elamin and colleagues carried out an online cross-sectional study titled “Examine public awareness and preventive actions for dengue fever in Sudan amidst the ongoing crises.” The study included 164 participants and explored how much the public knew about dengue and how they were protecting themselves. Only 36.9% of respondents demonstrated good overall knowledge of the disease. While most participants correctly identified common symptoms such as fever and headache, fewer (40%) knew that Aedes aegypti is the mosquito responsible for transmission. Preventive behaviors were mixed: about 61.7% reported using mosquito nets, yet only 26.7% met the criteria for good overall preventive practice. Notably, displaced individuals were significantly more likely to report infection compared to non-displaced participants (35.6% vs. 9.5%, $p = 0.001$). Financial hardship (39.3%), limited access to services (24.3%), and disruptions caused by conflict (20.6%) were the most commonly reported barriers. A key limitation of the study is that it relied solely on online participation, which likely excluded individuals in rural or conflict-affected areas without internet access.[1]
2. In 2024, Tasneem Ebrahim and her team examined physicians’ preparedness in a study titled “Doctors' knowledge, attitudes, and practices in managing dengue fever amid war,” conducted among 150 doctors working in Port Sudan hospitals. The findings showed that most physicians had a positive attitude toward dengue management (94%), and 77% demonstrated good clinical practices. However, only 55% had adequate knowledge overall. While common symptoms were widely recognized, less typical presentations were often overlooked. Just over one-third (37%) of participants had attended dengue-related workshops, and attendance was significantly associated with better clinical practice ($p = 0.05$). The majority of respondents were relatively early in their careers (72.7% had 1–5 years of experience), and 60% worked outside core medical specialties. Although the study offers useful insight, it was limited to hospitals in Port Sudan and did not evaluate the readiness of healthcare facilities or the broader health system.[2]
3. Earlier, in 2020, Abdulla M. Bagahizel and Hamadnalla Sir Elkhatim conducted a qualitative assessment in Kassala State titled “Assessment of the readiness and response toward the dengue fever outbreak (2019).” During that outbreak, Kassala accounted for 3,961 cases representing 93.5% of all reported cases in Sudan yet only 51 samples (1.3%)

were laboratory tested. Using the WHO readiness checklist, the surveillance and laboratory components received the lowest scores. The study highlighted several systemic challenges, including reliance on passive surveillance, absence of electronic reporting systems, political delays in officially declaring the outbreak, weak coordination between sectors, and limited diagnostic capacity. Additionally, only 43.6% of health facilities submitted reports on time. While the study provided important insights into system-level gaps during the 2019 outbreak, it focused solely on Kassala and did not explore healthcare providers' knowledge, attitudes, or risk perceptions. As a result, questions remain about frontline preparedness in other regions, such as Northern State.[3]

5. RESEARCH QUESTIONS

This study seeks to answer the following research questions:

1. What is the baseline level of knowledge among healthcare providers in Northern State regarding dengue fever transmission, clinical features, diagnosis, management, and prevention?
2. What are the attitudes of healthcare providers toward dengue fever as a public health threat, and how confident do they feel in their ability to identify and manage dengue cases?
3. To what extent do healthcare providers routinely implement evidence-based preventive and clinical practices related to dengue fever, including patient education, case reporting, appropriate clinical management, and vector control engagement?
4. How ready do healthcare providers perceive themselves to be in identifying, managing, and responding to dengue cases, including recognition and management of severe complications?
5. How prepared are health facilities in Northern State to prevent, detect, and manage dengue fever, in terms of diagnostic capacity, medical supplies, clinical protocols, triage functionality, workforce adequacy, and referral systems?

6. How prepared is the state health system (Ministry of Health) to prevent, detect, and control dengue fever, in terms of guideline provision, training delivery, vector control implementation, surveillance functionality, and outbreak response capacity?
7. What are healthcare providers' perceptions and observations regarding the epidemiological patterns, seasonal trends, high-risk populations, and exposure risk factors associated with dengue fever in Northern State?
8. What do healthcare providers perceive as the primary barriers to effective dengue prevention and control in Northern State, and what solutions do they recommend?
9. Are there significant associations between healthcare provider characteristics (age, gender, profession, experience, facility type, training attendance) and their knowledge, attitudes, practices, and readiness scores?
10. Is there a significant association between facility/system readiness and individual provider readiness?
11. Is there a significant association between perceived epidemiological risk and provider practices and preparedness?
12. Is there a significant association between provider knowledge, attitudes, practices, and readiness regarding dengue fever?

