

ASSESSMENT OF OUTBREAK PREPAREDNESS AND READINESS OF PUBLIC HEALTH FACILITIES IN A DISTRICT OF ARUNACHAL PRADESH: A MIXED-METHODS STUDY

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ABSTRACT

Outbreaks of infectious diseases can put a lot of strain on medical facilities, particularly in rural locations where access to medical supplies, laboratory facilities, skilled personnel, transportation and infection control measures may be restricted. Because of its steep environment, dispersed population, challenging transportation, and inconsistent access to health providers, Arunachal Pradesh has unique challenges. The purpose of this study is to evaluate the readiness and preparedness of public health facilities in a particular district in Arunachal Pradesh and to comprehend the difficulties and experiences that healthcare professionals and facility managers have when preparing for an outbreak. It is possible to employ a mixed-methods cross-sectional approach that combines an evaluation of healthcare facilities with interviews of key personnel and chosen healthcare workers. Facilities may be evaluated in areas including infection control, disease surveillance, and emergency preparedness.

Descriptive statistics could be used to analyse quantitative data, whereas thematic analysis is used to analyse data from interviews. Since actual field data were unavailable, the numerical results in this study are illustrative. A moderate level of preparedness was indicated by the overall preparedness score of 64.8% in an illustrative sample of 20 healthcare facilities. While laboratory services, emergency staffing, isolation facilities, and readiness exercises needed more attention, emergency planning and disease surveillance demonstrated relatively superior preparedness. Geographical conditions, transportation, a lack of healthcare personnel, supply and logistics, infection prevention strategies, and coordination between various healthcare providers were among the challenges identified by the qualitative findings.

The study emphasizes that outbreak preparedness involves several components of the health system and should not be judged only by the availability of medicines, protective equipment, or infrastructure. Strengthening surveillance, laboratory linkages, infection prevention and control, emergency staffing, communication, referral systems, and regular preparedness exercises may improve the ability of health facilities in remote areas of Arunachal Pradesh to respond effectively to future disease outbreaks.

Keywords: Outbreak preparedness, outbreak readiness, public health facilities, Arunachal Pradesh, infection prevention and control, disease surveillance, health-care workers, mixed-methods study.

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1. INTRODUCTION

1.1 Background

Globally, emerging and reemerging infectious diseases continue to present serious difficulties for health systems. Newly emerging infections, the resurgence of diseases that were previously under control, antibiotic resistance, changes in the environment and ecology, population shifts, and increased interactions between people, animals, and eco-systems can all cause outbreaks. In addition to having access to the right care, effective epidemic

response also rely on health systems' capacity to identify anomalous events early on, look into suspected cases right away, stop transmission, mobilize resources, and preserve vital health services. Health facilities play a key role in outbreak preparedness. They are often where suspected cases are first identified and reported. But when facilities are not well prepared, they can actually help spread infectious diseases. The World Health Organization (WHO) notes that healthcare facilities can enable

transmission during outbreaks. That's why it sees infection prevention and control (IPC) as essential for outbreak preparedness and response.

Preparedness and readiness are closely related but different ideas. Preparedness means planning ahead, organizing, training, securing resources, running drills, and making corrections. Operational readiness is about being able to activate and carry out response measures when a public health threat appears or is expected. Outbreak readiness comprises several interconnected components, including:

- governance and emergency preparedness planning;
- disease surveillance and early warning;
- adequate and appropriately trained human resources;
- infection prevention and control;
- personal protective equipment and essential supplies;
- isolation and treatment capacity;
- laboratory and diagnostic services;
- water, sanitation and hygiene facilities;
- referral and transportation arrangements;
- risk communication and community engagement;
- coordination with district administration and other sectors; and
- continuity of essential health services.

Facility-level preparedness assessments are important for identifying existing capacities and operational gaps. WHO guidance emphasizes systematic assessment of IPC and other emergency-readiness capacities, including the integration of IPC and WASH measures into preparedness and response planning.

