



Strengthening Competencies for Public Health Emergencies and Disaster Management in Bihar



Public Health Emergency and Disaster Management Professional Development Programme (PHEDM-PDP) Tier-III Training



सत्यमेव जयते

Strengthening Competencies for Public Health Emergencies and Disaster Management in Bihar

**Public Health Emergency and Disaster Management
Professional Development Programme (PHEDM-PDP)
Tier-III Training**

Prepared By:

National Institute of Disaster Management
Ministry of Home Affairs, Government of India

Integrated Disease Surveillance Programme, National Centre for Disease Control
Ministry of Health and Family Welfare, Government of India

and

U.S. Centers for Disease Control and Prevention
Division of Global Health Protection, Country Office-India

Strengthening Competencies for Public Health Emergencies and Disaster Management in Bihar

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Editors:

Prof. Amir Ali Khan

Dr Himanshu Chauhan

Dr Rajat Garg

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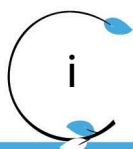
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This report is based on the Public Health Emergency and Disaster Management Professional Development Programme (PHEDM-PDP) Tier-III Training conducted in Bihar in four batches. The knowledge and learning presented in this report encompass information acquired through training sessions, experience sharing and dialogues held during the training programmes. This document may be freely reviewed, reproduced or translated, in part or whole, purely on a nonprofit basis for humanitarian, social and environmental well-being, with permission from the Institute and due credit to the authors. The document can be downloaded from <https://nidm.gov.in>





MESSAGE

Public health emergencies and disasters are no longer sporadic events; they are recurring, multidimensional challenges that test the resilience of our governance systems, health infrastructure, and community preparedness. In this evolving risk landscape, developing a technically competent, operationally agile, and institutionally anchored workforce has become central to India's disaster risk management agenda.

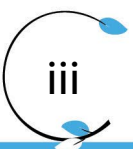
National Institute of Disaster Management (NIDM) continues to play a pivotal role in shaping capacity-building frameworks, strengthening institutional preparedness, and advancing evidence-based disaster risk reduction practices. The implementation of the PHEDM Tier-III Programme in Bihar through four intensive training batches reflects a purposeful investment in strengthening district and state-level preparedness. The programme enabled participants to enhance technical understanding, apply inter-departmental coordination mechanisms, and engage with practical tools essential for managing complex public health emergencies and disaster scenarios.

This report, *"Strengthening Competencies for Public Health Emergencies and Disaster Management in Bihar"*, presents a comprehensive synthesis of field-based learning, operational innovations, institutional insights, and strategic reflections generated through the programme. It is intended to support administrators, planners, practitioners, and development partners in translating capacity-building efforts into measurable preparedness outcomes.

I sincerely acknowledge the academic leadership and technical guidance provided by Dr. Himanshu Chauhan, Dr. Runa H. Gokhale, Dr. Rajat Garg, and Prof. Amir Ali Khan. I also commend the professional dedication of the teams from NIDM, NCDC, CDC-India, and the Government of Bihar, whose sustained collaboration has significantly strengthened Bihar's preparedness architecture.


(Madhup Vyas)

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प्रो. (डॉ.) रंजन दास
Prof. (Dr.) Ranjan Das
MD (CM)

निदेशक
Director



सत्यमेव जयते
भारत सरकार

राष्ट्रीय रोग नियंत्रण केन्द्र

(स्वास्थ्य सेवा महानिदेशालय)

स्वास्थ्य एवं परिवार कल्याण मंत्रालय, भारत सरकार

22 - शाम नाथ मार्ग, दिल्ली 110054

Government of India

NATIONAL CENTRE FOR DISEASE CONTROL

[Formerly Known as National Institute of Communicable Diseases (NICD)]

Directorate General of Health Services

Ministry of Health & Family Welfare, Government of India

22 - Sham Nath Marg, Delhi-110054



Direct: 00-91-1123913148, 23922132
Fax : 00-91-1123922677

Email : dirnied@nic.in

Website : www.ncdc.mohfw.gov.in
www.idsp.mohfw.gov.in



Message

Public health emergencies and disasters today unfold in increasingly interconnected and unpredictable ways, placing extraordinary demands on health systems, governance mechanisms, and community resilience. While these challenges carry profound risks, they also present a powerful opportunity to strengthen the foundations of Public Health Emergency and Disaster Management (PHEDM) through innovation, coordination, and shared learning. Building sustainable platforms that enable collaboration across health services, disaster management authorities, policymakers, and community institutions is essential for reducing vulnerabilities and enhancing collective response capacity.

India remains committed to a rights-based, inclusive, and preventive health system. The Directorate General of Health Services (Dte.GHS), under MoHFW, continues to drive this vision through focused public health programs and emergency readiness efforts.

Bihar's diverse geography, vulnerable populations, and recurring outbreaks highlight the need for a strong district-centered PHEDM framework. The Tier-III PHEDM training was developed to address these state-specific challenges by equipping district and block-level officials with practical tools, applied knowledge, and coordination mechanisms.

The successful delivery of the PHEDM Tier-III programme across four batches in Bihar represents a meaningful investment in strengthening last-mile preparedness for public health emergencies and disasters. Jointly implemented by NCDC, NIDM, and CDC-India, the programme stands as a strong example of institutional convergence for capacity development. This report, "*Strengthening Competencies for Public Health Emergencies and Disaster Management in Bihar*", captures the programmatic learnings, operational frameworks, and good practices that emerged through this process. It is envisaged as both a record of progress and a practical reference for scaling preparedness efforts nationally.

I convey my sincere appreciation to the teams of NCDC, NIDM, CDC-India, the Government of Bihar, and all participating institutions for their professionalism, technical commitment, and collaborative spirit in advancing this critical capacity-building initiative for the nation.

रंजन दास

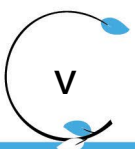
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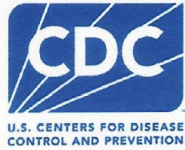


Antibiotic resistance Containment Stewardship: Our Role, Our Responsibility
Judicious Use of Antibiotic: Key to Contain Antibiotic Resistance



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U.S. Centers for Disease Control and Prevention (CDC) India

U.S. Embassy, Shantipath, Chanakyapuri
New Delhi - 110 021, India
Tel: +91-11-2419- 8649 Fax: +91-11-2419-8770



Message

Bihar's public health landscape is shaped by persistent infectious diseases, environmental vulnerabilities, and climate-sensitive hazards. Ongoing vector-borne illnesses, emerging zoonoses, seasonal outbreaks, and disaster-linked emergencies continue to strain local health systems, underscoring the need to strengthen preparedness, surveillance, and coordinated response capacities—especially at district and sub-district levels.

The PHEDM Tier-III training in Bihar was designed as a targeted investment in institutional readiness. Through applied learning, operational tools, and scenario-based simulations, the programme helped participants translate policy into practice. By promoting collaboration among health, veterinary, and disaster management departments, it fostered essential multisectoral coordination—critical in a State where delays can worsen the human and economic impacts of outbreaks.

The U.S. Centers for Disease Control and Prevention (CDC) remain committed to supporting India in strengthening public health systems. From historic initiatives like smallpox eradication to ongoing efforts in surveillance, laboratory capacity, diagnostics, workforce development, and emergency management, CDC continues to help build resilient health infrastructure.

I extend sincere appreciation to the leadership of NCDC and NIDM for guiding the design and implementation of the PHEDM Tier-III programme. Its successful rollout in Bihar and other priority States reflects the Government of India's strong commitment to institutionalizing preparedness. This report will serve as a practical resource for strengthening emergency readiness across the country.

Runa Hatti Gokhale, MD, MPH

CAPT, USPHS

Program Director (Acting)

Associate Director for Science and Programs

Division of Global Health Protection

CDC India

Phone: +91 7065281767

Email: rgokhale@cdc.gov

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Acknowledgement

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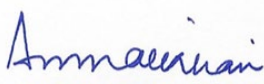
We also extend our sincere thanks to the Government of Bihar for its invaluable support in successfully implementing the PHEDM Tier-III Training across the state. The proactive engagement of state departments and district-level stakeholders made this initiative truly impactful and inclusive.

The committed leadership and proactive engagement of the Government of Bihar played a pivotal role in fostering an enabling environment for multi-sectoral collaboration and capacity building. The active participation of officials from the departments of Health, Disaster Management, and Animal Husbandry, along with dedicated representation from all districts, significantly enriched the quality and impact of the training program. Their engagement underscored a shared commitment to strengthening public health emergency preparedness at the grassroots level.

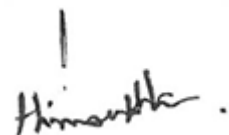
We extend our heartfelt thanks to Dr Muzaffar Ahmad, Former Member NDMA, MHA, Gol; Dr Sujeet K Singh, Former Director NCDC, MoHFW, Gol; Dr Jugal Kishore, Professor and Former Head, VMMC & SJH; Dr. Simmi Tiwari, Joint Director, Centre for One Health, NCDC, MoHFW, Gol; Dr. Meera Dhuria, Joint Director, NCDC, MoHFW, Gol; Dr Bimlesh Joshi, Nodal Officer, Health Emergencies and Disasters, Govt. of Uttarakhand; Dr. Sujata Singh, Assistant Director, Health Directorate, Govt of Uttarakhand and Dr. Prashant Shrivastava, Assistant Professor, Central Institute of Psychiatry (CIP), Ranchi, Jharkhand for guiding and strengthening the PHEDM Tier-III trainings with their vast technical expertise and extensive experience.

We also sincerely acknowledge the dedicated efforts of team members from NCDC, NIDM, and CDC-India, whose consistent support, coordination, and subject matter contributions have played a crucial role in the successful execution of the training program in Bihar. Their collaborative spirit and commitment to capacity building have significantly enriched the learning outcomes and overall impact of this initiative.

This collaborative initiative has laid a strong foundation for enhancing surveillance, improving response mechanisms, and building resilience to public health emergencies and disasters. The Government of Bihar's steadfast dedication to advancing integrated preparedness and response systems serves as a model for other states. It reflects its deep commitment to protecting the health and well-being of its communities.



Prof. Amir Ali Khan



Dr Himanshu Chauhan

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Abbreviations

Abbreviations	Full Forms
AIIMS	All India Institute of Medical Sciences
ANM	Auxiliary Nurse Midwife
ASHA	Accredited Social Health Activist
CBRN	Chemical, Biological, Radiological and Nuclear
CDC	Centers for Disease Control and Prevention
CHC	Community Health Centre
CPR	Cardiopulmonary Resuscitation
DDMA	District Disaster Management Authority
DDMP	District Disaster Management Plan
DEOC	District Emergency Operation Center
DGHP	Division of Global Health Protection
DRR	Disaster Risk Reduction
Dte.GHS	Directorate General of Health Services
EM	Emergency Management
EMR	Emergency Medical Relief
EOC	Emergency Operations Centre
EOP	Emergency Operations Plan
Gol	Government of India
GHSA	Global Health Security Agenda
GMR	Geo-meteorological Risks Management
IC	Incident Commander
ICS	Incident Command System
IDSP	Integrated Disease Surveillance Programme
IHIP	Integrated Health Information Platform

Abbreviations	Full Forms
IH	International Health
IHR	International Health Regulations
IMS	Incident Management System
IRS	Incident Response System
MC	Municipal Corporation
MHA	Ministry of Home Affairs
MoHFW	Ministry of Health and Family Welfare
NCDC	National Centre for Disease Control
NDMA	National Disaster Management Authority
NDRF	National Disaster Response Force
NGO	Non-Governmental Organization
NIDM	National Institute of Disaster Management
PPE	Personal Protective Equipment
PH	Public Health
PHE	Public Health Emergency
PHEDM	Public Health Emergency and Disaster Management
PHEDM-PDP	Public Health Emergency and Disaster Management- Professional Development Programme
PHEIC	Public Health Emergency of International Concern
PHEOC	Public Health Emergency Operations Centre
PHEM	Public Health Emergency Management
PHS	Public Health Specialist
PoE	Points of Entry
Prep Op	Preparatory Operations Meeting
PS	Principal Secretary
RCCE	Risk Communication and Community Engagement

Abbreviations	Full Forms
RRT	Rapid Response Team
SARI	Severe Acute Respiratory Infections
SDRF	State Disaster Response Force
SMEs	Subject Matter experts
SNO	State Nodal Officer
THIRA	Threat and Hazard Identification and Risk Assessment
US	United States
VMMC	Vardhman Mahavir Medical College
WHO	World Health Organization



Patrons

- Shri Madhup Vyas, IAS, Executive Director, NIDM, MHA, Gol
- Dr Ranjan Das, Director, NCDC, Dte.GHS, MoHFW, Gol
- Dr Runa Hatti Gokhale, Program Director, DGHP, CDC-India



List of Contributors

NIDM

- Dr Amir Ali Khan, Professor & Head, RI and GMR Divisions, NIDM, MHA, Govt. of India
- Dr Surya Parkash, Former Prof. & Head, GMRD, CBRN, Industrial and Cyber DRR Division, NIDM, MHA, Govt. of India
- Ms Stanzin Tsela, Young Professional, Centre for Cyber DRR, NIDM, MHA, Govt. of India

NCDC

- Dr Himanshu Chauhan, Additional Director & NPO, IDSP, NCDC, MoHFW, Govt. of India
- Dr Sanket Kulkarni, Joint Director, IDSP, NCDC, Govt. of India
- Dr Pranay Verma, Joint Director, IDSP, NCDC, Govt. of India
- Dr Niraj Kumar, Consultant (Epidemiologist), IDSP, NCDC, Govt. of India

CDC-India

- Dr Rajat Garg, Public Health Specialist, DGHP, CDC-India

STATE

- Dr A. K Shahi, State Surveillance Officer, Bihar
- Dr Ragini Mishra, State Epidemiologist, IDSP, Bihar

CDC-India Collaborating Partners

- Dr Joseph Williams, Project Director, The Voluntary Health Services, India
- Dr Akshay Dhariwal, Former Director, NCDC & NVBDCP, Dte.GHS, MoHFW, Govt. of India.
- Dr Sujeet K Singh, Public Health Expert and Former Director NCDC, Dte.GHS, MoHFW, Govt. of India
- Dr Raju Thapa, Technical Officer-Emergency Management, The Voluntary Health Services, India
- Mr Anil Kathait, Senior Technical Officer-Emergency Management, The Voluntary Health Services, India

- Dr Harjeet Kaur, Technical Officer-Emergency Management, The Voluntary Health Services, India
- Mr Sanjeev Karn, Technical Officer-IT, The Voluntary Health Services, India
- Ms Renu, Admin Executive, The Voluntary Health Services, India



1. Executive Summary

Bihar's vulnerability to disasters arises from its geographical location and climatic conditions. The state frequently experiences floods, droughts, heatwaves, thunderstorms, lightning hazards, cyclones and disease outbreaks, making it highly disaster-prone. These recurring disasters pose significant challenges to Bihar's socio-economic development, public health, and overall safety of its population. This requires preparedness and a coordinated, multi-sectoral approach underpinned by competent core capacities. The "Public Health Emergency and Disaster Management-Professional Development Programme (PHEDM-PDP) Tier-III Training" jointly structured, designed and implemented by the National Institute of Disaster Management (NIDM), Ministry of Home Affairs (MHA); National Centre for Disease Control (NCDC), Directorate General of Health Services (Dte.GHS), Ministry of Health and Family Welfare (MoHFW), and the U.S. Centers for Disease Control and Prevention (CDC), Country Office India, is a key initiative to enhance coordination and collaboration among stakeholders in emergency response. This training programme is part of a comprehensive five-tier capacity-building model (Figure 1) that engages a wide spectrum of public officials, from grassroots workers to policymakers. PHEDM Tier-III focuses on equipping operational-level functionaries with the knowledge and skills to serve as crucial links between communities and higher authorities during emergencies. The training emphasized the importance of collaborating with key stakeholders and offered participants a platform to engage with experts at both the national and state levels. This inclusive approach enabled them to share experiences, exchange best practices, and address challenges, fostering mutual learning and collective growth.

The training was implemented in Bihar across four batches through a well-structured six-module package developed by national-level experts from NCDC, NIDM, CDC-India and other subject-matter experts. Following the completion of Tier-III trainings in Bihar, efforts were made to enhance the PHEDM-PDP training package. These modules provide a foundational understanding of PHEDM. They cover key topics such as the public health aspects of disasters, public health emergencies, their management, and the One Health Approach. The course also explored international and national frameworks related to PHEDM, including the International Health Regulations (IHR) 2005, World Health Organization (WHO) Obligations, the Sendai Framework, Sustainable Development Goals, and the Disaster Management Act 2005, among others.

The training focused on essential concepts like Public Health Emergency of International Concern (PHEIC), Emergency Operations Plan (EOP), Public Health Emergency Operations Centre (PHEOC), Incident Management System (IMS), Incident Response System (IRS), and Public Health Emergency Preparedness and Response at Points of Entry (PoE), addressed through interactive sessions. An additional half day was dedicated to the Mentor's session, as the mentor-mentee concept is a critical component for sustaining the programme. Overall, this initiative significantly strengthened the capacity of key stakeholders to respond effectively to public health emergencies and manage disaster scenarios. Participants noted that the training was highly relevant and valuable to their roles.

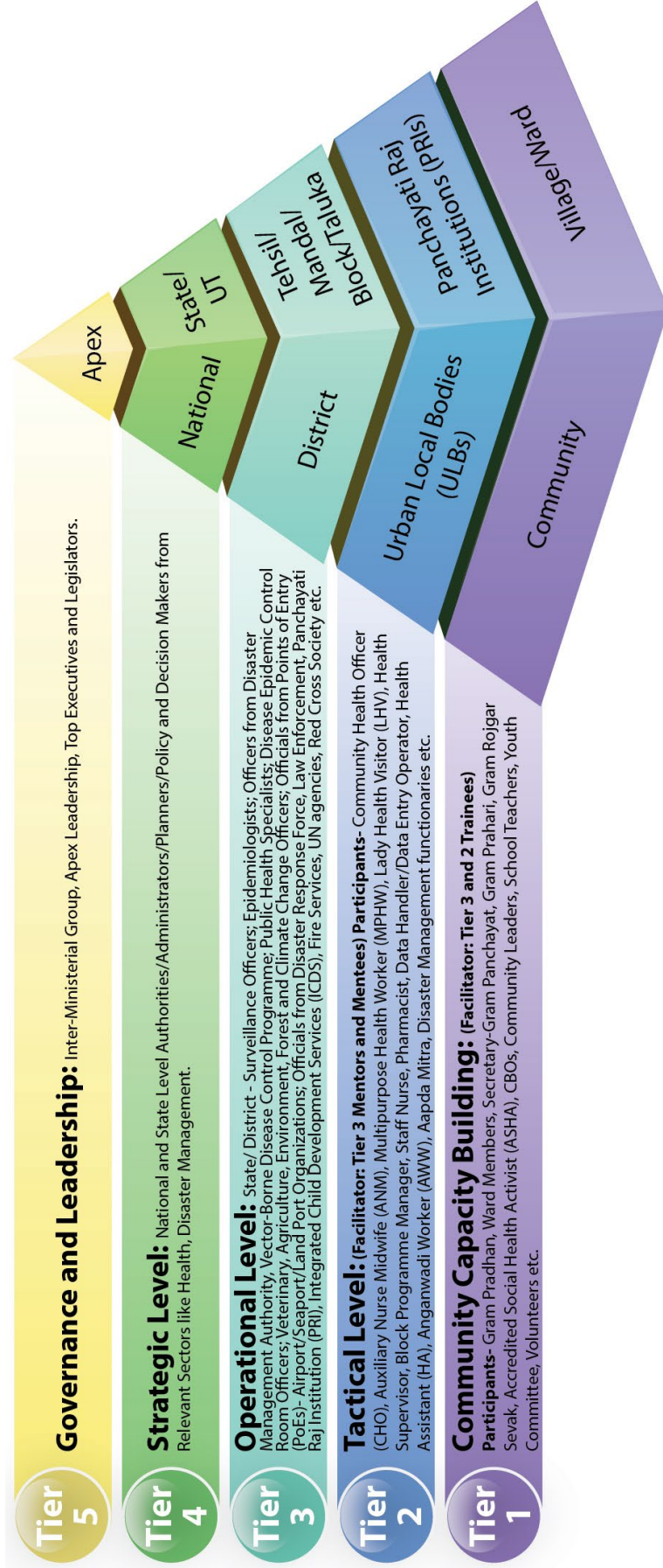


Figure 1: PHEDM Tiered Approach

As of August 2025, PHEDM-PDP Tier-III trainings have been conducted in 6 states. Trainings in Bihar state, covering all districts, were organized in 4 batches: 13 - 16 May 2025; 23 - 26 June 2025; 01 - 04 July 2025 and 04 - 07 August 2025. All together 181 participants, including 40 mentors and 141 mentees (district level officers from health, animal / veterinary department, disaster management, municipal corporations) were provided training in Patna by NCDC, NIDM, CDC-India, Health Society Bihar and other renowned subject matter experts.



2. Background-PHEDM Tier-III Training

Instances of Public Health Emergencies (PHEs) and disasters pose significant risks to public health, community infrastructure, and society. At the same time, these unexpected events provide critical learning opportunities, prompting evaluation of our workforce (staff), infrastructure (stuff), and policies, plans, and procedures (systems).

This training package has been conducted across six states, namely: Uttarakhand, Rajasthan, Maharashtra, Gujarat, Jharkhand, and Bihar. Recognising that public health emergencies and disasters are two sides of the same coin, often with one triggering the other, there was a clear need to train both systems as a unified entity.

The PHEDM Five-Tiered Capacity-Building Approach is an innovative initiative collaboratively designed, developed, and implemented by NIDM, NCDC, and CDC-India. It aims to build capabilities at all levels, ranging from local communities for tactical functions (Tier-I and II), to districts and states for operational components (Tier-III), and up to the strategic level for policymakers and decision-makers (Tier-IV and V). To strengthen operational-level capacity, the PHEDM-PDP Tier-III training package was created.

3. Objective-PHEDM Tier-III Training

The objectives of these PHEDM-PDP Tier-III trainings were to equip district-level participants with the following:

- Strengthen multi-sectoral, multi-disciplinary, and multi-layered coordination to manage public health emergencies and disasters.
- Enhance the state's capacity (primarily at district level) for risk mapping, prevention, preparedness, mitigation, response to, and recovery from public health emergencies and disasters using IMS/IRS applications, strengthening the 3S, i.e., Staff (human resource), Systems (plans, policies, and procedures), and Stuff (infrastructure) in their local context (Figure 2).
- Establishment of mentor–mentee framework.
- Acquaint with the Threat and Hazard Identification and Risk Assessment (THIRA)/ Risk communication concept and details.
- Provide a further understanding of key Public Health Emergency Operations Centre (PHEOC) infrastructure and information technology concepts.
- Provide the basic concepts of preparedness and response at Points of Entry (PoE) concerning PHEDM.
- Develop a mechanism between the mentor and mentee that appraises the mentors about PHEDM and discusses the roles and responsibilities of a mentor and strategies for effective mentoring.

Essential elements of PHEDM

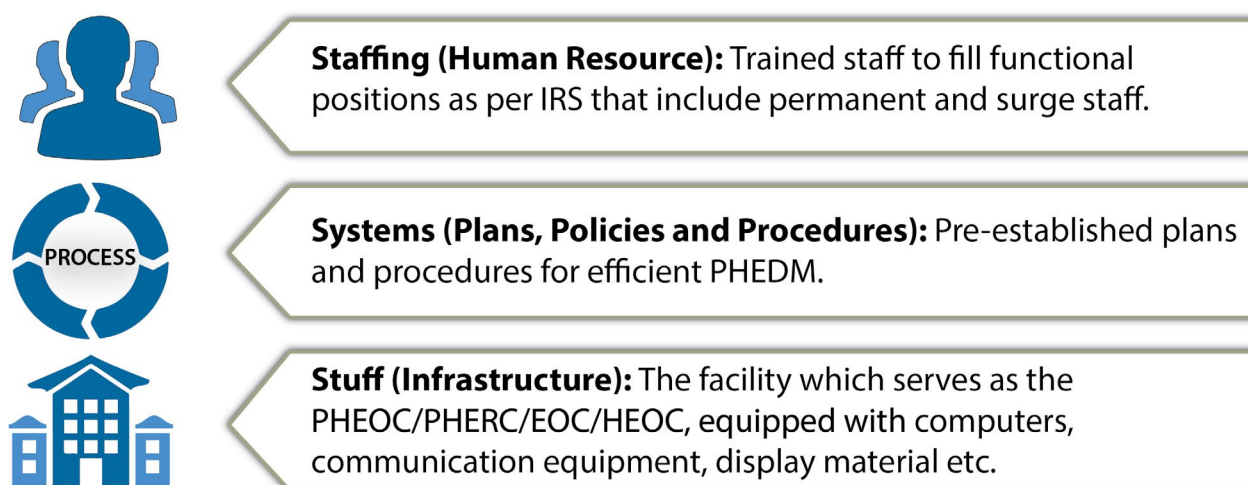


Figure 2: Three elements of PHEDM



4. A Step Toward Enhanced Emergency Preparedness and Response in Bihar

Bihar, located in eastern India, is an entirely landlocked state bordered by Nepal to the north, West Bengal to the east, Uttar Pradesh to the west, and Jharkhand to the south. Divided by the river Ganga into two unequal halves, Bihar's fertile plains are crisscrossed by major rivers like Kosi, Bagmati, and Gandak, which make the state highly productive agriculturally but also extremely disaster-prone.

Bihar is exposed to multiple risks - over 70% of its geographical area is flood-prone, nearly 30% faces recurring drought, and the entire state lies within earthquake-prone zones III, IV, and V. Cyclonic storms, high-speed winds, and fire hazards further compound its vulnerability. Frequent floods in North Bihar and droughts in the south severely impact agriculture, infrastructure, and livelihoods.

Bihar's dense population exacerbates the impacts of disasters, straining public health systems and essential services. The State Disaster Management Plan (SDMP) highlights a holistic and community-centered approach, emphasizing prevention, mitigation, preparedness, and capacity-building as critical elements for resilience. Institutional mechanisms like the State Disaster Management Authority (SDMA), District Disaster Management Authorities (DDMAs), and the State Emergency Operations Centre (SEOC) play pivotal roles in coordination, response, and recovery.

Public health emergencies and disease outbreaks remain significant challenges in Bihar. The state has experienced repeated episodes of Acute Encephalitis Syndrome (AES), Japanese Encephalitis, apart from vector-borne illnesses such as dengue and malaria in addition to diarrheas and food borne diseases. These outbreaks are often intensified by flooding, waterlogging, and inadequate sanitation, which disrupt access to healthcare and amplify transmission risks. Strengthening surveillance systems, rapid response mechanisms, and risk communication is critical to minimizing health impacts and ensuring coordinated action during such crises.

To address these challenges, the PHEDM Tier-III training was implemented in Bihar, focusing on operational-level functionaries. Conducted in four batches, this programme aimed to strengthen the capacity of key stakeholders across districts, enabling them to serve as vital links between communities and higher authorities. By fostering collaboration, sharing best practices, and equipping officials with technical knowledge, the initiative marks a significant step toward enhancing Bihar's preparedness and response to public health emergencies and disasters.



5. Strengthening Emergency Preparedness Across Bihar

The PHEDM Tier-III training programme in Bihar aims to build a robust emergency response system by equipping key officials with essential knowledge, skills, and coordination mechanisms to manage public health and disaster situations effectively. This initiative promotes interdepartmental collaboration and reinforces the state's overall preparedness framework.

- **Enhance emergency preparedness** by integrating into the Health Department, Disaster Management, and Animal Husbandry under a unified training framework.
- **Address region-specific challenges** by tailoring the training to the unique needs and circumstances of each district in Bihar.
- **Create a pool of trained officials** who understand the concept of Emergency Operations Centers (EOCs) and can serve as valuable resources during emergencies.
- Through focused training sessions, **enhance the skills and knowledge** of district-level officers in managing public health and disaster situations.
- **Provide a platform for cross-learning** among multi-sector district-level officers, allowing them to share experiences, best practices, and knowledge to improve response coordination.
- **Develop a pool of master trainers** who will cascade PHEDM training across the state through Tier-I and Tier-II initiatives under the guidance of the state government.



6. Participants (Target Audience)

The primary target group for this programme comprises key district-level officials responsible for emergency preparedness and response. These include officers from the Integrated Disease Surveillance Program (IDSP), the Disaster Management Department, and the Animal Husbandry Department, as well as municipal corporations, who play a vital role in detecting, managing, and mitigating public health emergencies and disasters. Local NGO representatives are also involved, supporting the state in responding to public health threats.

To ensure a multi-sectoral and comprehensive approach, each selected district must nominate three officials, one from each of the three departments, to participate in the training. This guarantees representation from public health surveillance, disaster risk management, and animal health sectors, fostering cross-sector coordination and collaboration during emergencies.

In addition to district-level officers, mentors from relevant institutions were engaged to guide and support participants. These mentors include:

- Faculty from Medical Colleges, offering expertise in epidemiology, clinical management, and public health response.
- Officials from the State Disaster Management Authority (SDMA), providing insights into disaster preparedness, response strategies, and risk mitigation.
- Experts from State Animal Husbandry Institutions, contributing critical knowledge on early detection of zoonotic diseases having epidemic potential for humans, livestock management, and veterinary public health.
- Subject Matter Experts (SMEs) specializing in emergency management, biological threats, and other relevant areas.



7. Training Tools

The Training Tools section outlines the comprehensive resources and methods used to deliver the PHEDM Tier-III programme effectively. It begins with the Training Agenda, which provides a structured schedule to guide the flow of activities throughout the programme. The Training Materials include presentations, reference documents, handouts, and case studies designed to support participant learning. Under the key Sessions/Modules Covered, the programme aimed to build foundational knowledge, along with Special Sessions on National and State-Level Initiatives that highlight current frameworks and strategies. To enhance engagement and practical understanding, Interactive and Practical Learning Activities such as group exercises, simulations, and scenario-based discussions are integrated. The programme also leverages Digital and Technological Tools to facilitate modern, technology-enabled learning experiences. Finally, Assessment Tools are employed to evaluate participant comprehension, skills development, and overall programme effectiveness. This multi-faceted approach ensures a well-rounded and impactful learning experience.

7.1 Training Agenda

The training agenda begins with a dedicated preliminary day for mentors and resource faculty to align on objectives, roles, and responsibilities for the training. This approach ensures clarity, coordination, and a shared understanding among facilitators. The agenda is continuously refined with input from earlier training and experience in managing public health emergencies to maximise its effectiveness and relevance for participants. A key component of the programme is the mentor's session, which emphasizes building a strong mentor-mentee relationship. This element is essential for sustaining the knowledge, skills, and practices gained during the training, ensuring long-term impact and ongoing capacity building. The objectives of this half-day session are to apprise the mentors to be able to:

- Comprehend the concept and principles underlying PHEDM.
- Demonstrate the knowledge and skills essential for fostering effective mentoring relationships.
- Elucidate the significance of mentorship within the context of PHEDM.
- Encourage self-reflection among mentors to facilitate their personal development as leaders.
- Examine the expectations placed upon mentors about PHEDM.

The comprehensive training programme implemented in each batch in Bihar state consisted of six well-structured modules, designed to provide participants with a

foundational understanding of key principles and concepts of PHEDM. The emphasis is on strengthening the human capacity to respond effectively to and mitigate the impacts of public health emergencies and disasters.

The training also incorporated a range of activity-based tabletop exercises, group activities, and supplementary sessions to reinforce practical learning and teamwork. Highlights included an NDRF demonstration, group exercises on Flood Action Plans, District Disaster Management Plans, and public health emergencies related to conflicts, including border health issues. Participants engage with case studies tailored to public health emergencies and disaster events specific to their districts and state, promoting contextual understanding and application. Interactive components such as an IRS tabletop exercise further enhance decision-making, coordination, and problem-solving skills. To track progress and ensure learning outcomes, the programme uses multiple evaluation methods: Kahoot quizzes after each session, training evaluations via feedback, and comprehensive pre- and post-training assessments. This combination of interactive learning and systematic evaluation ensures an engaging and impactful training experience.

7.2 Training Materials

Three comprehensive guides have been developed to support the PHEDM Tier-III training programme. These guides ensure structured learning, effective facilitation, and practical application of emergency preparedness concepts. They include a Mentor's Guide, a Facilitator's Guide (Parkash et al., 2022a), and a Participant's Guide (Parkash et al., 2022b) (Figure 3 – 5).

The PHEDM-PDP training guide has undergone continuous review and refinement, incorporating learnings, feedback, and suggestions from each Tier-III training conducted across different states. This iterative process ensures that the training materials remain relevant, practical, and aligned with the evolving emergency preparedness and response needs.

The Participant's Guide and Facilitator's Guide for the PHEDM-PDP Tier-III training were jointly developed and published by the NIDM, NCDC, and CDC-India. These guides serve as comprehensive learning resources and are freely accessible to the public through the NIDM website at the following link:

- Public Health Emergency and Disaster Management- Professional Development Programme (PHEDM-PDP) Participant's Guide

Link: https://nidm.gov.in/PDF/Modules/Book_Participating.pdf

- Public Health Emergency and Disaster Management- Professional Development Programme (PHEDM-PDP) Facilitator's Guide

Link: https://nidm.gov.in/PDF/Modules/Book_Facilitator%20Guide.pdf

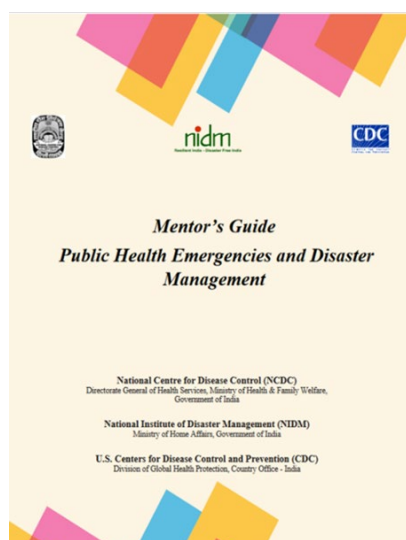


Figure 3: Mentor's Guide

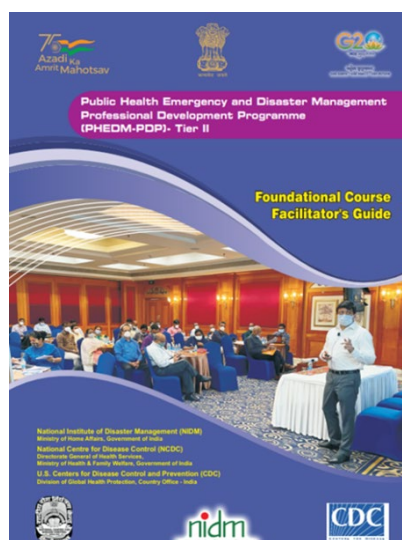


Figure 4: Facilitator's Guide

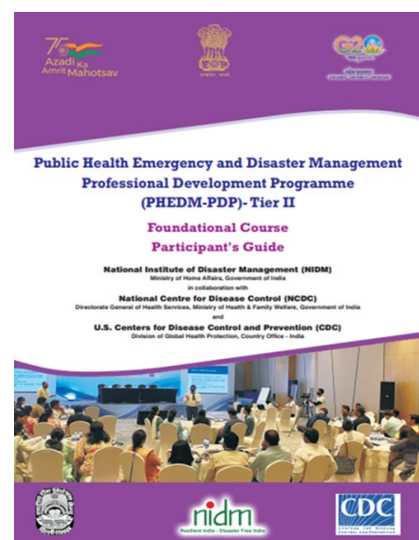


Figure 5: Participant's Guide

To further enhance the training experience, the PHEDM Tier-III guides have been revised and updated to incorporate new insights, emerging best practices, and evolving public health and disaster management strategies. The revised training modules will be published soon, ensuring they continue providing high-quality, evidence-based guidance for capacity-building efforts across states.

7.3 Sessions/Modules Covered

The PHEDM Tier-III training programme is designed to enhance the capacity of district-level officials in public health emergency preparedness and disaster management through a structured combination of theoretical learning, interactive sessions, and hands-on exercises. The training covers a range of critical modules, including emergency response frameworks, incident management systems, risk communication, psychosocial aspects, and international health regulations. In addition to these core components, specialised sessions on national and state-level initiatives provide participants with insights into ongoing public health and disaster response programmes. The training incorporates tabletop exercises, case studies, Cardiopulmonary Resuscitation (CPR) demonstrations, and team-building activities to ensure practical skill development, allowing participants to apply learned concepts in real-world scenarios. Integrating multi-sectoral collaboration and experiential learning, the programme aims to build a robust network of trained professionals equipped to respond effectively to public health emergencies and disasters at the district and state levels.

7.3.1 Core Training Modules

During the PHEDM Tier-III training, structured modules are covered to provide participants with a comprehensive understanding of public health emergency preparedness and disaster management. These modules focus on equipping district-level officials with the necessary knowledge, skills, and frameworks to respond to emergencies effectively.