6. METHODS

6.1 Study Design

A **facility-based cross-sectional study** will be conducted to assess the knowledge, attitude, practice, and readiness of health-care providers regarding dengue fever, and to evaluate their perceptions of epidemiological and exposure factors, as well as the readiness of health facilities and the health system to prevent and control dengue fever in Northern State, Sudan.

6.2 Study Setting

The study will be carried out in selected health facilities across the **Northern State of Sudan**, including hospitals, primary health-care centers, emergency units, and outpatient clinics located

in major localities such as Dongola, Merowe, Karimah, Aldabah Al-Goled, Delgo, and Wadi Halfa.

6.3 Study Population

The target population includes **health-care providers** working in the Northern State, including:

- Physicians
- Nurses
- Laboratory technicians
- Pharmacists
- Public health officers
- Other clinical staff involved in patient care

6.3.1 Inclusion Criteria

- Health-care providers currently working in a health facility in Northern State
- Providers with at least **6 months of work experience**
- Those who provide informed consent

6.3.2 Exclusion Criteria

- Administrative staff not involved in clinical care
- Providers on leave during the data collection period
- Incomplete questionnaires

6.4 Sample Size

The sample size will be calculated using the **single population proportion formula**:

$$n = \frac{Z^2 \cdot p(1-p)}{d^2}$$

Where:

- $Z = 1.96$for 95% confidence
- $p = 0.5$(assumed proportion due to lack of prior data, maximizing sample size)

- $d = 0.05$margin of error

$$n = \frac{(1.96)^2 \cdot 0.5(1-0.5)}{(0.05)^2} = 384$$

Adding **10% non-response rate**:

$$n_{final} = 384 + 38 = 422$$

Thus, the final sample size will be **approximately 420 health-care providers**.

Sampling Technique

A **multistage sampling technique** will be used:

1. **Stage 1:** Select major localities in Northern State.
2. **Stage 2:** Randomly select health facilities within each locality.
3. **Stage 3:** Proportionally allocate sample size to each facility based on staff numbers.
4. **Stage 4:** Use simple random sampling to select eligible health-care providers.

6.5 Data Collection Tool

Data will be collected using a **structured, self-administered questionnaire** developed based on WHO KAP guidelines and adapted to the Sudanese context. The questionnaire consists of the following sections:

1. Demographics and professional characteristics
2. Knowledge about dengue fever
3. Attitude toward dengue prevention and control
4. Practice related to dengue management and prevention
5. Individual readiness to manage dengue cases
6. Facility and health-system readiness
7. Epidemiological and exposure variables (provider perspective)
8. Suggested solutions and barriers

The questionnaire will be distributed through **Google Forms** and/or printed copies, depending on facility accessibility.

6.5.1 Variables

6.5.1.1 Dependent Variables

- **Knowledge score** (continuous; categorized as good/poor)
- **Attitude score** (positive/negative)
- **Practice score** (good/poor)
- **Individual readiness score** (adequate/inadequate)
- **Facility readiness score** (adequate/inadequate)

6.5.1.2 Independent Variables

- Age, gender
- Profession
- Years of experience
- Type of facility
- Locality of work/residence
- Training received
- Epidemiological perception variables (seasonality, risk groups, environmental factors)
- Exposure variables (breeding sites, water storage, vector control activities)

6.5.2 Scoring System

6.5.2.1 Knowledge Score

- Each correct answer = **1 point**
- Incorrect/"Not sure" = **0 points**
- Total score converted into categories:
    - **Good knowledge:** ≥ 75%
    - **Moderate knowledge:** 50–74%

- **Poor knowledge:** < 50%

6.5.2.2 Attitude Score

- 5-point Likert scale (Strongly agree = 5 → Strongly disagree = 1)
- Higher scores indicate more positive attitudes
- Categorization:
  - **Positive attitude:** ≥ 75% of total possible score
  - **Negative attitude:** < 75%

6.5.2.3 Practice Score

- "Always/Often" = 2 points
- "Sometimes" = 1 point
- "Rarely/Never" = 0 points
- Categorization:
  - **Good practice:** ≥ 70%
  - **Poor practice:** < 70%

6.5.2.4 Individual Readiness Score

- Likert scale items scored 1–5
- Higher scores indicate better readiness
- Categorization:
  - **Adequate readiness:** ≥ 70%
  - **Inadequate readiness:** < 70%

