

## **Close Interdepartmental Convergence And Active Services: Effective Mitigation Of Flood In A River Islet In Malda District, West Bengal – A Case Report**

**Dr. Kallol Bhandari,**

*Medical Officer (Public Health & Communicable Disease Branch), Swasthya Bhaban, Kolkata.*

**Dr. Tushar Kanti Saha,**

*Associate Professor, Department Of Community Medicine, North Bengal Medical College & Hospital, Darjeeling. (Corresponding Author)*

**Dr. Aveek Sankar Kumar,**

*Block Medical Officer Of Health, Manikchak Community Development Block, Malda.*

**Dr. Sudipta Bhaduri,**

*Chief Medical Officer Of Health, Malda.*

**Dr. Amitabha Mondal,**

*Deputy Chief Medical Officer Of Health-II, Malda.*

**Mrs. Tandra Choudhury,**

*District Public Health Nursing Officer, Malda.*

**Mrs. Nilima Mandal,**

*Senior Public Health Nurse, Manikchak Community Development Block, Malda.*

**Mrs. Soma Dutta,**

*Senior Public Health Nurse (Public Health), Manikchak Community Development Block, Malda.*

**Dr. Dipankar Maji,**

*Director (Hospital Administration) Cum Joint Director In-Charge (Public Health & Communicable Disease Branch), Government Of West Bengal, Swasthya Bhaban, Kolkata.*

**Dr. Swapan Saren,**

*Director Of Health Services, Government Of West Bengal, Swasthya Bhaban, Kolkata.*

---

### **Abstract:**

**Background:** Floods are recurrent natural disasters in riverine regions of India and pose serious public health challenges. Bhutni Diara, a low-lying river islet in Malda district, West Bengal, experiences annual flooding requiring large-scale evacuation and emergency health services.

**Case Presentation:** During August–October 2024, severe flooding affected Bhutni Diara under Manikchak Community Development Block, displacing approximately 100,000 people. Thirteen flood and rescue centres and two temporary hospitals were established. Health services were delivered through fixed and mobile medical camps, temporary inpatient facilities, and outreach services for vulnerable populations.

**Intervention and Outcome:** A total of 581 medical camps served over 112,000 beneficiaries. Mobile medical teams reached inaccessible areas using boats. Pregnant women, elderly persons, and children were prioritized. Enhanced disease surveillance, water sanitation measures, and vector control activities prevented any major disease outbreak during and after the flood.

**Conclusion:** This case highlights that strong interdepartmental convergence, adaptive health service delivery, and resilience-based planning can effectively mitigate public health risks during prolonged flood disasters.

**Keywords:** Flood, Disaster management, Public health response, Mobile medical units, Intersectoral coordination

Date of Submission: 18-04-2026

Date of Acceptance: 28-04-2026

### I. Introduction:

Flood is the most common type of natural disaster and expected to increase both in frequency and intensity, because of global warming & climate change <sup>(1)</sup>. The Ganga River after its entry in West Bengal, passes along the western and southern part of Malda district. Therefore, in case of heavy rainfall upstream specially during the monsoon, River Ganga puts Malda district before the risk of flood [Pic 1].

*Prologue of Bhutni Diara Islet, Manikchak block, Malda: [Pic 1]*

The Latitude of Bhutni Islet is 25.130714 & Longitude is 87.870934 with the gps coordinates of 25°7' 50.5704"N and 87°52' 15.3624"E

Area: Approximately 150 KM<sup>2</sup>

Total population of Bhutni's Diara Islet area is 1,10,000 spreads over 3 Gram Panchayets (GPs).