- **Module I:** Overview of Public Health Emergency and Disaster Management (PHEDM)
- **Module II:** Principles of PHEDM and its Applications
- **Module III:** Public Health Emergency Operations Centre (PHEOC)
- **Module IV:** Organizational Model for Managing Response
- **Module V:** Risk Communication and Community Engagement (RCCE)
- **Module VI:** Psychosocial Aspects of PHEDM

7.3.2 Special Sessions on National and State-Level Initiatives

In addition to the core modules, several focused sessions were conducted to sensitise participants on key national and state-level emergency response initiatives:

- One Health Approach in Public Health Emergencies & Disaster Management
- Role of the National Disaster Response Force (NDRF) in Disaster Management
- Case Scenario on District Disaster Management Plan (DDMP) and Border conflicts
- State-Level PHEDM Status Updates—Presented by officials from the Health Department, Disaster Management Authority, and Animal Husbandry Department, these updates highlight the current preparedness and response landscape in their respective states.

7.3.3 Interactive and Practical Learning Activities

The training focused on interactive group exercises and hands-on learning sessions to enhance practical understanding and skill development. These included:

- **Tabletop Exercises** - Simulated emergency scenarios requiring participants to develop response strategies collaboratively.
- **Case Studies Related to Participating Districts** - Context-specific analyses to help participants apply PHEDM concepts in real-life situations.
- **Incident Response System (IRS) Tabletop Exercise** - Practical application of IRS principles in managing disaster response.
- **Team Building Group Exercises** - Activities designed to foster participant collaboration and coordination.
- **CPR and Basic Life-Saving Techniques** - Hands-on demonstrations by professionals to equip participants with essential emergency medical skills.

- **National Disaster Response Force (NDRF) Demonstration** - Demonstrations on basic life-saving skills and disaster response and rescue operations.
- **Role Plays** - Simulated scenarios where participants act out roles to practice decision-making and coordination under pressure.
- **Group Discussions and Presentations on Given Topics** - Collaborative discussions followed by presentations to explore and share solutions on relevant topics.

7.3.4 Digital and Technological Tools

a. Kahoot Quizzes

Kahoot quizzes are conducted at the end of each module to enhance participant engagement and reinforce learning. These quizzes assess participants' understanding of key concepts and ensure the material is retained. Kahoot quizzes encourage active participation and create a competitive yet fun atmosphere by incorporating interactive and gamified elements.

After each module, the three highest-scoring participants are awarded small rewards to motivate attentiveness and foster a sense of competition. This encourages participants to stay focused and strive for excellence throughout the training. After the training, the cumulative scores of all participants are calculated, combining their performance across all quizzes. The top three participants with the highest total scores are honoured with trophies, recognizing their dedication and achievement throughout the training. This gamified approach boosts engagement and fosters a sense of accomplishment and camaraderie among participants. Some of the advantages of using Kahoot quizzes were as follows:

- **Enhancing Engagement & Attention:** Kahoot quizzes were incorporated into the training to make learning interactive and enjoyable. The gamified approach maintained participants' attentiveness, reinforced key concepts, and encouraged active participation.
- **Real-Time Feedback & Knowledge Reinforcement:** The quizzes provided instant feedback on participants' understanding, allowing facilitators to identify areas needing further clarification and adjust discussions accordingly.
- **Encouraging Participation & Motivation:** To boost enthusiasm, small prizes were awarded to the top three scorers after each Kahoot quiz. At the end of the training, cumulative scores were used to determine the top performers who received trophies in recognition of their achievements.
- **Promoting Healthy Competition & Peer Learning:** Kahoot's competitive nature fostered a fun learning environment, motivating participants to perform better while also encouraging peer discussions, knowledge-sharing, and collaborative learning.

b. Video Demonstrations related to PHEDM

Relevant videos of NCDC and NIDM were showcased during the training to enhance the learning experience. These videos were strategically played during spare time, before the training began, during tea breaks, and at other suitable intervals throughout the day. Participants can benefit from visual and practical examples that complement the training content by incorporating videos into these moments. The videos cover various topics related to public health emergencies, disaster management practices, and real-world case studies, providing participants with additional insights and reinforcing key messages.

7.3.5 Assessment Tools

a. Pre-training Assessment and Post-training Assessment

A pre-training assessment is conducted for all participants before the training begins. This assessment measures participants' knowledge and understanding of PHEDM concepts. However, individual results are not disclosed or evaluated separately. Instead, aggregate pre-training assessment data is analyzed to identify areas where participants may need further focus or clarification. This information helps resource persons tailor the training content, ensuring that the sessions address knowledge gaps and improve learning outcomes.

Following the completion of the training, a post-training assessment is administered to evaluate participants' progress and assess the training's effectiveness. The post-training assessment helps to gauge how much knowledge has been gained and whether the training objectives have been met. At the end of the programme, the results are compiled into a batch-wise summary, which is shared during the summary and way forward session. This aggregate assessment provides valuable insights into participants' overall progress and highlights areas for continued improvement or future training initiatives.

b. Feedback from Participants

After the training, feedback is gathered from participants to assess various aspects of the programme, including its content, delivery, and logistics. Participants are asked to provide input on the technical aspects of the training, such as the relevance and clarity of the modules, the effectiveness of the teaching methodologies, and the usefulness of the training materials.

In addition, feedback is collected on the logistics, including the venue, accommodation, transportation, and overall comfort and convenience. This input is crucial for identifying areas for improvement in future training sessions.



8. Methodologies

The methodologies used throughout the training programme are designed to provide a well-rounded learning experience, combining theoretical knowledge with practical applications. The approach is divided into three phases: pre-training, during training, and post-training. Each phase serves a unique purpose: ensuring that participants benefit as much as possible from the programme.

8.1 Pre-Training

The pre-training phase played a crucial role in ensuring the smooth execution of the PHEDM-PDP Tier-III training. This phase involved extensive planning, stakeholder engagement, and technical groundwork to enhance the training's relevance and effectiveness.

8.1.1 Preparatory Meetings of Organizing Team

- A series of preparatory meetings was conducted with key stakeholders, including the state of Bihar, NCDC, NIDM, CDC India, and implementing partners. These meetings focused on the technical aspects of the training, including preparing an in-depth overview of disease and disaster scenarios specific to the selected states through situation analysis.
- This collaborative process facilitated the creation of relevant and tailored case studies, offering participants hands-on experience and enabling them to relate training content to real-world situations.
- In addition, administrative and logistical details were thoroughly discussed to ensure the smooth and seamless execution of the training, covering aspects like venue arrangements, resource management, and participant coordination.

8.1.2 Pre-Training Technical Activities

Before the training, several technical activities were conducted to ensure a comprehensive, context-specific approach. These activities included:

- **Situational Analysis & DDMP Review:** A detailed review of the District Disaster Management Plans (DDMPs) and existing frameworks for managing public health emergencies was conducted. This helped identify priority hazards, multi-sectoral coordination, strengths, gaps, and areas for improvement.
- **Disease & Disaster Overview:** Data from the IDSP-IHIP portal prepared a district-specific overview of prevalent disease outbreaks and disaster risks for each training batch. This analysis facilitated informed discussions among resource faculty, mentors, and participants, ensuring that training content was aligned with real-world challenges.

- **Expert Observations & Feedback:** Resource persons, mentors, and participants were encouraged to provide observations and feedback on the stakeholder engagement in DDMPs in addressing disease outbreaks and disasters in their respective districts.
- **Public Health Integration in DDMPs:** Inputs were collected on the public health components of existing DDMPs to assess their effectiveness, identify gaps, and explore ways to enhance their alignment with public health emergency management.
- **Plan Strengthening & Alignment:** Recommendations were made to improve DDMPs by ensuring their alignment with other national and state-level initiatives focused on health disaster management, enhancing their effectiveness in emergency preparedness and response.

8.2 During the Training

Preparatory meetings, mentors session, core training modules, and special sessions on NDRF, the One Health approach, and group discussions were conducted as part of the training. The core training modules, special and interactive sessions are discussed in detail in sections 7.3.1 to 7.3.3.

8.2.1 Preparatory Meetings for fine-tuning administrative and technical areas of the training

- As part of the PHEDM Tier-III training, resource faculty, mentors, and state representatives held a half-day preparatory meeting to finalise logistics and technical sessions according to the agenda and ensure uniformity.
- Resource persons were oriented on state- and district-specific emergencies and the core competencies that should be emphasised in their training modules.
- State officials assigned mentors to their districts for better guidance and coordination.
- The session focused on defining roles, effective time management, competency-building strategies for skill enhancement, and providing final updates before the training.
- Discussions were conducted with hotel/venue management regarding the training programme's accommodation, catering, and logistical arrangements.

8.2.2 Strengthen Mentor-Mentee Relationships

- Mentors were paired with district-level mentees to provide technical guidance and foster a proactive mentor-mentee relationship during emergencies and disasters.

- Mentors were assigned as session coordinators and designated to participant groups to enhance engagement and build strong connections with their mentees.
- Participants were divided into groups to encourage interaction, and a rotating seating arrangement throughout the training allowed everyone to engage with different peers.
- Mentors and mentees participated in group exercises based on carefully designed case scenarios reflecting state-specific issues. Each group was tasked with developing a detailed management plan and presenting its strategy during the exercise.
- State identified and assigned the mentors and mentees for time-bound documentation of the case studies with inputs from all group members.
- On first day of each batch of training, a Mentors session was conducted to enhance the mentoring capabilities of selected mentors from various medical colleges across Bihar. The session focused on key areas such as the Art of Mentoring, essential Attributes of Effective Mentors, and the Role of Mentors in successfully implementing PHEDM Tier-III training. In addition to these tentative agendas, situation analysis, and planned scenario-based case studies, the session shared experiences from implementing PHEDM Tier-III trainings in other states, providing valuable insights and best practices. This session was designed to equip mentors with the necessary skills and knowledge to effectively guide participants, foster learning, and contribute to the overall success of the training programme in Bihar.

8.2.3 Innovations and Inclusions to make sessions more interactive

a) Experience sharing

Resource persons from states where training had been completed, were invited to share their experiences and lessons learned from state-level outbreak investigations.

b) Inject Group Discussions and Tabletop Exercises

Participants engaged in guided discussions to share ideas and enhance their understanding of public health challenges during disasters. Through peer-to-peer learning, they exchanged experiences and strategies for effectively addressing these challenges. Additionally, participants worked through simulated emergency scenarios, allowing them to practice problem-solving and decision-making in real-time. These practical exercises strengthened their ability to respond quickly and effectively during emergencies, fostering greater confidence and preparedness.

c) Lectures, Relevant Case Scenarios and Role-Playing Activities

Experts delivered easy-to-follow lectures on key topics, providing participants with a solid

foundation in public health emergency management. To enhance understanding, case scenarios drawn from actual events and examples of past public health emergencies and disasters were introduced. These scenarios focused on managing public health during and after such events, highlighting successful strategies and areas for improvement.

In addition, resource faculty incorporated on-the-spot role-playing exercises in which participants assumed roles such as health officers, disaster managers, emergency responders, and communication officers to interact with media during emergencies. This interactive approach gave them firsthand insight into the responsibilities, challenges, and decision-making processes involved in managing emergencies. Below are examples of mock exercises conducted during the training.

d) Relevant videos

Videos from NCDC and NIDM were featured during free moments of the training to enrich the learning experience [refer section 7.3.4(c) for more details].

e) Demonstration by NDRF

A special session was organized for NDRF team to demonstrate essential evacuation and first aid skills (Figure 6). This exercise played a vital role in helping participants familiarize themselves with key stakeholders and first responders, who are critical considerations in emergency planning.



Figure 6: Glimpse of NDRF Session

The NDRF team provided a brief overview of the organization's mandate, structure, roles, and responsibilities, along with examples of disaster responses they have managed. Participants received hands-on training in Cardiopulmonary Resuscitation (CPR) and the proper use of fire extinguishers (Figure 6). Additionally, the team shared basic life-saving techniques that can be applied during emergencies, enhancing participants' practical readiness for real-world situations.

f) Pre- and Post-Training Assessment

- The individual pre-training assessment results of participants are neither used for personal assessment nor displayed during the training. Instead, they assist facilitators in identifying areas that need additional attention and in tailoring discussions accordingly.
- The pre-training assessment analysis allows trainers to evaluate participants' baseline knowledge, enabling them to adapt training sessions effectively to bridge knowledge gaps (Figure 7).
- The post-training assessment results offer valuable insights into overall knowledge enhancement and help measure the effectiveness of training methodologies.
- Aggregate findings from both pre- and post-training are shared with programme coordinators and stakeholders to guide ongoing improvements in training design.
- These assessments also highlight specific thematic areas where further capacity-building efforts may be required in future sessions.



Figure 7: Pre-Training Assessment in Progress

g) Module-wise Knowledge Assessment

Kahoot quizzes were conducted after each module to engage participants actively. Further details are provided in Section 7.3.4.

h) Briefing and Debriefing

The organising team held daily briefings and debriefing meetings to ensure effective coordination and smooth execution of the training programme. Morning briefings focused on planning the day's activities, assigning responsibilities, and addressing logistical requirements, while evening debriefings reviewed progress, identified challenges, and collected feedback for improvement. These sessions facilitated real-time adjustments and enhanced the training's overall efficiency.

i) Participant Feedback

Participant feedback was collected at the end of the training to evaluate its effectiveness and relevance (Figure 8). Feedback was gathered in person and through Google Forms to capture participants' insights comprehensively. Input on the sessions and resource persons was crucial for identifying areas of improvement and ensuring the training remains relevant and tailored to participants' needs. This feedback will also be instrumental in refining future training programmes to achieve greater impact.



Figure 8: Participants giving Feedback during Training

j) Certificates for Training Completion

Certificates were awarded to participants who attended over 90% of the training, recognising their commitment and active participation in enhancing their emergency management skills.

k) Green Certificate

During the training programme, distinguished guests and resource persons were honoured with E-Tree Certificates, symbolising a commitment to environmental sustainability and a healthier, safer future. Each E-Tree Certificate represents a thicket of five trees planted in the recipient's name at Ram Bhoomi Ayodhya, Uttar Pradesh, India. These trees are geotagged, allowing recipients to track their contribution and visualise their planted trees remotely through Google Maps. This initiative offsets carbon footprints and reinforces the importance of sustainable practices and environmental conservation.

8.3 Post Training

a. Hotwash

A hotwash meeting was conducted with NCDC, NIDM, the state authorities, CDC-India, and implementing partners to review the training. This session focused on what worked well, areas for improvement, challenges encountered during the training, and strategies to mitigate them. Based on the feedback gathered, the training modules will be revised in consultation with NCDC, NIDM, and CDC-India to enhance future sessions.

This training approach is designed to make learning practical and effective. By integrating review sessions, discussions, real-world examples, and hands-on activities, participants gain essential skills to improve disaster preparedness and protect public health.

b. Comprehensive report of PHEDM tier-III training in Bihar

After the successful completion of all four batches of PHEDM Tier-III training in Bihar, a comprehensive report has been prepared to document the outcomes, key insights, and lessons learned from the sessions. The report presents a detailed overview of training activities, participant feedback, and the effectiveness of various modules. It further highlights best practices, challenges faced, and recommendations for enhancing future training programmes.

9. Venues and Schedule of PHEDM Tier-III Trainings in Bihar

The PHEDM-PDP Tier-III Trainings were conducted in Patna, Bihar, in four batches (Figure 9), and the details are as follows:

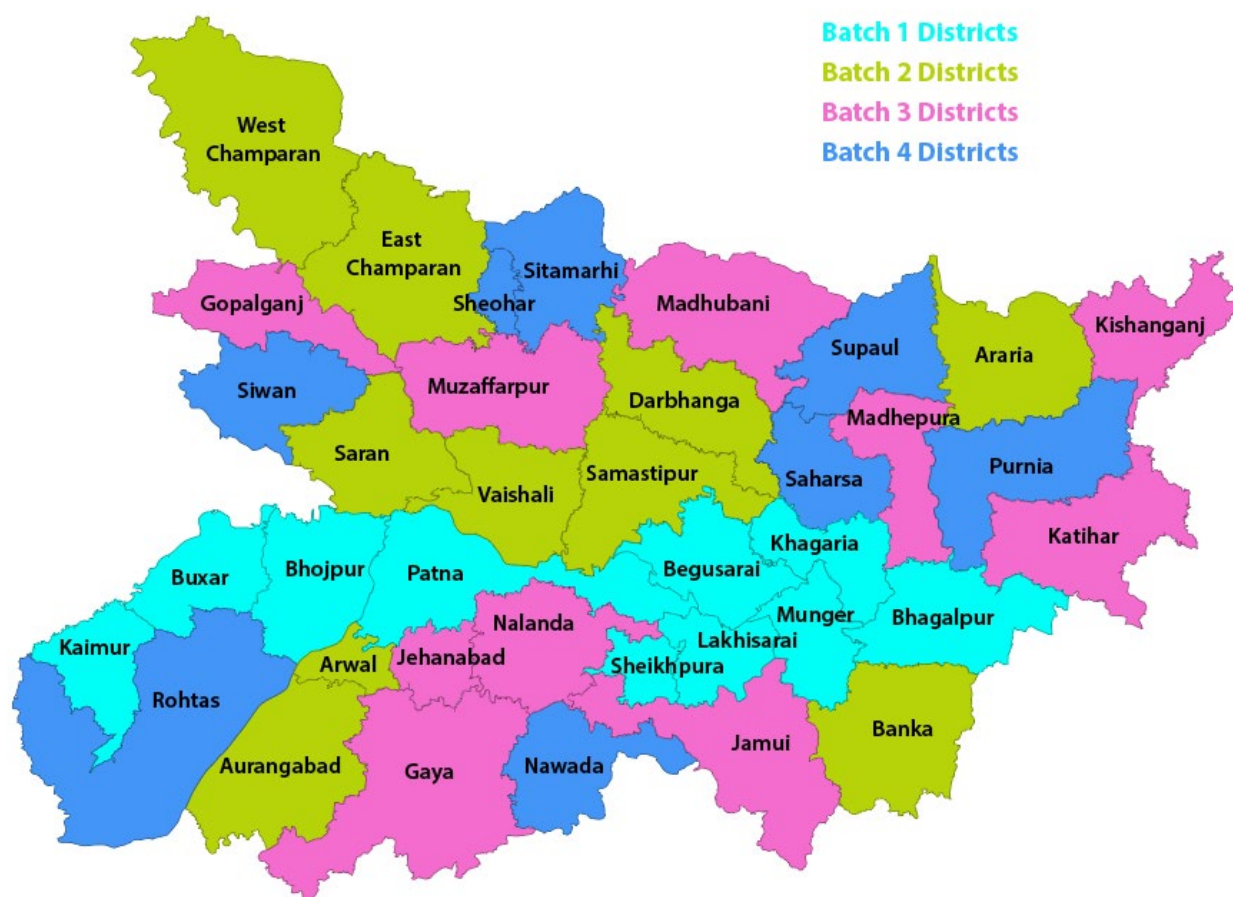


Figure 9: Map of Bihar State showing districts covered

Batch No.	Dates of the Training	Location of the Training	Names of the District
1.	13 – 16 May 2025	Patna, Bihar	Begusarai, Bhagalpur, Bhojpur, Buxar, Kaimur, Khagaria, Lakhisarai, Munger, Patna and Sheikhpurai.

Batch No.	Dates of the Training	Location of the Training	Names of the District
2.	23 – 26 June 2025	Patna, Bihar	Samastipur, Saran, Vaishali, Araria, Arwal, Aurangabad, Banka, West Champaran, Darbhanga, East Champaran
3.	01 – 04 July 2025		Gaya, Gopalganj, Jehanabad, Jamui, Katihar, Kishanganj, Madhepura, Madhubani, Muzaffarpur and Nalanda
4.	04 – 07 August 2025		Nawada, Purnia, Rohtas, Saharsa, Sheohar, Sitamarhi, Siwan and Supaul

10. Batch 1: Patna (13 – 16 May 2025)

The first batch was conducted in Patna, Bihar, covering ten districts: Begusarai, Bhagalpur, Bhojpur, Buxar, Kaimur, Khagaria, Lakhisarai, Munger, Patna and Sheikhpura.

A total of 56 participants (including 11 mentors) from 10 districts from various departments, such as Integrated Disease Surveillance Programme (IDSP) Units, Animal Husbandry, Disaster Management, Nagar Nigam, Veterinary Colleges, and Medical Colleges, participated (Figure 10) (Annexures I and II).



Figure 10: Group Photo of Batch-1

On 13 May 2025, a Preparatory Operations Meeting (Prep Op) was held in the forenoon at Patna, Bihar as discussed in section 8.2.1 (Figure 11). In the afternoon, a Mentors session was conducted for selected mentors from various medical colleges with objective as mentioned in section 8.2.2. From 14 to 16 May 2025, the training programme covered core modules and other technicals sessions as per agenda provided in annexure VII.



Figure 11: Glimpse of Preparatory Meeting and Mentors Session

The sessions were graced by eminent resource persons from NCDC, including Dr. Himanshu Chauhan, Additional Director, NCDC and Head, IDSP, NCDC; Dr. Simmi Tiwari, Joint Director, Centre for One Health; and Dr. Niraj Kumar, Consultant, IDSP, NCDC. Officials from CDC–India, namely Dr. Runa Hatti Gokhale, Program Director, DGHP, CDC-India, and Dr. Rajat Garg, Public Health Specialist, CDC–India, also participated as resource persons. National-level subject matter experts - Dr. Sujeet K. Singh, Distinguished Public Health Expert and Former Director, NCDC, MoHFW, GoI; Dr. Muzaffar Ahmad, Former Member, NDMA, GoI; Dr. Jugal Kishore, Professor and Former Head, VMMC & SJH and Dr. Ravishankar Singh, Regional Director, ROHFW, Patna, GoI also joined the training. In addition, state-level resource persons, including Dr. A. K. Shahi, State Surveillance Officer, IDSP, Bihar; Dr. Alka Sharma, Former Joint Director (Disaster Management), DMHS, Govt of Rajasthan; and Dr. Ragini Mishra, State Epidemiologist, SHSB–IDSP, Bihar, also contributed to the training (Annexures III - V) (Figure 12).

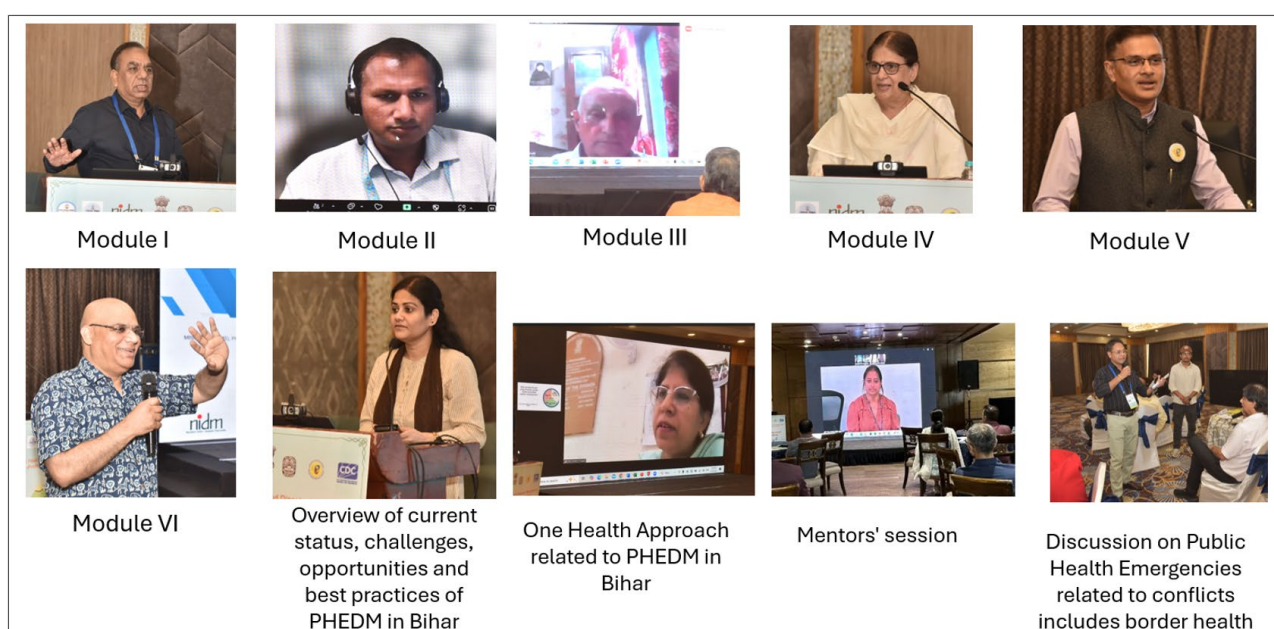
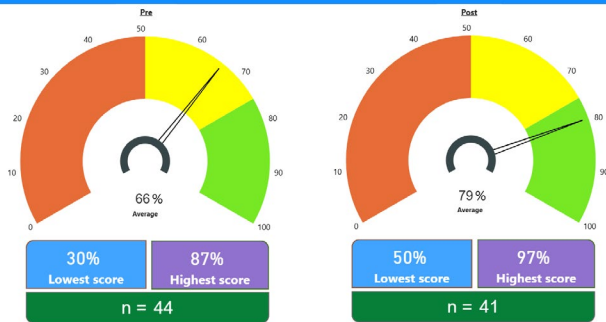


Figure 12: Glimpse of training sessions and respective resource persons

A group discussion on Public Health Emergencies During Conflicts and Cross-Border Threats was conducted during the training. The session highlighted the growing complexity of public health emergencies arising from armed conflicts, natural disasters, and cross-border population movements, and their profound impact on already fragile health systems. The detail summary of the group discussion is presented in Annexure-VIII. During the training programme, structured group activities were undertaken wherein participants were divided into four groups, and each group was assigned a unique scenario representing public health emergencies and disaster situations prevalent within the state. Detail report submitted by participants are annexed in annexure X.

The figure below illustrates participants' overall pre-training and post-training assessment scores of batch-1, demonstrating a significant improvement in knowledge acquisition (Figure 13).

Overall: Pre and Post-Course Assessment



Category wise Pre and Post Course Assessment

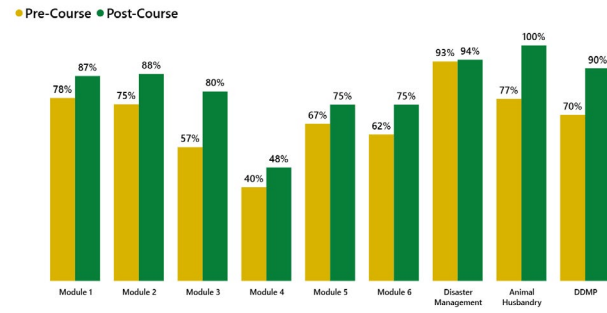


Figure 13: Pre- and Post-Training Assessment of Batch-1

11. Batch 2: Patna (23 – 26 June 2025)

The second batch of the PHEDM-PDP Tier-III Training was held in Patna, Bihar, from 23 – 26 June 2025. It included ten districts: Samastipur, Saran, Vaishali, Araria, Arwal, Aurangabad, Banka, West Champaran, Dharbhanga, and East Champaran. 41 participants, including 05 mentors from health, animal husbandry, disaster management, medical college and veterinary colleges, participated in the training (Figure 14) (Annexures I and II, respectively).



Figure 14: Group Photo of Batch -2

On 23 June 2025 preparatory meeting was held for PHEDM faculty, resource persons, and state organizers was held (Figure 15). In the afternoon sessions, mentor's session was held for Batch-2 mentors. The sessions were supported by a diverse group of eminent experts and resource persons from national institutions and partner organizations. Representation from NIDM included Prof. Surya Prakash, Former Head, GMRD, CBRN, Industrial and Cyber DRR Division, NIDM, MHA, Gol. Experts from NCDC comprised Dr. Sanket Kulkarni, Joint Director, IDSP; Dr. Meera Dhuria, Joint Director and Head, NCD Division; Dr. Simmi Tiwari, Joint Director, Centre for One Health; and Dr. Niraj Kumar, Consultant, IDSP, NCDC, MoHFW, Gol. CDC–India was represented by Dr. Rajat Garg, Public Health Specialist. National-level experts who contributed to the training included Dr. Sujeet K. Singh, Distinguished Public Health Expert and Former Director, NCDC, MoHFW, Gol; Dr. Muzaffar Ahmad, Former Member, NDMA, Gol; Dr. Jugal Kishore, Professor and Former Head, VMMC & SJH; Dr. Ravishankar Singh, Regional Director, ROHFW, Patna, Gol; Dr. Bimlesh Joshi and Dr. Sujata Singh, Assistant Directors, Health Directorate, Govt. of Uttarakhand. In addition, state-level experts, including Dr. A. K. Shahi, State Surveillance Officer, IDSP, Bihar; Dr. Ragini Mishra, State Epidemiologist, SHSB–IDSP, Bihar; and Mr. Deepak Kumar, Senior Research Officer, BSDMA, Government of Bihar, also participated in the sessions (Figure 16).



Figure 15: Glimpse of Preparatory Meeting and Mentors session



Figure 16: Glimpse of Training session in Batch-2

The 9th Battalion of the National Disaster Response Force (NDRF) conducted a mock drill to further equip them with essential skills (Figure 17). This drill covered first aid, Cardiopulmonary Resuscitation (CPR), and evacuation techniques during emergencies and disasters.



Figure 17: NDRF session in Batch-2

The training included group-based exercises in which participants were systematically organized into four groups, with each group provided a separate scenario aligned with state-specific public health emergency and disaster contexts (annexure X). During the training, a group discussion was held on the District Disaster Management Plan (DDMP), during which participants deliberated on departmental awareness, coordination mechanisms, preparedness, resource sharing, information management, post-disaster recovery, and key measures required to strengthen inter-departmental collaboration. The details summary of group discussion is presented in annexure IX.

The figure below presents participants' overall pre- and post-training assessment scores, showcasing a substantial improvement in knowledge acquisition (Figure 18).

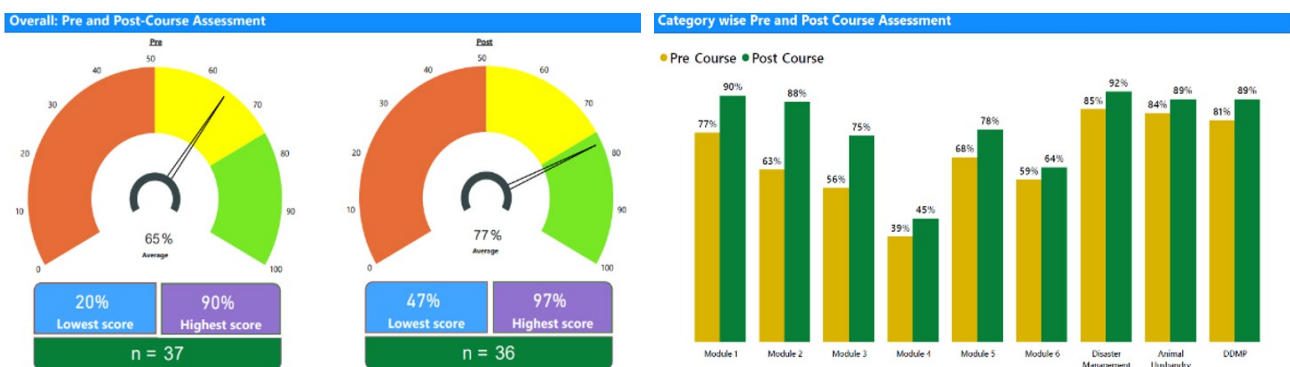


Figure 18: Pre and Post-Training Assessment of Batch-2

12. Batch 3: Patna (01 – 04 July 2025)

The third batch of the PHEDM-PDP Tier-III Training was also conducted in Patna, Bihar, from 01 – 04 July 2025. Participants from 10 districts, namely Gaya, Gopalganj, Jehanabad, Jamui, Katihar, Kishanganj, Madhepura, Madhubani, Muzaffarpur and Nalanda, participated in the training. A total of 46 participants attended, including 13 mentors and 33 mentees representing the departments of Health, Animal Husbandry, Disaster Management, Medical colleges, etc (Figure 19; Annexures I and II).



Figure 19: Group Photo of Batch -3

On 01 July 2025, a Preparatory Meeting (Prep Op) took place in the forenoon, bringing together PHEDM faculty and resource persons. From 02 – 04 July 2025, PHEDM-PDP Tier-III training was conducted. The sessions were supported by eminent experts and resource persons from national institutions and partner organizations. Representation from NCDC included Dr. Pranay Verma, Joint Director, IDSP; Dr. Simmi Tiwari, Joint Director, Centre for One Health; and Dr. Niraj Kumar, Consultant, IDSP, NCDC, MoHFW, Government of India. CDC–India was represented by Dr. Rajat Garg, Public Health Specialist. National-level experts who contributed to the training included Dr. Sujeet K. Singh, Distinguished Public Health Expert and Former Director, NCDC, MoHFW, Government of India; Dr. Muzaffar Ahmad, Former Member, NDMA, Government of India; Dr. Jugal Kishore, Professor and Former Head, VMMC & SJH; and Dr. Prashant Shrivastava, Assistant Professor, Central Institute of Psychiatry (CIP), Ranchi, Jharkhand. In addition, state-level experts, including Dr. A. K. Shahi, State Surveillance Officer, IDSP, Bihar, and Dr. Ragini Mishra, State Epidemiologist, SHSB–IDSP, Bihar, also participated in the sessions. A snapshot of the resource persons and their respective sessions is presented in Figure 20, while the detailed list of dignitaries and resource persons is provided in Annexures III and V.

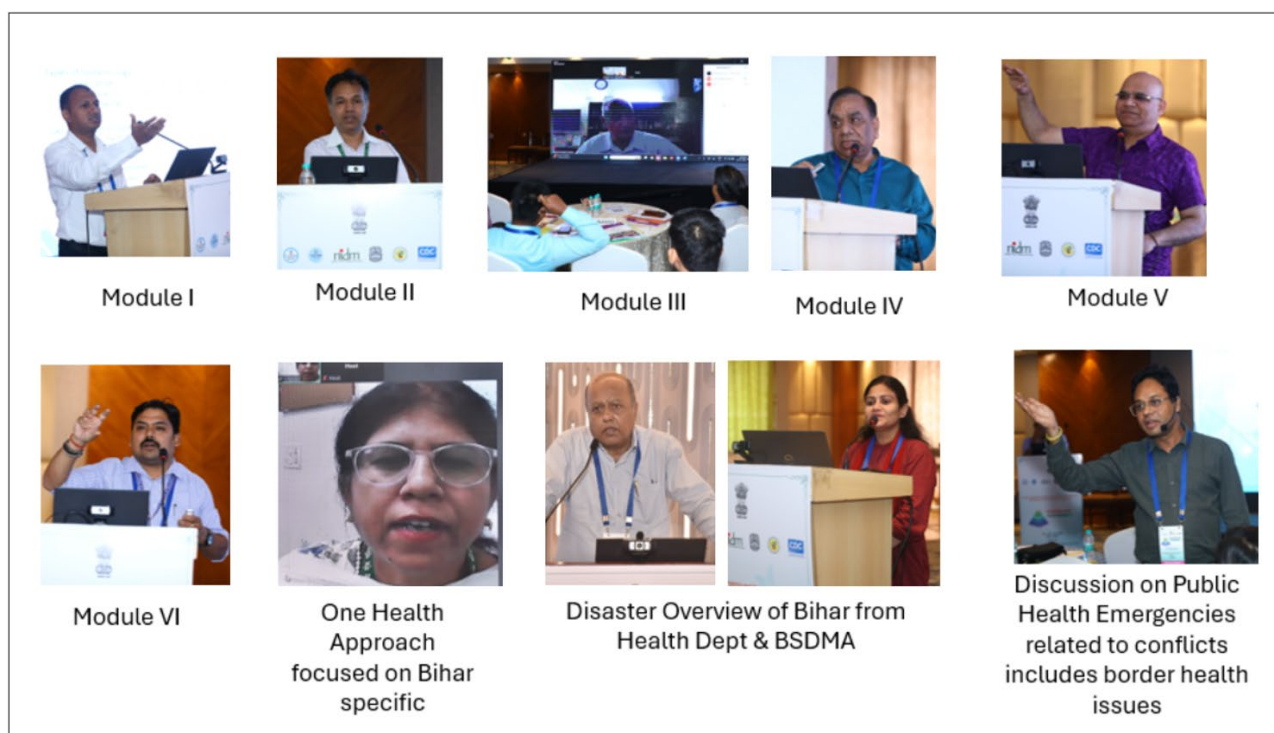


Figure 20: Resource faculties with their respective session

During the training, special session on Public Health Emergencies During Conflicts and Cross-Border Threats (annexure VIII) and group activity were also conducted where participants were divided into four groups, and each group was provided with separate scenarios of public health emergencies and disaster situations that prevail in the state (annexure X). The figure below presents participants' overall pre- and post-training assessment scores, highlighting a notable improvement in knowledge acquisition (Figure 21).