1.2 Health-System Context of Arunachal Pradesh

Arunachal Pradesh faces unique obstacles in delivering the health services. Its large area, scattered villages, rough landscape, and weak transport links all make access difficult. The Ministry of Health and Family Welfare has acknowledged these challenges, especially in the North-Eastern states. Under the National Health Mission, special measures have been introduced to account for the region's terrain and geography.

For many types of public health facilities, relaxed population standards apply in North-Eastern and hilly states. These adjustments reflect the difficulty of serving thinly populated and hard-to-reach areas. Health planners in hilly regions now also consider a time-to-care approach when designing services. The state's health system includes facilities and programs at various levels. These are supported by disease control efforts like the Integrated Disease Surveillance Programme (IDSP), along with programs for vector-borne diseases, tuberculosis, and leprosy. District-level health management structures handle planning, execution, oversight, and

monitoring. Still, having health facilities and programs in place does not guarantee readiness for an outbreak. True readiness depends on whether staff, equipment, supplies, monitoring systems, communication channels, referral networks, and emergency protocols can all work when needed.

1.3 RATIONALE FOR THE STUDY

The COVID-19 pandemic showed that even well-developed health systems can come under severe strain when demand spikes quickly. It also brought attention to the importance of infection control, protecting health workers, surveillance, surge capacity, and maintaining essential services. Tools like preparedness assessments, simulation exercises, and after-action reviews can uncover weaknesses before they turn into serious problems during a crisis. In Arunachal Pradesh, geographical and logistical factors can further shape how outbreaks are managed. The time needed to move patients, test samples, medicines, and equipment can affect how well emergency measures work. So preparedness assessments must look beyond whether resources are available. They also need to check if those resources are functional, reachable, and usable within a reasonable time.

Quantitative facility audits can highlight measurable gaps, but they often fail to explain why those gaps exist. A checklist might show whether an emergency plan or PPE stock is in place. But interviews can reveal why plans are not practiced regularly, why supplies get delayed, or how geography hampers patient referral and sample transport. A mixed-methods approach makes sense here. It combines measuring preparedness with understanding the organizational, staffing, logistical, and geographic factors that affect real-world readiness.

2. OBJECTIVES

2.1 General Objective

To evaluate outbreak preparedness and operational readiness in public health facilities of a district in Arunachal Pradesh using a mixed-methods approach.

2.2 Specific Objectives

1. Evaluate the availability of basic infrastructure and resources needed for outbreak readiness.
2. Examine public health facilities' ability to conduct disease surveillance, early warning, and reporting.
3. Assess infection prevention and control preparedness.
4. Review the availability of trained personnel and surge capacity arrangements.
5. Assess preparedness in laboratory services, diagnostics, isolation, treatment, and patient referral.
6. Examine the presence of emergency plans, standard operating procedures, and communication systems.
7. Explore healthcare workers' experiences and views on outbreak preparedness.
8. Identify key operational challenges that hinder outbreak readiness.

9. Formulate practical recommendations to strengthen outbreak preparedness at the district level.

3. RESEARCH QUESTIONS

This study addressed the following questions:

1. How prepared are public health facilities in the selected district for outbreaks?
2. Which areas of preparedness are relatively strong, and which need improvement?
3. Are facilities ready for early detection, notification, and response to outbreaks?
4. What gaps exist in infection control, staffing, lab services, supplies, and isolation capacity?
5. What major barriers to outbreak preparedness do healthcare workers identify?
6. How do geography and logistics affect operational readiness?
7. What feasible steps could improve outbreak preparedness at the district level?

4. MATERIALS AND METHODS

4.1 Study Design

A convergent mixed-methods cross-sectional design was used. The quantitative part involved structured assessments of public health facilities. The qualitative part explored the experiences and views of healthcare workers and key informants. Both components were carried out during the same period. They were analyzed separately and then merged during interpretation. The quantitative part measured the level and spread of preparedness. The qualitative part offered context to explain strengths and gaps found.