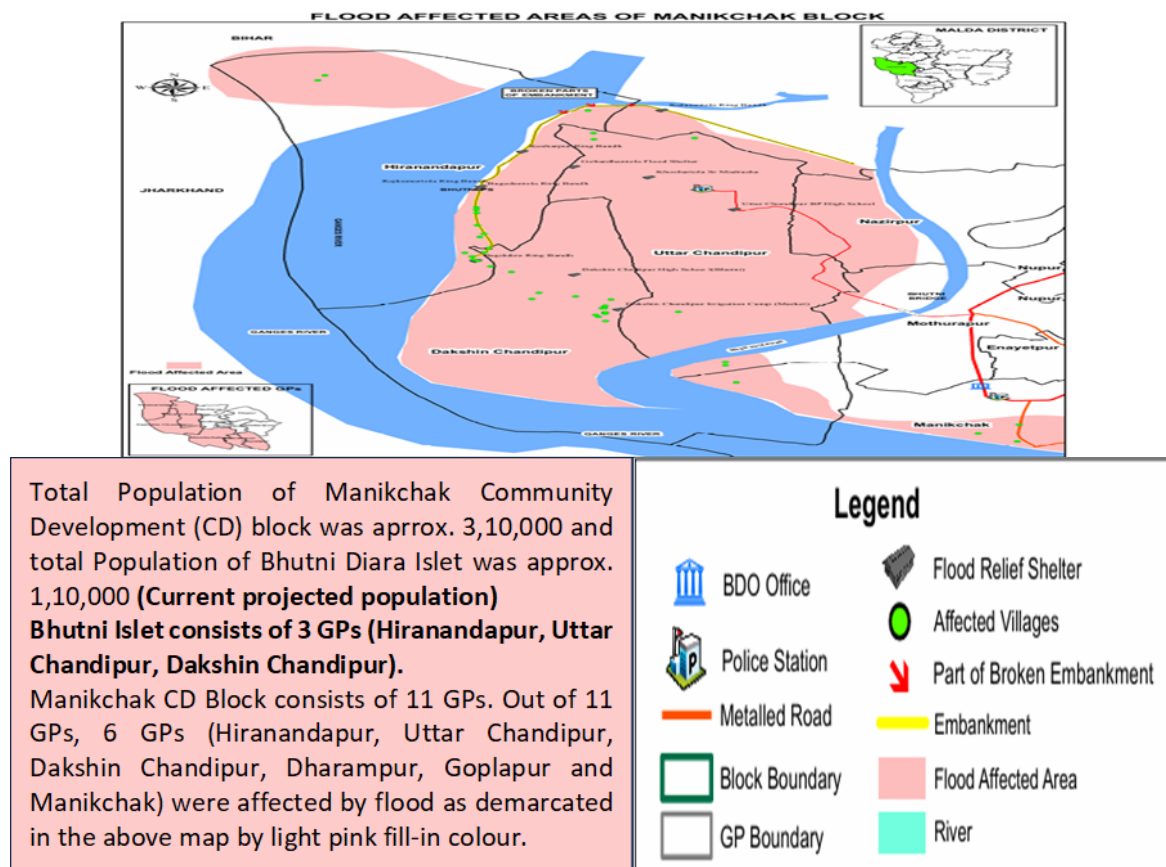
The Bhutni Diara Islet under Manikchak Community Development (CD) block of Malda district is an isolated land surrounded by rivers on all sides. The western and the southern part is surrounded by the Ganga River, in the eastern part by the Fulahar river, in the northern part by the Koshi river which is a branch of the Ganga River, connecting the Ganga River with the Fulahar river. Fulahar river joins with the Ganga River in the southern part. The Bhuti Bridge is the only connecting bridge which connects Bhutni Diara Islet with the main land of Manikchak CD block. Naturally, the topographical characteristics of Bhutni Islet itself makes it vulnerable to flood. In addition, the low-lying nature of the Islet land significantly aggravates the vulnerability.

*Existing Health care infrastructure of Manikchak CD block:*

Community Health Centre	<ul style="list-style-type: none"> <li>Manikchak Rural Hospital (60 bedded hospital)</li> </ul>
Primary Health Centres (3 in numbers)	<ul style="list-style-type: none"> <li>Bhutni Primary Health Centre (10 bedded)</li> <li>Mathurapur Primary Health Centre</li> <li>Nurpur Primary Health Centre</li> </ul>
Ayusman Arogya Mandir (AAM)/ HWC /SCs (35 in numbers)	<ul style="list-style-type: none"> <li>Ayusman Arogya Mandir (AAM)/ HWC (33 in number)</li> <li>Sub-centre (2 in number)</li> </ul>