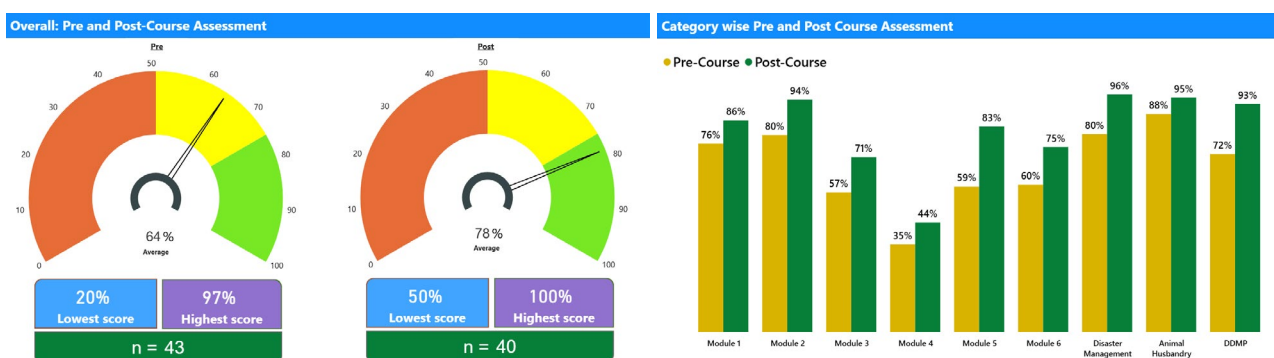


Figure 21: Overall: Pre and Post-Training Assessment of Batch-3

13. Batch 4: Patna (04 – 07 August 2025)

The fourth batch of the PHEDM-PDP Tier-III Training was also conducted in Patna, Bihar, from 04 – 07 August 2025. Participants from 08 districts, namely Nawada, Purnia, Rohtas, Saharsa, Sheohar, Sitamarhi, Siwan and Supaul, participated in the training. A total of 38 participants attended, including 11 mentors and 27 mentees representing the departments of Health, Animal Husbandry, Disaster Management, Medical colleges, etc (Figure 22; Annexures I and II).



Figure 22: Group Photo of Batch-4

Similar to earlier batches preparatory meeting (Prep Op) and mentors session was held in forenoon and afternoon of 04 August 2025 respectively. From 05 – 07 August 2025, the main sessions of the PHEDM-PDP Tier-III training were carried out. The sessions were supported by a wide range of eminent experts and resource persons from national institutions and partner organizations. Representation from NIDM included Prof. Surya Prakash, Former Head, GMRD, CBRN, Industrial and Cyber DRR Division, NIDM, MHA. Experts from NCDC comprised Dr. Himanshu Chauhan, Additional Director, NCDC and Head, IDSP; Dr. Jitesh Kuwatada, Assistant Director, Centre for One Health; and Dr. Niraj Kumar, Consultant, IDSP, NCDC, MoHFW, GoI. CDC–India was represented by Dr. Runa Hatti Gokhale, Program Director, DGHP, and Dr. Rajat Garg, Public Health Specialist. National-level experts who contributed to the training included Dr. Sujeet K. Singh, Distinguished Public Health Expert and Former Director, NCDC, MoHFW, GoI; Dr. Muzaffar Ahmad, Former Member, NDMA, GoI; Dr. Ravishankar Singh, Regional Director, ROHFW, Patna, GoI; and Dr. Jugal Kishore, Professor and Former Head, VMMC & SJH. In addition, state-level experts, including Dr. A. K. Shahi, State Surveillance Officer, IDSP, Bihar, and Dr. Ragini Mishra, State Epidemiologist, SHSB–IDSP, Bihar, also participated in the sessions (Figure 23).



Figure 23: Resource faculties with their respective session

During the training, tabletop exercises on Incident Response System (IRS), group discussion on the District Disaster Management Plan (DDMP) (annexure IX), group exercises on case scenarios were conducted (annexure X). The figure below presents participants' overall pre- and post-training assessment scores, highlighting a notable improvement in knowledge acquisition (Figure 24).

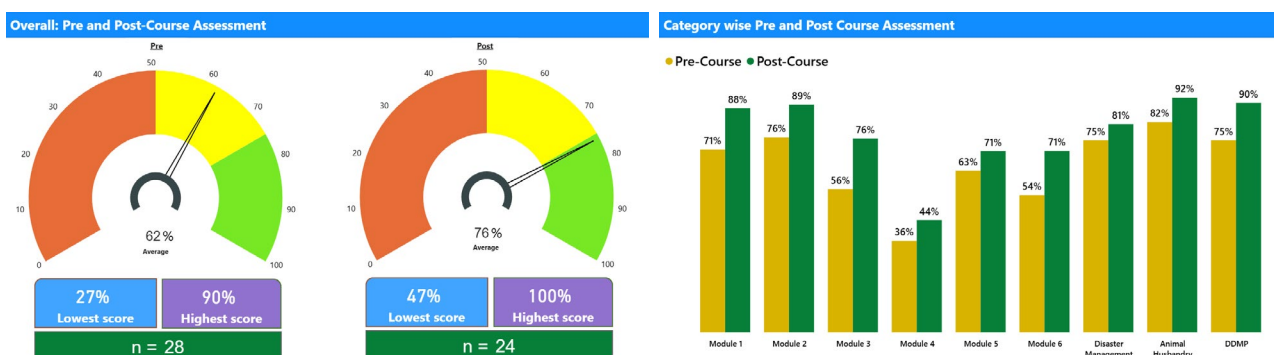


Figure 24: Overall Pre- and Post-Training Assessment of Batch-4

14. Consolidated Assessment of the Training

A total of 181 participants attended the four training batches conducted in Bihar, including 40 mentors and 141 mentees. The attendees came from diverse sectors, with 66 from the Health Department, 43 from Animal Husbandry, 37 from Disaster Management, 30 from Municipal Corporation and 05 from other departments (Figure 25). This multidisciplinary participation fostered a well-rounded and collaborative learning environment.

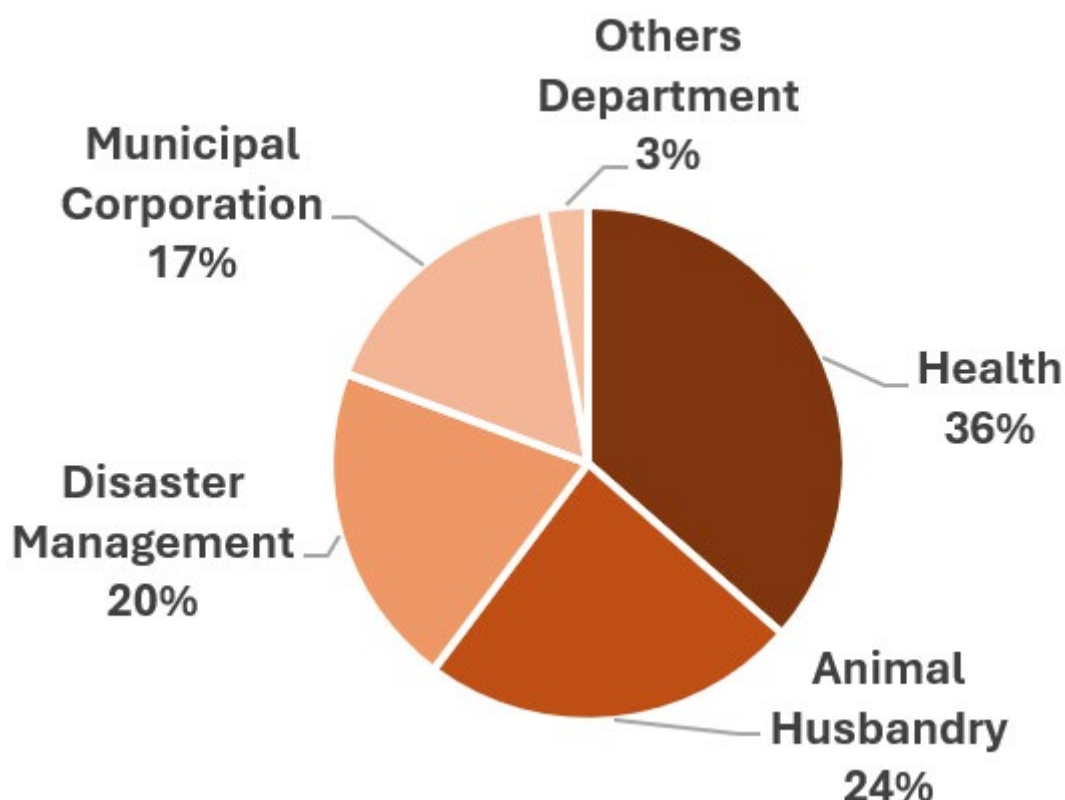


Figure 25: Sector-wise Participants (Mentors + Mentees) in Bihar State

The combined pre- and post-training assessment results from all four training batches in Bihar indicate a notable improvement in overall performance. The average score increased from 64% in the pre-training assessment to 78% in the post-training assessment, reflecting a 14% gain.

The lowest-scoring group also showed significant improvement, rising from 20% in the pre-training assessment to 47% in the post-training assessment, highlighting progress among participants with lower initial scores. Likewise, the highest score increased from 97% on the pre-training assessment to 100% on the post-training assessment, demonstrating improved learning outcomes at the top level (Figure 26).

Overall: Pre and Post-Course Assessment

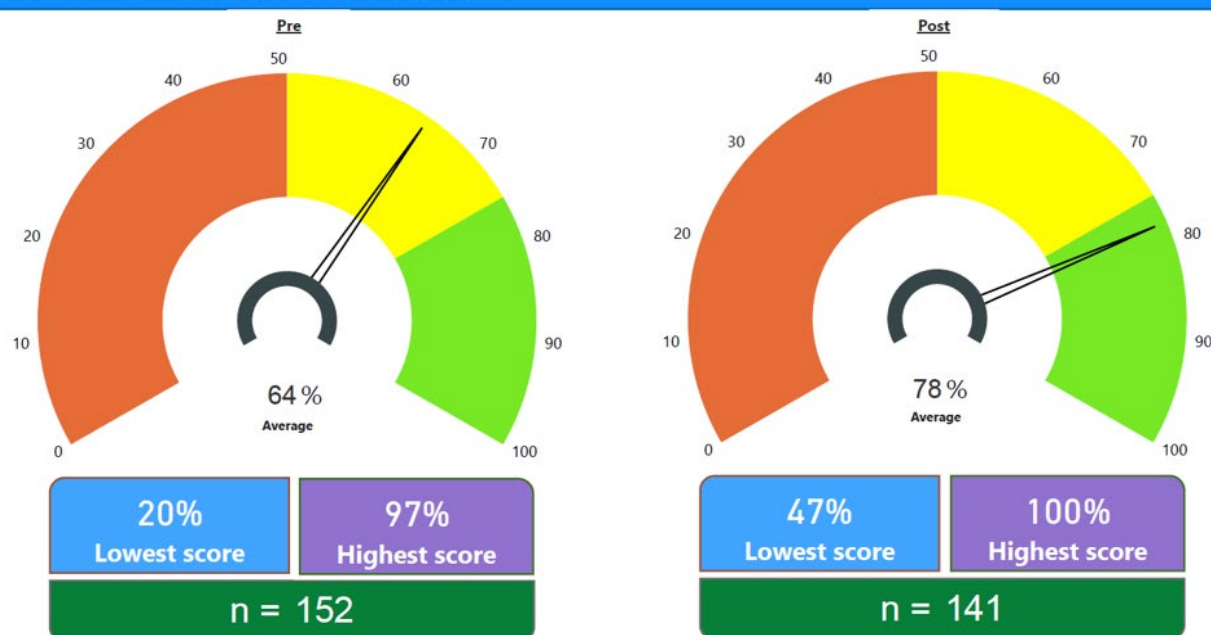


Figure 26: Consolidated pre- and post-training assessment scores for all four batches

Based on the feedback received from the states, participants, and resource faculty, the following things were observed:

- **Capacity Building:** Strengthened participants' knowledge and skills in disaster and public health emergency management, focusing on Incident Management Systems (IMS) and Incident Response Systems (IRS) for effective crisis response.
- **Multi-Sectoral Coordination:** Enhanced collaboration among health, disaster management, animal husbandry, and other key sectors through hands-on exercises and mentorship, fostering a more integrated response approach.
- **Context-Specific Training:** Customized training addressed Bihar's unique hazards, including cyclones, floods, and chemical disasters, equipping participants to manage region-specific challenges effectively.
- **Practical Skill Development:** Role-playing, case studies, and tabletop exercises provided immersive learning experiences, reinforcing the real-world application of emergency response strategies.
- **Sustainable Knowledge Transfer:** Establishing mentor-mentee mechanisms ensures ongoing skill development and fosters continuity in capacity building and knowledge sharing.



15. Best Practices

- **Development and Use of a District-Specific Case Scenario for Bihar Training:**

A key highlight of the Bihar PHEDM Tier-III Training was the development and use of district-specific case scenarios as a contextual learning tool. Recognizing that preparedness and response must address both disasters and public health emergencies, the training team designed realistic scenarios reflecting each district's unique hazard profile, health risks, and institutional context. These scenarios simulated real-life challenges that district officials might face during emergencies, promoting practical, situation-based problem-solving and decision-making.

During the sessions, participants worked in district-based groups to analyse the scenarios, identify priority health and disaster management challenges, and propose coordinated response strategies. Group discussions and presentations encouraged cross-learning and reinforced the importance of intersectoral coordination in managing emergencies.

The district-specific scenario approach proved to be an effective and engaging method, enhancing participants' understanding of both disaster and public health emergency management. It successfully bridged the gap between theory and field application, setting a strong example of how localized, experience-based learning can strengthen district-level preparedness and response capacities.

- **Orientation on PHEDM Tier-I and Tier-II:** The training began with a comprehensive orientation on PHEDM Tier-I and Tier-II to provide participants with continuity and clarity on the progression of the programme. This helped align their understanding of the foundational concepts and ensure consistency in knowledge across all three tiers of training. The refresher served as a bridge, reinforcing prior learnings and setting the stage for advanced discussions in Tier-III.
- **Role play was included during modules with the support of participants:** Interactive role-plays were strategically integrated across various modules to simulate real-life emergency management scenarios. Participants were actively engaged in portraying roles of key stakeholders, enabling experiential learning, improving their decision-making skills, and fostering better teamwork and communication under simulated public health emergency situations.
- **DDMP discussion focusing on strengthening public health aspects:** District Disaster Management Plan (DDMP) sessions emphasized the integration and strengthening of public health components within existing disaster preparedness frameworks. Through structured discussions, participants reviewed actual DDMPs, identified gaps, and proposed strategies to embed robust public health emergency responses, ensuring a more holistic and inclusive district-level planning process.

- **Engagement of mentors as session coordinators and assigning them to record minutes of their respective sessions:** Mentors played a pivotal role by serving as session coordinators, managing the flow of discussions and ensuring productive engagement during sessions. Additionally, assigning them the responsibility for documenting session minutes helped capture key insights, decisions, and action points, thereby contributing to the training's overall documentation and knowledge management.
- **Assessment of pre- and post-training assessments to see the progress of participants:** The training utilized structured pre- and post-training assessments to evaluate the knowledge gain and learning progress of participants. This comparative approach enabled trainers to measure the effectiveness of the training content, identify individual learning curves, and provide data-driven insights into areas that may need reinforcement.
- **Inclusion of Kahoot quiz after each module and awarding the three best performers:** To enhance participant engagement and reinforce learning, Kahoot quizzes were conducted after each module. This gamified approach not only made the sessions interactive and fun but also encouraged active recall and participation. Top performers were acknowledged, fostering a healthy competitive spirit among the group.
- **Daily review meetings of the organizing team: before, during, and at the conclusion of the day for review and planning upcoming sessions:** To ensure smooth conduct of training sessions and timely coordination with subject matter experts, daily review meetings were held by the organizing team at three critical junctures—before the start, during, and at the end of each training day. These meetings facilitated real-time feedback, allowed course correction, and supported the smooth execution of the day's agenda while planning effectively for upcoming sessions.
- **Recording of inputs for case studies and group work:** All case studies and group work sessions were meticulously documented, capturing participant discussions, key findings, and actionable insights. This practice ensured that valuable inputs were preserved for future reference, follow-up actions, and informing the design of subsequent trainings or knowledge-sharing materials.



16. Challenges

- **Logistical Issues:** Some of the logistical issues with regard to pre-booking accommodation and change of participants occurred mostly because we received the participant list just few days before the training. These were effectively tackled by the coordinating partners.
- **Time limitations:** There is very limited time for technical sessions as the five-day programme is squeezed into three and a half days.
- **Coordination Across Stakeholders:** Aligning diverse sectors and agencies during training was complex.
- **Technological Familiarity:** Some participants were unfamiliar with advanced tools, such as digital platforms, used in pre-and post-training assessments.



17. Limitations

- **Time Constraints:** The condensed format limited in-depth discussions on critical topics.
- **Timely Nomination of Participants:** One of the key limitations observed during the Bihar PHEDM Tier-III Training was the timely nomination of participants from some districts. This was primarily due to operational and situational factors, including the need for multiple administrative approvals, ongoing flooding in certain districts, and officials' engagement in concurrent district-level initiatives and emergency response activities. As a result, a few participants received their nominations at short notice, limiting the time available for pre-training preparation and coordination. While this did not affect the overall quality of the training, it highlighted the need for an improved nomination process and early communication with district authorities to ensure smoother participation in future training programmes.



18. Scope for Improvement

- **Enhanced Planning**

- Encourage state/district authorities to share the list of participants two weeks before the training.
- Persuasion for more participation of mentors from Disaster and animal husbandry sectors.

- **Technical Content**

- Update modules to include relevant recent global case studies.
- Add more interactive sessions focusing on local perspectives.

- **Logistics and Administrative**

- Streamline pre-training logistics and administrative preparations with coordination between state authorities and district-level officers from various sectors for timely nominations and NCDC.
- Increase the use of digital resources in the flow of nomination details for better planning of accommodation and logistics, daily attendance and coordinating feedback from session coordinators.

- **Sustainability**

- Ensuring the sustainability of training programmes in PHEDM is essential for building long-term capacities, fostering resilience, and maintaining readiness for public health emergencies. A sustainable training model addresses immediate skill gaps and ensures that knowledge and competencies are retained, enhanced, and institutionalised over time.

- **Coordination and collaboration**

- Introduce post-training follow-ups to track participant progress.



19. Conclusion

- Advocacy directed toward national and state-level leadership presents a pivotal opportunity to strengthen public health emergency preparedness and disaster management systems. Engaging with policymakers and key decision-makers can drive awareness, garner support, and secure resources for initiatives that enhance community resilience and public health outcomes.
- Enhance core capacity competencies for preparedness and response at the district level in Bihar State.
- The Tier-III PHEDM-PDP has successfully laid a strong foundation for multi-stakeholder processes to enhance coordination for proactive response with a one health approach to emergencies and disasters.
- Fostered a multi-stakeholder approach to managing public health emergencies and disasters by engaging key national and state-level agencies, including NIDM, NCDC, Bihar State Health Society, BSDMA, and international partners like the U.S. CDC Country office India.
- The training emphasised multisectoral, multidisciplinary, and multilayered coordination to manage emergencies effectively. It focused on enhancing state capacity for risk mapping, prevention, preparedness, mitigation, response, and recovery, leveraging IMS/IRS applications, and strengthening the 3S approach i.e., Staff (human resources), Systems (plans, policies, procedures), and Stuff (infrastructure) in local contexts. Participants were introduced to critical concepts, including THIRA, risk communication, PHEOC infrastructure, and preparedness at Points of Entry (PoE).
- Interactive modules, group exercises, and mentoring mechanisms fostered engagement and skill-building, while the mentorship programme clarified roles, responsibilities, and strategies for effective collaboration. Practical exercises, including DDMP development and IHR-related tabletop exercises, reinforced the application of theoretical knowledge.



20. Way Forward

States should establish a follow-up mechanism to ensure the continuity and effectiveness of PHEDM Tier-III Training. This will help track progress, assess implementation, and reinforce key learnings to strengthen PHEDM at the district and community levels.

Mentors and mentees play a crucial role in this process. They should focus on documenting group work and case scenarios, capturing key insights and lessons learned for future reference. Additionally, they must develop district-level plans addressing significant threats and hazards, ensuring preparedness for potential emergencies.

At the community level, mentors and mentees should facilitate PHEDM assessments and support the development or enhancement of Village PHEDM Plans. Strengthening these plans will improve local capacities for responding to public health emergencies and disasters.

Furthermore, mentors and mentees will serve as master trainers and facilitators for PHEDM-PDP Tier-I and Tier-II training, expanding the programme's reach and ensuring sustained capacity-building. To enhance long-term impact, states should explore opportunities to integrate PHEDM-PDP into their systems, institutionalising the programme to ensure sustainable emergency preparedness and response.

21. Annexures

Annexure I: Participant List

List of Participants for Training Programme on Public Health Emergency and Disaster Management (PHEDM), Bihar

Sl. No.	Name	Designation	Organization
Batch-1			
1.	Dr Kundan Krishnan	Touring Veterinary Officer	Animal & Fisheries Resources Department, Govt. of Bihar
2.	Krishna Kumar Singh	I/c Epidemiologist	Begusarai
3.	Vikash Kumar	I/c DEOC	DEOC (District Emergency Operation Centre), Begusarai
4.	Anurag Kumar	Sanitation Officer	Municipal Corporation Begusarai
5.	Dr Gopal Krishna Kanhaiya	Touring Veterinary Officer (Mobile)	District Animal Husbandry Officer, Bhagalpur
6.	Shashi Bhushan Singh	Lok Swachta Padadhikari	UDHD
7.	Saurav Kumar Singh	ADMO (Asstt. Disaster Management Officer)	Disaster Management, Bhagalpur
8.	Dr Seema Kumari	Epidemiologist	Health
9.	Dr Vishal Kumar Sharma	Touring Veterinary Officer	TVO Koilwar
10.	Ratnesh Kumar	City Manager	Ara UDHD
11.	Rahul Bhushan	ADMO	Ara
12.	Rajiv Kumar	District Epidemiologist	DHS, Bhojpur
13.	Naveen Kr Pandey	Clerk	Nagar Parishad, Buxar

Sl. No.	Name	Designation	Organization
14.	Kumar Nachiketa	ADMO	Collectorate, Buxar
15.	Dr Parambodh Kumar	Touring Veterinary Officer, Bagen	Animal Husbandry Department, Buxar
16.	Dr Ashutosh Kr. Chaturvedy	District Epidemiologist	ACMO Officer
17.	Dr Kamlesh Prasad Singh	District Animal Husbandry Officer	District Animal Husbandry Office
18.	Mr Sanjay Upadhyay	Deputy Municipal Commissioner-cum-Executive Officer	Nagar Parishad Bhabhua
19.	Dr Saroj Kumar	District Epidemiologist-IDSP	DHS, Kaimpur
20.	Dr Bam Shankar Kr	Touring Veterinary Officer	Animal Husbandry Department, Khagaria
21.	Kumar Mukesh Ranjan	City Manager	Nagar Parishad, Khagaria
22.	Ms Kaushiki Kashyap	Sr. Deputy Collector	Collectorate, Khagaria
23.	Dr Shashi Kumar	District Epidemiologist	IDSP DHS Khagaria/Munger
24.	Kamlesh Kumar	Programmer	DEOC
25.	Dr Julee Kumari	District Epidemiologist	Civil Surgeon office
26.	Dr Kusum Lata	Touring Veterinary Officer, Khutana	First Class Veterinary Hospital, Khutana, Lakhisarai

Sl. No.	Name	Designation	Organization
27.	Ravi Kumar Arya	Executive Officer. Nagar Parishad Barahia, Latehar	Executive Office, Barahia, Latehar
28	Dr Md. Anzar Quraishi	Touring Veterinary Officer	Class I, Veterinary Hospital, Khandbihar, Munger
29	Kumari Sweta	Senior Deputy Collector, DMO Incharge	Disaster Management, Munger
30	Prem Ranjan Dubey	District Epidemiologist	DHS Sadar Hospital, Munder
31	Dr Manoj Kumar	Touring Veterinary Officer	Animal Husbandry and Fisheries Resources, Bihar, Patna
32	Dr Shashi Ranjan Prabhat	Touring Veterinary Officer, Khusrupur, Patna	Animal Husbandry and Fisheries Resources, Bihar, Patna
33	Dr Prashant Kumar	District Epidemiologist	DHS, Patna
34	Chandrashekhar A. Bohara	Monitoring & Evaluation Specialist	FIND, Barakhamba Road, Delhi
35	Prabhat Ranjan	Executive Officer, NCC (New Capital Culture), PMC	Patna Municipal Corporation, Patna
36	Punya Taru	Executive Officer Patliputra	Patna Municipal Corporation, Patna
37	Nikhil Kumar	Executive Officer, Kankarbagh	Kankarbagh
38	Sharmila Sinha	Assistant Admin Officer	Patna Collectorate office
39	Ashutosh Kumar	Executive Officer	Patna Nagar Nigam
40	Ganga Kant Thakur	Executive Officer, Bankipur	Patna Municipal Corporation, Patna

Sl. No.	Name	Designation	Organization
41	Shreya Kashyap	Executive Officer, Azimabad Anchal, PMC	PMC, Patna
42	Dr Shashi Kant Kumar	Touring Veterinary Officer	DAHO, Sheikhpura
43	Saurabh Satyam	ADMO	DMD, Sheikhpura
44	Randhir Kumar	District Epidemiologist	ACMO officers, Sheikhpura
45	Vinay Kumar	Executive Officer	Nagar Parishad, Sheikhpura
Batch-2			
46	Sudhanshu Shekhar	Assistant Town Planning Supervisor	Nagar Nigam Samastipur, Samastipur
47	Arif Ali Siddiqui	District Epidemiologist	DHS (IDSP), Samastipur
48	Dr Manish Kumar	Touring Veterinary Officer-cum-BAHO, Tajpur	District Animal Husbandry Office, Samastipur
49	Anushka Shrivastava	ADMO	Disaster Management Office, Collectorate, Samastipur
50	Anubhav Raj	Assistant Disaster Management Officer	Disaster Management Department, Bihar
51	Obaidullah	DAHO, Saran	District Animal Husbandry Office, Saran, Bihar
52	Dr Riya Kumari	District Epidemiologist	District Health Society
53	Abhay Kumar Nirala	City Manager, Nagar Parishad, Hajipur	Nagar Parishad Hajipur
54	Dr Maheshwari Singh Mahesh	District Epidemiologist	Sadar Hospital, Hajipur

Sl. No.	Name	Designation	Organization
55	Dr Nitish Kumar	TVO Vaishali	Animal Husbandry, Vaishali
56	Akash Kumar	ADMO	Disaster Management Office, Vaishali Collectorate
57	Mrityunjay Pandey	ADMO	DMD Araria
58	Abadh Kishore Singh	City Manager, Nagar Parishad Arariya	Nagar Parishad, Araria
59	Dr Sree Kant	District Epidemiologist	DHS Araria
60	R Ishwar (Attended -Day 1 only)	TVO, Araria	DAHO, Araria
	Dr Bharti Singh (Attended-Day 2&3)	V.S. Araria	DAHO, Araria
61	Salim Jawed	District Programme Manager-DHS	DHS
62	Gitanjali	ADMO	Disaster Management
63	Dr Amit Kumar	DAHO, Arwal	Animal Husbandry
64	Antra Kumari	ADMO	Collectorate Aurangabad
65	Dr Shyam Kishor	District Animal Husbandry Officer	DAFR (Dept. of Animal Husbandry Fisheries Resources)
66	Ajeet Kumar	Executive Officer, Nagar Parishad Aurangabad	Nagar Parishad, Aurangabad
67	Upender Kumar Choubey	District Epidemiologist	DHS Aurangabad
68	Dr Rajesh Kumar	Epidemiologist	District Health Society, Banka

Sl. No.	Name	Designation	Organization
69	Dr Babul Kumar	Veterinary Doctor	Animal Husbandry, Banka
70	Sakshi Kumari	ADMO	District Administration, Banka
71	Dr Ravi Ranjan Kumar	TVO Chiraiya	A.H.D., Govt. of Bihar
72	Akhilesh Kumar	Assistant Disaster Management Officer	Disaster Management Department, Govt. of Bihar
73	Dr Rahul Raj	District Epidemiologist	Health Department, Govt. of Bihar
74	Pranav Raj	Assistant Disaster Management Officer	D.M.D, Bihar, Darbhanga Collectorate-846001
75	Dr Ravindra Nath Ravi	Medical Officer	M.O.-cum- District Epidemiologist, Darbhanga
76	Ravi Amar Nath	City Manager	Nagar Nigam Darbhanga
77	Dr Nand Kishor	TVO Deokulidham	T.V.O Deokulidham
78	Dr Aditya Kumar	Veterinary Officer	AFRD, Bihar
79	Dr Aras Munna Kr	Epidemiologist	DHS
80	Lucky Kumar	Programmer	District Disaster Mgmt
81	Sudhir Kumar	Leading Fireman	Agnisamalay Fhulwari Shareef, Branch office at Patna, AIIMS

Sl. No.	Name	Designation	Organization
Batch-3			
82	Dr Priyanka Kumari	Epidemiologist	DHS, Gaya
83	Surbhi Singh	ADMO	Disaster Management Branch- Gaya, Collectorate, Gaya
84	Shahnawaz Khan	Assistant Disaster Management Officer	DEOC, Collectorate Gopalganj
85	Dr Ranjeet Kumar Singh	District Epidemiologist	District Health Society, IDSP, Gopalganj
86	Monika Manjusha	APSWMO	Nagar Parishad Gopalganj, Gopalganj
87	Dr B K Himanshu	TVO Jigna Gopalganj	DAHO, Gopalganj
88	Hrithik Raushan Tejasvee	Assistant Disaster Management Officer	DEOC, Jehanabad, Collectorate
89	Alok Kumar	District Epidemiologist	IDSP Health Dept. Jehanabad
90	Dr Ramesh Kumar	Touring Veterinary Officer, Kako, Jehanabad	Deptt. Of Animal and Fishery Resource, Govt. of Bihar
91	Shamim Akhtar Ansari	District Epidemiologist	IDSP, Jamui
92	Dr Shuchi Kumari	TVO	DAHO, Jamui
93	Abhishek Kumar	Assistant Disaster Management Officer	ADMO, Collectorate, Jamui
94	Snehal Anshu	Assistant Town Planning Supervisor	Urban Development & Housing Department, Patna

Sl. No.	Name	Designation	Organization
95	Noor Ali Khan	APSWMO-Asstt. Public Sanitary & Waste Management Officer	Municipal Corporation, Katihar
96	Dr ShashiKant Singh	Medical Officer	PHC Dandkhora, Katihar
97	Ritika Bharti	Assistant Disaster Management Officer	District Management Department, Katihar, Bihar
98	Dr Md Jawed Alam	Sub-divisional Animal Husbandry Officer	Kishanganj
99	Mr Aditya Kumar Singh	ADMO	Kishanganj Collectorate
100	Dr Rina Praveen	District Epidemiologist	District Health Society, Kishanganj
101	Shiv Dayal	Assistant Disaster Management Officer	DEOC, Madhepura Collectorate
102	Tanya Kumari	Executive Officer, NP Madhepura	EO, NP, Madhepura
103	Dr Pawan Kumar	APO Madhepura	AHD, Madhepura
104	Dr Kishore Kumar Das	Senior Medical Officer	Sadar Hospital Madhepura
105	Anil Kumar Chakrawarty	District Epidemiologist	IDSP, Madhubani
106	Dr Rajesh	DAHO	DAHO Office, Madhubani
107	Amitabh Gunjan	Assistant Public Sanitary and Waste Management Officer	Municipal Corporation, Madhubani
108	Dr Parmanand Rajak	TVO (Mobile), Muzaffarpur	DAHO Office Muzaffarpur

Sl. No.	Name	Designation	Organization
109	Gaurav Narain	Asstt. Public Sanitary and Waste Management Officers	Municipal Corporation, Muzaffarpur, Bihar
110	Dr Ranjan Kumar	District Epidemiologist	Sadar Hospital, Muzaffarpur
111	Dr Mukesh Singh	District Epidemiologist (I/c)	IDSP, DSO, Nalanda
112	Niharika Sinha	Assistant Disaster Management Officer (ADMO)	Disaster Management Department, Patna, Bihar
113	Dr Ashok Akela	TVO	Nalanda
114	Kundan Kumar	Assistant Public Sanitary and Waste Management Officer	Bihar Sharif Nagar Nigam
Batch-4			
115	Dr Abhay Kumar	Touring Veterinary Officer	Veterinary Hospital Andharwari (Nawada)
116	Dr Rashmi Kumari	Epidemiologist	Sadar Hospital, Nawada
117	Dr Nagmani Singh	City Manager	Nagar Parishad, Nawada
118	Md Shere Afghan Khan	Assistant Disaster Management Officer	Collectorate, Nawada
119	Mr Gaurav Kumar Arya	Programmer	District Disaster Management, Purnea
120	Dr Deepshikha Raj	Touring Veterinary Officer	AHD, Purnea
121	Pawan Kumar	City Manager	Nagar Nigarm, Purnea
122	Mr Neeraj Kumar Nirala	District Epidemiologist	IDSP, DHS Purnea

Sl. No.	Name	Designation	Organization
123	Dr Nand Kishore Chaturvedi	M.O.	DSU, DHS, Rohtas
124	Dr Raj Kapur	Veterinary Officer	V.O. Sasaram, Rohtas
125	Mr Shankar Kumar	Programmer	DM Office, Rohtas
126	Dr Kumud Kumar	D.A.H.O, Saharsa	Animal Husbandry, Saharsa
127	Mr Uday Pratap Singh	ADMO, Saharsa	Disaster Management Section, Saharsa
128	Dr Anand Pratap Amit	District Epidemiologist	DHS, Saharsa
129	Mr Chandan Kumar	Public Sanitary Officer	Nagar Parishad, Sheohar
130	Ms Shweta Suman	Assistant Disaster Management Officer	Collectorate, Sheohar
131	Dr Md Fatehuzzaman	District Animal Husbandry Officer, Sheohar	Sheohar
132	Dr Rahul	District Epidemiologist	DHS, IDSP Sheohar
133	Dr Pallavi	Touring Veterinary Officer	AHD, Sitamarhi
134	Dr Indu Kumari	M.O.	Sadar Hospital Sitamadhi
135	Dr Ahsanul Hoda	Distt. Animal Husbandry Officer, Siwan	Distt. Veterinary Officer
136	Ms Shabnam Naazneen	Assistant Disaster Management Officer	District Disaster Management Section, Siwan
137	Dr Vikas Kumar	District Epidemiologist	Sadar Hospital, Siwan

Sl. No.	Name	Designation	Organization
138	Dr Manoj Kumar	T.V.O.	Animal Husbandry, Supaul, Bihar
139	Dr Chandan Kumar	I/c Epidemiologist	Civil Surgeon Office, Supaul
140	Devershi Ranjan	MEO	Municipal Executive Officer
141	Chandrabushan Kumar	Assistant Disaster Management Officer	Bihar State Disaster Management

Annexure II: Mentor List

List of Mentors for Training Programme on Public Health Emergency and Disaster Management (PHEDM), Bihar

Sl. No.	Name	Designation	Organization
Batch-1			
1	Dr Anjana Kumari	Junior Assistant Research Officer	Institute of Animal Health and Production, Bihar, Patna
2	Dr Rajesh Ranjan Sinha	Professor	P.M.C.H. Patna
3	Dr Suman Kumar	Professor	P.M.C.H. Patna
4	Dr Aman Kumar	Associate Professor	I.G.I.M.S. Sheikhpura, Patna-800014
5	Dr Sweta Roy	Junior Assistant Research Officer	Institute of Animal Health and Production, Bihar, Patna
6	Dr Nitika Singh	Deputed Officer	IAHP Patna
7	Dr Shilpi Ranjan	Associate Professor	Nalanda Medical College, Patna
8	Dr Mahendra M	Assistant Professor	AIIMS, Patna
9	Md. Seraj Ansari	Assistant Professor	Nalanda Medical College, Patna
10	Dr Ankita	Senior Resident	JLNMCH, Bhagalpur
11	Dr Jyoti Chaturvedi	Tutor PSM	JLNMCH, Bhagalpur
Batch-2			
12	Dr Chandra Mani	Associate Professor	Darbhanga Medical College, Laheriasarai