4.2 Study Setting

The study was designed for one district in Arunachal Pradesh, India. To keep the framework broadly applicable, the district is called the "selected district." The district health system was seen as a network of the district hospital, community health centres, primary health centres, and some peripheral facilities. The final number and types of facilities depended on the district chosen. The assessment considered the geography and service delivery conditions in Arunachal Pradesh, especially terrain, travel time, connectivity, transport, and access to referral services.

4.3 Study Population

The quantitative part included selected public health facilities in the district.

The qualitative part included healthcare workers and key informants such as medical officers, nursing officers, lab staff, pharmacists, surveillance and program personnel, facility administrators, IPC staff (if available), and district-level health managers.

4.4 Inclusion Criteria

Facilities were eligible if they were public-sector facilities in the selected district, provided outpatient, inpatient, or public health services, and had been running for at least six months before the assessment. Healthcare workers were eligible if they had worked at the facility for at least six months,

were involved in clinical, public health, lab, nursing, administrative, or emergency response tasks, and gave informed consent.

4.5 Exclusion Criteria

Facilities temporarily closed during the study period were excluded. Healthcare workers who could not be reached after repeated attempts or who declined to take part were not included in the qualitative part.

4.6 Sampling

A multistage purposive sampling method was used for the quantitative part to ensure representation across different health system levels. Facilities were grouped into district hospital, community health centres, primary health centres, and selected peripheral facilities. For the qualitative part, purposive sampling aimed for maximum variety in professional role, facility level, and years of experience.

4.7 Study Tool

A structured facility assessment checklist was created based on WHO guidance on outbreak preparedness, IPC, surveillance, WASH, and emergency readiness. It was then adapted to the Indian public health context.

THE CHECKLIST COVERED THESE AREAS:

Governance and planning - Emergency plan, SOPs, designated focal person, incident management

Surveillance - Case definitions, notification, reporting, trained staff

IPC - Hand hygiene, PPE, waste management, isolation precautions

Human resources - Staffing, training, surge arrangements, duty rosters

Infrastructure - Isolation area, oxygen, electricity, water, sanitation

Laboratory - Sample collection, packaging, transport, referral lab

Medicines and supplies - Essential medicines, PPE, disinfectants, emergency stocks

Referral - Ambulance, referral protocols, communication with higher centres

Risk communication - IEC materials, staff communication, community engagement

Continuity of services - Essential service continuity plan, backup systems

Simulation and learning - Mock drills, tabletop exercises, after-action reviews

4.8 Preparedness Scoring

Each indicator was scored based on availability and functionality. 0 meant absent or not available.

1 meant partially available or not functional.

2 meant fully available and functional.

Domain score was calculated as obtained score divided by maximum possible score, multiplied by 100. Overall preparedness score used the same method. For analysis, these categories were used. Under 50% was poor preparedness. 50 to 69% was moderate. 70 to 84% was good. 85% or above was high.

4.9 Qualitative Data Collection

Semi-structured interview guides were used for key informant and in-depth interviews. These explored past outbreak experiences, confidence in emergency plans, training, preparedness exercises, supply availability, staffing limits, surveillance and reporting, sample transport, patient referral, IPC practices, communication with district authorities, geographic challenges, community engagement, and suggestions for improvement. Interviews were held in private settings. With participant consent, sessions were audio-recorded or documented through detailed field notes.

4.10 Quantitative Analysis

Quantitative data were entered into appropriate statistical software and checked for completeness and consistency. Descriptive analysis included frequencies, percentages, means, standard deviations, and medians where relevant. Preparedness scores were summarized by domain and compared across facility levels. Where the sample size allowed, statistical tests examined links between facility characteristics and preparedness categories.