6.5.2.5 Facility/System Readiness Score

- Likert scale items scored 1–5
- Categorization:
  - **Adequate readiness:** ≥ 70%

- **Inadequate readiness:** < 70%

6.6 Data Analysis

Data will be analyzed using **SPSS** version 26

- **Descriptive statistics:** frequencies, percentages, means, SD
- **Bivariate analysis:** Chi-square test, t-test, or ANOVA
- **Multivariate analysis:** logistic regression to identify predictors of good KAP and readiness
- **Significance level:** $p < 0.05$

6.7 Ethical Considerations

- Ethical approval will be obtained from the **Ministry of Health, Northern State**.
- Participation will be voluntary and anonymous.
- Informed consent will be obtained electronically or in writing.
- Data will be used solely for research purposes

7. TIMELINE

Activity	Month 1	Month 2	Month 3	Month 4
Proposal writing & Submission				
Data collection				
Data entry & analysis				
Report writing				
Submission & defense				

8. PROPOSED BUDGET

Item	Description	Estimated Cost (SDG)
Internet Fee		100.000
Transport		800.000
Room & Board		400.000
Data Analysis	SPSS access	485.000
Contingency (5-10%)	Unforeseen expenses	135.000
Total Estimate Budget 1.483.000 SDG		

9. REFERNCES

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10. ANNEXES

10.1 Questionnaire

SECTION 1 — Informed Consent

1. Study Information (Description paragraph) "This survey aims to assess the knowledge, attitudes, practices, and readiness of healthcare providers regarding dengue fever, and to evaluate their perceptions of epidemiological and exposure factors, as well as the readiness of health facilities and the health system to prevent and control dengue fever in Northern State, Sudan". Participation is voluntary, anonymous, and data will be used for research purposes only."

2. Consent Question

- I agree to participate
- I do not agree to participate (End survey)

SECTION 2 — Demographic Information

3. Age

- 20-29
- 30-39
- 40-49
- 50-59
- 60-69

4. Gender

- Male
- Female
- Prefer not to say

5. Profession

- Physician
- Nurse

- Laboratory technician
- Pharmacist
- Public health officer
- Other (specify)

6. Years of experience

- <1 year
- 1–5 years
- 6–10 years
- 10 years

7. Type of healthcare facility

- Primary health center
- Hospital
- Private clinic
- Community health center
- Other (specify)

SECTION 3 — Knowledge About Dengue Fever

Response type: Multiple choice or checkbox, depending on question.

8. Dengue fever is transmitted by:

- Aedes aegypti mosquito
- Culex mosquito
- Anopheles mosquito
- Not sure

9. Peak biting time of Aedes mosquitoes:

- Early morning & late afternoon

- Night
- Midday
- Not sure

10. Common symptoms of dengue fever (select all that apply):

- High fever
- Severe headache
- Joint and muscle pain
- Rash
- Bleeding
- Cough
- Not sure

11. Severe dengue may lead to:

- Shock
- Organ failure
- Death
- None of the above
- Not sure

12. There is a vaccine for dengue fever:

- True
- False
- Not sure

13. The most effective prevention method is:

- Eliminating mosquito breeding sites
- Using antibiotics

- Using antiviral drugs
- Not sure

SECTION 4 — Attitude Toward Dengue Prevention

14. Dengue fever is a serious public health threat.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

15. Healthcare providers play a key role in dengue prevention.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

16. Eliminating mosquito breeding sites is essential.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

17. Community awareness is necessary to reduce dengue cases.

- Strongly agree
- Agree

- Neutral
- Disagree
- Strongly disagree

18. I feel confident in identifying dengue symptoms.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

SECTION 5 — Practice

19. How often do you educate patients about dengue prevention?

- Always
- Often
- Sometimes
- Rarely
- Never

20. Do you routinely check for mosquito breeding sites around your facility?

- Yes
- No
- Sometimes

21. Do you report suspected dengue cases promptly?

- Yes
- No
- Sometimes

22. Have you attended any dengue-related training in the past 12 months?

- Yes
- No

SECTION 6 — Readiness of Healthcare Providers

23. My facility is adequately prepared to manage dengue cases.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

24. We have sufficient diagnostic tools for dengue.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

25. We have clear protocols for dengue case management.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

26. I feel personally prepared to manage dengue cases.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

27. Additional training is needed for dengue management.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

Section 7 — Epidemiological and exposure variables (from the provider's perspective)

Form description: "This section explores your observations and perceptions as a health-care provider about dengue occurrence, risk factors, and exposure patterns in Northern State. Please answer based on your professional experience."