Sl. No.	Name	Designation	Organization
13	Dr Ameet Kumar	Senior Resident	Nalanda Medical College, Patna
14	Dr Seema Singh	Senior Resident	Nalanda Medical College, Patna
15	Deepak Kumar	Senior Research Officer	Bihar State Disaster Management Authority
16	Dr Manoj Kr. Singh	Asstt. Prof.	Bihar Animal Sciences University, Patna
Batch-3			
17	Dr Bipin Kumar	Associate Professor	SKMCH, Muzaffarpur
18	Dr Saroj Kr. Rajak	Associate Professor & Head	Deptt. Of Veterinary and Animal Husbandry, Extension Education, BVC. Patna-800014
19	Mr Rajkumar	Leading Fireman	Bihar Fire Service Lodipur, Patna
20	Dr Trinetri Kumari	Senior Resident/Tutor	BMIMS, Pawapuri, Nalanda
21	Engineer Alok Ranjan	Senior Research Officer	BSDMA
22	Dr Nidhi Sharma	Senior Resident/Tutor	Anugrah Narayan Magadh Medical College and Hospital, Gaya
23	Dr Shahid Iqbal	Associate Professor	KMC, Katihar
24	Dr Rashid Ahmad Khan	Associate Professor	Katihar Medical College, Katihar
25	Dr Sazid Hussain	Professor & Head	Madhubani Medical College, Madhubani

Sl. No.	Name	Designation	Organization
26	Dr Sajjar Uddin	Senior Resident	Madhubani Medical College, Madhubani
27	Dr Ajeet Kumar Singh	Project Officer	BSDMA, Sardar Patel Bhawan, Patna
28	Dr Gulshan Imroz	Senior Resident/Tutor	ANMMCH, Gaya
29	Dr Balmukund Kumar	Medical Officer	JNKTMCCH, Madhepura
Batch-4			
30	Mr Anil Kumar Yadav	Leading Fire Man	Agnisamaly, Danapur
31	Ms Bhawana Singh	Project Officer	BSDMA, Bihar
32	Dr Seema Kumari	Assistant Professor	PMCH, Patna
33	Dr Diwakant Mishra	D S GMCH Bethiah	GMCH, Bettiah
34	Mr Ravi Anand	Sr Research Officer	BSDMA
35	Dr Santosh Kumar Nirala	Associate Professor, AIIMS, Patna	AIIMS, Patna
36	Dr Dharam Prakash	Medical Officer	BMIMS, Pawapuri (Nalanda)
37	Dr Manish Kumar	Medical Officer	BMIMS, Pawapuri (Nalanda)
38	Dr Puspendra Kumar Singh	Asstt. Professor	BVC, Patna
39	Dr Rachna Rani	Tutor	SKMCH, Muzaffarpur
40	Dr Rajeev Kumar Ranjan	Tutor	GMCH, Bettiah

Annexure III: List of Dignitaries

List of Dignitaries for Training Programme on Public Health Emergency and Disaster Management (PHEDM), Bihar

Sl. No.	Name	Designation	Organisation/ Institution	Batch 1	Batch 2	Batch 3	Batch 4
1.	Dr A. K. Shahi	SSO	IDSP Bihar				
2.	Dr Ravishankar Singh	RD	ROHFW Patna, Gol				
3.	Prof Surya Parkash	Former Head GMRD, CBRN, Industrial and Cyber DRR Division	NIDM, MHA		Virtually		Virtually
4.	Dr Runa Hatti Gokhale	Program Director, DGHP	CDC-India		Virtually		Virtually

Annexure IV: List of State Team

List of State Team for Training Programme on Public Health Emergency and Disaster Management (PHEDM), Bihar

Sl. No.	Name	Designation	Organisation/ Institution	Batch 1	Batch 2	Batch 3	Batch 4
1.	Dr Ragini Mishra	State Epidemiologist	SHSB, IDSP, Bihar				
2.	Mr Amit Kumar Mishra	State Consultant Climate Change & Human Health	Vital Strategies, SHSB, EHC				
3.	Mr Navnit Kr. Dutta	State Microbiologist-IDSP	SHSB, IDSP, Bihar				
4.	Mr Sujeet Kumar	Consultant Finance	SHSB, IDSP, Bihar				
5.	Dr Ranjit Kumar	Sr. Public Health Specialist	MSU, Patna				
6.	Mr Naveen Kumar Raman	Microbiologist, IDSP	SHSB				
7.	Mr Shailendra Kumar	Executive Assistant	SHSB				
8.	Mr Anil Kumar	Data Entry Operator	SHSB				
9.	Mr Vishal Kumar	Data Entry Operator	SHSB				

Annexure V: Resource Person List

List of Resource Persons for Training Programme on Public Health Emergency and Disaster Management (PHEDM), Bihar

Sl. No.	Name	Designation	Organisation/ Institution	Batch 1	Batch 2	Batch 3	Batch 4
1.	Dr Muzaffar Ahmad	Former Member, NDMA	Subject Matter Expert	Virtually		Virtually	
2.	Dr Sujeet K Singh	Distinguished Public Health Expert and Former Director of NCDC, MoHFW, Gol	Subject Matter Expert				
3.	Dr Himanshu Chauhan	Addl. Director NCDC & HoD IDSP	NCDC, MoHFW, Gol				
4.	Dr Simmi Tiwari	Joint Director	Centre for One Health, NCDC, New Delhi	Virtually	Virtually	Virtually	
5.	Dr Jugal Kishore	Professor and Former Head	VMMC&SJH				
6.	Dr Runa Hatti Gokhale	Program Director, DGHP	CDC-India	Virtually			
7.	Dr Rajat Garg	Public Health Specialist- EM	CDC-India	Virtually			
8.	Dr Alka Sharma	Former Joint Director (DM)	DMHS, Govt. of Rajasthan				
9.	Dr Meera Dhuria	JD & HoD, NCD	NCDC, MoHFW, Gol		Virtually		

Sl. No.	Name	Designation	Organisation/ Institution	Batch 1	Batch 2	Batch 3	Batch 4
10.	Dr Sanket Kulkarni	JD IDSP	NCDC, MoHFW, Gol				
11.	Dr Niraj Kumar	Consultant	IDSP, NCDC				
12.	Dr Bimlesh Joshi	Assistant Director	Health Directorate, Govt of Uttarakhand				
13.	Dr. Sujata Singh	Assistant Director	Health Directorate, Govt of Uttarakhand				
14.	Dr Pranay Verma	JD IDSP	NCDC, MoHFW, Gol				
15.	Dr Prashant Shrivastava	Asst. Professor	CIP, Ranchi, Jharkhand				
16.	Dr. Jitesh Kuwatada	Assistant Director	COH, NCDC, MoHFW, Gol				Virtually

Annexure VI: Organizing Team List

List of State Team for Training Programme on Public Health Emergency and Disaster Management (PHEDM), Bihar

Sl. No.	Name	Designation	Organisation/ Institution	Batch 1	Batch 2	Batch 3	Batch 4
1.	Ms Stanzin Tsela	Young Professional	NIDM, New Delhi				
2.	Dr Joseph Williams	Project Director	VHS, Chennai				
3.	Mr. Baskar Kasiviswanathan	Admin Manager	VHS, Chennai				
4.	Dr Raju Thapa	STO-EM	VHS, New Delhi				
5.	Dr Harjeet Kaur	TO-EM	VHS, New Delhi				
6.	Ms Renu	AE-EM	VHS, New Delhi				
7.	Mr Anil Kathait	STO-EM	VHS, New Delhi				
8.	Ms Pemu Doma Bhutia	Capacity Development Specialist, EpiC India	FHI360, New Delhi				

Annexure VII: Core Training Agenda

Agenda of PHEDM-PDP Tier-III in Bihar

Venue: Patna, Bihar

Time	Subject
Day 1	
1000-1300 hrs	Preparatory meeting of the Resource Person
1300-1400 hrs	Lunch
1400 - 1410 hrs	Welcome Address
1410 - 1420 hrs	Address
1420 – 1430 hrs	Overview and Objectives of Session
1430 – 1500 hrs	Art of Mentoring
1500 – 1545 hrs	Attributes for a Mentor and strategies for effective mentoring
1545 - 1600 hrs	Tea Break
1600 - 1645 hrs	Experience sharing from States (where PHEDM Tier-III training has been conducted)
1645 – 1730 hrs	Expected Outcome from the Mentorship Programme
1730 – 1745 hrs	Concluding Remarks and Way Forward
1745 - 1800 hrs	Group Photo
1800 hrs onwards	End of Mentors session with High Tea
Day 2	
0900 - 0930 hrs	Registration
0930 – 1000 hrs	Pre-Training Assessment
1000 – 1030 hrs	Brief Introduction of all participants and Ground Rules & Housekeeping for Training

Time	Subject
1030 – 1130 hrs	Inaugural Session
1130 – 1145 hrs	Tea Break
1145 – 1230 hrs	Overview of the current status, challenges, opportunities, and best practices of PHEDM in Bihar
1230 – 1330 hrs	Module I: Overview of Public Health Emergency and Disaster Management (PHEDM)
1330 – 1420 hrs	Lunch Break
1420–1510 hrs	Module II: Principles of PHEDM and its Applications
1510 - 1600 hrs	Module III: Public Health Emergency Operations Centre (PHEOC)
1600 – 1615 hrs	Tea Break
1615 – 1700 hrs	Module IV: Organizational Model for Managing Response
1700 – 1715 hrs	Assigning Group Exercise: Allocation of tasks to the group
Day 3	
0915 - 0930 hrs	Recap of Day 2
0930 - 1000 hrs	Overview of the current status, challenges, opportunities, and best practices of PHEDM in Bihar
1000 – 1045 hrs	Module V: Risk Communication and Community Engagement
1045 – 1115 hrs	Group Discussion on Public Health Emergencies during Conflicts, including border Health issues
1115 – 1130 hrs	Tea Break
1115 – 1200 hrs	Module VI: Psychosocial aspects of PHEDM
1200 - 1300 hrs	Group Discussion on Case Scenarios
1300 – 1330 hrs	One Health Approach with respect to PHEDM in Bihar
1330 - 1420 hrs	Lunch Break

Time	Subject
1420– 1545 hrs	Demonstration by NDRF
1545 – 1600 hrs	Tea Break
1600 – 1715 hrs	Group Exercises on Case Scenarios
1715 – 1730 hrs	Feedback on Day 3
Day 4	
0900 - 0915 hrs	Recap of Day 4
0915 – 1000hrs	Post-Training Assessment
1545 - 1600hrs	Tea Break
1000 – 1215 hrs	Presentation of Case Scenarios
1215 – 1245 hrs	Participant's Feedback
1245 – 1300 hrs	Summary and way forward
1300 - 1315 hrs	Certificate Distribution
1315 hrs onwards	Closure of training followed by Lunch.

Annexure VIII: Summary of Group Discussion on Public Health Emergencies During Conflicts and Cross-Border Threats

A group discussion on the topic “**Public Health Emergencies During Conflicts and Cross-Border Threats**” were conducted as part of the PHEDM Tier-III Training Batch-1 and 3 (Figure 27 and 28).

Background:

In the current global scenario marked by rising geopolitical tensions, frequent natural disasters, and complex humanitarian emergencies, the topic of public health emergencies during conflicts, cross-border threats, and disasters holds critical relevance. Armed conflicts and disasters, whether natural or human-induced, can severely disrupt healthcare systems, exacerbate disease outbreaks, and create widespread displacement, all of which compound public health vulnerabilities. In such settings, the spread of infectious diseases, malnutrition, mental health crises, and mass casualty incidents become pressing concerns. The discussion was timely and necessary, especially as countries in the region face growing risks from both natural disasters and conflict-driven emergencies that often transcend borders and require coordinated, multisectoral responses.

Objective of the Group Exercise

The objective of the group exercise was to develop a comprehensive understanding of public health emergencies arising from conflicts, cross-border threats, and disasters. Participants were encouraged to examine the health system challenges encountered in such settings and to identify practical strategies for emergency preparedness, risk reduction, and coordinated response. The exercise aimed to enhance participants' capacity to analyze complex scenarios involving disrupted health services, population displacement, and multi-hazard risks, while fostering cross-learning on governance mechanisms, technological innovations, and the application of global frameworks such as the IHR (2005) and the Sendai Framework for Disaster Risk Reduction.

Dr. Neeraj Kumar, Consultant, IDSP opened the group discussion by underlining the significance of addressing public health emergencies in the context of not only conflicts and cross-border threats but also natural and man-made disasters. The session was overall moderated by Dr Sujeet K Singh. Dr Singh remarked that in recent years, the health sector has been increasingly challenged by overlapping crises—be it disease outbreaks in post-disaster settings, population movements due to floods or conflict. He stressed the importance of building health system resilience across all types of emergencies and urged participants to share their perspectives and lessons learned from field experiences. His introduction set the stage for a rich and inclusive discussion on health preparedness and response in fragile and disaster-prone contexts.

Mentors and mentees participated in an in-depth and comprehensive discussion on the

topic, exploring various aspects and challenges, with the key points from their dialogue summarized below:

1. Key Issues Identified:

- Destruction of health infrastructure due to armed conflict
- Displacement of populations disrupting healthcare access
- Interruption of vaccination and routine health services
- Outbreaks of communicable diseases (e.g., cholera, measles, polio, COVID-19)
- Overburdening of health systems during natural disasters
- Cross-border spread of infectious diseases
- Worsening of non-communicable diseases (NCDs) due to lack of continuity in care
- Rising malnutrition, especially among children and displaced persons
- Escalation of mental health and psychosocial issues
- Exposure to chemical, biological, radiological, and nuclear (CBRN) threats
- Overcrowded and unsanitary living conditions in refugee and IDP camps
- Gaps in cross-border surveillance and early warning systems
- Weak coordination between civilian and military health actors
- Inadequate protection and support for healthcare workers in conflict zones
- Barriers to accessing essential maternal and child health services
- Spread of misinformation and lack of effective risk communication
- Legal and ethical challenges in delivering healthcare in conflict settings
- Insufficient health screening and referral mechanisms at border points
- Funding constraints and lack of rapid resource mobilization mechanisms
- Limited use of innovative technologies like telemedicine, drones, and GIS

2. Preparedness Activities for Public Health Emergencies During Conflicts and Cross-Border Threats

a. Surveillance and Early Warning Systems:

- Establish integrated, cross-border event-based and indicator-based surveillance systems.
- Develop real-time data sharing protocols and communication channels between neighboring countries.
- Utilize digital health platforms, mobile technology, and community-based surveillance to monitor outbreaks and health trends in conflict zones and refugee settings.
- Implement early warning and response systems (EWARS) specifically adapted for fragile, insecure, and rapidly changing environments.

b. Emergency Coordination and Governance:

- Activate and strengthen Public Health Emergency Operations Centers (PHEOCs) with interoperable systems for coordination between civilian and military sectors.
- Formulate regional and cross-border coordination mechanisms including task forces with WHO, IHR focal points, and other partners.
- Align national and state emergency preparedness plans with international frameworks such as DM Act (2005), IHR (2005), and the Sendai Framework.
- Engage multisectoral stakeholders (health, security, logistics, humanitarian agencies) in joint contingency planning and decision-making.
- Establish clear protocols and communication channels for civil-military cooperation and coordination.

c. Health System Strengthening in Fragile Settings:

- Protect health infrastructure and personnel from conflict-related damage and ensure their safety and security.
- Pre-position essential medical supplies, vaccines, and equipment in strategic, accessible locations close to conflict-affected and border areas.
- Deploy mobile health units, field hospitals, and trauma care facilities to ensure continuity of care.

- Maintain stockpiles for mass casualty incidents, infectious disease outbreaks, and CBRN threats.
- Strengthen supply chain management and logistics to enable rapid and flexible response.

d. Protection and Support of Vulnerable Populations:

- Develop targeted preparedness plans for women, children, elderly, persons with disabilities, and displaced populations.
- Ensure availability and delivery of reproductive, maternal, newborn, child health services in camps and conflict zones.
- Integrate mental health and psychosocial support (MHPSS) services into emergency preparedness activities.
- Establish safe spaces and protection mechanisms for vulnerable groups, including refugees and internally displaced persons (IDPs).

e. Workforce Readiness and Capacity Building:

- Maintain a surge-ready, trained health workforce including emergency teams prepared for rapid deployment.
- Provide ongoing training in trauma care, outbreak response, mental health, and CBRN risk management.
- Support frontline health workers with protective equipment, incentives, and mental health services.
- Incorporate community health workers and volunteers into emergency response frameworks.
- Conduct regular simulation exercises, tabletop drills, and capacity-building workshops focused on cross-border and conflict-related scenarios.

f. Risk Communication and Community Engagement (RCCE):

- Counter misinformation, rumors, and disinformation through trusted local leaders, religious institutions, NGOs, and diaspora networks.
- Establish two-way communication channels to involve communities actively in preparedness and response.

- Use multiple platforms (radio, social media, mobile messaging) to reach displaced and mobile populations.

g. Points of Entry (PoE) and Border Health Measures:

- Implement standard operating procedures (SOPs) for health screening, triage, and referral at border crossings and transit points.
- Coordinate health services across borders to manage mobile populations, refugees, and returnees.
- Conduct vaccination campaigns and infection prevention and control (IPC) measures at points of entry.
- Monitor and manage cross-border population movements to reduce transmission risks.

h. Funding and Resource Mobilization:

- Develop procurement and logistics systems that allow fast acquisition and delivery of supplies and services in conflict settings.

3. Response Activities for Public Health Emergencies During Conflicts and Cross-Border Threats

a. Rapid Activation of Emergency Operations:

- Immediately activate Public Health Emergency Operations Centers (PHEOCs) and Incident Command Systems to coordinate multi-agency response.
- Mobilize emergency response teams including healthcare workers, logisticians, epidemiologists, and security personnel.
- Establish unified command and control with clear roles for military, health, humanitarian, and local authorities.

b. Surveillance, Case Detection, and Outbreak Investigation:

- Conduct active case finding and contact tracing for infectious disease outbreaks.
- Maintain real-time cross-border surveillance data sharing and coordination to track disease spread.
- Deploy rapid response epidemiological teams to investigate clusters and outbreaks.
- Utilize mobile and digital tools for remote data collection and reporting from conflict or hard-to-reach areas.

c. Medical and Trauma Care Delivery:

- Provide immediate trauma care and mass casualty management in field hospitals and trauma centers.
- Ensure continuity of essential health services including immunization, maternal and child health, and treatment of communicable and non-communicable diseases.
- Deploy mobile clinics and outreach teams to reach displaced populations and remote areas.
- Facilitate referral systems for specialized care and evacuation when needed.

d. Logistics and Supply Chain Management:

- Coordinate with military and humanitarian partners for secure transport and delivery of goods.
- Monitor supply chain to prevent stockouts and ensure timely replenishment.

e. Protection and Support for Vulnerable Populations:

- Implement targeted interventions for at-risk groups including women, children, elderly, and persons with disabilities.
- Provide reproductive health services, mental health and psychosocial support, and nutrition assistance in camps and conflict zones.
- Establish safe spaces and protection mechanisms to prevent exploitation and abuse.

f. Risk Communication and Community Engagement:

- Deliver timely, transparent, and culturally sensitive information to affected communities.
- Address misinformation and rumors actively through trusted local leaders, community groups, and media.
- Engage community representatives in planning and implementation of response activities to enhance acceptance and cooperation.

g. Mental Health and Psychosocial Support:

- Provide psychological first aid and trauma counseling to affected populations and responders.

- Set up community-based MHPSS programmes and safe spaces for vulnerable groups.
- Train healthcare providers and volunteers in trauma-informed care practices.

h. Security and Protection of Health Workers and Facilities:

- Ensure the security of healthcare personnel, facilities, and medical supplies, especially in conflict zones.
- Provide physical and mental health support to frontline workers under stress.

i. Use of Innovation and Technology:

- Deploy drones for delivery of medicines and supplies in inaccessible areas.
- Apply GIS mapping for real-time tracking of disease spread and resource deployment.



Figure 27: Group discussion on Public Health Emergencies During Conflicts and Cross-Border Threat in Batch-1



Figure 28: Group discussion on Public Health Emergencies During Conflicts and Cross-Border Threat in Batch-3

The group discussion on public health emergencies during conflicts and cross-border threats highlighted the complex and multifaceted challenges that arise when health systems are disrupted by conflict, displacement, and disaster. Participants underscored the critical need for resilient health infrastructure, robust surveillance systems, and coordinated multisectoral responses to mitigate the severe impacts on vulnerable populations. The dialogue also brought to light significant gaps in cross-border coordination, resource mobilization, and the utilization of innovative technologies, which are essential to improving the timeliness and effectiveness of responses in fragile settings.

In conclusion, the exercise successfully enhanced participants' understanding of the challenges and strategic approaches necessary for managing public health emergencies in conflict and cross-border contexts. It emphasized that strengthening emergency preparedness and response requires continuous capacity building, inclusive governance, and strong community engagement to ensure equitable health services even in the most difficult circumstances. By fostering collaboration among civilian, military, and humanitarian actors, and leveraging technological advancements, health systems can be better equipped to save lives and reduce suffering during crises.

Annexure IX: Summary of Group Discussion on District Disaster Management Plan

In batch 2 and 4, group discussion was held on the District Disaster Management Plan (DDMP), during which participants deliberated on departmental awareness, coordination mechanisms, preparedness, resource sharing, information management, post-disaster recovery, and key measures required to strengthen inter-departmental collaboration (Figure 29 and 30).

During the group exercise, participants discussed various dimensions of awareness, coordination, preparedness, and implementation related to the District Disaster Management Plan (DDMP). Most participants indicated that their departments were generally aware of the existence of the DDMP; however, the level of engagement with the plan varied significantly across sectors. While a few departments had been consulted during the preparation or revision of the DDMP, many participants reported limited involvement in the planning process. Awareness of clearly defined roles and responsibilities under the DDMP was uneven, and participants noted that the roles assigned to their respective sectors were often broad, generic, and insufficiently operationalized. Several participants acknowledged that the DDMP was rarely referenced during actual emergencies or mock drills, highlighting a gap between documented plans and their practical application.

Participants further highlighted that interaction between departments and the District Disaster Management Authority (DDMA) primarily occurred during emergencies, review meetings, or disaster-prone seasons, rather than through routine coordination mechanisms. Inter-departmental communication during emergencies was reported to be predominantly informal, relying on phone calls, messaging applications, and ad-hoc instructions. Although some departments had designated nodal officers for disaster coordination, this practice was not uniformly adopted across sectors, leading to coordination challenges and delays during response operations.

In terms of planning and preparedness, participants shared that only a limited number of departments had developed sector-specific contingency plans, and even where such plans existed, alignment with the DDMP was often partial. Joint mock drills involving multiple sectors were reported to be irregular and limited in scope. Participants emphasized that structured joint training and cross-sectoral capacity-building initiatives were insufficient, and many frontline staff lacked adequate orientation or training on their specific roles and responsibilities under the DDMP, adversely affecting preparedness and response effectiveness.

The discussion also focused on resource availability and sharing during emergencies. Participants noted that departments contributed various resources, including manpower, vehicles, equipment, infrastructure, and technical expertise; however, systematic resource mapping across sectors was either absent or not regularly updated. Several participants recounted difficulties accessing timely support from other departments during disasters, citing unclear protocols, weak coordination, and logistical constraints as key barriers.

Regarding information management and early warning, participants stated that alerts were primarily received through official government channels, district administration communications, control rooms, and technical agencies. While early warnings were generally accepted promptly, participants felt that information sharing across all relevant departments was not always comprehensive or synchronized. Real-time information exchange was largely dependent on informal digital platforms, which limited structured documentation, coordinated decision-making, and accountability.

Participants also discussed post-disaster coordination and recovery processes, noting that departmental involvement in damage and loss assessments and Post-Disaster Needs Assessment (PDNA) varied considerably. Some departments played an active role in assessment and recovery activities, while others were engaged only upon specific direction. Collaboration during recovery and rehabilitation was described as fragmented, with limited convergence planning and weak mechanisms for sustained inter-sectoral coordination.

In conclusion, participants identified unclear roles, weak coordination structures, limited joint planning, and inadequate training as significant challenges to effective inter-departmental collaboration. The group strongly recommended institutionalizing regular multi-sectoral coordination meetings to strengthen preparedness and trust among departments. Participants emphasized that operationalizing a common coordination platform, such as a functional Emergency Operations Center (EOC), would significantly improve communication, enhance resource sharing, and promote a more integrated and practical approach to disaster response and recovery.



Figure 29: Group Discussion on DDMP in Batch-2



Figure 30: Group Discussion on DDMP in Batch-4

Annexure X: Detail report on the Case scenario prepared by participants

(Note: The figures/images included in the Annexure X are indicative and intended solely for illustrative and educational purposes. The figures/images were submitted by the participants as part of their group presentations and have been included to support the understanding of the respective case scenarios. The authors have not independently verified the source, ownership, or accuracy of these figures/images and therefore do not assume responsibility for their authenticity, accuracy, or attribution.)

1. Batch 1: Patna (13-16 May 2025)

1.1. Group 1: Dengue Outbreak in Bhagalpur, Bihar



Figure 31: Group Photo of Group-1 during their presentation

Group Members:

Dr Anjana, Dr Sweta, Dr Gopal Krishna, Dr Kundan Krishnan, Dr Prashant, Krishna Kumar, Vikash Kumar, Saurabh Kumar, Kamlesh Kumar, Dr Seema, Dr Vinay Kumar, Ms Malti Kumari, Shashi Bhushan Singh

Section 1: General Details

Item	Response
Title of the Case Scenario	Dengue Outbreak in Bhagalpur, Bihar
Type of Emergency/ Disaster	Outbreak

Item	Response
Event specific background: Event description: Event Duration	Dengue fever is a mosquito-borne tropical disease caused by the dengue virus (DENV). It is transmitted to humans through the bites of infected female Aedes mosquito. About half of world's population is at risk of dengue. Dengue is found in tropical and sub-tropical climates worldwide, mostly in urban and semi-urban areas. Unplanned urbanization, increased population density, human mobility, water storage practices, etc. are associated with dengue transmission. Prevention and control of dengue depend on vector control.
Affected Location(s)	Urban and semi-urban wards of Nathnagar, Tilkamanjhi, Barari, and Kahalgaon, district - Bhagalpur
Population Affected	1200 suspected cases and 460 laboratory confirmed cases

Section 2: Event Description

Within a time span of 14 days in May 2024, an alarming rise in dengue cases were reported in urban and semi-urban wards of Nathnagar, Tilkamanjhi, Barari, and Kahalgaon, Bhagalpur. 1200 suspected cases were reported and 460 laboratory-confirmed dengue infections. Hospital admission of dengue patients was high with few severe cases of complications such as dengue haemorrhagic fever and shock syndrome. With beds and platelets in short supply, many patients had to be referred to nearby districts or private hospitals, leading to public dissatisfaction and media attention. Though fogging operations and larvicide spraying were initiated, the efforts were sporadic and lacked community participation. Public awareness was low, and myths about dengue transmission delayed timely medical intervention. Health workers faced challenges in door-to-door surveys due to staff shortages and resistance from households.

Section 3: Risk Assessment

- Hazards Identified: The major threat was rapid spread of disease with limited measures being taken for treatment and vector control. No mosquito breeding sites were identified prior to monsoon onset for prevention and control of dengue. Sporadic measures may not be sufficient to control the spread of disease.

Secondly, Shortage of health staffs may interrupt the intervention, lack of knowledge and myths in the community may lead to repeated outbreaks in the community.

- **Vulnerabilities Observed:** The most affected areas were urban and semi-urban population with low-income households and overcrowding. There were poor water storage practices led to stagnation of water and breeding ground for mosquitos. There was also lack of knowledge of use of mosquito net, repellents, etc. The health seeking behaviour of the people was good as access to government health facility was nearby. High number of people reached hospital for treatment. Few complicated cases were admitted and treated. There was no fatality reported. But sudden rise in cases led to shortage of hospital beds, platelet supply and logistic supplies. Shortage of hospital preparedness led to generation of chaos. Low-income population lacked access to facilities at private institute due to affordability issues.
- **Exposure Factors:** People of all age groups and gender were affected with a toll as high as 1200 in urban and semi-urban areas.
- **Existing Capacity:** The health infrastructure and work force were in place for intervention but due to sudden rise in cases, an immediate shortage of supplies, logistics and work force were observed. There was shortage of field level staffs for conduction of door-to-door survey, awareness generation and fogging activities. Shortage in hospital led to shifting of patients to private hospital, etc. There was limited activities conducted for source reduction.

Section 4: Prevention and Mitigation Measures (Before the Event)

Health department was the nodal department for prevention and control of dengue with support from Nagar Nigam, ICDS and administration. There was provision of IEC for awareness generation through TV, radio, banners and posters displayed and distributed by field health workers. Testing and treatment facilities were available at CHC, sadar hospital and medical college. Fogging is a routine activity conducted by Nagar Nigam.

Section 5: Preparedness Measures

There was no entomological surveillance conducted prior to onset of monsoon. It was initiated after dengue cases peaked. Vector reduction measures were also not initiated prior to monsoon. Hospital readiness was not in place.

Future suggestions for strengthening preparedness: Strengthening testing mechanism and hospital readiness. Larval sources reduction – Use of larvicidal, Gambusia fish at mosquito breeding sites. Awareness campaigns Targeting educational institutions such as schools, colleges and coaching institutions for awareness generation. Sensitization of faith healers for spreading awareness in their local community and promote early health seeking behaviour. Creation of war room for intersectoral co-ordination of departments such as health, ICDS, municipal corporation, education, PRI under the chairpersonship of DM. Daily review of progress during evening briefing chaired by DM. Concurrent monitoring and feedback sharing for corrective actions

Section 6: Impact and Response

6.1 Impact Summary

Though there was no fatality but incidence of dengue cases in urban and semi-urban areas has impacted communities well being and created huge patient admission in hospitals

6.2 Response Actions at Different Levels

The key respondent should be the health department with hospital readiness in terms of testing, beds, logistic and supplies. Routine entomological surveillance should be a plan of IDSP with rigorous training of health workers. Isolation of patients should be initiated as early as possible.

Section 7: Application Emergency Management Principles

As dengue outbreaks have become evident in every monsoon, so district level task force with inter-sectoral co-ordination to review the preparedness at hospitals, conduction of source reduction activities, awareness generation, community engagement, etc. need to be strengthened.

Section 8: Recommendations (Way Forward)

- Outbreak Response – Diagnosis and clinical management and vector control measures
- Risk Communication and Community Engagement
- Multisectoral co-ordination
- Monitoring and Evaluation
- Long term preparedness and prevention -Strengthening of surveillance of suspected dengue cases, its reporting and availability of treatment facilities at all health centres and referral

Section 9: Summary (Key Takeaways)

Bhagalpur reported 1200 suspected Dengue cases and 460 lab confirmed cases within a fortnight. Descriptive epidemiology: On data analysis, we found this was the highest surge in the last three years, We described the cases w.r.t time, place and person were analyzed, Hospital records were reviewed. Entomological surveillance for calculation of HI, CI and BI was conducted in the affected areas by FLWs. We recommended strengthening diagnosis, detection, clinical management of cases and vector reduction measures, awareness campaigns engaging youths and multisectoral co-ordination as a key to strengthen surveillance, response and corrective action.

1.2. Group 2: Measles Outbreak in Bhojpur, Bihar



Figure 32: Group Photo of Group-2 during their presentation

Group Members:

Dr Rajesh Ranjan Sinha, Dr Nitika Singh, Dr Md. Seraj Ansari, Dr. Rajiv Kumar, Rahul Bhushan

Dr. Vishal Kumar Sharma, Shri Ratnesh Kumar, Dr Ashutosh Kumar Chaturvedi, Kumar Nachiketa, Dr Parambodh Kumar, Naveen Kumar Pandey, Dr. Shashi Ranjan Prasad and Dr Randhir Kumar

Section 1: General Details

Type of Emergency/Disaster: Epidemic (Vaccine-preventable disease outbreak)

Event Specific Background: In early February 2024, Bhojpur district reported a cluster of measles cases from Shahpur and Piro blocks, with additional reports from Ara town. Over 150 suspected cases were reported, 78 clinically confirmed, including 4 deaths among unvaccinated children under five. The outbreak was linked to poor immunization coverage during the COVID-19 pandemic, vaccine hesitancy, and inadequate health-seeking behaviour.

Event Duration: Early February 2024 – March 2024

Affected Location(s): Shahpur, Piro blocks, Ara town, Bhojpur District, Bihar

Population Affected: 150+ suspected cases, 78 confirmed, 4 deaths; primarily unvaccinated children under five

Section 2: Event Description

The measles outbreak originated in a remote village where multiple children developed symptoms. The Rapid Response Team (RRT) confirmed the outbreak. Transmission was facilitated by low immunization coverage, poor health-seeking behaviour, misinformation, and logistical challenges in routine immunization delivery. Cases spread to schools and anganwadi centres, raising the risk of wider community transmission.

Section 3: Risk Assessment

Hazards Identified: Measles transmission, pneumonia, malnutrition, misinformation, low MR vaccination coverage

Vulnerabilities Observed: Unvaccinated children, low-income households, malnourished children, vaccine-hesitant families, overburdened PHCs, poor cold chain maintenance

Exposure Factors: School children, anganwadi attendees, families in rural villages with limited access to healthcare

Existing Capacity: District surveillance system (IDSP), RRT, PHCs, ICDS workers, ANMs, ASHAs; limited staff and inadequate cold chain infrastructure

Decision-Making Based on Risk: Risk assessment guided mop-up vaccination campaigns, case isolation, and interdepartmental coordination.

Section 4: Prevention and Mitigation Measures (Before the Event)

Structural: Health sub-centres, PHCs, anganwadi centres, schools (but limited readiness)

Non-structural: National measles-rubella elimination program, IDSP notification protocols, outbreak response immunization (ORI) guidelines

Ecosystem-based: Not applicable for measles outbreak

Intersectoral Coordination: Limited before outbreak; scope for stronger integration across Health, ICDS, Education, PRI

Section 5: Preparedness Measures

Preparations evident: IDSP surveillance system, MR vaccine availability, RRT deployment

Challenges faced: Poor immunization coverage, vaccine hesitancy, misinformation, inadequate cold chain maintenance, shortage of trained staff

Preparedness Gaps and Learnings: Need for better vaccine awareness, strong routine immunization, community engagement, and stronger logistics

Future Suggestions: Digital immunization tracking (eVIN), regular mock drills, school-based health education, enhanced intersectoral coordination

Section 6: Impact and Response

Impact Summary: 150+ suspected cases, 78 confirmed, 4 child deaths, spread to schools and anganwadi centres, negative impact on livelihoods due to school closures and community fear

Response Actions: District RRT activated, house-to-house surveillance by ASHAs/ANMs, mop-up vaccination campaign, IEC campaigns to counter misinformation, coordination with ICDS, Education, and PRI institutions

Challenges: Vaccine hesitancy, misinformation via social media, inadequate logistics; addressed via community leaders, mobile cold storage, additional staff deployment

Section 7: Application of Emergency Management Principles

- All-hazards approach: Integrated response combining surveillance, medical care, vaccination, and communication
- Incident Response System: District-level coordination through RRT and IDSP
- Unified Command: Joint efforts by Health, ICDS, Education, PRIs
- Emergency Operation Centers: District surveillance unit as coordination hub
- Risk Communication: IEC materials, local influencers, schools
- Psychosocial Aspects: Addressed community fear and vaccine hesitancy through counselling

Section 8: Recommendations (Way Forward)

- Strengthen routine immunization and ensure MR vaccine coverage above 95%
- Build strong intersectoral coordination with ICDS, Education, Panchayati Raj institutions
- Improve cold chain and logistics using eVIN and backup systems
- Enhance community engagement through trusted local leaders, IEC campaigns
- Train frontline health workers on outbreak response, AEFI management, and communication skills

Section 9: Summary (Key Takeaways)

The measles outbreak in Bhojpur highlighted the consequences of immunization gaps and vaccine hesitancy. Preparedness was limited by poor logistics, weak routine immunization, and community misinformation. The response required strong surveillance, vaccination campaigns, and community engagement. Future preparedness must focus on strengthening routine immunization, intersectoral coordination, cold chain systems, and risk communication.

Section 10: Annexures

- Outbreak maps, charts, and visuals (as discussed during exercise)
- References: IDSP Guidelines, Measles-Rubella Surveillance Guidelines, Outbreak Response Immunization Guidelines

1.3. Group 3: Lightning (Vajrapat) Preparedness and Mitigation in Khagaria, Bihar



Figure 33: Group Photo of Group-3 during their presentation

Group Members:

Dr Suman Kumar, Dr Shilpi Ranjan, Dr Ankita, Dr Saroj Kumar, Arbind Kumar, Dr Kamlesh Prasad, Sanjay Upadhyay, Dr. Shashi Kumar, Kashyap, Ramakant Prasad, Mr Kumar Mukesh Ranjan, Dr. Shashi Ranjan Prasad, Dr Shashikant Kumar

Section 1: General Details

Microplan for Lightning (Brajpat) Preparedness and Mitigation

Introduction:

Khagaria district in Bihar is highly vulnerable to lightning strikes (Brajpat), especially during the monsoon season. Every year, several fatalities and property damage are reported due to lightning. Blocks such as Mansi, Alauli, Parbatta, Beldaur, Gogri, Chautham, and Khagaria Sadar are particularly prone to such incidents due to their open fields, riverside villages, and rural setups. A comprehensive microplan is essential to minimize the risk and protect lives.