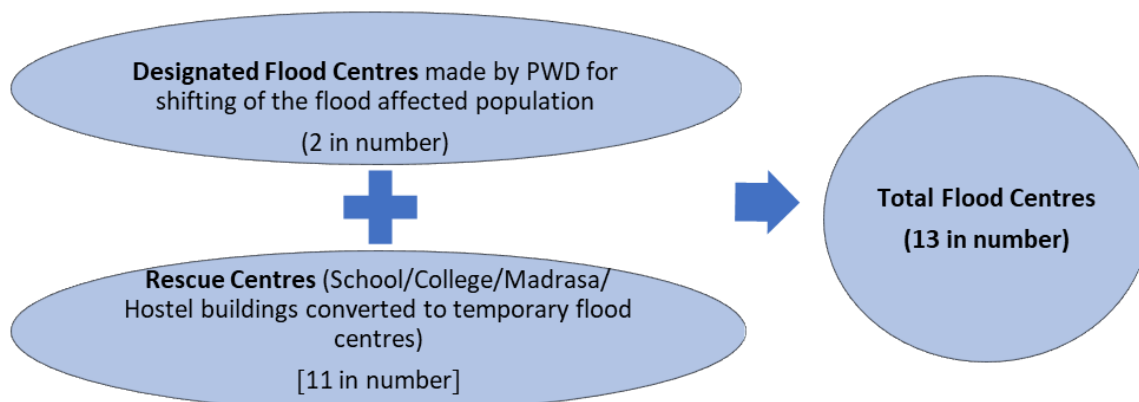
**\*Source: Office of the Block Medical Officer of Health, Manikchak CD Block, Malda**  
 Pic 1: Map showing the Health Infrastructure of Manikchak CD Block with peculiar natural encircling of Bhutni Diara by the Koshi River, Fulahar River and the Ganga River.



*\*Source: Office of the Block Medical Officer of Health, Manikchak CD Block*  
 Pic 2: Map showing the Flood affected GPs of Manikchak Block with important landmarks.

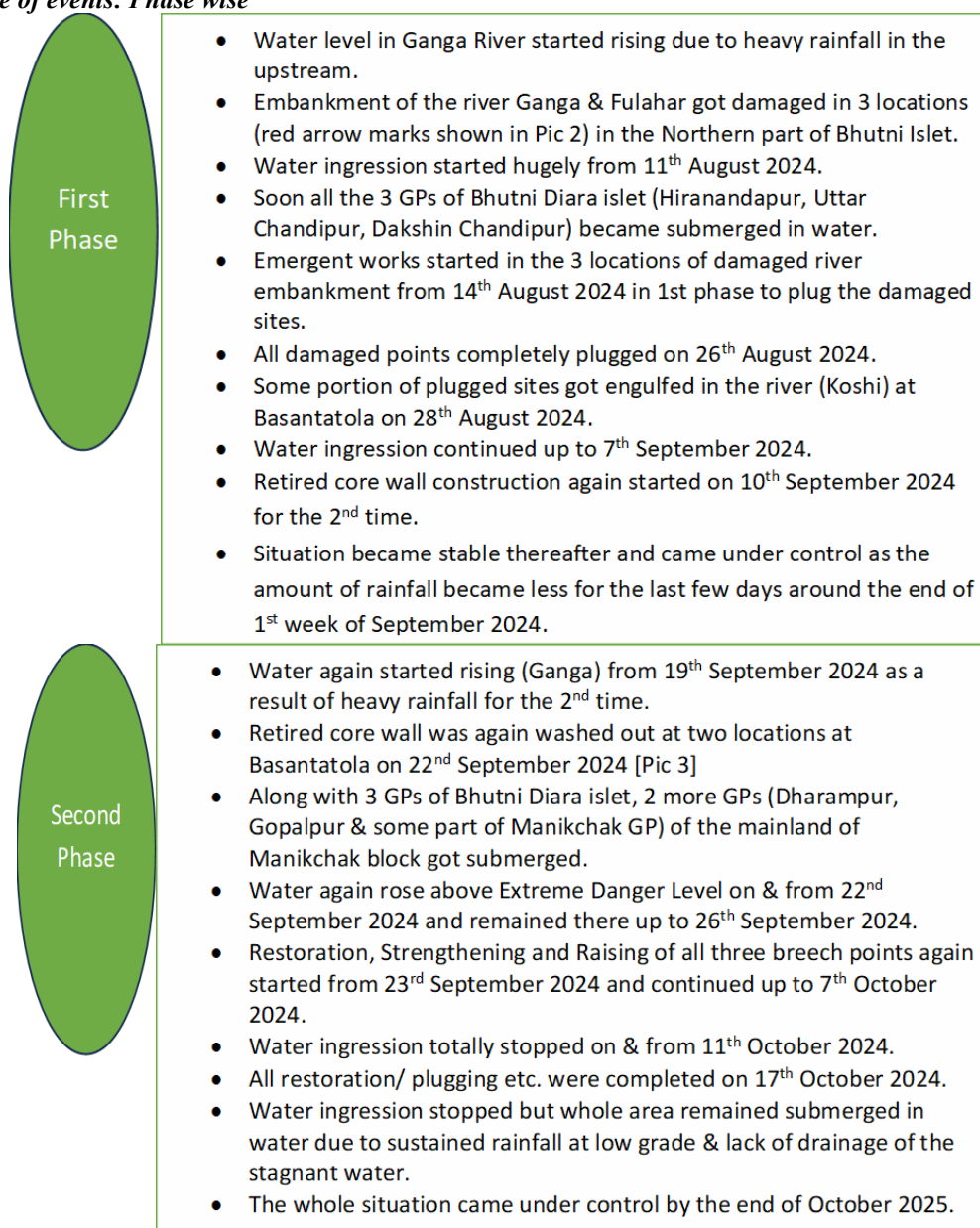
## II. Case Report:

Ingress of water from the Ganges started from 11<sup>th</sup> August, 2024 due to the river being at high spate and a breach occurring in the inner Ring Bandh (embankment) around the habited areas of Bhutni Islet in the Manikchak CD Block of Maldah district of West Bengal. Consequently, all the 3 GPs of Bhutni islet (Hiranandapur, Uttar Chandipur & Dakshin Chandipur) started to get progressively inundated. In the later phase of the flood incident 3 more GPs of Manikchak CD Block (Dharampur, Goplapur & Manikchak GP) got submerged due to heavy rainfall (described as 2<sup>nd</sup> phase). Many people were evacuated along with the livestock from the submerged areas and shifted by the district administration to the designated flood centres, rescue centres & temporary shelters over the Bhutni band. Around 1,00,000 people from around 15000 households were shifted temporarily to those flood centres. 150 families of Sahebramtola took shelter on the Bhutni Bandh. Approximately 35000 population were shifted to the temporary shelters made over the bandh. Rest of the population were shifted to flood centres [Pic 3]. A total of 13 flood centres were established. Out of those 13 sites, 2 sites were designated building as Flood Centres made by Public Works Department (Sankartola Flood Centre at Uttar Chandipur and Dakshin Chandipur Flood Centre) another 11 sites were Rescue Centres (School/ College/ Madrasa/ Hostel buildings etc. were converted to temporary flood centres). Out of 13 sites, 6 sites were in Bhutni Islet. Rest of the sites were made in Manikchak GP, Gopalpur GP and other few surrounding GPs. All of the sites were thus covered with required services.



The flood incident was started from 11<sup>th</sup> August 2024 and continued till mid of October 2024. The sequence of events has been described here in two phases for better understanding of the event.

**Sequence of events: Phase wise**



**Activities Performed:**

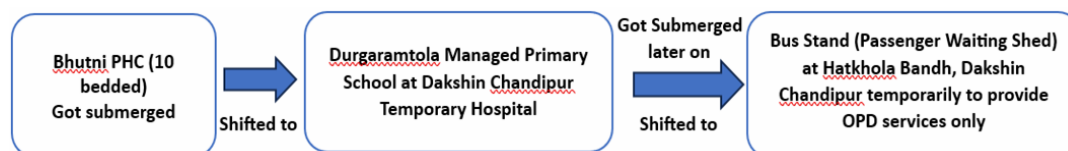
The entire activities were done promptly in co-ordination with all the line departments during both the phases with few strategic changes as per situational need in the 2<sup>nd</sup> phase of the event. The number of Health care workers (HCWs), supporting staffs & the logistics supplied were much more in the 2<sup>nd</sup> phase of the flood event. Different types of approaches were adopted for providing medical services at the health care facilities [Table 1].

**A. Initial activities-** Multiple small medical teams were formed to provide medical service including Immunization Services at the makeshift habitations on the embankment & at the flood centres. Initially, 10 spots were identified in the Intersectoral Disaster Management Committee meeting and Health Teams with Medical Officers were deployed accordingly. One additional Officer in the rank of Block Medical Officer of Health (BMOH) from unaffected neighboring Bamongola Block was deployed at Manikchak Rural Hospital (RH) exclusively to observe the flood and water logging related public health activities while all the administrative & routine public health activities of the entire block were carried out by the BMOH of Manikchak block.