28. How common is dengue fever in your catchment area?

- Very common
- Common
- Occasionally seen
- Rare
- I have not seen any cases

29. In which season do you observe the highest number of dengue cases?

- Rainy season
- Post-rainy season

- Winter season
- Summer season
- Dry season
- No clear seasonal pattern
- I am not sure

30. In your experience, which age group is most affected by dengue in your area?

- Children (<15 years)
- Young adults (15–30 years)
- Adults (31–60 years)
- Elderly (>60 years)
- All age groups equally
- Not sure

31. Which groups are at higher risk of dengue in your area?

- People living near stagnant water
- People living in crowded housing
- Low-income households
- People who store water in open containers
- Health-care workers
- No specific group
- Not sure
- Other

31. Based on your observation, how frequently do you see mosquito breeding sites around patients' homes or communities?

- Very frequently

- Frequently
- Sometimes
- Rarely
- Never
- Not sure

32. What are the main environmental factors contributing to dengue in your area?

- Stagnant water (pools, ditches, canals)
- Water storage practices (tanks, drums, clay pots)
- Poor waste management/garbage accumulation
- Unplanned urbanization
- Flooding or seasonal waterlogging
- Climate/temperature changes
- Other
- I do not know

33. How would you rate the overall risk of dengue outbreaks in your locality in the coming 12 months?

- Very high
- High
- Moderate
- Low
- Very low
- Not sure

34. Have you noticed any change in the number of dengue cases in the last 6-12 months?

- Increasing

- Decreasing
- Stable
- Fluctuating
- Not sure

35. What is the main barrier to controlling dengue in your area?

- Limited community awareness
- Weak vector control activities
- Poor environmental sanitation
- Limited resources in health facilities
- Weak coordination between sectors
- Other (specify)

SECTION 8 — Prevalence of Dengue Fever

36. Have you encountered dengue cases in your facility in the past 12 months?

- Yes
- No

37. If yes, approximately how many cases?

- 1–5
- 6–10
- 11–20
- 20 or more

38. Have you personally been diagnosed with dengue fever before?

- Yes
- No
- Prefer not to say

Section 9 — Readiness of health facilities and health system (hospital & Ministry of Health)

This section assesses how prepared your health facility and the health system (including the Ministry of Health and the hospital) are to prevent and control dengue fever. Please answer based on your actual experience."

A. Facility/hospital readiness

39. My facility has clear written guidelines or protocols for dengue case management.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

40. My facility has a functional triage system to identify suspected dengue cases early.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

41. Laboratory tests for dengue (e.g., NS1, IgM/IgG, CBC) are readily available when needed.

- Strongly agree
- Agree
- Neutral
- Disagree

- Strongly disagree

42. There are enough trained staff to manage dengue cases during peak seasons.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

43. My facility has adequate supplies (IV fluids, antipyretics, lab reagents, beds) to manage dengue cases.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

44. There is an effective referral system for severe dengue cases to higher-level facilities.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

45. My facility regularly receives updates or training on dengue from the Ministry of Health.

- Strongly agree
- Agree

- Neutral
- Disagree
- Strongly disagree

B. Ministry of Health/health system readiness

46. The Ministry of Health provides clear national guidelines for dengue prevention and control.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

47. The Ministry of Health conducts regular awareness campaigns about dengue in the community.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

48. Vector control activities (e.g., spraying, larviciding) are conducted regularly in my area.

- Strongly agree
- Agree
- Neutral
- Disagree

- Strongly disagree

49. The surveillance system for dengue (case reporting and feedback) is effective.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

50. The Ministry of Health provides adequate support to health facilities during dengue outbreaks.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

Section 10 — Suggested solutions and needs for improving dengue control

This section asks for your opinion on what is most needed to improve dengue prevention and control in your facility and in Northern State.

51. In your opinion, what are the MOST important needs to improve dengue control in your facility?

- More staff training on dengue diagnosis and management
- Better availability of diagnostic tests
- More medicines and supplies for dengue management
- Clearer clinical guidelines and protocols
- Improved referral system for severe cases
- More vector control activities around the facility

- Better coordination with the Ministry of Health
- More community awareness activities
- Other (specify)

52. What do you think is the SINGLE most important action to improve dengue control in your area?