Khagaria demographic details	
Name of the Block	Number of panchayat
Alauli	21
Khagaria	26
Chautham	13
Mansi	7
Gogri	24
Beldaur	16
Parbatta	22
राजस्व ग्राम	306
ग्राम पंचायत	129
क्षेत्रफल	1,486 वर्ग किमी
जनसंख्या ग्रामीण	15.8 लाख
जनसंख्या शहरी	0.87 लाख
उप-प्रभाग	2
नगर परिषद	1

Objectives:

- To raise public awareness regarding lightning risks and safety measures.
- To develop an efficient alert and early warning system.
- To identify high-risk areas and prepare for mitigation and response.
- To implement preventive infrastructure and community training in schools, panchayats, anganwadi centres, and public spaces.

Section 2: Structure of committees responsible for managing lightning (Brajpat) incidents and other disasters in Khagaria

- I. District Disaster Management Authority (DDMA) — Khagaria

- II. Chairperson— District Magistrate / Collector,
- III. Co-Chairperson— Elected representative (Zilla Parishad Chairperson or MP/MLA),
- IV. Members,
- V. Chief Executive Officer (usually Addl. DM),
- VI. Superintendent of Police,
- VII. Chief Medical Officer of Health (Civil Surgeon),
- VIII. Additional key district officials (e.g., Executive Engineers from PWD, Irrigation, PHED, Water Resources)
- IX. Representatives from departments like Health, Fire, Electricity, Agriculture, Animal Husbandry, Fisheries, and NGOs/Red Cross (as per state guidelines)

Role: The DDMA is tasked with planning, coordinating, and implementing disaster management—including preparedness, mitigation, response, relief, and recovery—at the district level.

Block-Level Disaster Management Committee

- I. Under Bihar's implementation of the Disaster Management Act:
- II. Chairperson: Block Development Officer (BDO) or Sub-Divisional Officer (SDO)/ Tehsildar
- III. Members include:
 - Police representative (e.g., Inspector-in-charge)
 - Assistant Health Officer
 - Block-level officials from Agriculture, Animal Husbandry, Fisheries
 - Fire service/Disaster Response Team rep
 - Representatives of Panchayat (Pradhan/Sarpanch)
 - Heads/teachers from local schools, Anganwadis, Primary Health Centres
 - Other line department officials as needed

Purpose: Coordinates local disaster preparedness and response—including lightning events, floods, and storms— through planning, awareness, drills, early-warning dissemination, and resource mobilisation.

Village-/Panchayat-Level Committees

- I. Chairperson: Village Pradhan/Gram Pradhan
- II. Members: Ward members, Gram Sevak, local health worker/teacher, youth volunteers, NGO representative

Duties: Create & maintain local disaster plans, conduct education & drills, manage search & rescue teams, first aid, early warning, evacuation, and shelter support at the grassroots level.

Committee Structure Summary

- Level Chairperson Key Members, District District Magistrate / Collector SP, CMOH, CEO, Executive Engineers (PWD, Irrigation, PHED), NGO representative, Red Cross,
- Block BDO / SDO Police, Health Officer, Agriculture/Animal Husbandry, Panchayat rep, teachers, fire service
- Village Pradhan (Panchayat head) Ward members, teacher/health worker, youth/volunteers, NGO/local groups,

By structuring disaster management committees at district, block, and grassroots levels—with designated government officers and community representatives—Bihar ensures a multi-tiered, coordinated approach to natural hazards like lightning, floods, and storms.

Section 3: Risk Area Identification:

- **Alauli Block:** Largely rural with expansive agricultural fields, putting farmers at risk during fieldwork.
- **Parbatta Block:** Riversides and open areas where herders and labourers are exposed to lightning.
- **Beldaur Block:** Paddy fields and open lands make agricultural workers highly vulnerable.
- **Gogri Block:** Villages along the Ganga River are particularly exposed during storms.
- **Chautham & Khagaria Sadar:** Though semi-urban, construction sites and open grounds remain risky spots.

Section 4: Action Plan:

Awareness Campaign:

- Dissemination of posters, leaflets, and banners with lightning safety tips in every panchayat, school, and anganwadi centre.
- The Disaster Management Department will conduct door-to-door campaigns and use mobile vans with loudspeakers for lightning awareness.
- Schools will educate children on the “30-30 rule” (seek shelter if the time between lightning flash and thunder is less than 30 seconds).

Early Warning and Communication System:

- Promote the use of the ‘Damini App’ for real-time lightning alerts.
- Establish a block-level control room to disseminate weather warnings via SMS, WhatsApp, and public announcements.
- Coordination with IMD (Indian Meteorological Department) for timely alerts.

Infrastructure Measures:

- Install lightning arresters in schools, hospitals, and key public buildings.
- Encourage community shelters in open fields and flood-prone areas.
- Conduct safety drills and training sessions for community leaders, teachers, and health workers.

Special Focus Areas:

- Farmers, daily wage workers, herders, and fishermen will be targeted for customized training sessions.
- Develop IEC (Information, Education, Communication) materials in local dialects for better understanding.

Monitoring and Review:

- Monthly review meetings at the block level under the BDO’s supervision to monitor implementation progress.
- Data collection on lightning incidents for continuous risk assessment.

Section 5: Challenges related to lightning (Brajpat) incidents

Human Casualties & Injuries:

- A recent incident in Parbatta block (Raka Diara panchayat) saw four individuals injured, one critically, after lightning struck during heavy rain.
- Historically, tragedies have occurred — for example, in June 2022, a mother and daughter were fatally struck in Chautham block during crop harvesting.

Damage to Life & Livelihoods:

- Lightning and subsequent storms cause crop damage, leading to farmer protests in April 2025 demanding compensation.
- Besides crops, homes and cattle shelters are often damaged or destroyed in storm events.

Infrastructure Disruption:

- Severe thunderstorms have downed trees and power poles across Beldaur and Khagaria Sadar, leading to damaged houses and disrupted daily life.
- Frequent events cause long-duration power outages, affecting urban and rural electricity supply.

Frequent Weather Warnings & Lack of Preparedness:

- District administration regularly issues alerts for thunderstorms and gusty winds, advising people to avoid open fields, trees, utility poles, and electronic devices during storms.
- Despite warnings, basic safety practices—such as avoiding sheltering under trees in open areas—are not widespread.

Inadequate Lightning Protection & Community Awareness:

- Many rural structures lack lightning conductors and proper earthing, making them highly susceptible.
- Communities are not sufficiently educated on emergency responses like the “30-30 rule” or seeking safe shelter during storms.

Section 6: Summary of Key Challenges

Challenge Area	Issue Details
Casualties & Injuries	Lightning injuries (e.g., Parbatta) and fatal incidents (e.g., Chautham).
Crop & Property Damage	Farmers' loss of livelihoods leading to protests, home destruction.
Infrastructure & Power Supply	Fallen trees/poles causing lengthy outages and disrupted services.
Weather Alerts & Safety	Regular warnings, but low implementation of safety practices.
Protection Systems	Poor coverage of lightning conductors; low public awareness in rural areas.

Section 7: Recommendations & Next Steps

- Install lightning arrester systems on schools, homes, and public buildings across all blocks.
- Launch mass awareness campaigns, especially teaching safe practices like avoiding open areas or trees during storms.
- Establish a rapid-response protocol for power utility teams to restore supply post-storm.
- Ensure prompt compensation and support to farmers and families affected by lightning and storm damages.
- Conduct community-level drills on weather alerts and lightning safety (e.g., using the Damini App).

By addressing these challenges through infrastructure upgrades, community education, and faster recovery systems, Khagaria can significantly reduce the impact of lightning disasters.

Lightning (Brajpat) -Affected v/s Total Population — Khagaria Blocks

Block	Total Population	Affected by Lightning (Brajpat)
Alauli	2,82,127	10 house hold
Beldaur	2,00,223	13 house hold
Khagaria	3,81,358	11 house hold
Mansi	88,511	8 house hold
Gogri	3,16,770	09 house hold
Chautham	1,53,831	6 house hold
Parbatta	2,44,066	12 house hold
District Total	16,66,886	

Section 8: What Can We Do Next?

- Contact local authorities: The District Disaster Management Authority (DDMA) or Block Development Offices may have more granular data on lightning impact.
- Draw inferences: If district-wide figures are available and the affected blocks are known, approximate block-level estimates can be made.
- Survey data: On-ground surveys post-lightning events might exist through local media reports or administrative records.

Section 9: Conclusion:

By implementing this microloan, Khagaria district can significantly reduce the fatalities and losses caused by lightning strikes. Community participation, technological interventions like the Damini App, and infrastructure improvements will ensure better preparedness and resilience against Brajpat.

1.4. Group 4: Flash Flood

Group Members:

Dr Aman Kumar, Dr Mahendra. M, Dr Manoj Kumar, Dr Julee Kumari, Kamlesh Kumar, Dr Kusumlata, Ravi Kumar Arya, Prem Ranjan Dubey, Kumari Shweta, Dr. Md. Anzar Qurasi, Md. Gulam Rabbani, Sri Saurabh Satyam, Dr Bam Shankar Kumar



Figure 34: Group Photo of Group-4 during their presentation

Section 1: General Details

Item	Response
Title of the Case Scenario	Flash Flood
Type of Emergency/Disaster	Flood
Event specific background:	Torrential rainfall measuring over 200mm in less than 6 hours triggered sudden flash flood
Event description:	Disaster Aspects: Natural disaster, heavy rainfall triggered flash flood.
Event Duration	July 17,2024

Item	Response
Affected Location(s)	Multiple low lying areas of Patna, capital city of Bihar such as Rajendra Nagar, Kankarbagh, Gardanibagh and Patliputra colony.
Population Affected	>30,000

Section 2: Event Description

On 17 July 2024, torrential rainfall measuring over 200mm in less than 6 hours triggered flash floods across multiple low lying areas of Patna, Bihar. Water levels rising up to 4 feet in some locations. Rajendra Nagar, Kankarbagh, Gardanibagh and Patliputra colony were severely affected. Disruption of Railway Services, power outages, failure of mobile networks and traffic gridlock occurred. More than 30,000 people affected so far with over 6000 shifted to relief camps.

Section 3: Risk Assessment

• Hazards Identified:

- Power cut
- Traffic gridlock
- Failure of mobile networks
- Hindered critical patients care
- Schools closed
- Routine livelihood of residents hampered
- Life and food risks for livestock
- Water and food shortage
- Diseases like diarrhea

• Vulnerabilities Observed:

- Children, elderly and livestock are vulnerable

- Infrastructure damaged
- Health care approach hampered
- Low immunization coverage
- Malnourishment
- Low-income households suffer (as they mainly depend on livestock for their income)

- **Exposure Factors:**

- School going children as school premises faced sewage backflow
- Patients seeking health care
- Railway services
- Residential colonies

- **Existing Capacity:**

- Surveillance System,
- Health systems including specialists and laboratory facilities,
- Veterinary support,
- Disaster readiness including disaster management plans,
- Contact details of key functionaries etc.

- **Decision-Making Based on Risk:**

Yes, this assessment has been used in planning or response

- Most affected areas identified
- Evacuation of vulnerable population (children, elders, pregnant women, and livestock etc)
- Shifted to relief camps
- Mobile and static medical team formed
- Maternity huts prepared

Section 4: Prevention and Mitigation Measures (Before the Event)

- Relief camps are formed in public schools and community halls
- Plans for Health/Disaster/animal husbandry like plan for avian influenza, flood; systems like identified shelters, contact details etc
- Food packaging with medical kits sent to shelters
- Health, animal husbandry and disaster department were coordinating time to time.

Section 5: Preparedness Measures

- Early warning systems/Disease surveillance
- Inter-department coordination including contact details of important functionaries.
- Training, mock drills, community awareness

Preparedness remained strained due to rapid urbanization, poor drainage infrastructure and city's geographic vulnerability.

Preparedness Gaps and learnings:

- Strict follow of early warnings
- Intersectoral coordination and clear communication
- Rapid response team must include intersectoral members

Future suggestions for strengthening preparedness:

- Plan must be prepared and followed accordingly with intersectoral regular meetings

Section 6: Impact and Response

6.1 Impact Summary

- More than 30,000 people have been affected
- Over 6000 shifted to relief camps set up in public schools and community halls.

6.2 Response Actions at Different Levels

- key responders (departments), and how was coordination ensured?
 - Disaster management department, health department, animal husbandry department. Coordination can be ensured by emergency operation centres.

- In the first 24–72 hours, evacuation of vulnerable population, shifting to relief camps
- Food, drinking water, hygiene, physical separation from their dear ones are the challenges that arose and can be overcome by distributing food packages, aware to drink NaDCC treated water, maintaining cleanliness (i.e. leftover food, wrappers must be dumped properly in bins) and empathise sufferers.

Section 7: Application Emergency Management Principles

Indicate how these can be applied in your scenario for better management:

- Joint district level disaster, health emergency plans, Disease specific plan can be made and used
- All-Hazards Approach: After early warnings by IMD (India Meteorological Department) a comprehensive strategy can be applied for emergency management emphasizing preparedness.
- Incident Response System (IRS): Structured, standardized approach aiming to minimize chaos, reduce duplication of efforts, improve communication and accountability during response operations
- Unified command and coordination: Work together under single command structure to manage any disaster
- Joint planning with veterinary, health, DM, others and unified plans must share to IRS and Emergency Operation Centers (EOC/PHEOC).
- Use of Emergency Operation Centers (EOC/PHEOC) where public health officials gather to coordinate information and resources during emergencies.
- Risk Communication and Community engagement for evacuation
- Psychosocial support mandatory

Section 8: Recommendations (Way Forward)

- Drainage system must be properly planned
- Evacuation must as early as possible after warning
- shelters must be more enough so livestock also get shelters
- strengthening of inter-agency coordination.

Group's practical recommendations:

- Policy made for both humans and animals.
- Timely intersectoral meetings
- Emergency operating centers must be there for coordinating messages and resources
- General Awareness to population before flood to tackle

Section 9: Summary (Key Takeaways)

After flash floods across multiple low lying areas of Patna, Bihar. Water levels rising up to 4 feet in some locations. Disruption of Railway Services, power outages, failure of mobile networks and traffic gridlock occurred. More than 30,000 people affected so far with over 6000 shifted to relief camps. Municipal corporation, SDRF teams and civil society volunteers engaged in rescue operations and distributing essential supplies. Early warnings issued but all remain strained due to limitations. Recommendations suggested having emergency operating centers, proper drainage system, relief camps, essential supplies, medical camps, medical kits and psychosocial behaviour towards sufferer.

2. Batch 2: Patna (23-26 June 2025)

2.1. Group 1: Dengue Outbreak in Vaishali district, Bihar



Figure 35: Group Photo of Group-1 during their presentation

Group members:

Dr Manoj Kumar Singh, Upendra Kumar Chaubey, Antra Kumari, Dr Shyam Kishore, Ajit Kumar, Dr Maheshwari Singh Mahesh, Sri Akash Kumar, Dr Nand Kishore, Sri. Ravi Amarnath, Jagarnath Yadev

Section 1: General Details

Item	Response
Title of the Case Scenario	Dengue Outbreak in Vaishali Bihar
Type of Emergency/ Disaster	Outbreak
Event specific background: Event description: Event Duration	Dengue fever is a mosquito-borne tropical disease caused by the dengue virus (DENV). It is transmitted to humans through the bites of infected female Aedes mosquito. About half of world's population is at risk of dengue. Dengue is found in tropical and sub-tropical climates worldwide, mostly in urban and semi-urban areas. Unplanned urbanization, increased population density, human mobility, water storage practices, etc. are associated with dengue transmission. Prevention and control of dengue depend on vector control.
Affected Location(s)	Urban and semi-urban wards of Bidupur, Patepur, Mahua, and Raghapur, district - Vaishali
Population Affected	46 suspected cases and 09 laboratory confirmed cases

Section 2: Event Description

Within a time span month of May 2024, an alarming rise in dengue cases were reported in urban and semi-urban wards of Raghapur, Bidupur, Patepur, and Mahua, Vaishali. 46 suspected cases were reported and 09 laboratory-confirmed dengue infections. Hospital admission of dengue patients was high with few severe cases of complications such as dengue haemorrhagic fever and shock syndrome. With beds and platelets in short

supply, many patients had to be referred to nearby districts or private hospitals, leading to public dissatisfaction and media attention. Though fogging operations and larvicide spraying were initiated, the efforts were sporadic and lacked community participation. Public awareness was low, and myths about dengue transmission delayed timely medical intervention. Health workers faced challenges in door-to-door surveys due to staff shortages and resistance from households.

Section 3: Risk Assessment

- **Hazards Identified:**

The major threat was rapid spread of disease with limited measures being taken for treatment and vector control. No mosquito breeding sites were identified prior to monsoon onset for prevention and control of dengue. Sporadic measures may not be sufficient to control the spread of disease.

Secondly, Shortage of health staffs may interrupt the intervention, lack of knowledge and myths in the community may lead to repeated outbreaks in the community.

- **Vulnerabilities Observed:**

The most affected areas were urban and semi-urban population with low-income households and overcrowding. There were poor water storage practices led to stagnation of water and breeding ground for mosquitos. There was also lack of knowledge of use of mosquito net, repellents, etc. The health seeking behaviour of the people was good as access to government health facility was nearby. High number of people reached hospital for treatment. Few complicated cases were admitted and treated. There was no fatality reported. But sudden rise in cases led to shortage of hospital beds, platelet supply and logistic supplies. Shortage of hospital preparedness led to generation of chaos. Low-income population lacked access to facilities at private institute due to affordability issues.

- **Exposure Factors:**

People of all age groups and gender were affected with a toll as high as 46 in urban and semi-urban areas.

- **Existing Capacity:**

The health infrastructure and work force were in place for intervention but due to sudden rise in cases, an immediate shortage of supplies, logistics and work force were observed. There was shortage of field level staffs for conduction of door-to-door survey, awareness generation and fogging activities. Shortage in hospital led to shifting of patients to private hospital, etc. There was limited activities conducted for source reduction.

Section 4: Prevention and Mitigation Measures (Before the Event)

Health department was the nodal department for prevention and control of dengue with support from Nagar Nigam, ICDS and administration. There was provision of IEC for awareness generation through TV, radio, banners and posters displayed and distributed by field health workers. Testing and treatment facilities were available at CHC, sadar hospital and medical college. Fogging is a routine activity conducted by Nagar Nigam.

Section 5: Preparedness Measures

There was no entomological surveillance conducted prior to onset of monsoon. It was initiated after dengue cases peaked. Vector reduction measures were also not initiated prior to monsoon. Hospital readiness was not in place.

Future suggestions for strengthening preparedness: Strengthening testing mechanism and hospital readiness. Larval sources reduction – Use of larvicidal, Gambusia fish at mosquito breeding sites. Awareness campaigns Targeting educational institutions such as schools, colleges and coaching institutions for awareness generation. Sensitization of faith healers for spreading awareness in their local community and promote early health seeking behaviour. Creation of war room for intersectoral co-ordination of departments such as health, ICDS, municipal corporation, education, PRI under the chairpersonship of DM. Daily review of progress during evening briefing chaired by DM. Concurrent monitoring and feedback sharing for corrective actions

Section 6: Impact and Response

6.1 Impact Summary

Though there was no fatality but incidence of dengue cases in urban and semi-urban areas has impacted communities wellbeing and created huge patient admission in hospitals

6.2 Response Actions at Different Levels

The key respondent should be the health department with hospital readiness in terms of testing, beds, logistic and supplies. Routine entomological surveillance should be a plan of IDSP with rigorous training of health workers. Isolation of patients should be initiated as early as possible.

Section 7: Application Emergency Management Principles

As dengue outbreaks have become evident in every monsoon, so district level task force with inter-sectoral co-ordination to review the preparedness at hospitals, conduction of source reduction activities, awareness generation, community engagement, etc. need to be strengthened.

Section 8: Recommendations (Way Forward)

- Outbreak Response – Diagnosis and clinical management and vector control measures
- Risk Communication and Community Engagement
- Multisectoral co-ordination
- Monitoring and Evaluation
- Long term preparedness and prevention -Strengthening of surveillance of suspected dengue cases, its reporting and availability of treatment facilities at all health centres and referral

Section 9: Summary (Key Takeaways)

Vaishali reported 46 suspected Dengue cases and 09 lab confirmed cases within a fortnight. Descriptive epidemiology: On data analysis, we found this was the highest surge in the last three years, We described the cases w.r.t time, place and person were analyzed, Hospital records were reviewed. Entomological surveillance for calculation of HI, CI and BI was conducted in the affected areas by FLWs. We recommended strengthening diagnosis, detection, clinical management of cases and vector reduction measures, awareness campaigns engaging youths and multisectoral co-ordination as a key to strengthen surveillance, response and corrective action.

2.2. Group 2: Severe Acute Respiratory Infections (SARI) Linked to Sonapur Mela



Figure 36: Group Photo of Group-2 during their presentation

Group members:

Dr Ameet Kumar, Dr Chandra Mani, Dr Rahul Raj, Sri Akhilesh Kumar, Dr Ravi Ranjan Kumar, Dr. Aras Munna Kumar, Lucky Kumar, Dr. Aditya Kumar, Dr. Nitish Kumar, Sri Abhay Kumar Nirala, Dr. Amit Kumar.

Section 1: General Details

Item	Response
Title of the Case Scenario	Severe Acute Respiratory Infections (SARI) Linked to Sonapur Mela
Type of Emergency/ Disaster	Outbreak
Event specific background: Event description: Event Duration	Epidemiological aspects: Transmission dynamics Disaster Aspects: Triggering factors etc. Friday, December 12, 2024
Affected Location(s)	Sonapur Mela
Population Affected	264 SARI cases and 23 related deaths were reported from Districts I, J, K, and L of Bihar

Section 2: Event Description

The Sonapur Mela, held annually during Kartik Purnima, attracts lakhs of visitors from across Bihar and neighbouring states. In December 2024, a notable surge in SARI cases was reported across four districts—Districts I, J, K, and L—following the mela, where close human-to-human contact, overcrowding, low mask compliance, and poor ventilation in temporary structures likely facilitated transmission.

By the end of the second week of December, 264 SARI cases and 23 related deaths were recorded across the four districts. Epidemiological links to mela attendees were found in nearly 70% of the early reported cases.

Section 3: Risk Assessment

Hazards Identified:

- An Outbreak of Severe Acute Respiratory Infection (SARI).
- Trigger event - Sonapur Mela (a mass gathering, High density, poor ventilation)
- Likely a respiratory virus as a pathogen

Vulnerabilities Observed: -

Name of District	Vulnerable Groups	Contributing Factors
I	Elderly, co-morbid individuals	Epicentre, low mask use, delayed
J	Returnees, transport workers	No screening/quarantine, PHC overload
K	Urban poor, slum dwellers	No risk communication, crowding at bus terminals
L	Street vendors, traders	Continued contact while symptomatic, no advisories

Exposure Factors: -

- Primary Exposure Source: Attendees and workers at Sonapur
- Close person-to-person contact
- Aerosol and droplet transmission in crowded
- Contact with contaminated surfaces in food courts, animal enclosures
- 5–7 days during the mela; secondary exposure continues post-event.

Existing Capacity:

- Surveillance & Early Warning Systems in all four districts under IDSP/IHIP (Integrated Disease Surveillance Programme).
- Delayed detection in District I due to overlap with seasonal flu; no event-based surveillance at the mela.

- Limited testing facilities for pathogens
- Limited ventilator or oxygen support
- District Hospitals (DHs) available in all districts
- Isolation Beds Some available (COVID-era setup)
- Mobile Health Units (MHUs)

Section 4: Prevention and Mitigation Measures (Before the Event)

- Temporary Health Camp/stall in the mela area.
- Active case finding from house to house in affected area.
- Contact tracing of the active cases.
- Rapid awareness campaigns in affected area in the districts
- Temporary isolation facilities and mobile clinics for returnee
- ASHA/AWW/ANM orientation on SARI detection
- Active monitoring from district-level respiratory illness surveillance

Section 5: Preparedness Measures

- Early warning systems/Disease surveillance through IDSP/IHIP.
- Temporary hospital setup in the Mela area.
- ASHA/AWW/ANM orientation on SARI detection
- Mass gathering health protocols (e.g., health clearance, ventilation standards in the Mela area.
- Community resilience programmes for early reporting
- Inclusion of event-based surveillance in IDSP
- Stockpiles and infrastructure readiness including logistics like satellite phones Ham radio
- Inter-department coordination including contact details of important functionaries.

Challenges faced in preparedness

- Unexpected/large gathering in the Mela.
- Overcrowding, low mask compliance, and poor ventilation in temporary structures likely facilitated transmission.

Preparedness Gaps and learnings:

- Missed Early warning systems/Disease surveillance
- Delayed or absent response across district
- Overburdened Health system and lack of orientation for field workers.
- Laboratory support in the district Hospital
- Non-compliance of mela protocols.
- low mask compliance, and poor ventilation in temporary structures

Section 6: Impact and Response

6.1 Impact Summary

Category	Impact
Health	264 cases,23 death (CFR-8.7%), High severity among elderly
Health System	PHC overcrowding, Poor triage, Lack of preparedness, Lack of resources
Socioeconomic	Income loss among vendors/people, Market disruption
Public Trust	Erosion due to early warning and visible responses

6.2 Response Actions at Different Levels

- Incident Command system (ICS)-District Magistrate to activate District Health Emergency Operations Centre (DHEOC)
- Assign Incident Commander for coordinated response from Health/administration

- Designate treatment facilities with oxygen supported beds
- Referral linkages for safe transfer of critical patients.
- Deploy Rapid Response Team for active case finding from house to house in affected area.
- Contact tracing of the active cases.
- Rapid Health awareness campaigns in affected area in the districts
- Temporary isolation facilities and mobile clinics for returnee
- Inter-sectoral Coordination: Weak between health, transport, and local bodies.

Section 7: Application Emergency Management Principles

- Establishment of Incident Command system (ICS) and activation of District Health Emergency Operations Centre (DHEOC)
- Assign Incident Commander for coordinated response
- Designate treatment facilities with oxygen supported beds
- Referral linkages for safe transfer of critical patients.
- Deploy Rapid Response Team for active case finding from house to house in affected area.

Section 8: Recommendations

Short Term:

For Health Dept.: -

- Early warning systems/Disease surveillance through IDSP/IHIP.
- Temporary hospital setup in the Mela area.
- ASHA/AWW/ANM orientation on SARI detection
- Inclusion of event-based surveillance in IDSP

For General Admission: -

- Mass gathering health protocols (e.g., health clearance, ventilation standards in the Mela area.

- Community resilience programmes for early reporting
- Inter-department coordination including contact details of important functionaries.
- Overcrowding, low mask compliance, and poor ventilation in temporary structures likely facilitated transmission.
- Proper compliance of mela protocols.
- Sufficient IEC for Mask compliance and awareness for self-protection
- Temporary isolation facilities and mobile clinics

Long Term:

For Health Dept.: -

- Institutionalize health risk assessments before large events (like Sonapur Mela).
- Establish standard operating procedures (SOPs) for surveillance, medical response, sanitation, and ventilation during mass gatherings.
- Make Health Safety Certification mandatory before event approval.
- Integrated Disease Surveillance System (IDSS) Strengthening
- Enhance real-time data capture from all levels—PHCs, CHCs, district hospitals.
- Upgradation of laboratory for identification of pathogens
- Train surveillance staff to identify early warning signals and atypical clusters.
- Regular orientation of ASHAs, ANMs, and medical officers on SARI case definitions, referral protocols, and outbreak response.
- Establish permanent or semi-permanent isolation and triage centres near major event sites (like Sonapur).
- Equip district hospitals with dedicated infectious disease wards and negative-pressure rooms.
- Ensure oxygen availability, pulse oximeters, and ventilator support in all district and sub-district hospitals.
- Build a rumour surveillance and response mechanism to counter misinformation.

For General Admiration: -

- Develop a PHEOC for any mega events.
- District-level communication task force to create locally tailored IEC/BCC material.
- Use local influencers (PRI members, faith leaders) and platforms (WhatsApp, community radio) to spread timely messages.
- Health-Security Integration at Transit Points
- Mandate health kiosks at major bus/railway stations in high-risk districts.
- Create a QR-based tracking system for pilgrims/traders participating in large gatherings.
- Provide health advisories with travel tickets during mela season.
- Encourage academic and public health institutes to conduct retrospective studies and serosurveys post-events.
- Encourage early warning dashboards using AI/ML to detect anomalies in health data.
- Include public health preparedness in District Disaster Management Plans (DDMPs).
- Set up a State-Level Mass Gathering Health Oversight Committee with health, animal husbandry, disaster, urban affairs, and tourism departments.
- Promote inter-departmental simulation exercises pre-event to check response readiness.
- Regular health screening of animals at livestock fairs and mela enclosures.
- Surveillance for zoonotic spill over risks, especially where animal and human interactions are high.
- Enforce guidelines for waste disposal, water quality, and ventilation at temporary structures.
- Institutionalize mandatory health impact assessment after large gatherings.
- Document learnings and update district-level response protocols annually based on real incidents like Sonapur.

Section 9: Summary

The Sonapur Mela in December 2024, one of the largest mass gatherings in Bihar, was followed by a significant outbreak of Severe Acute Respiratory Infections (SARI) across four districts—Districts I, J, K, and L—resulting in 264 cases and 23 deaths. The majority of early cases were linked to mela attendees, with factors such as overcrowding, poor ventilation, low mask compliance, and inadequate post-event surveillance contributing to rapid transmission. The outbreak highlighted critical gaps in preparedness, surveillance, risk communication, and inter-departmental coordination. In response, long-term recommendations include institutionalizing mass gathering health risk assessments, strengthening the Integrated Disease Surveillance System, training frontline health workers, and improving infectious disease infrastructure. Enhanced community engagement, transit point health screening, zoonotic surveillance, and the integration of health planning into district disaster management plans are also essential. A state-level oversight mechanism, periodic simulation exercises, and mandatory post-event health impact assessments are necessary to ensure early detection, rapid containment, and prevention of similar outbreaks in the future.

2.3 Group 3: Acute Encephalitis Syndrome (AES) Outbreak in Bihar



Figure 37: Group Photo of Group-3 during their presentation

Group Members:

Dr Seema Singh, Dr Riya Kumari, Anubhav Raj, Dr Obaidullah, Arbind Kumar, Dr Rajesh Kumar, Sakshi Kumari, Dr Babul Kumar, Sumitra Nandan, Salim Jawed, Gitanjali

Section 1: General Details

Item	Response
Title of the Case Scenario	Multi-District Outbreak of Acute Encephalitis Syndrome (AES) in Bihar
Type of Emergency/ Disaster	Epidemic (AES outbreak), Environmental (heatwave and pre-monsoon rains)
Event specific background	A dry heatwave period followed by pre-monsoon showers in May 2025 triggered a spike in AES cases, predominantly among children under 15 in four districts of Bihar.
Event Description	73 AES cases and 18 deaths reported across Districts E, F, G, and H within two weeks. Marked differences in preparedness, health infrastructure, and coordination were noted among districts.
Event Duration	15 May – 31 May 2025
Epidemiological aspects	Predominantly affected children under 15. Associated factors include high temperature, malnutrition, poor hygiene, and proximity to litchi orchards. Transmission suspected to be viral/toxic in origin. Lack of early warning, lab confirmation, and pre-monsoon vector control worsened the situation. Similar spikes in previous years noted.
Disaster Aspects	Natural disaster (heatwave and rain), public health emergency. Triggering factors include weather, nutritional status, and low awareness.
Affected Location(s)	Districts E, F, G, and H (Bihar), peri-urban and tribal areas with poor access
Population Affected	73 AES cases (children), 18 deaths. Vulnerable groups: under-15 children, malnourished, tribal populations, peri-urban poor

Section 2: Event Description

A sudden rise in AES cases occurred in May 2025 after pre-monsoon showers broke a prolonged heat wave. Districts E and G struggled with delays in referrals and infrastructure gaps. District F showed effective preparedness with trained ASHAs and active control rooms. District H faced environmental challenges like waterlogging and poor vector control.

Section 3: Risk Assessment

Hazards Identified:

- Primary: AES viral outbreak
- Secondary: Malnutrition, poor sanitation, litchi toxicity, dehydration
- Vulnerabilities Observed:
- Children <15 years, malnourished and tribal groups, lack of ICU/PICU, low literacy, poor health-seeking behaviour

Exposure Factors:

- Proximity to litchi orchards, waterlogging, poor shelter, poor sanitation in peri-urban/tribal areas

Existing Capacity:

- Pediatric ICU only in select districts, active surveillance in F, poor communication and referral systems in E & G, insufficient ambulances in tribal areas

Decision-Making Based on Risk:

- District F used early detection for response; others lagged behind in real-time planning

Section 4: Prevention and Mitigation Measures (Before the Event)

Structural:

- Some districts had pediatric ICUs (E, F), but G lacked basic infrastructure

Non-structural:

- AES plans existed but were weakly implemented; mock drills missing in G & H

Ecosystem-based Solutions:

- No significant buffers; waterlogging not addressed pre-monsoon

Intersectoral Coordination:

- District F demonstrated model coordination; other districts lacked integration with animal husbandry, PRI, disaster units

Section 5: Preparedness Measures

Evident Preparations:

- Refresher training for ASHAs (District F), control rooms in F & E, partial readiness of AES wards

Challenges in Preparedness:

- Delayed vector control, lack of awareness drives, gaps in transportation and referral

Preparedness Gaps & Learnings:

- Weak early warning in G & H, lack of dashboard tracking, poor staff deployment in tribal belts

Future Suggestions:

- State-wide AES EWS system, annual ASHA training, seasonal vector-prevention drives, mobile medical units in tribal blocks

Section 6: Impact and Response

6.1 Impact Summary

- 73 AES cases, 18 deaths
- Children most affected
- Displacement not noted, but healthcare-seeking was delayed
- Poor environmental conditions and sanitation triggered disease

6.2 Response Actions at Different Levels

Key Responders: District Health Societies, PHED, Disaster Management, ICDS, ASHAs

Immediate Actions (First 72 Hour): Sample collection, referral activation, control room alert, fogging, awareness drives

Challenges: ICU shortage, transport delays, late detection, IEC gaps

Resolutions: Need for pre-season alertness and logistics pooling

Section 7: Application of Emergency Management Principles

- District AES Plans partially used
- Incident Response System activated only in District F
- Unified command missing across districts
- No central AES dashboard used
- EOCs partially functional
- Communication with communities was weak in E, G
- Psychosocial support not integrated
- Veterinary department not engaged despite zoonotic suspicion

Limitations:

- Lack of joint planning, delayed inter-district updates, weak risk communication

Section 8: Recommendations (Way Forward)

Lessons Learned:

- Timely ASHA training directly reduces fatality
- Unified AES dashboard is critical
- Real-time command room activation ensures rapid response
- Ambulance-tagging in rural Panchayats helps referrals
- Inter-departmental seasonal drills build preparedness

Policy Suggestions:

- Annual AES preparedness audit and funding at district level

Training:

- Include AES in CHC/PHC simulation drills

Coordination:

- Appoint inter-district AES liaison officers during outbreaks

PDNA and Monitoring:

- Introduce rapid AES impact assessment templates with geotagging

Section 9: Summary (Key Takeaways)

This case study highlights the contrasting district responses to a sudden AES outbreak in Bihar. While District F showcased proactive training and coordination, others lagged in early warning, lab support, and community outreach. Strengthening inter-district coordination, real-time surveillance, and community awareness can drastically reduce AES impact in future outbreaks.

Section 10: Annexures (if applicable)

[✓] AES Dashboard Screenshots (PPT Reference)

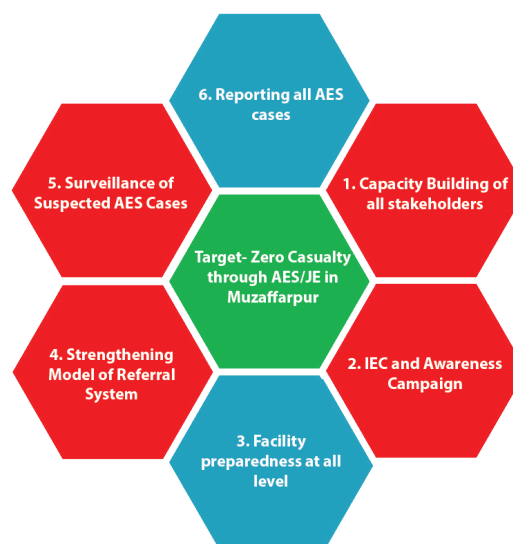
[✓] Surveillance Line Lists (SKMCH 2025 Data)

[✓] Block-wise Incidence Charts

[✓] Ambulance Tagging Map

[✓] IEC Activity Charts (Sandhya Chaupal etc.)