**B. Out-Patient Department (OPD) Services-** OPD services were provided in the form of Medical Camps as well as in the Temporary Hospitals as per the norms. Medical camps were started in different forms viz. medical camps at the fixed sites (rescue centers, flood centers, GP Offices & on the embankments) and mobile medical camps for the waterlogged hard-to-reach areas. OPD services were alternatively made available initially at another 3 strategic locations, one each at the three flood affected GPs of Bhutni islet and at Hathkhola Bandh at Dakshin Chandipur which was a relatively highland area [Pic 3]. Later on, Medical Camps were made available in those GPs which were flooded in 2<sup>nd</sup> phase of the event. In addition to these medical camps, GP wise health camps were organized for better coverage. Approximately 65,000 population got medical services from these sites.

**Mobile Medical teams** moved in hired boats, arranged with the help of Block level General Administration to provide uninterrupted medical facilities to the hard-to-reach areas. On an average 2-3 mobile medical teams were moving on a regular basis. Around 45,000 people were served by those teams.

**C. Indoor Patient Services (IPD)-** State level Officers visited the waterlogged areas to assess the situational need. Support from the State Head Quarter (SHQ) was warranted. 8 Medical Officers (MO) and 6 Staff Nurses from State level were deployed to reinforcement the necessary medical services at the temporary hospitals. The 10 bedded Primary Health Centre (PHC) at Bhutni Islet got submerged. Human resources, drugs & other logistics were shifted from Bhutni PHC to Durgaramtola Managed Primary School at Dakshin Chandipur for establishing a Temporary Hospital.



Another 1 Temporary Hospital were was started in the upper story of Uttar Chandipur GP Office [Pic 3]. Total 242 patients were admitted in those Temporary hospital

**Table 1: Different facilities with different approaches for providing medical services**

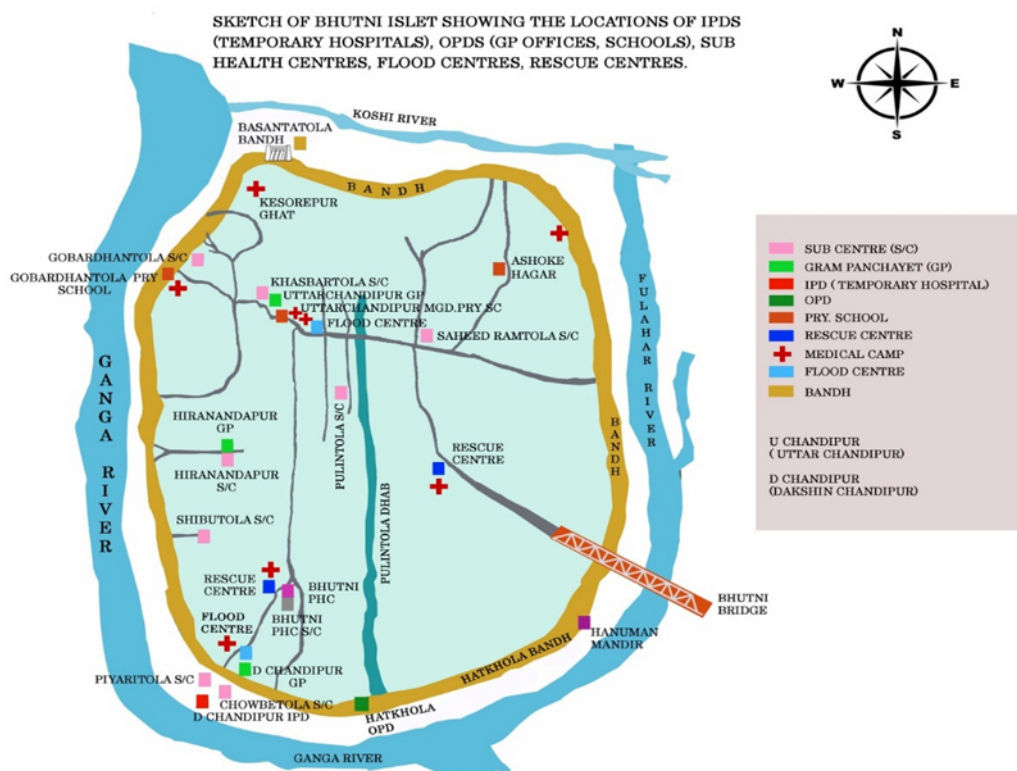
Facilities with numbers	Approaches for providing medical services
<b>Flood Centres (2)</b>	<ul style="list-style-type: none"> <li>Existing designated Flood Centres made by PWD only for the purpose of shifting the people with livestock during flood incidents.</li> <li>Medical Teams with MOs &amp; HCWs visited &amp; delivered medical services on OPD basis. 24 hr Medical Service was not available.</li> </ul>
<b>Rescue Centres (11)</b>	<ul style="list-style-type: none"> <li>Not pre-designated buildings as Flood Centres.</li> <li>As per the situational need, some buildings are converted to flood centres on temporary basis viz. School &amp; College buildings, Hostel buildings, Madrasas buildings &amp; hostels etc.</li> <li>OPD services by the Medical teams were provided in the same manner as above. 24 hr Medical Service was not available.</li> </ul>
<b>Temporary Hospitals (2)</b>	<ul style="list-style-type: none"> <li>Not pre-designated structures as hospital.</li> <li>As per the situational need, some buildings are converted to hospital on temporary basis viz. GP Office, School building.</li> <li>Round the clock makeshifts Medical facilities available along with OPD, IPD &amp; Emergency services.</li> <li>Critical cases were referred to Manikchak Rural Hospital (RH).</li> </ul>