4.11 Qualitative Analysis

Interview transcripts were analyzed using thematic analysis. The process involved familiarization with transcripts, initial coding, category development, theme identification, theme review and refinement, and interpretation of findings. Where possible, two researchers independently coded a subset of transcripts to improve analytical credibility.

4.12 Integration of Findings

Quantitative and qualitative findings were merged during interpretation. For instance, if the quantitative part showed low lab preparedness, qualitative interviews could reveal whether the cause was inadequate equipment, insufficient training, sample transport problems, or slow communication with referral labs. This integration was especially useful in remote areas. A numerical score alone often fails to capture the operational barriers that affect real response capacity.

4.13 Ethical Considerations

Ethical approval was obtained from the appropriate Institutional Ethics Committee before the study began. Permission was also secured from the district health authority and relevant facility administrators. All participants gave informed consent. Participation was voluntary. Participants could withdraw at any time without penalty. Facility-level findings were reported in a way that minimized identification of individual healthcare workers.

5. RESULTS

The numerical findings in this section are illustrative, as no primary field data were provided. They show how results could be presented. Replace them with actual findings before submitting this as an original research article or dissertation.

5.1 Characteristics of Assessed Facilities

For illustration, 20 public health facilities were assumed to have been assessed. This included one district hospital, four community health centres, and 15 primary health or peripheral facilities.

Table 1. Illustrative Distribution of Assessed Facilities

Facility type	Number	Percentage
District hospital	1	5.0
Community health centres	4	20.0
Primary health/peripheral facilities	15	75.0
Total	20	100.0

The illustrative sample represents facilities operating at different levels of the district health system.

5.2 Overall Preparedness

The overall mean preparedness score was **64.8%**, corresponding to moderate preparedness according to the proposed study-specific classification.

Table 2. Illustrative Preparedness Scores by Domain

Preparedness domain	Mean score (%)	Interpretation
Governance and emergency planning	72.0	Good
Surveillance and reporting	74.0	Good
Infection prevention and control	66.5	Moderate
Human resources and training	58.0	Moderate
Infrastructure and isolation	57.5	Moderate
Laboratory preparedness	49.0	Poor
Medicines and emergency supplies	63.0	Moderate
Referral and transport	61.5	Moderate
Risk communication	65.0	Moderate
Continuity of essential services	60.0	Moderate
Simulation exercises	43.0	Poor
Overall	64.8	Moderate

In the sample assessment, governance, surveillance, emergency planning, and reporting emerged as the strongest areas. In contrast, laboratory readiness and simulation exercises received the lowest scores.

Governance and Emergency Planning

Most facilities in the sample were considered to have an outbreak or emergency response plan. However, having a written plan did not automatically mean it was regularly reviewed, updated, or put into practice. Around 70% of facilities had an outbreak focal person assigned. Only 55% had evidence that their emergency plan had been reviewed within the

past year. Just 35% had run a documented simulation exercise or drill in the previous 12 months.

Surveillance and Early Warning

Surveillance ranked among the stronger preparedness areas in this sample. Most facilities had access to standard disease reporting systems. Still, reporting effectiveness could be limited by heavy workloads, poor connectivity, and confusion about how to report unusual events. A strong early warning system depends on quick detection, notification, investigation, and escalation of possible public health threats.

Infection Prevention and Control

The sample IPC assessment showed moderate readiness. Most facilities had basic hand hygiene supplies, but consistent access to soap, alcohol-based hand rub, and other materials varied. Larger facilities generally had better PPE availability than smaller ones. A key challenge was the gap between having IPC materials and using them properly. Some facilities had adequate supplies but lacked refresher training, monitoring, or hands-on practice.

Human Resources

Staffing was a major weakness, especially at smaller facilities. The sample revealed possible issues including:

- few trained workers
- challenges releasing staff for training
- overreliance on specific individuals
- no dedicated outbreak response teams
- limited ability to keep routine services running during an outbreak

Qualitative findings suggested that surge capacity might be hard to build quickly, since extra personnel were not always available.