Focused areas of intervention



2.4. Group 4: Widespread Flooding in Bihar



Figure 38: Group Photo of Group-4 during their presentation

Group members:

Anushka Shrivastava, Pranav Raj, Mritjunjay Pandey, Deepak Kumar, Dr. Manish Kumar, Dr. Sree Kant, Sudhanshu Shekhar, Dr. Bharti Singh, Abadh Kishore Singh and Dr. Ravinder Nath Ravi

Section 1: Details:

Disaster Management: Disaster management encompasses the processes and practices involved in preparing for, responding to, and recovering from disasters, aiming to minimize their impact on human life, property, and the environment.

Key Aspects of Disaster Management:

- **Preparedness:**

This involves developing plans, establishing early warning systems, and conducting training to ensure effective response and recovery.

- **Response:**

This focuses on immediate actions during and after a disaster, such as search and rescue, providing medical aid, and distributing relief supplies.

- **Recovery:**

This involves long-term efforts to rebuild communities, restore infrastructure, and rehabilitate affected populations.

- **Mitigation:**

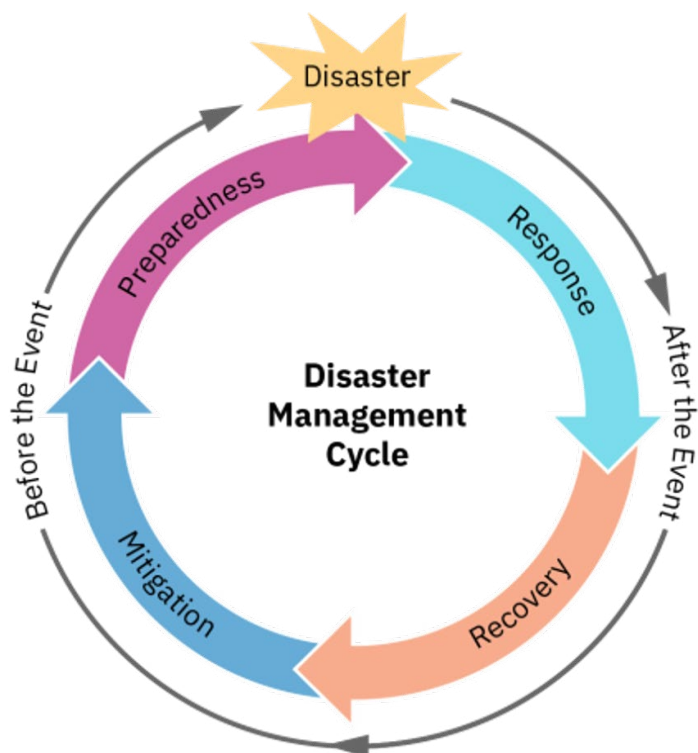
This aims to reduce the potential impact of disasters by implementing measures like hazard-resistant construction, land-use planning, and strengthening infrastructure.

I. Preparedness and Early warning:

- a. How did the IMD/Central water commission (CWC) alerts translate into district level actionable plans?
- b. Were communities informed and evacuated timely, especially in embankment-risk zones?
- c. Was there a mechanism for inter-district coordination and resource forecasting before a flood hit?

Solution to the above:

- IMD and CWC communicate to district via email and WhatsApp channel, channel is open to all the residents of the district and early warning is given through the same, so that it directly reaches the residents.
- We also have BMSK (Bihar Mausam Seva Kendra) providing accurate information related to Bihar, giving early warnings to all the districts through WhatsApp channel and mobile alerts which is later disseminated to concerned blocks through alerts and citizen through WhatsApp channel.



- In case communication is not possible through mobile communication, a traditional system can be used for e.g.

- Identifying the vendors for miking, religious places can be used for miking, public announcements.
- Police wireless System can be used as it does not require mobile tower communication.
- HAM radio etc.
- Resource person from FCD, RWD, RCD are deployed at distance of 1 km near embankments can be utilized.
- Apada Mitra, Auxiliary Nurse Midwives (ANM) workers, Anganwadi workers, Jeevika Didi, Asha workers etc. can be utilized for early warning.

II. Activation of EOCs and Incident Command

- a. When were the District EOCs activated in the respective districts?
- b. How did the SEOC facilitate a common operational picture across all affected districts?
- c. Was the Incident Response System (IRS) activated with designated Incident Commanders?

Solution to above:

- Emergency and operation center: 24*7 Emergency and operation center is operational at state (SEOC), district (DEOC), block level during flood season i.e. 15 June to 15 October and can be extended according to the requirement.
- SDRF is deployed in advance in vulnerable locations beforehand.
- Daily reporting is done through DSS portal
- Situation Reporting (SITREP) is done
- Incident commanders are deputed, and deputy incident commander are made in case of incident commander being absent or unable to perform his duties.

III. Search, Rescue, and Relief Operations

- a. How did districts manage real-time coordination of boats, rescue teams, and shelters?
- b. Were there inter-district mutual support arrangements (e.g., Samastipur lending equipment to Vaishali)?

- c. How were vulnerable groups (elderly, pregnant women, children, PwDs) prioritized?

Solution to the above:

- The list of all the Govt Boats available in districts is updated in March month only. Based on the number of Govt boats available circle offices enter in agreement with private boat owners to ensure that in times of need these boats are made available to the public free of cost.
- The Govt pays these private boat owners rent at a rate that is same for all the districts in a commissionerary and determined by divisional commissioner well in advance and the boatmen are paid wages in accordance with the wage rate notified by Labor department.
- List of Local volunteers (Aapda Mitras) is available with authorities who act as first responders at community level. Among these volunteers only some are selected as master trainers to train other members of the community and to sensitize them.
- SDRF & NDRF teams are placed/ posted at key locations; mostly in center of districts or at inter district boundaries from where they can be mobilized at short notice and thus reduce the response time. If need is felt during floods more teams of NDRF are demanded from centers and stationed at critical places during floods.
- Government has constructed Flood shelters in flood prone regions which has all the basic facilities available and can accommodate up to 200-300 persons. Apart from these shelters, several Govt buildings like schools are identified as shelters which can be used to accommodate additional affected populations. Many times, this happens that people reside in their homes or on roofs only but cannot cook food because of flood water or damage to household goods. For such situations a list of high places is identified where community kitchens can be established where cooked food is served to people.
- Yes, there are provisions for inter district mutual support. The resourced mapped on IDRN are geotagged and supposed to be used on the basis of geographical proximity. Even SDRF and NDRF teams have operational domain over multiple districts.



- For example, during 2024 floods food packets for air dropping in Flood affected regions of Sitamarhi district were prepared in Darbhanga district where Airforce was stationed. Similarly, when because of sudden surge in demand Supaul district felt a shortage of Polythene sheets, Saharsa district supplied it.
- During pre-flood preparation phase only Social Welfare department and health department identifies and prepares the list of elderly, differently able children and pregnant women who are given priority during rescue and special attention is paid to them at relief centers. e.g., Assisted delivery of pregnant women, provision of milk for children under 5.

Section 2: Health and Public Health Response

- What public health actions were taken to prevent outbreaks of cholera, hepatitis, or leptospirosis?
- Were mobile health units, sanitation workers, and ASHAs deployed effectively?
- How was chlorination and potable water access managed in remote blocks?

Solution to the above:

- Basic medicines such as Anti venom, bleaching powder, Paracetamol etc. stocks are kept in blocks and district headquarters, so that early access to the same can be ensured.
- Mobile health units visit all the relief centers on regular frequency and boat ambulances are put to use in areas where connectivity through roads is not possible. Sanitation workers and ASHAs are used in disinfection and spreading of bleaching powder once flood water has receded.
- Potable water access is ensured through water tankers and water ATMs ensured by Municipalities and PHED.

Logistics and Lifeline Services

- What were the logistics challenges in ensuring food, medicine, and water delivery?
- Were pre-positioned stockpiles sufficient? Were inter-district resource transfers enabled by the State?
- How did road and bridge damage affect relief movement and patient referrals?

Solution to the above:

- One issue is avoiding centralization of stocks. Before the advent of flood only

polythene sheets, tents, life jackets are stocked at Circle offices. Even the packaging of food is done at multiple locations. For transporting these materials boats, pickup vans and tractors are used. In areas that are completely cut-off Air force helicopters are used for air dropping food and ration packets.

- For most of the supplies rate contract is done with Vendors who are legally obligated to supply at short notice. In 90% of the cases these vendors don't default and in case they default the administration buys these materials at market price from open market. Through Bihar State Disaster Resource Network inter district resource transfer is mandated.



- Road and Bridge damages indeed affect the connectivity but that is overcome by using vehicles like tractors and boats. For patients boat ambulances and mobile medical teams are put to use.

Section 3: Communication and Coordination

- a. How did districts maintain communication lines between DMs, EOCs, and field teams during network failures?
- b. Was there a common dashboard or WhatsApp coordination group at district/ state level?
- c. Were NGOs, PRIs, and community-based organizations integrated into the formal response?

Solution to the above:

- In case of network failures Satellite phones in important offices, wireless communication sets installed in police stations are used. In case of urgent need of mass communication loudspeakers mounted on rickshaws, three wheelers and Govt vehicles are used.
- On the state level a common dashboard DSS portal is maintained and in districts all line departments are connected through whatsapp group which helps in real time dissemination of information.

- PRIs are indeed a part of formal response as the registers of Shelters and community kitchens are to be countersigned by PRI representatives. They are also members of Anushrawan Samiti that approves of the list of beneficiaries for availing GR. To ensure that the response of NGOs is evenly spread and not over centralized in a particular focus area, Bihar Inter Agency Group has been created for coordination among all NGOs

Section 4: Recovery and Transition Planning

- a. What are the immediate steps for damage assessment and restoration of health services, schools, and homes?
- b. How will the districts transition from response to recovery and rehabilitation?
- c. How will Post-Disaster Needs Assessment (PDNA) be coordinated across districts?

Solution to the above:

- For damage assessment a survey team formed that includes Govt Officials of affected areas as well as from outside as well to eradicate any possibility of bias. Immediate restoration of facilities like electricity and connecting roads is ensured within a month. For major damages assessment is done by concerned departments and restoration is subject to policy decisions.
- Towards recovery and rehabilitation, the measures from administration are aimed towards building confidence in the short term so that people return to their homes and resilience in the long term.
- The post disaster needs assessment is coordinated at individual as well as community level. While on broad infrastructure level policy decisions are taken to restore normalcy on individual front also affected population is given individual supports like GR for House damage, occupational support etc.

Apart from this flagship schemes of the Govt are also utilized to complement the efforts. Mukhyamantri Solar light Yojna is used to install solar lamps if electricity is not restored. Those whose houses have been damaged are given grants to construct toilet under Swachh Bharat Mission.

So, flood requires coordination of multiple departments working together in all its phases – preparedness, response, recovery and mitigation. Different sections handle and coordinate among themselves for e.g., Incident commander and deputy incident commander Planning section, Safety officer, Information and media officer, logistics section, health officers etc. When public is aware, society works together with administration and there is interdepartmental coordination can disaster be reduced and its effects can be minimized.

So let's work together to realize the pledge for Build Back Better Bihar:

"AAPDA NAHI HO BHARI YADI PURI HO TAIYARI"

"आपदा नहीं हो भारी यदि पूरी हो तैयारी"

3. Batch 3: Patna (01 – 04 July 2025)

3.1. Group 1: Multi- district outbreak of fever with rash in Bihar



Figure 39: Group 1 during their presentation on case scenarios

Group Members:

Dr Shahid Iqbal, Dr Rashid Ahmad Khan, Dr Shashikant Singh, Ms Ritika Bharti, Dr Anil Kumar, Mr Noor Ali Khan, Dr Ranjan Kumar, Dr Parmanand Rajak, Mr Anil Kumar Chakrawarty, Mr Santosh Kumar, Dr Rajesh and Amitabh Gunjan, Amitabh Gunjan

Section 1: General Details

Item	Response
Title of the Case Scenario	Multi- district outbreak of fever with rash in Bihar.

Item	Response
Type of Emergency/ Disaster	Epidemic (Fever with Rash)
Event specific background: Event description Event Duration	The outbreak of fever cases accompanied by rash, conjunctivitis, triggered by early July 2024, resulted in over 2300 suspected cases and 470 laboratory confirmed cases of measles, rubella and other viral exanthema Tou's fever (pending final differential diagnosis) found in 6 districts. In the Month of July 2024.
Affected Location(s)	The outbreak affected six districts (A and B, followed within a week by similar cluster in District C,D,E, and F.) in Bihar, District
Population Affected	An over of 2300 suspected cases with approximately 470 laboratory-confirmed cases of measles, rubella, and other viral exanthema Tou's fever were reported across six districts. The most affected were unvaccinated or partially vaccinated children under 10 years, residing in urban slum and remote rural pocket.

Section 2: Event Description

By early July 2024, multiple districts in Bihar began reporting a surge in fever cases accompanied by rash, conjunctivitis, and—particularly in paediatric cases—joint pain and swelling. The initial alerts emerged from Districts A and B, followed within a week by similar clusters in Districts C, D, E and F.

By July 15, 2024, over 2,300 suspected cases had been reported across these six districts, with approximately 470 laboratory-confirmed cases of measles, rubella, and other viral exanthema Tous fevers (pending final differential diagnosis). Many of the hospitalized cases involved unvaccinated or partially vaccinated children under 10 years.

Section 3: Risk Assessment

Hazards Identified:

Primary hazard:

An Outbreak of measles.

Aerosol and droplet transmission of measles virus.

High proportion of unvaccinated or partially vaccinated children under 10 years.

Secondary hazard:

Low immunization coverage of MR in both urban slums and remote rural areas.

High proportion of unvaccinated or partially vaccinated children under 10 years.

Misinformation and vaccine hesitancy fuelled by local myths or poor literacy.

Vulnerabilities Observed:

- Many of the children under 10 years, unvaccinated or partially vaccinated in the urban slums and remote rural pockets.
- Absence of good health-seeking behaviour among caregiver.
- Communities with poor immunization coverage, lack of awareness, about vaccine.
- Poor infrastructure in hard to reach and flood prone areas.
- Delayed reporting by frontline workers due to lack of training or motivation.

Exposure Factors:

- Exposed population; children with incomplete or partially immunized who residing in urban slum and remote rural household.
- Geographical exposure; dense population in urban slum, limited access to health care in hard-to-reach area.
- Environmental exposure: Temperate climate, (During flowering and fruiting season) because people crowded together indoor.

Existing Capacity:

- Surveillance System: surveillance and EWS in all six districts under IDSP/IHIP (integrated disease surveillance programme), VPD surveillance.

- Poor functionality, under reporting by RU and by the community reporting. no real time reporting by health care worker,
- No EWS could be generate. shortage of HR, Untrained health care worker.
- Health systems: Lack of specialist in remote health care facility, unavailability of cold chain facility, trained staff. ambulance availability, shortage of HR.
- Laboratory facilities: District labs used rapid tests; surge samples referred to VRDLs (Viral Research & Diagnostic Labs) for confirmation
- Disaster readiness: no standard district -level fever with rash disaster management plan, minimal co-ordination, out of date contact directories.
- Decision-Making Based on Risk:

(Has this assessment been used in planning or response?)

Yes, this assessment is used for planning and response purposes such as fulfilling large gaps, strengthening surveillance, real time reporting specially in fever with rash.

Section 4: Prevention and Mitigation Measures

What is already in place (or not) before the event?

Structural:

- The majority of affected area were lack of essential infrastructure like isolation ward, paediatric ICU (for severe case management).
- There were no pre designed shelter or child friendly facilities available for emergency care in rural areas.

Non-structural:

- Lack of a specific fever with rash disaster preparedness plan at the district level
- Ineffective contact directories of emergency responder and nodal officers.
- Minimal IEC activity or health education.

Ecosystem-based solutions: Lack of high vaccination coverage to achieve and maintain herd immunity, lack of Community Engagement

Intersectoral coordination and investments:

- Low coordination among department like ICDS, Education, Disaster management, IEC officer, and panchayat raj institution.
- Lack of Engaging community leaders and representatives: to promote vaccination and address community-specific concerns or beliefs about measles and vaccination.
- Lack of community reporting and real time surveillance and laboratory systems in hard to reach area.
- Lack of Emergency preparedness and response:

Section 5: Preparedness Measures

- Early warning systems/Disease surveillance
- Exist surveillance and ews system in all six districts under IDSP/IHIP (integrated disease surveillance programme), and VPD surveillance.
- Under reporting by RU and by the community that's why EWS could not be generated timely.

Stockpiles and infrastructure readiness (Including Logistic):

- No reference to emergency communication device such as satellite phones or Ham radio being operational.
- Lack of Prepared designated isolation units in healthcare.
- Stocking of relevant medicine, logistic, cold chain equipment and vaccine inadequately.
- District control room were not functioning in many places during the critical period.

Inter-department coordination:

- Weak intersectoral department co-ordination system

Training, mock drills, community awareness:

- Limited in – services training of ASHA, ANM and Medical officer on MR identification and referral procedure.
- NO mock Drill were done regarding these types of events in majority of district.
- Lack of community awareness about MR, severity, timely reporting, prompt treatment, hygiene and its hazard.

Preparedness Gaps and learnings:

- Inadequate surveillance systems can lead to under reporting and delayed response, hindering outbreak control.
- Insufficient funding and resources can limit the capacity to implement effective preparedness measures.
- Ineffective communication strategies can lead to low vaccination rates and increased susceptibility.

Future suggestions for strengthening preparedness:

- To generate EWS on the basis of past history year wise , Analyse the vaccine coverage area wise especially in rural pocket and urban slum then start catchup drive and follow-up drive of vaccination to prevent future outbreak.
- Strengthen surveillance system for real time reporting, sensitivity, timeliness and geographic coverage.
- Conduct training for community health workers on vaccination, surveillance, and health promotion.
- Ensure sustainable funding for all aspect like cold chain maintenance, availability of condition ice pack, and training of cold chain handler, courier who deliver vaccine to the site.
- Enhance community engagement to address vaccine hesitancy, promote community ownership and ensure high vaccination coverage.
- upgrading healthcare facilities, particularly in remote areas, to ensure adequate capacity for isolation, diagnosis, specialist, and treatment.
- Coordination of cross border district and develop common IAP for effective surveillance, mass immunization campaign, community engagement and data reporting.

Section 6:1 Impact and Response

Impact Summary

Health Impact

- Total 2,300 suspected cases across 6 districts; 470 confirmed cases of measles rubella, and other viral exanthems.
- Majority affected were children under 10, especially unvaccinated or partially vaccinated.

- Paediatric wards in district hospitals were overwhelmed. Shortages of beds, staff, and essential supplies (e.g., Vitamin A).

Programmatic Impact

- Revealed major deficiencies in routine immunization, cold chain integrity, and community-level surveillance.
- Delayed Detection: Early warning signals were delayed due to weak reporting systems, especially in rural and underserved areas.

Socioeconomic Impact:

- Temporary closures of schools to prevent spread.
- Community Fear & Misinformation: Widespread rumours around vaccines and disease severity; reduced health-seeking behaviour.
- Loss of Livelihood: Parents stayed home to care for sick children; affected daily wage earners.
- Environmental impact: indirectly impact through increase waste generation in health care system.

6.2 Response Actions at Different Levels

Key responders:

- Health Department: ASHAs, ANMs, HCWs, PHC, civil surgeon, state HEOC.
- ICDS: Anganwadi worker and child protection officer.
- Disaster Management Authority: For coordination and control room activation.
- District administration (DM's office): oversight and multi-sector coordination.
- Education Department: for school level IEC and Awareness campaign.
- Community based responder: Panchayat member, village influencer, and NGO.

Immediate action taken (within 24-72 hours):

- District PHEOCs and the State EOC were activated early and functioned under the Incident Response System (IRS).
- Early activation of District control room (district A and B)

- Deployment of Rapid response Team to the affected village.
- A coordinated Incident Action Plan (IAP) guided daily operations across all affected districts.
- District labs used rapid tests; surge samples referred to VRDLs (Viral Research & Diagnostic Labs) for confirmation.
- Paediatric isolation wards established; temporary beds added; stockpiling of Vitamin A, ORS, antipyretics.
- Critical patients transferred to medical colleges via 102/108 ambulance systems.
- Mass Measles-Rubella immunization campaigns rolled out in schools, Anganwadi, and slums.
- Emergency audits and repair of ILRs and vaccine carriers.
- Use of mobile vans, local influencers, and folk media to counter vaccine hesitancy and educate the public.
- Tailored approaches for urban slums vs remote rural areas.
- Resource Sharing: Vaccines, doctors, and ambulances shared across districts (e.g., District C supplying vaccines to District D).
- Multi-sector Support: ICDS, Education, Urban Development, and Disaster Management departments all contributed to the response.
- Tracked cases, vaccinations, bed occupancy, and IEC coverage.

Challenges faced:

- Affective implementation of mass Measles-Rubella immunization campaigns.
- Delayed referrals due to poor road access.
- Resource sharing like doctor, vaccine, ambulance.
- Tailored approaches for urban slums vs remote rural areas.
- Critical patients transferred to medical colleges via 102/108 ambulance systems.

Overcoming the challenges:

- Strengthen routine immunization, cold chain integrity,

- Strengthen real time surveillance
- Strengthen the block level health infrastructure and IDSP unit.

Section 7: Application Emergency Management Principles

All hazard approach

- Identification of low-immunization coverage blocks and slums as vulnerable hotspots.
- Rapid assessment of cold chain gaps and immediate repair/replacement of faulty equipment (e.g., ILRs, vaccine carriers).
- Mapping and red-flagging of zero-dose children in remote and urban marginalized communities.
- Localized risk communication strategies to dispel myths and vaccine hesitancy.
- Pre-emptive stockpiling of Vitamin A, ORS, and measles vaccines for future needs.

Unified command and coordination.

- Mock drills and refresher training for ASHAs, ANMs, and MOICs on outbreak detection and response.
- Districts reviewed and updated micro plans for emergency immunization and mobile health teams.
- Multi-agency coordination plans were refined, including roles of ICDS, Education, and Disaster Management departments.
- Development of pre-scripted IEC materials in multiple dialects for rapid rollout.
- District EOCs conducted pre-positioning of logistics like PPE, vaccine carriers, and rapid test kits.

Incident response system and Use of Emergency operation centres (EOC/PHEOC):

- Activation of EOCs at both district and state level under the Unified Command Structure.
- Incident Response System (IRS) activated with designated Incident Commanders and support teams (Operations, Logistics, Planning, Finance/Admin).
- Rollout of mass immunization campaigns in schools, Anganwadi, and high-risk areas.

- Mobilization of additional paediatricians from medical colleges, especially for Districts E and F

Joint planning (health, veterinary, DM):

- Fever with rash is a human health issue but planning was done with the DM for oversight and multisectoral coordination.

Psychosocial aspect of PHEDM:

- Psychosocial intervention of affected family and field worker are often overlooked or inadequate address.

Risk communication and community engagement

- Catch-up immunization drives planned beyond outbreak control to close immunity gaps. Re-evaluation and improvement of Routine Immunization performance in underperforming blocks.
- Post-outbreak review meetings at state and district level to capture lessons learned and refine SOPs.
- Incorporation of outbreak findings into training curricula for front-line workers.
- Development of a long-term community engagement plan to build vaccine trust and outbreak literacy.

Section 8: Recommendation:

Shot Term: -

- Targeted Microplanning for low-coverage areas (urban slums, remote rural blocks).
- Introduce community-based syndromic surveillance through ASHAs and ANMs.
- Monthly data review at block and district level to identify zero-dose children.
- Ensure real-time digital reporting via mobile apps or IDSP platforms at sub-centre level.
- Ensure availability of RDKs (Rapid Diagnostic Kits) for measles, rubella, dengue in all districts.
- Trained laboratory staff in biosafety, specimen collection, and differential diagnosis protocols.

- Strengthen IDSP sentinel surveillance in urban and peri-urban areas.
- Develop standard triage and referral protocols with 102/108 coordination.
- Launch sustained IEC/BCC campaigns targeting caregivers and communities with low literacy.
- Engage religious leaders, teachers, and PRI members as immunization champions.
- Tailor IEC materials to local dialects and cultural beliefs; use radio, folk media, and mobile vans.
- Formalize joint planning platforms between Health, ICDS, Education, Urban Development, and Disaster Management.
- Disseminate key findings to all districts to enhance statewide preparedness.

Group's Practical Recommendations:

- For state/District policy:
- Include immunization and outbreak response in district disaster management plans (DDMPs).
- Update Standard Operating Procedures (SOPs) and training modules based on outbreak experience.

For training and capacity building:

- Conduct quarterly refresher training for ASHAs, ANMs, and MOICs on outbreak response and vaccine management

For coordination and communication:

- Tailor IEC materials to local dialects and cultural beliefs; use radio, folk media, and mobile vans.
- Implement feedback loops between State EOC and districts to address bottlenecks rapidly.
- Launch sustained IEC/BCC campaigns targeting caregivers and communities with low literacy.
- Engage religious leaders, teachers, and PRI members as immunization champions

For PDNA (Post-Disaster Needs Assessment) and Monitoring:

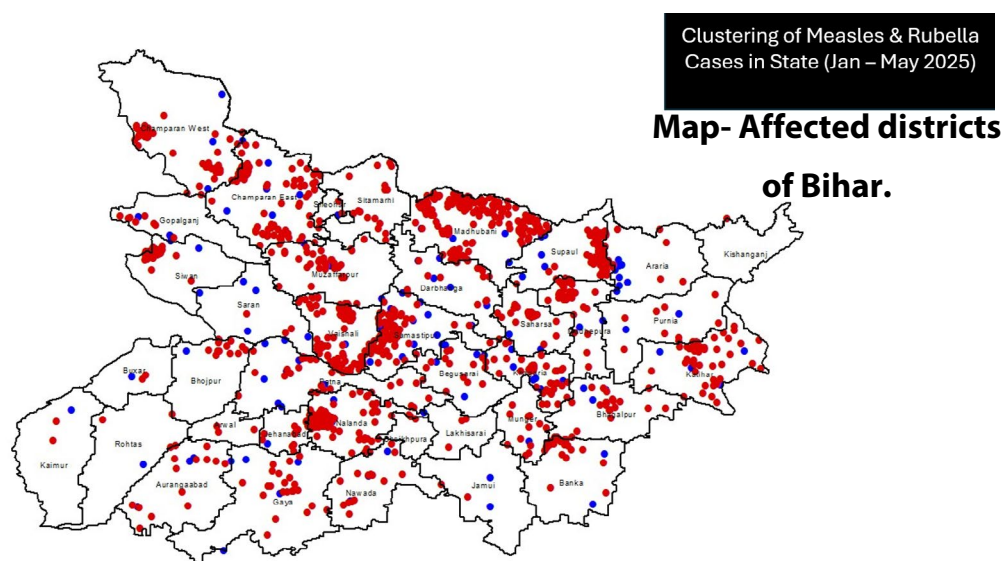
- Routine immunization audits, including supportive supervision and cold chain validation
- Conduct cold chain gap assessments in all six districts bi-annually.
- Invest in solar-powered ILRs and temperature monitoring devices (e.g., eVIN).
- Establish district-level vaccine reserves for rapid redistribution during emergencies.
- Strengthen linkages with VRDLs and regional reference labs for surge testing.
- Designate paediatric isolation wards in all district and sub-district hospitals.
- Stockpile essential supplies (Vitamin A, PPE, IV fluids) during pre-monsoon months.

Section 9: Summary

In July 2024, a multi-district outbreak of fever with rash—predominantly affecting children under 10—was reported across six districts in Bihar. Over 2,300 suspected cases and 470 laboratory-confirmed infections of measles, rubella, and other viral exanthema. The fevers overwhelmed paediatric health services, especially in areas with poor routine immunization coverage and cold chain gaps. The outbreak exposed critical vulnerabilities in the public health system, including delayed detection, weak surveillance in remote and urban slum populations, and widespread vaccine hesitancy. In response, District and State Emergency Operations Centres (EOCs) were activated under a Unified Command approach, deploying Incident Response System (IRS) teams and coordinating mass vaccination drives, hospital preparedness, and inter-district support for logistics and human resources. Risk communication strategies using mobile IEC vans and community influencers were instrumental in improving awareness and vaccine acceptance. Cross-sectoral collaboration with departments like ICDS, Education, and Disaster Management enhanced the overall response. The crisis demonstrated the value of applying emergency management principles—prevention, preparedness, response, and recovery—and highlighted the need for sustained investments in immunization systems, health worker training, community engagement, and real-time data systems to strengthen Bihar's resilience to future outbreaks.

Section 10: Annexures (if applicable)

Attach any: -



- Charts, impact visuals
- References or source materials (if any) Here's a structured breakdown and response to the key questions in your outbreak scenario on the Multi-District Fever with Rash Outbreak in Bihar (July 2024), categorized under each emergency management principle:

3.2. Group 2: Multi-District Outbreak of Acute Encephalitis Syndrome (AES) in Bihar



Figure 40: Group 2 during their presentation on case scenarios

Group Members:

Dr Bipin Kumar, Dr Gulshan Emroz, Dr Sajar Uddin, Dr Priyanka Kumari, Ms Surbhi Singh, Dr A K Gautam, Mr Asif seraj, Dr Ranjeet Kumar Singh, Mr Shahnawaz Khan, Dr Birandra Kumar Himanshu, Ms Monika Manjusha, Mr Gaurav Narain

Item	Response
Title of the Case Scenario	Multi-district outbreak of Acute Encephalitis Syndrome
Type of Emergency/ Disaster	Epidemic (Acute Encephalitis Syndrome - AES)
Event-specific background: Event description: Event Duration	The outbreak of Acute Encephalitis Syndrome, or AES, emerged after severe heat waves were followed by pre-monsoon rains. The focused zone was near the orchards of litchi and the hard-to-reach rural floodplain areas. There were 73 reported cases, along with 18 deaths in total. It predominantly affected children coming from poor, economically disadvantaged, and malnourished families. Several systemic gaps were found such as slow response times, insufficient pediatric ICU facilities, inadequate outreach education, poor community awareness, weak interdisciplinary collaboration, and lack of multidisciplinary teamwork. Improved response was apparent in District F due to prompt detection and emergency response activation. Nature of Disaster: This is a public health emergency of a non-communicable seasonal type, with socio-economic environmental undercurrents. Rather than classified as an epidemic, it is more of a syndromic cluster caused by a metabolic response — in the principal context acute hypoglycaemia — in vulnerable children. Triggering Factors: Pre-monsoon showers followed by extreme heat waves (causing ecological strain) Consumption of undergrown lychee fruit by undernourished children (which contains the toxins hypoglycin A and MCPG) Undernourished children skipping meals in the evening (increasing chances for overnight hypoglycaemia) Lack of access to appropriate medical attention and pediatric intensive care units Poor referral systems, limited population awareness, delayed action, and weak surveillance.

Item	Response
Affected Location(s)	The outbreak affected four districts in Bihar, mainly rural, flood-prone villages near litchi orchards. These areas had poor healthcare access, limited infrastructure, and low awareness about AES. District F responded effectively due to early surveillance, while others faced delays in referral and lacked pediatric ICU support.
Population Affected	A total of 73 cases and 18 deaths were reported, primarily among children under 15 years of age. The most affected were malnourished children from low-income, rural families living near litchi orchards. These children were especially vulnerable due to poor nutrition, skipped meals, exposure to extreme heat, and lack of timely medical care.

Section 2: Event Description

There was an outbreak of Acute Encephalitis Syndrome (AES) after extreme heat waves and early pre-monsoon rains in four districts of Bihar. The most impacted areas were rural villages surrounding litchi orchards, flood-prone areas, and far-off areas with limited access to healthcare. There were 73 reported cases and 18 deaths, mostly among malnourished children less than 15 years old. The crisis was fueled by several systemic problems, such as delayed referral, lack of pediatric ICUs, inefficiency in disease surveillance, ignorance, and poor interdepartmental coordination. District F, however, fared better because of early case detection, active surveillance, and efficient emergency response planning. The episode underlined the imperative for strong pediatric care, enhanced referral, community awareness, and intersectoral coordination among high-risk districts.

Section 3: Risk Assessment

Hazards Identified:

- Primary hazard: Acute Encephalitis Syndrome (AES) due to hypoglycemia because of malnourishment, litchi intake, and heat stress
- Secondary hazards: Delayed referrals, lack of pediatric ICUs, poor sanitation and hygiene, lack of community awareness, poor interdepartmental coordination

- Vulnerabilities Observed:
 - Children less than 15 years, particularly the malnourished and those from poor rural households
 - Absence of good health-seeking behaviour and awareness among caregivers
 - Communities with low immunisation levels and no access to emergency pediatric services
 - Weak infrastructure in flood-prone and distant areas

Exposure Factors:

- Exposed population: Malnourished children who reside in villages surrounding orchards of litchi trees
- Geographic exposure: Floodplains, rural localities with suboptimal health infrastructure, poor sanitation, and poor road connectivity
- Environmental exposure: Pre-seasonal litchi harvest season, heatwaves, and irregular meals led to hypoglycemic crises

Existing Capacity:

- **Surveillance System:** Poor functionality; underperforming IDSP units; no real-time AES alert system
- **Health Systems:** Suboptimal pediatric critical care, weak referral linkages, low ambulance availability
- **Laboratory Facilities:** Inadequate diagnostic capability at the block level
- **Disaster Readiness:** No standard district-level AES disaster management plan; minimal coordination; out-of-date contact directories
- **Other Gaps:** No identified AES nodal officers; no emergency medicine stockpiles at PHCs

Decision-Making Based on Risk:

- Yes, the evaluation was useful in laying bare vital gaps in early alertness, referral systems, and paediatric readiness. It pointed to the necessity of AES-specific planning, surveillance tools in real-time, and enhanced pre-monsoon interdepartmental coordination. District F's success was founded on taking action early on risk cues and learning from past outbreaks.

Section 4: Prevention and Mitigation Measures (Before the Event)

Structural:

- The majority of affected areas were devoid of essential infrastructure like pediatric ICUs, operational ambulance systems, and well-stocked PHCs.
- There were no pre-designated shelters or child-friendly facilities available for emergency care in rural or flood-prone areas.

Non-structural:

- Lack of a specific AES disaster preparedness plan at the district level.
- Ineffective contact directories of emergency responders and nodal officers.
- No formal SOPs for AES referral, triage, or outbreak response.
- Minimal IEC activities or health education on seasonal disease risk.
- Surveillance systems (IDSP) were not strong, without early warning dashboards or digital integration.

Ecosystem-based Solutions:

- No natural buffer planning in flood-risk zones.
- Stagnant water and inadequate drainage facilitated risk enhancement.
- No attempt to maintain ecosystem health or regulate urban–rural ecological imbalances around orchards and residential areas.

Intersectoral Coordination and Investments:

- Low coordination among departments like Health, ICDS, PHED, Disaster Management, and Agriculture.
- There was no joint pre-monsoon planning or multi-stakeholder simulation exercises.
- Prior investment in real-time AES surveillance apps, public dashboards, and pre-positioned medical supplies was lacking.
- District F was different, where initial meetings and coordination had reduced impact—this was a good model to emulate.

Section 5: Preparedness Measures

Early Warning Systems / Disease Surveillance:

- Disease surveillance was poor in the majority of districts. IDSP units were not performing well without a real-time AES early warning system.
- District F, on the other hand, had activated early surveillance measures, which helped with quicker response and fewer deaths.

Stockpiles and Infrastructure Readiness (Including Logistics):

- Stocking of critical medicines (ORS, dextrose, anticonvulsants) did not take place in the majority of affected areas.
- Health centres lacked infrastructure readiness, including paediatric ICUs and referral transport.
- No reference to emergency communication devices such as satellite phones or ham radios being operational.
- District control rooms were not functioning in many places during the critical period.

Inter-department Coordination:

- Weak pre-existing coordination systems.
- No recent directory of nodal officers in health, disaster management, PHED, or ICDS was available.
- District F had operational interdepartmental coordination, which effectively curbed the outbreak.

Training, Mock Drills, Community Awareness:

- Limited in-service training of ASHAs, ANMs, and medical officers on AES identification and referral procedures.
- No indication of mock drills or seasonal preparedness meetings in the majority of districts.
- Low community knowledge about AES symptoms, litchi-associated hazards, and emergency response.