**D. Medical Camps at the Flood Centers & Rescue Centers-** Teams of HCWs with Gynaecologists, Specialist Medical Officers & other staffs paid daily visits to those centres. PWs were kept under regular check-up

during the whole period. It was easier to transfer those pregnant mothers to the hospitals for admission as and when required. A total of 581 Medical Camps were conducted & 1,12,002 population were served. [Table 2]

**Table 2: Showing the distribution of total number of Medical Camps**

Medical Camps/ Health Camps	Numbers
GP Wise Health Camps	436
Medical Camps at Flood Centres/ Rescue Centres	113
Mobile Medical Camps	32
<b>Total</b>	<b>581</b>



*Pic 3: Sketch of Bhutni Islet showing the locations of IPDs (Temporary hospitals), OPDs (GP Offices, Schools), Sub Health Centres, Flood Centres, Rescue Centres.*

- A. Public Health Services-** Immunization services and care for the persons with Non-Communicable Diseases (NCDs) were emphasized. NCD Drugs was supplied uninterruptedly to the beneficiaries either through the mobile medical teams or the local ASHA workers. Immunization sessions were organized regularly maintaining proper cold chain for the vulnerable group like Pregnant women (PW) & Pediatric age group to prevent any dropouts. Vaccines and other logistics were supplied at the medical camp sites (including mobile medical camps) with the help of boats and Dingi/ Dinga (a small boat made up of Tin).
- B. Shifting of Vulnerable group of population to the nearby Flood Centres-** Pregnant women (PW), elderly and under 5 children were shifted to flood centres beforehand. Hence, a line list was made for PWs who were expected to deliver within 2 weeks and PWs with any complications. A total of 102 PWs were shifted in advance for safe labour. Line listing & tracking was made also for those PWs who had moved to other unaffected blocks and districts for safe shelter.
- C. Toilets and Hygiene:** People were made aware of the importance of hand washing with soap after every toilet use by repeated IEC. As the normal hand-washing facilities became dysfunctional, temporary alternatives (such as a bucket, mug, soap and a jug of water) were provided to the persons in the rescue centres. Sweepers & scavenging staff have done a commendable job to provide usable & clean toilets in flood centres. The stock of soaps & detergents was replenished at a regular interval. 450 Bio-toilets were provided by the PHE near the makeshift habitations and at some flood centres also.
- D. Waste Management:** General waste management was taken care of by Block level administrative authority. All the collected general waste were dumped into multiple pits which were excavated at different sites. Pits

were covered by soil later on. Bio-medical waste management was taken care of by the Block level health authority. All the bio-medical waste in different color-coded bio-medical waste bags from different camp sites/ temporary hospitals were collected by the scavenging staffs and brought to the existing designated place. An agency was already designated to dispose all those bio-medical waste as per Bio-medical waste management norms.