Infrastructure and Isolation Capacity

The availability of dedicated isolation space varied. Larger facilities were more likely to have separate areas for suspected infectious patients. Smaller ones often relied on temporary separation. **Key infrastructure gaps included:**

- not enough dedicated isolation areas
- limited oxygen supply
- insufficient space for cohorting
- unreliable connectivity
- limited backup power
- poor arrangements for safely moving infectious patients

LABORATORY PREPAREDNESS

Laboratory readiness was the weakest quantitative area in the sample.

Not every small facility needs to run advanced outbreak testing on site. Instead, readiness depends on a working diagnostic pathway that covers specimen collection, packaging, storage, transport, testing, result reporting, and follow-up action. Laboratory capacity should therefore be assessed as a system, not just by what equipment each facility holds.

Emergency Supplies

The sample showed moderate availability of PPE, disinfectants, and emergency items. But stock management practices varied between facilities. Some facilities could not easily estimate how long their emergency supplies would last during a sudden patient surge. Good preparedness means not just holding stocks but also tracking usage, restocking, and planning for increased demand.

QUALITATIVE FINDINGS

Five main themes came from the qualitative analysis.

Theme 1: Geography Affects Readiness. Distance and road conditions were noted as major barriers to emergency referrals and specimen transport. Plans that ignore real travel times may overstate operational readiness.

Theme 2: Staffing Is Fragile. Participants said an outbreak could quickly strain existing workers. A few trained staff could become bottlenecks if several fell ill, were exposed, or were assigned outbreak duties.

Theme 3: Supply Chain Problems. Interviewees cited uncertainty about emergency stocks, transport, and timely restocking. Peripheral facilities were seen as especially at risk when normal supply chains broke down.

Theme 4: Plans Work Best When Practised. Participants agreed that written plans are useful only when backed by regular training and drills. Simulation exercises happened less often than routine reporting and training.

Theme 5: Leadership and Coordination Matter. Strong local leadership and coordination were seen as key to readiness. Facilities where medical officers and managers coordinated staff, supplies, and reporting were viewed as better prepared.

DISCUSSION

The mixed-methods framework presented here treats outbreak preparedness as a multidimensional health system capacity. It covers governance, surveillance, infection control, staffing, infrastructure, lab services, logistics, referrals, communication, and continuity of essential services. The overall preparedness score of 64.8% from this sample falls into the moderate category. But this number does not mean facilities are simply ready or not ready. Preparedness is better seen as a spectrum, where different capacities develop at different speeds and work with varying effectiveness.

Governance and Preparedness Planning

The relatively strong results in governance and emergency planning are positive. However, having a written response plan does not guarantee operational readiness. True preparedness requires training, resources, practice, evaluation, and corrective actions behind the plan. Emergency plans should be reviewed regularly and tested through drills. At the district level, an all-hazards plan can offer a common framework while letting each facility adapt responses to local threats.

Surveillance

Quick detection is critical for outbreak response, because delays in finding cases leave less time for investigation and action. The existing IDSP system already provides a useful platform for disease surveillance in Arunachal Pradesh. Improving communication among clinicians, lab staff, surveillance teams, and district authorities could help identify and escalate unusual events sooner. Facilities also need clear guidance on which events must be reported immediately, even without a confirmed diagnosis.

Infection Prevention and Control

IPC is vital to stop health facilities from becoming sources of transmission. Preparedness must go beyond buying PPE and include proper infrastructure, staff training, standard precautions, cleaning, waste management, respiratory hygiene, triage, isolation, exposure management, and regular monitoring. Having supplies is not enough. Facilities also need organizational systems and staff skills to use them correctly.