Challenges Encountered During Preparedness:

- No early detection tools and real-time dashboards

- Fruitful intersectoral coordination
- No AES nodal officers or focal persons in most districts
- Deficient supplies and no stockpiling prior to the monsoon
- Health workers were untrained or did not know AES-specific referral procedures
- IEC materials and communication channels were absent, creating public confusion

Preparedness Gaps and Learnings:

- **Gaps:** No well-structured AES preparedness plan, no rapid response system, lack of standard operating procedures, and inadequate training
- **Learnings:** Districts where there were pre-monsoon meetings, updated nodal contacts, and trained community workers responded better (e.g., District F)

Future Suggestions for Strengthening Preparedness:

- Set up real-time AES early warning dashboards integrated with HEOC
- Identify and train AES nodal officers in each district
- Provide annual refresher training to ASHAs/ANMs on AES
- Provide pre-monsoon stocking of ORS, dextrose, and emergency items at PHCs
- Establish interdepartmental pre-monsoon planning SOPs
- Carry out public-oriented IEC campaigns prior to the outbreak season
- Enact district control rooms with adequate communication systems, backed by digital and radio-based support

Section 6: Impact and Response

6.1 Impact Summary

Human Impact:

- Total cases: 73
- Deaths: 18
- Affected group: Mainly children under the age of 15 years

- Most vulnerable: Poor, malnourished children of rural, low-income families living close to litchi orchards

Displacement:

- None reported; however, transfer of critical patients to district hospitals because of the unavailability of pediatric ICUs in local PHCs

Livelihood Impact:

- Indirect impact on daily-wage rural families, who needed to take time off work to tend to ill children
- Fear and misinformation upset the local fruit economy (particularly litchi farming communities)

Environmental Impact:

- Outbreak followed heatwave and early pre-monsoon rains, exacerbated by stagnant water and poor sanitation
- Inadequate WASH infrastructure and the absence of fogging/vector control contributed to the risk increase

6.2 Response Actions at Different Levels

Key Responders:

- **Health Department:** ASHAs, ANMs, PHCs, Civil Surgeon, State HEOC
- **ICDS:** Anganwadi workers and child protection officers
- **Disaster Management Authority:** For coordination and control room activation
- **Public Health Engineering Department (PHED):** For water supply and sanitation
- **District Administration (DM's Office):** Oversight and multi-sector coordination
- **Education Department:** For school-level IEC and awareness campaigns
- **Community-Based Responders:** Panchayat members, village influencers, and NGO partners

Immediate Actions Taken (within 24–72 hours):

- Early activation of District Control Rooms (District F)

- Deployment of Rapid Response Team (RRT) to the affected villages
- Triage emergency centres opened for the management of AES cases
- Symptom identification and awareness through ASHA door-to-door visits
- Referral tracking and coordination with district hospitals
- Public announcements using loudspeakers and radios
- Fogging operations and distribution of chlorine tablets for WASH enhancement
- Media and community radio-based countering of misinformation

Challenges Faced:

- Delayed referrals due to inadequate transport and road access
- Insufficient pediatric ICUs and critical care professionals in rural districts
- Disturbances in communication between PHCs and district hospitals
- Lack of a real-time AES surveillance system for alerting or tracking
- Weak interdepartmental coordination in the majority of districts
- Low awareness among communities and no structured IEC materials

Overcoming the Challenges:

- Develop real-time surveillance and referral tracking apps
- Appoint AES nodal officers and refresh emergency contact directories
- Pre-position ambulances and basic medicines in high-risk areas
- Organise pre-monsoon planning meetings and mock drills
- Strengthen the block-level health infrastructure and IDSP units
- Organise intensive IEC campaigns prior to the AES season

Section 7: Application of Emergency Management Principles

District-Level Disaster/Health Emergency Plans / Disease-Specific Plans Available/

Used:

No AES response plan existed in the majority of affected districts. General disaster and health management plans were in place, but without AES-specific protocols. District F was the only district that used past experience and available health preparedness frameworks to respond.

All-Hazards Approach:

The epidemic underscored the imperative of using an All-Hazards Approach, where AES response is incorporated into overall public health emergency preparedness schemes. The planning had been disorganised and disease-specific, as opposed to being in anticipation of several overlapping hazards such as heat waves, floods, and nutritional stressors.

Incident Response System (IRS):

There was no systematic implementation of the IRS in the crisis in the majority of districts. District F, however, vaguely adhered to IRS concepts with an evident chain of command and mobilisation of resources by a nodal control room.

Unified Command and Coordination:

Poor interdepartmental coordination was seen in general. Health, ICDS, PHED, Education, and Disaster Management worked in isolation, with no systematic unified command, with the exception of relative success in District F.

Joint Planning (Health, DM, Veterinary, etc.):

AES is a human health issue, but joint planning was weak or nonexistent. The outbreak revealed lost opportunities for integrated planning, particularly among health, ICDS, PHED, and district administration.

Use of Emergency Operation Centres (EOC/PHEOC):

Only District F had an operating control room connected to the state HEOC. Other districts failed to activate EOCs or had weak documentation and outdated emergency contact lists, restricting real-time coordination.

Communication and Information Sharing:

There was no organised risk information flow among field workers, PHCs, and district hospitals. Referral tracking systems did not exist. Public communication was reactive and erratic, resulting in panic and misinformation.

Risk Communication and Community Engagement:

The IEC campaign was absent or poor in the majority of the areas. Public health messages regarding AES symptoms, risks of litchi, and early treatment were either delayed or weak. District F, however, utilised ASHAs and local influencers for door-to-door awareness.

Psychosocial Aspects of PHEDM:

Psychological intervention for field workers and families was not anticipated or executed in the response. Later phases only referred to counselling, which was still minimal in scope and reach.

Limitations and Challenges:

- Lack of a separate AES plan within disaster management systems
- No real-time incident response system deployed
- Lack of trained district leadership to implement unified command
- Aged contact directories and EOC procedures
- Inadequate interdepartmental coordination and risk communication delays
- No specific fund for psychosocial support or IEC activities
- Poor simulation exercises or review of preparedness

Section 8: Recommendations (Way Forward)

Key Lessons Learned:

- Early monitoring and trained grassroots health workers (ASHAs/ANMs) cut down morbidity and mortality substantially, as seen in the successful response in District F.
- Absence of intersectoral coordination and coordinated response mechanisms undermines crisis handling and prolongs life-saving interventions.
- Tracking real-time data and referral systems is critical for controlling AES and such outbreaks in remote areas.
- Community sensitisation and risk communication should be initiated prior to seasonal peaks, with robust IEC measures through local influencers.
- Lack of pediatric ICUs and trained emergency personnel in rural areas continues to be an important systemic weakness in AES response preparedness.

Group's Practical Recommendations:

For State/District Policy:

- Institute and develop a district-level AES Preparedness and Response Plan as part of the larger disaster management policy.
- Make provision for AES-specific IEC campaigns, emergency medical kits, and surveillance equipment in the budget.

For Training and Capacity Building:

- Provide annual refresher training for PHC staff, ANMs, and ASHAs on AES detection, emergency triage, and prompt referral procedures.
- Train and orient AES Nodal Officers in each district with well-defined roles and duties.

For Coordination and Communication:

- Activate bi-monthly interdepartmental readiness meetings prior to the AES season with Health, ICDS, PHED, DM, Education, etc.
- Create an AES Early Warning Dashboard in real-time, integrated with the State HEOC, with regularly updated emergency contact lists.

For PDNA (Post-Disaster Needs Assessment) and Monitoring:

- Include AES and seasonal epidemics in PDNA templates and in reviews of response.
- Perform mortality audits and utilise the results to enhance surveillance, referral logistics, and training modules.
- Track IEC coverage, medicine stores, and RRT preparedness yearly, before AES-prone months.

Section 9: Summary (Key Takeaways)

The AES epidemic in Bihar uncovered severe gaps in readiness, particularly in high-risk rural communities along litchi orchards. Although District F showed how lives can be saved through early detection, health worker training, and interdepartmental collaboration, other districts faced challenges through late referrals, the absence of pediatric ICUs, and weak community awareness. The response underscored the need for real-time surveillance, pre-monsoon planning, and effective IEC efforts. Recovery processes should involve psychosocial care and long-term investment in child care infrastructure. In the future, incorporating AES into district disaster plans, enhancing frontline capacity, and building cross-sector partnerships are critical for preventing future outbreaks and safeguarding at-risk children.

Section 10: Annexures (if applicable)

Map – Affected districts and high-risk litchi-growing zones (optional visual aid)

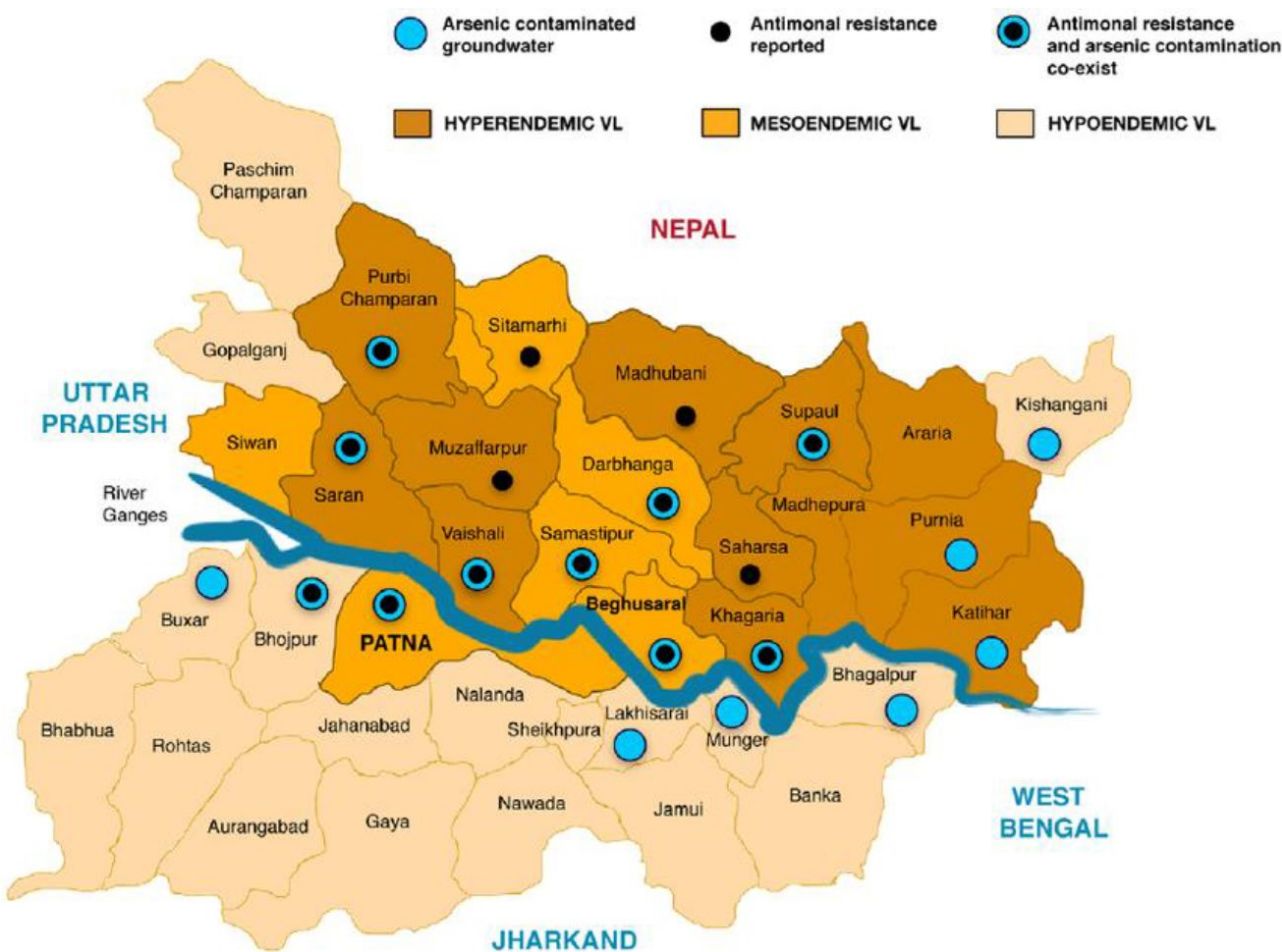
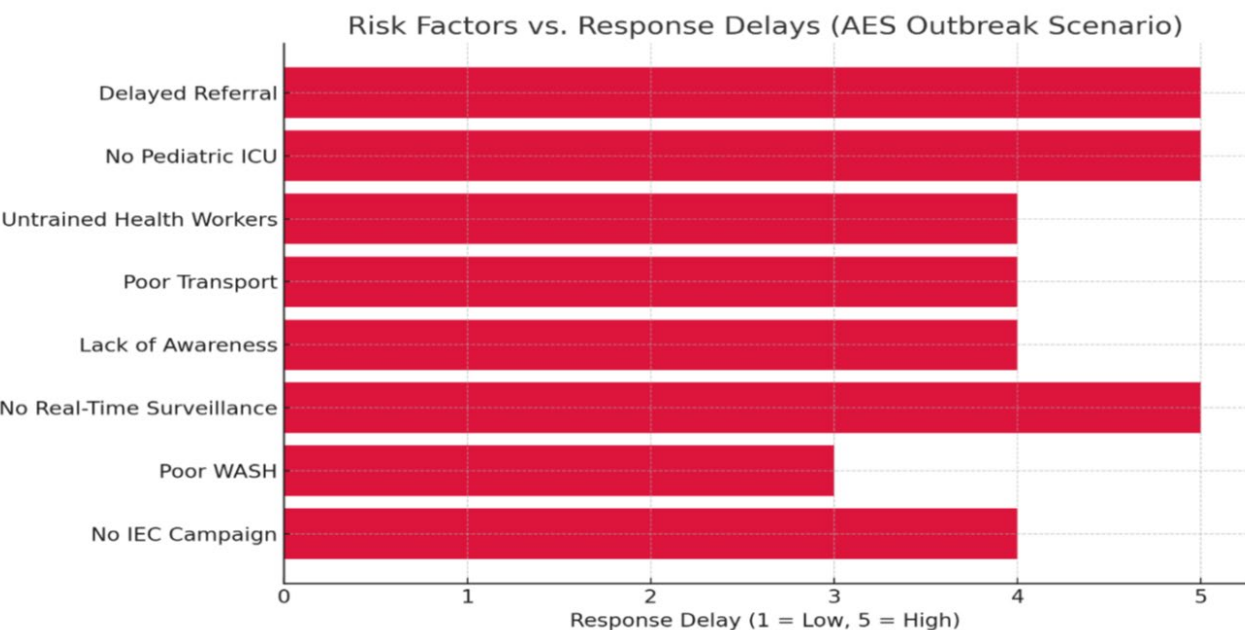


Chart – Risk Factors vs. Response Delays



3. Table – District-wise Comparison of AES Response

District	Surveillance	Referral System	Pediatric Availability	ICU Community Awareness
District F	Strong (early detection)	Timely, well-coordinated	Available or accessible nearby	High (IEC done pre-monsoon)
District A	Weak	Delayed	Not available	Low
District B	Limited	Unstructured	Referred to far districts	Very low
District C	Poor	Highly delayed	Unavailable	Absent
District D	Patchy	Irregular	Partially functional	Moderate

Reference Materials:

1. Determinants of Acute Encephalitis Syndrome (AES) in Muzaffarpur ... (n.d.). <https://www.sciencedirect.com/science/article/pii/S2213398416300173>
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5. Exposure to Lychee Orchard Pesticides Linked to AES Outbreak. (2017). <https://jamanetwork.com/journals/jama/fullarticle/2654396>
6. [PDF] AES_guidelines.pdf. (n.d.). https://ncvbdc.mohfw.gov.in/WriteReadData/l892s/AES_guidelines.pdf
7. Recurring Outbreaks of Acute Encephalitis Syndrome Cases in Bihar. (n.d.). <https://pmc.ncbi.nlm.nih.gov/articles/PMC6881881/>

3.3. Group 3: Widespread Flooding in Bihar



Figure 41: Group 3 during their presentation on case scenarios

Group members:

Dr Nidhi Sharma, Dr. Trinetri kumara, Dr Ajeet Kumar Singh, Dr Saroj Kumar Rajak, Dr. Rina Praveen, Mr Shamim Akhtar Ansari, Mr Abhishek Kumar, Dr Shuchi Kumari, Ms Snehal Anshu, Dr Mukesh Singh, Ms Niharka Sinha, Dr Ashok Akela, Mr Kundan Kumar, Mr Aditya Kumar Singh

Section 1: General Details

Item	Response
Title of the Case Scenario	Widespread Flooding in Bihar
Type of Emergency/ Disaster	Monsoon-Induced Multi-District Flood Emergency

Item	Response
Event specific background: Event description: Event Duration	Event Description: On July 17, 2024, Bihar faced widespread flooding due to 36+ hours of heavy monsoon rainfall (exceeding 250 mm) and upstream water discharge from Nepal. Major rivers—including the Bagmati, Kosi, Gandak, Burhi Gandak, and Ghaghara—breached embankments or rose above danger levels, inundating low-lying areas. • In District A, the Bagmati River overflowed, marooning 3 blocks and cutting off 65+ villages due to road collapses and damaged health centers. • District B saw a Gandak embankment breach, submerging 48 villages and affecting 40,000+ people; drinking water was contaminated. • District C faced flash floods and tribal area isolation, with 6,000+ unreachable and food airdrops required. • In District D, overcrowded shelters with poor sanitation increased disease risks; no early disease surveillance was deployed. • District E reported severe crop and livestock loss across 8,000 hectares; PDS operations were disrupted. The State Emergency Operations Centre (SEOC) activated Level 2 Emergency Protocols, coordinating a multi-district response through a Unified Command system. Event Duration: • Rainfall Onset: Late July 16, 2024 • Peak Flood Impact: July 17, 2024 • Ongoing Effects: Continued displacement, health risks, and infrastructure damage as of July 18 onward

Item	Response
Affected Location(s)	Floods impacted five districts in Bihar: • District A – 3 blocks marooned; 65+ villages cut off (Bagmati overflow). • District B – 48 villages submerged; urban and peri-urban flooding (Gandak breach). • District C – Tribal villages isolated by flash floods in hilly terrain. • District D – 5 blocks affected; overcrowded shelters in schools and anganwadis. • District E – Severe crop and livestock loss across 8,000 hectares.
Population Affected	• Total affected population: 180,000 people • Evacuated to shelters: 22,000 individuals • Affected areas: 85 panchayats across 5 districts • High-impact zones: ○ District B – 40,000 people affected (urban-peri-urban flooding) ○ District D – 8,500 displaced and sheltered ○ District C – 6,000 tribal residents temporarily unreachable Vulnerable groups include children, the elderly, tribal populations, and livestock-rearing families

Section 2: Event Description

On July 17, 2024, Bihar experienced widespread flooding triggered by 36+ hours of intense monsoon rainfall (exceeding 250 mm in parts) and upstream water discharge from Nepal.

Major rivers including the Bagmati, Kosi, Gandak, Burhi Gandak, and Ghaghara breached embankments or touched danger levels, leading to submergence of low-lying rural and peri-urban areas.

Floodwaters damaged homes, cropland, embankments, and critical services such as healthcare, drinking water, and electricity. Over 180,000 people across 85 panchayats were affected, with more than 22,000 people evacuated to temporary shelters. The State Emergency Operations Centre (SEOC) activated Level 2 Emergency Protocols, and District EOCs across all five districts coordinated response actions under a Unified Command system.

Section 3: Risk Assessment

Fill in the details from your group analysis:

Hazards Identified:

- Primary hazard across these districts is flooding, manifesting as:
 - Riverine floods in Districts A (Bagmati overflow), B (Gandak breaches), and E (seasonal farmland inundation).
 - Flash floods in District C due to hilly runoff and blocked drainage.
 - Moderate crop-inducing floods in District D.
- Bihar's landscape remains one of India's most flood-prone regions, with ~3 million hectares of cropland exposed, and 19 of 38 districts ranked as "very high risk"

Vulnerabilities Observed:

- Infrastructure & Health: Districts A and D suffer from weak roads, bridges, PHCs, and inadequate WASH services—leading to service breakdowns, sanitation failures, and delayed disease surveillance during floods.
- Waterborne Risk: District B faces severe contamination threats post-flooding; flash flood zones (C) show elevated risk for leptospirosis, skin infections, and diarrheal outbreaks.
- Socio-economic Sensitivity: Livelihood vulnerability is high—especially in E, where crop loss and livestock death threaten food security. Tribal and marginalized communities in C face additional isolation and distrust issues.
- Climate Context: Bihar records recurrent hydro-meteorological extremes (floods and droughts), intensified by climate change—highlighted by exposure to erratic monsoons, rain-fed agriculture, and low livelihood diversification

Exposure Factors:

Populations and infrastructure at risk are significant:

- Dozens of villages (65 villages in A; 48 villages in B) and tens of thousands of people (40,000+ in B; 8,500+ in D; 6,000+ in C) are repeatedly impacted.
- Agricultural exposure lies in the thousands of hectares (e.g., 8,000+ ha in E).
- Large-scale embankments encase these high-density zones.

Existing Capacity:

- **Forecasting & Infrastructure:** While forecasting systems and embankments exist, real-time tools (dashboards) often fail during crises (esp. District B), and embankment reinforcement remains inconsistent. NDRF and SDRF are active but localized.
- **Emergency Services:** Relief camps and health/water distribution have responded (e.g., pregnant women outreach, camp kitchens, boat ambulances).
- **Adaptive Capacity:** Districts show mixed resilience—urban centers have moderate governance, but rural/tribal areas have low adaptive capacity, poor road density, low health staffing, weak crop insurance coverage

Decision-Making Based on Risk:

Priority Interventions:

- I. **Infrastructure Resilience:** Strengthen and maintain embankments, roads, culverts across riverine districts (A, B, E).
- II. **WASH & Health Preparedness:** Pre-deploy sanitation kits, vector control, water treatment—not just post-flood but pre-monsoon (B, D, C).
- III. **Community Engagement:** Critical for tribal and remote areas (C)—drills, trust-building, and early warning systems.
- IV. **Data Systems Enhancement:** Improve real-time monitoring and backup solutions for control rooms and dashboards (B).
- V. **Livelihood Safeguards:** Scale crop insurance access, ensure fodder reserves, maintain PDS/godown outlets in agrarian zones (E).
- VI. **Health Surveillance:** Establish syndromic teams before displacement peaks, especially in camp settings (D) and contaminated areas (B).

- VII. Multi-sector Coordination: Health, agriculture, disaster management, and communities need pre-defined coordination frameworks.

Section 4: Prevention and Mitigation Measures (Before the Event)

Bihar employs a multifaceted approach to flood prevention and mitigation, integrating structural, non-structural, and ecosystem-based strategies, alongside intersectoral coordination. Here's an overview of the measures in place:

Structural Measures

- **Embankments:** Over 3,700 km of embankments have been constructed along major rivers like the Kosi, Gandak, Bagmati, and Kamla to contain floodwaters.
- **Barrages and Reservoirs:** Plans are underway to build additional barrages on rivers such as Gandak, Kosi, Kamla, and Mahananda in districts bordering Nepal.
- **Detention Basins:** Natural depressions, locally known as 'Chauris,' act as detention basins to absorb floodwaters.
- **Channel Improvements:** Widening and desilting of river channels to enhance water flow capacity.

Non-Structural Measures

- **Flood Plain Management:** Implementation of floodplain zoning regulations to restrict development in high-risk areas.
- **Early Warning Systems:** Collaboration with the Central Water Commission (CWC) to monitor river levels and issue timely flood warnings.
- **Community-Based Flood Preparedness:** Training local communities in flood response, including evacuation and first aid.
- **Flood-Resistant Agriculture:** Promotion of flood-tolerant crop varieties and adjusted cropping patterns.

Ecosystem-Based Solutions

- **Bio-Shields:** Planting of bamboo and banana trees along riverbanks to prevent erosion and provide materials for boat construction during floods.
- **Grain Banks:** Establishment of community-managed grain banks to ensure food security during emergencies.
- **Women's Leadership:** Empowerment of women through training in first aid, search and rescue, and management of grain banks.

Intersectoral Coordination and Investments

- **Institutional Framework:** The Bihar State Disaster Management Authority (BSDMA) coordinates disaster management efforts across the state.
- **Financial Investments:** The state government has allocated ₹7,451.14 crore for the Water Resources Department in the 2025-26 fiscal year to enhance flood mitigation measures.
- **Insurance Support:** Linking farmers with insurance companies to mitigate risks associated with crop and livestock losses.

Section 5: Preparedness Measures

Early Warning Systems & Disease Surveillance

- **River Monitoring:** The Central Water Commission (CWC) and state agencies monitor river levels to issue flood alerts. However, delays in real-time data availability have been noted.
- **Disease Surveillance:** Post-flood disease outbreaks, such as leptospirosis and skin infections, highlight the need for robust surveillance systems.

Stockpiles & Infrastructure Readiness

- **Emergency Supplies:** The state has procured motorboats, life jackets, tents, and other essentials for flood-prone districts.
- **Communication Tools:** Efforts are underway to equip teams with satellite phones and walkie-talkies to ensure connectivity during floods.

Inter-Department Coordination

- **Joint Operations:** A 'flood relief synergy seminar' was conducted to enhance coordination between civil and military authorities, including the Army, SDRF, NDRF, and the Bihar State Disaster Management Authority.
- **Training Programmes:** Engineers in flood-prone regions received training on embankment safety, coordination, and the use of technology to improve flood management.

Community Awareness & Capacity Building

- **Community Engagement:** Local communities are being trained in disaster preparedness, including first aid and evacuation procedures.

- **Mock Drills:** Regular simulation exercises are conducted to test response mechanisms and improve readiness.

Challenges in Preparedness

- **Communication Gaps:** A significant percentage of families rely on informal networks for flood information, indicating deficiencies in official warning systems.
- **Infrastructure Weaknesses:** Poor roads and weak embankments hinder effective flood response and relief efforts.
- **Delayed Response:** Limited resources and bureaucratic delays often slow down relief operations.
- **Limited Community Participation:** Traditional knowledge and local coping mechanisms are often overlooked in disaster planning.

Preparedness Gaps & Learnings

- **Inclusive Planning:** Disaster plans often exclude vulnerable groups, such as women, the elderly, and disabled individuals.
- **Technological Integration:** There's a need for greater adoption of AI, remote sensing, and GIS mapping for disaster prediction and relief.
- **Community-Based Approaches:** Engaging local communities in disaster preparedness and response can enhance resilience.

Future Suggestions for Strengthening Preparedness

- **Enhance Early Warning Systems:** Integrate modern technologies to provide timely and accurate flood alerts
- **Strengthen Infrastructure:** Invest in reinforcing embankments and improving road networks to facilitate swift response.
- **Promote Community Participation:** Incorporate local knowledge and engage communities in disaster planning and response.
- **Improve Inter-Agency Coordination:** Establish clear communication protocols and conduct joint training exercises among all stakeholders.
- **Adopt Technological Innovations:** Utilize satellite imagery, AI, and blockchain for real-time damage assessment and resource allocation.

Section 6: Impact and Response

6.1 Impact Summary

District	Population Affected	Displacement	Deaths	Livelihood Impact	Environmental Impact
District A	Over 65 villages cut off for more than 24 hours	3 administrative blocks marooned	Not specified	Loss of medical supplies due to cold chain disruption	Road and culvert collapses
District B	48 villages submerged	Over 40,000 people affected	Not specified	Contamination of drinking water sources	Embankment breaches leading to backflow
District C	Over 6,000 people in remote villages isolated	Villagers resisted evacuation	Not specified	Air-dropped food packets	Flash flooding due to blocked drainage
District D	Over 8500 people sheltered in school and angadwadi	Overcrowding in relief camps	Not specified	Risk of COVID-19 and diarrheal outbreaks	Lack of sanitation facilities
District E	No casualties reported	Livestock migration to urban fringes	Not specified	Severe crop loss across 8,000 hectares	Flooded livestock shelters

6.2 Response Actions at Different Levels

Key Responders and Coordination

- Departments Involved: National Disaster Response Force (NDRF), State Disaster Response Force (SDRF), Indian Army, Bihar State Disaster Management Authority (BSDMA), Health Department, Agriculture Department, Animal Husbandry Department.

- **Coordination Mechanisms:** Joint operations and coordination among civil and military authorities, including the Army, SDRF, NDRF, and BSDMA, were emphasized to enhance response effectiveness.

Immediate Actions (First 24–72 Hours)

- **Rescue Operations:** Deployment of 16 NDRF teams, 17 SDRF teams, and over 600 boats for evacuation and rescue operations.
- **Relief Camps:** Establishment of 43 relief camps sheltering approximately 12,000 displaced individuals.
- **Food and Water:** Distribution of over 9,700 dry ration packets and 11,000 polythene sheets; operation of 18 community kitchens.
- **Medical Assistance:** Deployment of health teams to prevent outbreaks of waterborne diseases; spraying of bleaching powder in contaminated areas.

Challenges and Addressing Them

- **Communication Gaps:** Disruptions in mobile networks hindered the dissemination of early warning messages.
- **Infrastructure Damage:** Collapsed roads and culverts delayed access to health centers and shelters.
- **Disease Outbreaks:** Contamination of drinking water sources led to risks of diarrheal outbreaks.
- **Delayed Response:** Limited resources and bureaucratic delays slowed down relief operations.

Section 7: Application Emergency Management Principles

District-Level Disaster and Health Emergency Plans

- **District Disaster Management Plans (DDMPs):** Each district in Bihar has developed a DDMP, outlining roles, responsibilities, and resources for disaster response. For instance, Muzaffarpur's DDMP includes hazard maps, lists of relief centers, and community volunteer details.
- **Health Emergency Protocols:** In response to escalating tensions, the Bihar Health Department activated emergency protocols, directing medical institutions to remain on high alert and establish Quick Medical Response Teams across districts.

All-Hazards Approach

- **Multi-Hazard Planning:** The Bihar State Disaster Management Authority (BSDMA) has developed multi-hazard District Disaster Management Plans (DDMPs) for all 38 districts, focusing on various risks including floods, heatwaves, and disease outbreaks.
- **Integrated Risk Assessment:** Hazard, vulnerability, and capacity assessments are conducted to inform planning and resource allocation.

Incident Response System (IRS)

- **Activation of Emergency Support Functions (ESFs):** During disasters, Bihar activates ESFs to coordinate efforts across various departments, ensuring a structured and efficient response.
- **Resource Mobilization:** The Bihar State Disaster Resource Network (BSDRN) serves as a repository for equipment and skilled human resources, facilitating quick deployment during emergencies.

Unified Command and Coordination

- **Centralized Command Structure:** The District Magistrate chairs the District Disaster Management Authority, ensuring a unified command for disaster response.
- **Coordination with Multiple Agencies:** Collaboration among various departments, including police, health, and civil defense, ensures a cohesive response.
- **Joint Planning with Veterinary, Health, DM, and Other Sectors**
- **Integrated Planning:** Departments such as Animal Husbandry, Health, and Disaster Management collaborate in planning and response activities, addressing the multifaceted impacts of disasters.
- **Training and Capacity Building:** Joint training sessions and workshops are conducted to enhance interdepartmental coordination and response capabilities.

Use of Emergency Operation Centers (EOC/PHEOC)

- **Activation of District EOCs:** Muzaffarpur's District Emergency Operation Centre coordinates emergency management and disaster response operations, including monitoring, coordination, and resource mobilization.
- **Integration with State EOC:** District EOCs maintain communication with the State Emergency Operation Centre to ensure a coordinated response.

Communication and Information Sharing

- **Real-Time Data Sharing:** The BSDRN platform enables real-time sharing of resource availability and needs, enhancing decision-making during emergencies.
- **Public Awareness Campaigns:** Information dissemination through various channels, including media and community outreach, ensures public awareness and preparedness.

Risk Communication and Community Engagement

- **Community-Based Approaches:** Programmes like Aapda Mitra train volunteers in disaster response, fostering community involvement and resilience.
- **Feedback Mechanisms:** Post-disaster evaluations and community feedback are utilized to improve future risk communication strategies.

Psychosocial Aspects of Public Health Emergency and Disaster Management (PHEDM)

- **Psychosocial Support Services:** Mental health services are integrated into disaster response, addressing the psychological impacts of disasters on affected populations.
- **Training for Healthcare Providers:** Healthcare workers receive training in providing psychosocial support during emergencies.

Limitations and Challenges

- **Resource Constraints:** Limited financial and human resources can hinder the implementation of comprehensive disaster management plans.
- **Infrastructure Gaps:** Inadequate infrastructure in remote areas can impede effective response and recovery efforts.
- **Communication Barriers:** Challenges in reaching remote communities can affect the dissemination of information and coordination of response activities.

Section 8: Recommendations (Way Forward)

Keeping Rivers Clean Matters

- **Removing extra silt from rivers** (like the Bagmati and Gandak) helps them handle floodwaters better.
- **After years of requests**, the National Silt Management Policy has finally been approved to make this a regular practice

Government and Army Working Together Helps

- Flood control workshops in Danapur brought together the Army, state disaster teams, police, and government workers.
- They created plans for working together, sharing resources, and using better forecasts.

Local Volunteers Save Lives

- Programmes like Aapda Mitra train local volunteers to respond immediately during disasters—before official help arrives
- Bihar has about 9,000 trained volunteers ready to help

Communities Must Be Part of the Solution

- Most people depend on friends, neighbours, and local groups—not official alerts—for flood warnings.
- Involving villagers in planning makes warning systems work much better

Practical Recommendations Area	What to Do
Policy (State/District)	1. Finish silt-clearing rivers each year under NSMP. 2. Make floodplain rules that stop building in risky areas. 3. Update district disaster plans to work across all hazards.
Training & Capacity Improvement	1. Train engineers annually on embankment safety and quick fixes. 2. Give more training to SDRF/NDRF to teach local volunteers rescue and first aid. 3. Expand Aapda Mitra, so every village has trained volunteers.

Practical Recommendations Area	What to Do
Coordination & Communication	1. Hold joint flood drills with Army, local officials, rescue forces, and volunteers. 2. Use many ways to warn people (SMS, phone, radios, announcements). 3. Have backup communication tools (like satellite phones) in case regular networks fail.
Damage Assessment & Monitoring (PDNA)	1. Use mobile apps post-disaster to quickly record damage to homes, crops, livestock, and roads. 2. Set measurable goals—like % of river-clearing done or % of people reached by alerts. 3. Include village feedback in after-action reviews—especially from women, elderly, and farmers.

Section 9: Summary (Key Takeaways)

In July 2024, Bihar faced severe flooding due to intense monsoon rains and upstream water discharge from Nepal. The floods affected over 180,000 people across 85 panchayats, leading to significant infrastructure damage, displacement, and health risks.

Preparedness: Prior to the floods, the Bihar government had initiated flood control preparations, including a training programme aimed at enhancing preparedness and effective response to potential flooding situations.

Response: The State Emergency Operations Centre (SEOC) activated Level 2 Emergency Protocols, and District EOCs coordinated response actions under a Unified Command system. However, challenges such as road collapses, mobile network disruptions, and delayed evacuations hindered timely assistance.

Recovery: Post-flood recovery efforts included setting up temporary shelters and providing

relief materials. Despite these efforts, issues like overcrowded shelters, lack of sanitation facilities, and delayed disease surveillance persisted, complicating the recovery process.

Recommendations: To enhance future flood management, it is recommended to strengthen infrastructure resilience, improve early warning systems, ensure timely evacuation procedures, and bolster disease surveillance and sanitation measures in relief camps. Additionally, fostering community involvement and inter-sectoral coordination can significantly improve response and recovery outcomes.

Scenario 10 Annexure

Map showing Flood prone area of Bihar



District	Key Impacts	Response Actions	Challenges
District A	3 blocks marooned 65+ villages cut off - PHCs and shelters inaccessible	- Rescue teams deployed - Temporary shelters established	- Road access lost - Mobile network disruptions - Cold chain storage compromised

District	Key Impacts	Response Actions	Challenges
District B	• Gandak embankment breached • 48 villages submerged • 40,000+ affected	• District control room activated • Emergency relief teams mobilized	• Real-time data dashboards non-functional initially • Drinking water contamination • Delayed vector control activities
District C	• Flash floods due to blocked drainage • 6,000+ tribals isolated • PHCs reported leptospirosis and skin infections	• Air-dropping of food packets by NDRF • Coordination with local leaders for evacuation	• Resistance to evacuation due to past negative experiences • Limited access to remote areas
District D	• 8,500+ displaced in shelters • Overcrowding in schools and anganwadi centers • Lack of sanitation and vector control	• Deployment of sanitation kits and mosquito nets • ORS stocks replenished	• Initial lack of syndromic surveillance teams • High risk of disease outbreaks
District E	• 8,000 hectares of crops damaged • Livestock shelters submerged • Migration of cattle-rearing families	• Coordination with Agriculture and Animal Husbandry Departments • PDS operations resumed	• Weak coordination in initial 48 hours • Food grain storage godowns affected

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3.4. Group 4: Earthquake Followed by Dengue Outbreak in Bihar



Figure 42: Group 4 during their presentation on case scenarios

Group Members:

Dr Balmukund Kumar, Dr Sazid Hussain, Er Alok Ranjan, Dr Kishore Kumar Das, Mr Shiv Dayal, Dr Pawan Kumar, Ms Tanya Kumari, Mr Alok Kumar, Mr Hrithik Roushan Tejasvee, Dr Ramesh Kumar, Deenanath Singh, Dr Md Jawed Alam, Mr Manoj kr Bharti

Section 1: General details

Date: Friday, June 14, 2024 **Location:** Districts A, B, C, and D **Event:** Multi-District Earthquake Emergency Followed by Dengue Outbreak After 20 Days

Section 2: Prevention and mitigation measures

They are crucial to reduce the risk and impact of disease outbreaks like dengue following natural disasters such as earthquakes.

Here are key strategies to implement before such events occur:

Section 2.1 Prevention Measures

Public Education and Awareness

- Inform communities about dengue transmission, mosquito breeding sites, and preventive practices.
- Promote use of personal protective measures such as bed nets, clothing covering skin, and repellents.