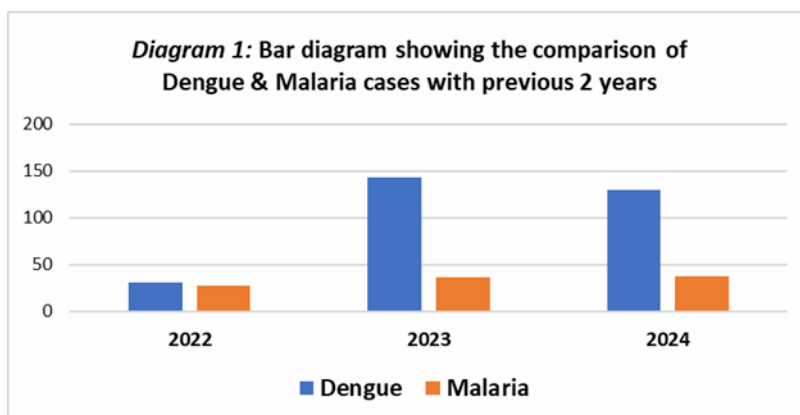
- E. Provision of Safe water:** Potable water was supplied by the Dept. of Public Health Engineering (PHE) in different types of containers like water pouches, mobile water tanks, plastic water jars (20 liters) depending on the accessibility of the affected areas. Creating awareness during Para Baithak to disinfect the river water and to use it for purposes other than drinking, played a vital role for safe use of water during the long-term critical situation.
- F. Sanitation and Disinfection:** Bleaching powder mixed with lime was extensively used for surface disinfection in the temporary settlements and rescue centres. Dept. of PHE took up a massive load of chlorination of around 11,000 tube wells and all the four major piped water supply lines. Sinking of 475 new tubewells were also done. Sufficient amount of halogen tablets was supplied to each household for disinfection of water for small scale. Periodic water quality assessment was done in a regular manner at PHE Laboratory as well as at the field level by the HCWs using H<sub>2</sub>S kit. A total of 90 bags (25 Kg/Bag) of Bleaching Powder distributed at Flood affected area, which were spread by ASHA/AWW & Panchayat personnel.
- G. Post-flood Outbreak Prevention Strategies-** It was apprehended from the earlier days of the disaster that the incidences of Acute diarrheal diseases, Acute Respiratory Illness, Vector Borne Diseases, other water-borne infections, Skin Diseases, Snake Bite etc. were likely to increase both during the disaster as well as in the post disaster phase. Dynamic medical need assessment through the daily robust IHIP-IDSP reporting system was emphasized to identify any Early Warning Signals (EWS) of any outbreak prone diseases. Accordingly, pre-emptive measures were taken in time. House to house case searching and outreach fever camps (mainly for Malaria and Dengue) were organized by Block level health officials to identify, diagnose & treat all fever cases early.

**Para Baithaks:** The District Health authorities, under active support from District administration, planned to arrange “Para Baithaks” through ASHA and ICDS Workers. This “Para Baithaks” are awareness campaigns in small groups at village level. Initially Para Baithaks were organized over the embankments and later on at the local clubs with the help of local youths. People were made aware of washing hands with soap before preparing foods, before eating & after defecation. They were trained to disinfect the river water and to use it for purposes other than drinking. A total of 305 Para Baithaks sessions were organized during the whole period.

**Entomological Activities:** Vector control activities were organized with the help of Vector Control Teams (VCT) according to the survey findings of the District Entomologist along with the help of Survey teams. During the post-flood period breeding of Aedes mosquitoes was found mainly in concave spaces/ pockets formed on the tarpaulin/ plastic sheets that were used to cover houses & temporary habitations along with the other common containers. In contrast to the pre-flood period, larval density of both Anopheles & Culex were much less during the post-flood period. As a result of thorough entomological activities both in pre & post flood period, the total number of Dengue and Malaria cases was not more than the previous 2 years. [Diagram 1]

A **home care kit** containing soap, ORS packets, halogen tablets & anti-fungal cream was distributed to each family through house-to-house visits by the ASHA workers. A total no. of 1820 Self Care Kits and 3250 no. of Medicine Kits were distributed.

**The Informal Health Care Providers (IHCP)/ Rural Health Practitioners** were repeatedly oriented on early intervention for the diarrhea & other communicable diseases. They were also sensitized for not making any delay in referring any critical cases to the nearby medical camp/ hospital.