Human Resources

Staff preparedness matters most in remote areas where staffing is already thin. A district outbreak plan should cover:

- minimum staff levels needed
- personnel who can be moved to new roles
- trained backup staff
- replacement procedures
- staff protection measures
- steps for rapid deployment

Training should reach beyond medical officers to include nurses, lab staff, pharmacists, sanitation workers, ambulance drivers, and administrative staff. All of them may play key roles during an outbreak.

Laboratory Preparedness

Lab readiness should be seen as a coordinated network, not just a list of what each facility has. A working system must ensure:

1. suspect cases are recognized
2. specimens are collected correctly
3. samples are safely packaged
4. transport happens on time
5. lab testing is done
6. results are communicated
7. public health action follows quickly

A breakdown at any step can weaken the whole outbreak response.

GEOGRAPHY AND REFERRAL SYSTEMS

Arunachal Pradesh's geography calls for preparedness strategies that differ from those used in crowded, well-connected cities. A facility may have an ambulance but still face major limits if roads are blocked, travel takes too long, or communication fails. Readiness assessments should look at travel time, alternate routes, transport availability, communication during transfers, oxygen supply, referral acceptance, and backup plans for natural

disasters. Preparedness indicators should reflect real accessibility, not just whether resources exist on paper.

SIMULATION EXERCISES

Simulation exercises ranked among the weakest areas in this sample. This finding points to a gap between having a preparedness plan and being able to carry it out effectively. Exercises can test many parts of a response, including detection, notification, triage, isolation, PPE use, specimen collection, communication, referral, logistics, and decision-making. Regular tabletop and functional drills help uncover weaknesses in roles, communication, logistics, and coordination. These exercises should lead to documented improvements and follow-up testing.

IMPLICATIONS FOR PUBLIC HEALTH PRACTICE

The findings and framework have several practical implications.

- First, outbreak preparedness should become part of routine facility quality improvement, not something done only after an outbreak starts.
- Second, district-level assessments should happen regularly to track progress and find new gaps.
- Third, emergency stocks should be based on realistic usage estimates and backed by good inventory systems.
- Fourth, surveillance systems need clear paths for escalation and response.
- Fifth, simulation exercises should be a regular activity, not an occasional one.
- Sixth, preparedness indicators must include geographical and transport realities.
- Seventh, staff safety and health should be built into outbreak plans.
- Eighth, planning should cover continuity of routine health services so regular care does not get ignored during emergencies.

RECOMMENDATIONS

Facility Level

- Keep an updated outbreak plan at each facility.
- Formally assign an outbreak or IPC focal person.
- Maintain minimum stocks of PPE, disinfectants, and essential supplies.
- Identify isolation or cohorting areas ahead of time.
- Monitor hand hygiene and WASH infrastructure regularly.
- Review and update emergency contact lists periodically.
- Give staff regular training in IPC and outbreak response.
- Run tabletop or simulation exercises at the facility level on a regular basis.

District Level

- Maintain a comprehensive district outbreak plan.
- Identify a multidisciplinary district response team in advance.

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- Link surveillance, lab, and clinical services through clear communication.
- Map, document, and test specimen transport arrangements.
- Build backup options into referral pathways.
- Develop surge staffing plans and review them regularly.
- Pre-position emergency supplies at strategically chosen facilities.
- Conduct after-action reviews after outbreaks and major exercises.

State Level

- Support regular district preparedness assessments.
- Give remote facilities logistical support suited to their context.
- Include peripheral health workers in training programmes.
- Strengthen lab referral networks.
- Improve digital communication in areas with poor connectivity.
- Fund ongoing costs for training, exercises, maintenance, and stock management, not just infrastructure and equipment.

STRENGTHS OF THE STUDY

The main strength is the mixed-methods design. Quantitative facility checks give measurable preparedness estimates, while qualitative interviews explain the context and organizational factors behind the gaps. The framework also covers multiple dimensions of preparedness instead of focusing only on PPE or infrastructure. It includes geographical and logistical factors that matter in remote and hilly settings. Another strength is that the tool can be used repeatedly, letting district health authorities track changes over time.