Environmental Management

- Eliminate standing water in and around homes, construction sites, and public areas to prevent mosquito breeding.
- Encourage proper waste disposal and drainage to reduce stagnant water collection.

Vector Control Programs

- Conduct regular larviciding and fogging in high-risk areas.
- Promote biological control methods, such as introducing natural mosquito predators.

Health Infrastructure Strengthening

- Ensure availability of diagnostic tools and supplies for early detection.
- Train healthcare workers on dengue identification and management.

Community Engagement

- Involve local leaders and community groups in prevention efforts.
- Establish community clean-up campaigns targeting mosquito breeding sites.

Section 2.2 Mitigation Measures (Post-Earthquake)

Rapid Assessment and Surveillance

- Conduct quick assessments to identify standing water, waste, and vulnerable populations.
- Set up surveillance systems to monitor dengue cases and mosquito populations.

Emergency Response Planning

- Develop contingency plans for vector control and healthcare services.
- Coordinate among health departments, NGOs, and local authorities.

Provision of Resources

- Stockpile insecticides, larvicides, and medical supplies.
- Ensure availability of safe water, sanitation, and waste disposal services.

Health Promotion

- Continue education campaigns emphasizing personal protection and environmental sanitation.
- Mobilize volunteers for cleanup and vector control activities.

Section 3: Preparedness During the Event

Establish Emergency Response Teams

- Mobilize trained health, sanitation, and disaster response teams.
- Assign roles for surveillance, vector control, healthcare delivery, and communication.

Set Up Surveillance and Monitoring Systems

- Initiate immediate reporting of suspected dengue cases.

- Monitor environmental conditions that favor mosquito breeding, such as water accumulation sites created by the earthquake.

Secure Resources and Supplies

- Stockpile essential items: insecticides, larvicides, personal protective equipment (PPE), medicines, and diagnostic kits.
- Ensure availability of clean water, sanitation supplies, and waste disposal facilities.

Public Communication and Education

- Disseminate information about ongoing risks and preventive measures.
- Use multiple channels: community meetings, local radio, social media, and loudspeakers.

Environmental Management

- Begin rapid removal of debris, rubble, and stagnant water in affected areas.
- Identify and prioritize high-risk zones for intervention.

Coordinate with Stakeholders

- Collaborate with government agencies, NGOs, community groups, and international partners.
- Establish communication lines for swift information sharing.

Healthcare Facility Preparedness

- Ensure hospitals and clinics are ready to handle increased patient load.
- Prepare isolation areas if needed and ensure infection control protocols.

Community Engagement

- Encourage community volunteers to participate in cleanup campaigns.
- Promote personal protective measures among residents.

Overall

Preparedness during the earthquake is about readiness to respond swiftly to reduce mosquito breeding, detect and treat dengue cases early, and communicate effectively

to prevent an outbreak. This proactive approach helps mitigate health risks during and immediately after the disaster.

Section 4: Challenges in Preparedness

Limited Resources and Infrastructure

- Insufficient supplies of insecticides, diagnostic kits, medicines, and protective equipment.
- Damage to healthcare facilities and communication infrastructure hampers coordination.

Lack of Community Awareness

- Low levels of knowledge about dengue prevention and early symptoms.
- Resistance or apathy toward participation in cleanup and prevention activities.

Coordination Difficulties

- Fragmented efforts among government agencies, NGOs, and local communities.
- Delays in information sharing and decision-making processes.

Environmental and Logistical Barriers

- Debris, rubble, and damaged infrastructure obstruct access to affected areas.
- Difficult terrain or widespread damage complicates vector control activities.

Limited Human Resources and Trained Personnel

- Shortage of trained health workers, vector control teams, and volunteers.
- Overburdened healthcare workers due to other disaster-related injuries and health issues.

Cultural and Social Barriers

- Cultural beliefs or misconceptions about disease transmission.
- Language barriers in diverse communities impacting communication.

Financial Constraints

- Limited funding for preparedness activities, supplies, and training.

- Competing priorities in disaster response efforts.

Unpredictable Disaster Dynamics

- Rapidly changing situations that make planning difficult.
- Post-earthquake conditions that may worsen or delay preparedness activities.

Addressing these challenges requires strategic planning, resource allocation, community engagement, and fostering strong coordination among all stakeholders to enhance preparedness and resilience.

Section 5: Preparedness Learning and Gaps

They are critical for improving disaster response, especially in managing health risks like dengue after an earthquake:

Learning from Past Experiences

Importance of Early Surveillance and Rapid Response

- Early detection of dengue cases helps contain outbreaks.
- Timely vector control activities reduce mosquito breeding sites.

Community Engagement is Crucial

- Well-informed communities participate actively in cleanup and prevention.
- Education campaigns increase awareness about dengue transmission and prevention.

Multi-sectoral Coordination Enhances Effectiveness

- Collaboration between health, sanitation, disaster management, and local authorities improves resource utilization.

Infrastructure Damage Hinders Response

- Earthquakes often damage health facilities and sanitation systems, complicating response efforts.

Need for Stockpiling and Prepared Supplies

- Pre-positioned supplies ensure quick deployment during emergencies.

Gaps in Preparedness

Insufficient Planning and Drills

- Lack of regular simulation exercises limits readiness.
- Gaps in comprehensive emergency preparedness plans specific to vector-borne diseases.

Limited Community Awareness and Participation

- Low levels of public knowledge about dengue prevention.
- Cultural barriers or misinformation hinder community involvement.

Inadequate Resources and Infrastructure

- Shortages of diagnostic tools, medicines, and vector control supplies.
- Damage to healthcare and sanitation infrastructure impairs response.

Poor Data Collection and Surveillance Systems

- Inconsistent or delayed reporting hampers early detection.
- Lack of integrated data systems for real-time monitoring.

Weak Inter-agency Coordination

- Fragmented efforts lead to duplication or gaps in response activities.

Limited Focus on Environmental Management

- Insufficient emphasis on removing standing water and debris post-earthquake.

Funding and Policy Constraints

- Limited financial support for preparedness activities and capacity building.

Section 6: Future Suggestions for Strengthening Preparedness

Develop and Regularly Update Comprehensive Disaster Response Plans

- Incorporate specific strategies for vector-borne disease control post-disaster.
- Ensure plans are adaptable to different scenarios and include clear roles and responsibilities.

Conduct Regular Training and Simulation Exercises

- Organize drills for health workers, volunteers, and community members.
- Practice rapid response, vector control, and communication protocols to build capacity.

Strengthen Surveillance and Data Management Systems

- Implement real-time reporting tools for early detection of dengue cases.
- Use technology such as mobile apps and GIS mapping to monitor mosquito breeding sites and disease patterns.

Promote Community Engagement and Education

- Conduct awareness campaigns to educate communities about dengue prevention, especially before disasters.
- Encourage community-led cleanup drives and source reduction activities.

Invest in Infrastructure Resilience

- Improve waste management and drainage systems to prevent mosquito breeding.
- Ensure health facilities are disaster-resilient and equipped for outbreak response.

Establish Stockpiles and Rapid Deployment Teams

- Pre-position essential supplies like insecticides, diagnostic kits, and protective gear.
- Train and maintain rapid response teams ready for immediate action post-disaster.

Foster Multi-sectoral Collaboration

- Coordinate efforts among health, sanitation, disaster management, and local governance.
- Create joint planning committees to ensure integrated response strategies.

Secure Sustainable Funding

- Advocate for dedicated budgets for disaster preparedness and vector control.
- Seek partnerships with NGOs and international agencies for technical and financial support.

Incorporate Climate and Environmental Factors

- Monitor environmental changes that influence mosquito breeding.
- Integrate climate data into preparedness planning for proactive measures.

Promote Research and Innovation

- Support studies on effective vector control methods in post-earthquake settings.
- Explore new technologies such as biological control agents or innovative community engagement tools.

Section 7: Impact and Response

They are key components in understanding how disasters like earthquakes affect public health, particularly regarding vector-borne diseases like dengue, and how to effectively address these challenges.

Section 7.1 Impact of Earthquakes on Dengue and Public Health

Infrastructure Damage

- Destruction of sanitation facilities, water supply, and health centers hampers disease control efforts.
- Displacement of populations leads to overcrowded shelters with poor sanitation, increasing mosquito breeding sites.

Increased Mosquito Breeding Sites

- Broken pipes, stagnant water in debris, and discarded containers create ideal habitats for Aedes mosquitoes.
- Post-earthquake debris and water accumulation facilitate rapid mosquito proliferation.

Disruption of Healthcare Services

- Overburdened health facilities and limited access delay diagnosis and treatment.
- Interruptions in routine vector control programs weaken ongoing prevention efforts.

Elevated Disease Risk

- Increased vector populations and crowded living conditions raise the risk of dengue outbreaks.

- Delayed response exacerbates disease spread and morbidity.

Psychological and Socioeconomic Impact

- Fear and misinformation can hinder community cooperation.
- Economic hardship limits access to preventive measures and healthcare.

Section 7.2 Response Strategies to Mitigate Impact

Rapid Assessment and Surveillance

- Conduct quick assessments to identify affected populations and mosquito breeding sites.
- Implement community-based surveillance to track dengue cases early.

Immediate Vector Control Activities

- Conduct targeted fogging, larviciding, and source reduction in affected areas.
- Remove standing water and debris from shelters and surroundings.

Strengthen Healthcare and Diagnostic Services

- Deploy mobile clinics and emergency health units.
- Ensure availability of diagnostic kits, medicines, and protective equipment.

Community Engagement and Education

- Inform communities about dengue prevention measures and safe practices.
- Promote personal protective measures like mosquito nets and repellents.

Infrastructure Repair and Environmental Management

- Restore sanitation and water systems promptly.
- Implement environmental cleanup campaigns to eliminate mosquito habitats.

Coordination and Multi-sectoral Collaboration

- Coordinate efforts among health authorities, disaster management, sanitation, and community groups.
- Establish clear communication channels for effective response.

Preparedness and Capacity Building

- Train responders in disaster and vector-borne disease management.
- Maintain stockpiles of necessary supplies for rapid deployment.

Section 8: Application of Emergency Management Principles

Preparedness

- Develop comprehensive disaster response and vector control plans.
- Conduct training, drills, and community education programmes regularly.
- Stockpile essential supplies and establish early warning systems.
- Integrate dengue prevention into disaster preparedness activities.

Prevention and Mitigation

- Implement environmental management strategies to eliminate mosquito breeding sites.
- Strengthen infrastructure (e.g., water and sanitation systems) to reduce post-earthquake vulnerabilities.
- Promote community-based source reduction activities.
- Enforce policies that reduce risk factors for vector proliferation.

Response

- Mobilize rapid response teams equipped to handle both earthquake aftermath and disease control.
- Establish emergency communication channels for timely information dissemination.
- Deploy mobile clinics and vector control measures immediately after the disaster.
- Prioritize vulnerable populations, ensuring access to healthcare and preventive measures.

Recovery

- Restore health services, sanitation, and infrastructure swiftly.

- Continue surveillance and vector control activities during recovery.
- Support community rebuilding efforts, including health education.
- Evaluate response effectiveness and integrate lessons learned into future planning.

Coordination

- Foster collaboration among government agencies, NGOs, community groups, and international partners.
- Use a unified command structure to streamline efforts.
- Share information and resources efficiently for a coordinated response.

Risk Assessment and Planning

- Conduct hazard and vulnerability assessments specific to earthquake-prone areas.
- Develop tailored emergency plans that incorporate local context and risks.
- Regularly update plans based on new data and lessons learned.

Communication

- Maintain transparent, timely communication with the public and stakeholders.
- Use multiple channels (radio, social media, community meetings) to disseminate information.
- Counter misinformation and promote community engagement.

In summary, applying these principles ensures a structured, proactive approach to managing emergencies, reducing health impacts, and enhancing resilience against future disasters.

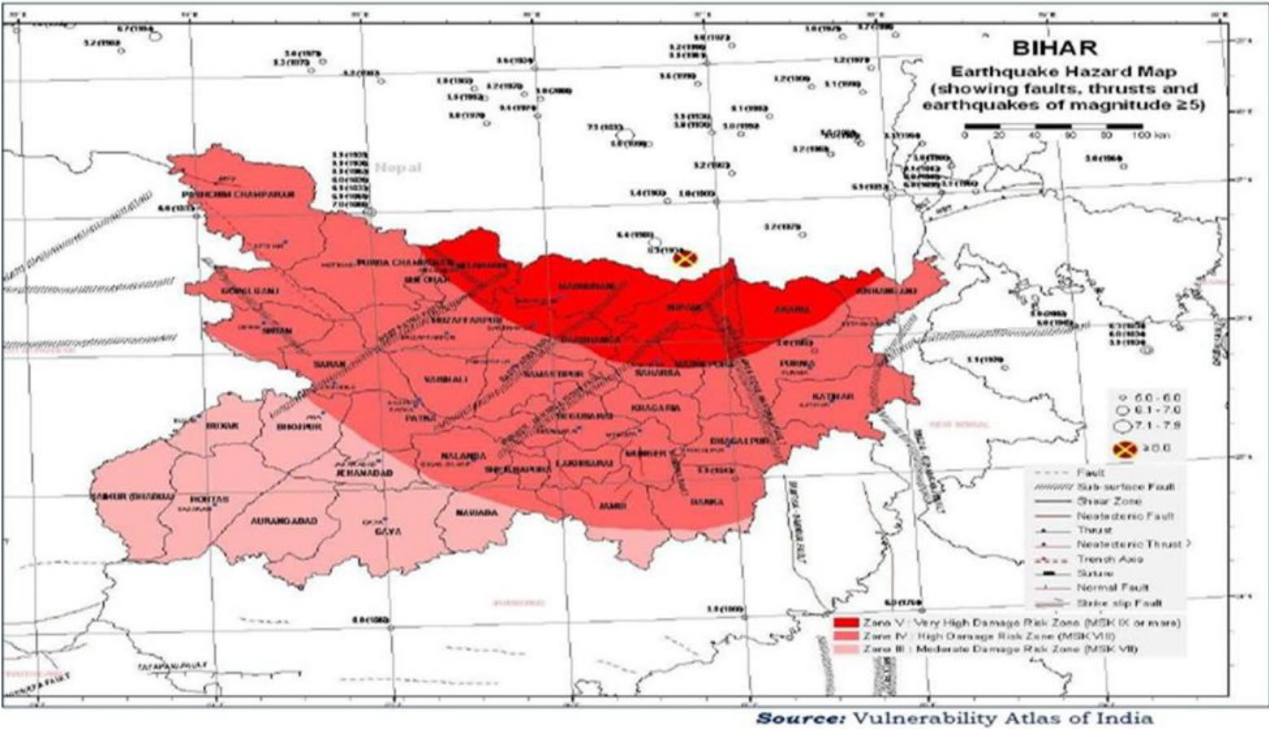
Section 9: Summary:

In our case discussion, we examined the impact of an earthquake on public health, particularly focusing on the surge in dengue cases due to increased mosquito breeding sites and disrupted healthcare services. Major insights highlighted the importance of preparedness through community education, early warning systems, and resource stockpiling. During response, rapid deployment of vector control measures, healthcare services, and effective communication were crucial to mitigate disease spread. Recovery efforts emphasized restoring sanitation infrastructure, ongoing surveillance, and community engagement to prevent future outbreaks. Our key recommendation is to

integrate disaster preparedness with vector control strategies, ensuring multi-sectoral coordination and community participation to build resilience and enhance response effectiveness in similar emergencies.

Section 10: Annexures

Map: Earthquake prone areas of Bihar



Charts, impact visuals

S.No.	District Name	Earthquake Event – Number of Injuries	Earthquake Event – Number of Deaths	Dengue Outcomes – Confirmed Cases	Dengue Outcomes – Number of Deaths
1	A	180	27	112	02
2	B	00	00	96	01
3	C	140	18	79	03
4	D	19	01	27	01

References

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- NVBDCP PORTAL.
- IHIP PORTAL.
- STATE DISASTER MANAGEMENT PLAN, BIHAR.

4. Batch 4: Patna (04 – 07 August 2025)

4.1. Group 1: Multi-District Outbreak of Fever with Rash in Bihar



Figure 43: Group Photo of Group 1 during their presentation

Group Members:

Dr Santosh Kumar Nirala, Dr. Rachna Rani, Anil Kumar Yadav, Dr. Rashmi Kumari, Md Shere Afghan Khan, Dr Abhay Kumar, Ms Nagmani Singh, Mr. Neeraj Kumar Nirala, Mr Gaurav Kumar Arya, Dr Deepshikha Raj

Group 1 presented a detailed analysis of a multi-district outbreak of fever with rash reported across four districts of Bihar in July 2025 (Figure 43). The group described that the outbreak, primarily affecting children under ten years of age, included confirmed cases of measles, rubella, and other viral exanthematous fevers. District A was reported as the worst affected due to low immunization coverage, overcrowding, and delayed containment measures. At the same time, District B demonstrated effective early containment through timely alerts, intersectoral coordination, and proactive community engagement.

The group highlighted key vulnerabilities such as poor routine immunization, misinformation, and difficult geographical access in rural and tribal areas. They emphasized that limited surveillance capacity, inconsistent cold chain management, and weak coordination among Health, ICDS, and Education departments had contributed to the escalation of the outbreak. District B was cited as a model for preparedness, having benefited from prior MR catch-up campaigns and early involvement of ASHAs and school health teams.

In terms of response, the group noted that actions in the first 72 hours included rapid verification, isolation of suspected cases, vaccination mop-ups, and intensified IEC activities. Coordination among multiple departments was achieved to varying extents, though delays in data sharing and community resistance remained significant challenges.

Group 1 also discussed the application of emergency management principles, noting that the activation of the Incident Response System (IRS), the use of PHEOCs, and the use of unified command could have strengthened coordination and information flow. They underlined the importance of risk communication, local influencers, and psychosocial support in addressing vaccine hesitancy and community fear.

Key recommendations shared by the group included strengthening district-level outbreak response teams, improving routine immunization monitoring, conducting refresher training for frontline workers and school teachers, and establishing digital dashboards and formal communication networks for real-time reporting.

The group concluded that the scenario reinforced the need for an integrated, all-hazards approach to public health emergency management, emphasizing preparedness, intersectoral coordination, and community engagement as essential components for preventing and containing future outbreaks.

4.2. Group 2: Dengue Outbreak in Multiple Districts of Bihar



Figure 44: Group Photo of Group 2 during their presentation

Group Members:

Dr Seema Kumari, Dr Puspendra Kumar Singh, Dr Nand Kishore Chaturvedi, Dr Anand Pratap Amit, Shankar Kumar, Uday Pratap Singh, Dr Raj Kapoor, Dr Kumud Kumar, Mr Pawan Kumar Pawan

Group 2 presented an analysis of the dengue outbreak that occurred across four districts of Bihar in August 2024, following intense and unseasonal monsoon rains (Figure 44). The group described how the outbreak rapidly evolved into a multi-district public health emergency, with over 1,850 suspected and 660 confirmed cases reported within two weeks. The surge in dengue infections placed a severe strain on district health systems, particularly in high-burden areas such as District D, where diagnostic delays, limited entomology capacity, and inadequate community participation compounded the crisis.

The group highlighted key differences in district-level preparedness and response. District C was recognized as a best-performing district, where the Early Warning System (EWS) had successfully triggered a timely response, leading to rapid mobilization of vector control teams, targeted fogging, and IEC/BCC campaigns. Conversely, District D was identified as the most affected, with weak diagnostic infrastructure, limited trained personnel, and delayed case reporting. District B reported the highest number of deaths, attributed to delayed detection, poor digital connectivity, and insufficient community engagement. District A, though initially reporting fewer cases, was flagged as high-risk due to favorable mosquito breeding conditions and inadequate environmental management.

The group emphasized that vulnerabilities such as poor urban sanitation, waterlogging, stagnant water in construction areas, and weak community participation were major contributors to the outbreak. They noted that elderly individuals, children, and residents of densely populated urban and peri-urban settlements were most exposed. The team also discussed the critical role of environmental factors, including high Breteau and Container indices, which reflected uncontrolled Aedes mosquito breeding.

In discussing preparedness, Group 2 observed that dengue surveillance systems and vector control protocols existed but were unevenly implemented across districts. Only a few had pre-monsoon entomological surveys or sufficient stockpiles of larvicides and fogging equipment. They identified poor interdepartmental coordination, a shortage of trained rapid response teams, and gaps in data reporting as major limitations. District C's use of digital dashboards and community mobilization was cited as a good practice that could be replicated elsewhere.

During the response phase, actions taken included rapid field surveillance, fogging operations, fever screening camps, and IEC drives. However, Group 2 noted challenges such as community resistance to fogging, testing delays due to distant laboratories, and inadequate platelet supplies for Dengue Haemorrhagic Fever (DHF) cases. Coordination between the health department, municipal bodies, and local governance was found to be inconsistent, with fragmented communication channels hindering real-time decision-making.

The group applied emergency management principles to the scenario, observing that activation of district-level health emergency plans, use of an Incident Response System (IRS), and establishment of unified command could have improved coordination and accountability. They emphasized the need for an integrated “all-hazards” approach, especially given the potential overlap of vector-borne diseases with flood-related emergencies. Use of Emergency Operations Centers (EOCs) was identified as a critical gap, as such systems could have enhanced data tracking, logistics management, and inter-departmental coordination.

Key recommendations put forward by the group included:

- Linking seasonal vector control and larval surveillance with IMD monsoon forecasts to pre-empt outbreaks.
- Strengthening district entomology capacity and establishing certified fogging technician pools.
- Conducting pre-monsoon sanitation and solid waste management drives through joint coordination between Health, Urban Development, and Disaster Management departments.
- Enhancing community-based risk communication using local influencers, school campaigns, and PRI engagement.
- Introducing digital dashboards for real-time entomological indices, case mapping, and logistics tracking.

Group 2 concluded that the dengue outbreak underscored the interconnectedness of environmental management, health system readiness, and community participation for effective response. They stressed that sustainable vector control requires not only medical intervention but also long-term investment in urban planning, drainage systems, and behavioural change communication. The discussion reaffirmed that early warning, integrated coordination, and proactive community engagement are key to preventing future dengue surges in Bihar.

4.3 Group 3: Widespread Flooding in Bihar



Figure 45: Group Photo of Group 3 during their presentation

Group Members:

Dr Dharam Prakash, Dr Manish Kumar, Ms Bhawna Singh, Dr Rahul, Dr Chandan Kumar, Shweta Suman, Chandra Bushan Kumar, Dr Md Fatehuzzaman, Devershi Ranjan, Dr Manoj Kumar

Group 3 presented a comprehensive account of the widespread monsoon-induced flooding that affected multiple districts of Bihar on July 17, 2024 (Figure 45). The group explained that over 36 hours of intense rainfall exceeding 250 mm had triggered large-scale inundation, embankment breaches, and submergence of low-lying rural and peri-urban areas. Major rivers such as the Sone, Punpun, and Phalgu reached or crossed danger levels, resulting in the marooning of several villages, damage to infrastructure, and disruption of essential services. More than 180,000 people were affected across 85 panchayats, and around 22,000 individuals had to be evacuated to temporary shelters. The State Emergency Operations Centre (SEOC) had activated Level-2 Emergency Protocols, while district EOCs coordinated under a Unified Command system to manage the unfolding emergency.

The group elaborated on district-specific impacts, noting that District A suffered complete marooning of three administrative blocks, with roads, culverts, and health facility access completely disrupted. Power outages led to cold-chain failures and the spoilage of vaccines and medicines in District B. Backflow flooding and embankment breaches submerged 48 villages and contaminated drinking water, raising the risk of diarrheal outbreaks. The district also suffered heavy livestock losses due to submerged animal shelters, and coordination with the Animal Husbandry Department was reportedly delayed. District C, a tribal-dominated area, experienced flash floods and the isolation of remote villages for two days, requiring food drops by NDRF. Stagnant water at construction sites worsened vector breeding, and suspected clusters of leptospirosis and skin infections were reported.

District D faced overcrowding in relief camps, where poor sanitation and lack of surveillance increased risks of ARI, ILI, and diarrheal diseases.

Group 3 identified multiple hazards, including drowning, infrastructure collapse, disease outbreaks, and livestock loss. Vulnerabilities such as low-lying geography, weak embankment maintenance, inadequate early warning dissemination, and poor shelter infrastructure had exacerbated the crisis. Communities dependent on agriculture and livestock were particularly exposed, as prolonged inundation destroyed crops and disrupted livelihoods.

In their discussion on preparedness, the group observed that although flood contingency plans existed, implementation was uneven. While early warning systems like IMD and CWC alerts were functional, their community-level dissemination remained inconsistent, especially in tribal and remote areas. Stockpiles of chlorine tablets, sanitation kits, and life jackets were either inadequate or not pre-positioned. The group pointed out that inter-departmental coordination before the monsoon was limited, with little integration between Health, Disaster Management, Agriculture, and Animal Husbandry departments.

During the response phase, the group highlighted that rescue and evacuation operations were promptly initiated by the NDRF, SDRF, and local administration, but were hindered by damaged roads, communication breakdowns, and resistance to relocation among some communities. Health and veterinary teams conducted outreach in relief camps, though disease surveillance and sanitation measures were initially inadequate. The absence of digital dashboards and delayed data sharing were cited as key challenges. Despite these constraints, the Unified Command structure and functioning of EOCs were appreciated for enabling coordination and resource mobilization.

Applying public health emergency management principles, the group noted that the Incident Response System (IRS) could have been more effectively activated to clarify roles for inter-sectoral agencies. They emphasized the importance of integrating human and animal health services during flood response, particularly for zoonotic disease surveillance. Risk communication and community engagement were identified as crucial gaps, as inconsistent messaging had led to misinformation and reluctance toward evacuation. Psychosocial support for displaced families and livestock owners was also highlighted as an under-addressed area.

In their recommendations, Group 3 proposed:

- Strengthening embankment monitoring and maintenance through community-based vigilance committees.
- Establishing pre-monsoon multi-sectoral planning cells to review flood preparedness annually.
- Enhancing stockpiles of essential health and veterinary supplies, ensuring functional cold chains at higher ground PHCs.

- Developing integrated digital dashboards for real-time flood and health surveillance.
- Conducting flood-specific training for frontline responders, including ANMs, ASHAs, and livestock assistants.
- Incorporating psychosocial support, animal care, and livelihood restoration into post-flood recovery frameworks.

Group 3 concluded that the scenario reinforced the importance of adopting an all-hazards and One Health approach in flood management. They underscored that resilience depends not only on structural measures but also on coordinated preparedness, effective risk communication, and inclusion of both human and animal health considerations in emergency planning. The exercise, they noted, provided valuable insights into strengthening intersectoral coordination, community-based preparedness, and integrated disaster-health system response in Bihar.

4.4. Group 4: Cyclone “Ganga Vayu” in Bihar



Figure 46: Group Photo of Group 4 during their presentation

Group Members:

Dr Divakant Mishra, Dr Rajeev Kumar Ranjan, Ravi Anand, Dr Indu Kumari, Dr Vikash Kumar, Shabnam Naazneen, Dr Manoj Kumar, Dr Pallavi, Dr. Ahsanul Hoda, Chandan Kumar

Group 4 presented a comprehensive analysis of the multi-district impact of Cyclone “Ganga Vayu”, which struck Bihar on 24 October 2024, bringing torrential rainfall and wind speeds exceeding 100 km/h (Figure 46). The cyclone caused widespread devastation across four

districts—A, B, C, and D—triggering severe flooding, embankment breaches, and the collapse of essential infrastructure. Over 4.2 lakh people were affected, more than 48,000 displaced, and around 320 villages submerged. Power and communication outages were reported across three districts, while damage to water supply systems and sanitation facilities led to outbreaks of diarrheal and febrile illnesses. The group emphasized that the cyclone's impact extended beyond physical destruction, severely disrupting livelihoods, livestock health, and food security.

In the district-wise assessment, Group 4 noted that District A was the most severely affected, with embankments collapsing and villages marooned. Health facilities, including PHCs, were submerged, leading to paralysis of medical services and cold chain failures. Outbreaks of acute diarrheal diseases, skin infections, and snakebites were reported, while livestock mortality was high due to the absence of immediate veterinary relief. The group noted that the delayed activation of the District EOC and the lack of pre-positioned supplies further hampered the response.

In contrast, District B demonstrated proactive preparedness and served as a model for best practices. Early warnings were issued 72 hours in advance, and pre-evacuation was carried out for 12 high-risk panchayats. The district utilized community radio, WhatsApp groups, and local volunteers to disseminate alerts. Pre-positioned health kits, ORS stocks, and activation of veterinary response teams facilitated a swift and organized relief operation. Power and water services were restored quickly, and partnerships with local NGOs ensured the timely delivery of food, hygiene kits, and livestock fodder.

District C, however, suffered extensive infrastructure collapse, with roads blocked by uprooted trees and downed electric poles, leaving several villages isolated. Over 100 handpumps were contaminated, and more than 20 PHCs were damaged or inaccessible. Relief camps were overcrowded, and veterinary services were largely absent, forcing many livestock owners to sell their livestock under duress. Logistical constraints and coordination gaps delayed relief delivery.

In District D, the cyclone triggered severe communication breakdowns and public unrest. Communities remained isolated for nearly two days due to the collapse of mobile networks and power lines—frustration over delayed relief distribution led to public protests at block offices. Poor sanitation and lack of chlorination in relief camps caused waterborne illnesses, while fodder shortages added to the distress of livestock-dependent households. Coordination between departments was weak, and NDRF teams arrived only after 48 hours due to accessibility issues.

Group 4 identified multiple hazards and vulnerabilities, including drowning, electrocution, vector proliferation, disease outbreaks, and livestock deaths. Vulnerable populations included slum dwellers, families in low-lying areas, elderly individuals, and livestock owners. The group observed that while early warning systems were available, dissemination at the community level was inconsistent in most districts except B. Structural preparedness was

limited, with inadequate cyclone-resistant shelters and poor maintenance of stormwater drainage systems.

In the preparedness analysis, Group 4 commended District B's early action, community training, and multi-sectoral coordination but noted that other districts lacked synchronised preparedness planning. There were minimal mock drills, limited interdepartmental meetings before the cyclone season, and inadequate stockpiling of essential medical, veterinary, and sanitation supplies. Early warning messages did not reach several vulnerable hamlets due to connectivity issues and the absence of local communication networks.

During the response phase, actions included activation of EOCs, evacuation of at-risk populations, setup of relief camps, water purification, and deployment of mobile medical teams. However, delays in the transport of relief materials, inadequate health and veterinary staffing, and the absence of psychosocial support were significant constraints. Despite communication blackouts, field coordination through local volunteers and PRI members played a crucial role in initial relief operations.

The group reflected on the application of emergency management principles, emphasizing that a Unified Command and Incident Response System (IRS) could have enhanced coordination across departments, particularly between Health, Animal Husbandry, and Disaster Management authorities. The lack of functional Emergency Operations Centers (EOCs) in some districts delayed real-time information sharing and decision-making. They highlighted that integrating veterinary, public health, and psychosocial care under a One Health framework would have ensured a more holistic response.

Group 4 proposed the following recommendations and lessons learned:

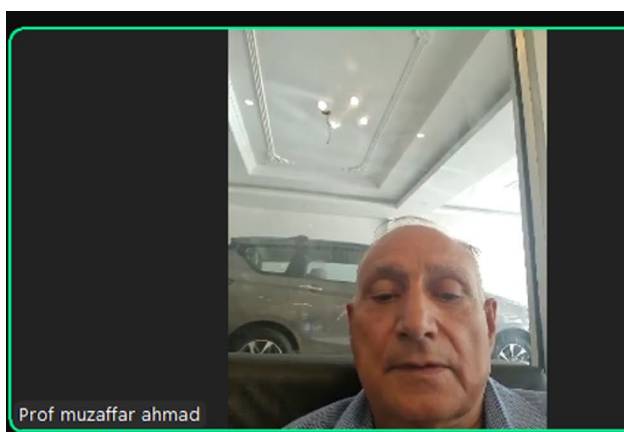
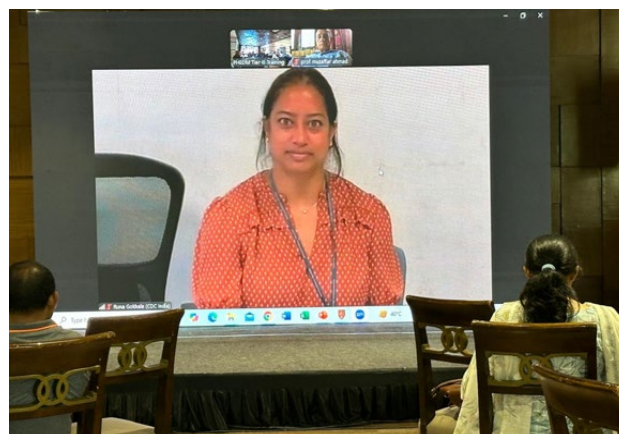
- Institutionalize pre-cyclone evacuation protocols and conduct annual mock drills in high-risk panchayats.
- Strengthen EOCs with redundant communication tools such as satellite phones and community radio systems.
- Integrate human and animal health response under a unified plan, including mobile veterinary units and fodder stockpiles.
- Develop resilient multipurpose shelters accommodating both people and livestock with adequate WASH facilities.
- Enhance community engagement and risk communication, leveraging local influencers and digital networks for early warnings.
- Include psychosocial support and livelihood recovery in post-disaster needs assessments (PDNA).

In conclusion, Group 4 emphasized that Cyclone Ganga Vayu illustrated the growing complexity of overlapping natural and public health emergencies in Bihar. The group underlined the importance of pre-emptive planning, local capacity building, intersectoral coordination, and integrating “One Health” and “All-Hazards” approaches to strengthen disaster resilience. The exercise reinforced the critical need for timely preparedness, efficient command systems, and inclusive recovery planning to safeguard both human and animal populations during future cyclonic events.

Annexure XI: Glimpses of Trainings

Batch 1: Patna (13 – 16 May 2025)

Photo Gallery



Mentors Session



Inaugural Session of Batch-1



Group Discussion session



Certificate distribution after completion of training



Kahoot Quiz Winners



NDRF Demonstration Session

Batch 2: Patna (23 – 26 June 2025)

Photo Gallery



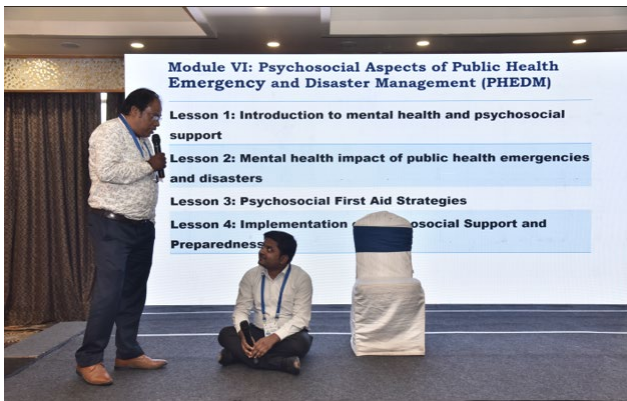
Glimpse of Mentors sessions



Glimpse of inaugural sessions



Group Discussion Session



Role Play during training session



NDRF Demonstration Session



Winners of Kahoot Quiz



Certificate distribution to participants

Batch 3: Patna (01 – 04 July 2025)

Photo Gallery



Mentor's Session



Tabletop exercise on case scenarios



Group Photo - Valedictory Session



Kahoot Quiz Winners

Batch 4: Patna (04 – 07 August 2025)

Photo Gallery



Mentor's Session



Group exercise on case scenarios



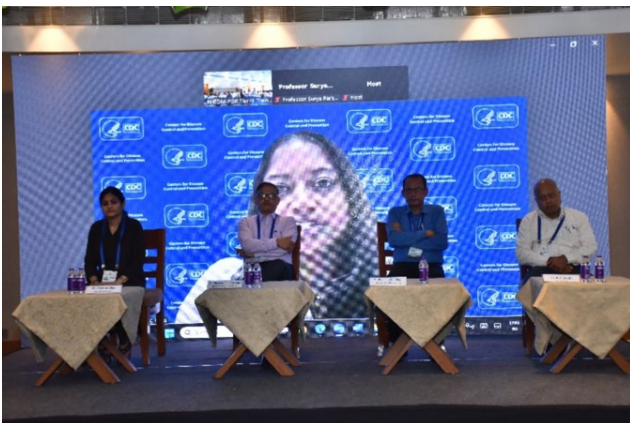
IRS tabletop exercises



NDRF Session



Kahoot Quiz Winners



Valedictory Session



Certificate distribution



22. References

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Parkash S., et al., (2022b). Training Module on Public Health Emergency and Disaster Management- Professional Development Programme (PHEDM-PDP)-Tier-II – Participant's Guide. National Institute of Disaster Management, Delhi. https://nidm.gov.in/PDF/Modules/Book_Participating.pdf

Batch 1



Batch 2



Batch 3



Batch 4