LIMITATIONS

Several limitations should be noted.

- First, a cross-sectional assessment captures only one point in time and may miss changes.
- Second, facility assessments can be affected by self-reporting and social desirability bias.
- Third, having equipment or supplies does not prove it works.
- Fourth, a small number of facilities limits meaningful statistical comparisons.
- Fifth, qualitative findings from selected participants may not reflect all health workers' experiences.
- Sixth, the scoring system is an analytical tool developed for this study, not an officially validated national system.

Most importantly, the numbers in this manuscript are illustrative because no primary data were used. They must be replaced with actual facility and interview data before the manuscript is submitted as an original research paper or dissertation.

CONCLUSION

Outbreak preparedness and operational readiness are key to resilient public health systems. In a challenging geography like Arunachal Pradesh, readiness requires more than just having facilities, medicines, and supplies. Effective response depends on working surveillance, trained staff, proper IPC measures, lab referral networks, isolation capacity, reliable logistics, good communication, emergency transport, and regular practice of response procedures. The mixed-methods framework in this study offers a comprehensive way to assess these capacities. Quantitative facility checks can show the extent and distribution of gaps, while qualitative inquiry explains the organizational, staffing, logistical, and geographical factors behind them. The sample suggests that governance and surveillance may be stronger areas, while lab readiness, surge staffing, and simulation exercises may need more attention. But these observations should not be treated as real district-level findings until backed by actual data. Strengthening outbreak readiness should become a standard part of routine district health planning. Focus especially on peripheral facilities, where isolation, workforce limits, transport challenges, and supply chain disruptions can seriously affect response capacity. Regular preparedness checks, simulation exercises, after-action reviews, staff training, emergency stock management, and stronger lab and referral networks can help build a more responsive and resilient district health system. Such a system can detect, contain, and respond to future outbreaks effectively.

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APPENDIX 1. PROPOSED FACILITY PREPAREDNESS ASSESSMENT CHECKLIST

No. Indicator **0 1 2**

- 1 Written outbreak preparedness plan
- 2 Plan reviewed within previous year
- 3 Designated outbreak focal person
- 4 Emergency contact list available
- 5 Staff trained in outbreak response
- 6 Surveillance reporting mechanism functional
- 7 Standard case definitions available
- 8 IPC guidelines available
- 9 Hand-hygiene facilities functional
- 10 PPE available
- 11 Safe health-care-waste management
- 12 Isolation/cohorting area identified
- 13 Oxygen capacity available
- 14 Emergency medicines available
- 15 Laboratory sample-collection capacity
- 16 Specimen-transport mechanism
- 17 Referral protocol available
- 18 Ambulance/referral transport arrangement
- 19 Emergency communication system
- 20 Simulation exercise conducted
- 21 After-action review mechanism
- 22 Surge-staffing plan
- 23 Continuity-of-services plan
- 24 Risk-communication materials
- 25 WASH/emergency water arrangements

Scoring: 0 = absent; 1 = partially available; 2 = fully available and functional.

APPENDIX 2. PROPOSED QUALITATIVE INTERVIEW GUIDE

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1. What types of outbreaks are considered most relevant to this district?
2. How prepared do you consider your facility to be for an outbreak?
3. What happens when a suspected outbreak case is identified?
4. How is the event reported through the district surveillance system?
5. Are staff adequately trained to respond to outbreaks?
6. What are the main challenges related to PPE and other emergency supplies?
7. How would the facility manage a sudden increase in patient volume?
8. How are suspected infectious patients isolated or separated?
9. What challenges are encountered in collecting and transporting specimens?
10. What difficulties arise during patient referral?
11. How does the geographical location of the facility affect outbreak response?
12. How effective is communication with district health authorities?
13. Have you participated in a mock drill or simulation exercise?
14. What are the three most important preparedness gaps at your facility?
15. What measures would most improve outbreak readiness in this district?