### Schematic Diagram of health care delivery system

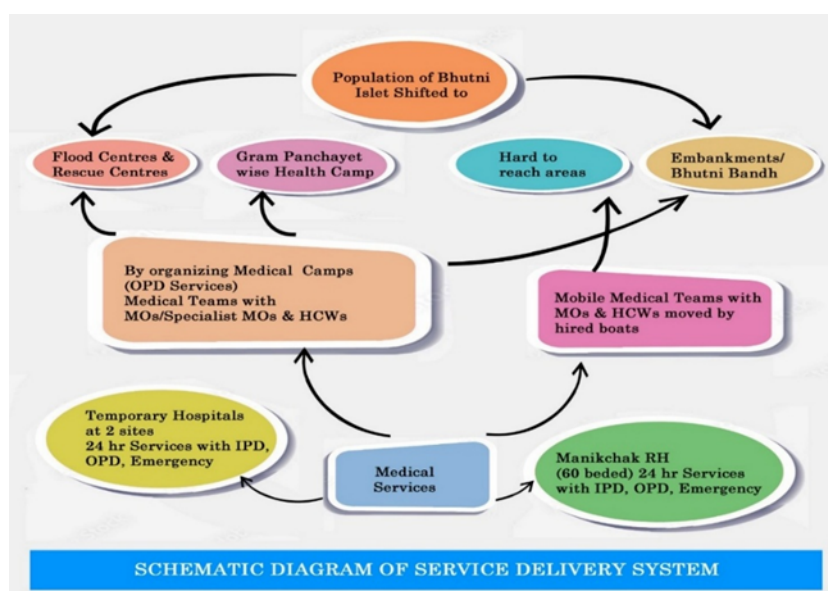


Diagram 2: Schematic diagram of the service delivery system

### III. Discussion:

In a country which is at risk of recurrence of disasters, disaster risk reduction plays a significant role for the social and economic development of the country which is essential for the sustainable development in the future <sup>(2)</sup>.

Bhutni islet under Manikchak CD Block because of its own geographical location, poses highly vulnerable to flood. Timely interventions with proper planning and implementation of the necessary steps taken by all the stakeholder departments, played a major role in fighting for survival during that crisis period. General administration along with the other related departments viz. Public Works Department (PWD), Animal Resource Development Department (ARD), Police personnel, Civil Defense etc. contributed a major action by early & prompt evacuation of Bhutni Islet and shifting a large number of floods affected people along with livestock which saved many lives. Rapid establishment of 11 rescue centres in addition to existing designated Flood Centres (2) along with provision of other necessary services were possible only because of prompt actions taken by General administration. Once people took shelter at those Flood centres, medical services were delivered timely by the health department. OPD services through medical camps (also mobile medical camps by boat for the hard-to-reach areas), IPD services for temporary hospitals were started in parallel with the activities by the other stakeholder department. Decision for hiring of boats by the General Administration was crucial at that critical situation to provide necessary medical services at the door step. Schematic diagram of the entire service delivery system shown in Diagram 2. The PWs were at risk since it was very difficult to transport the PWs from the marooned areas at the time of labour pain. Hence, they were shifted to flood centres beforehand. Convergence and intersectoral co-ordination in each & every step were the main strategy to overcome the disaster situation. ARD Department played a significant role in safeguarding the animal health and preventing

catastrophic incidences for the livestock. Crisis in cattle food availability were effectively managed by the ARD Department by re-establishing the supply chain after telephonic conversation with the higher authority.

In a crisis situation people fight for survival amenities, the quality-of-life factors like preventive health & hygiene are often at stake. The quality of medical care may sometimes become questionable during such crisis period. It becomes an added challenge for the health care delivery system to create awareness for preventive health & hygiene practices to the affected people and also to make a change in behavior. In a systematic review of the quality of health systems in humanitarian settings by Jordan K et al<sup>(3)</sup> concluded that, there remain different types of challenges like gaps in process of care, quality of care for providing need based medical care to the affected population.

In a review article Wang L et al<sup>(4)</sup> concluded that integrating the concept of resilience into the framework of risk management is a better approach in future flood management. As the Bhutni Islet is vulnerable to flood, designated flood centers have already been made by PWD. During the flood incident, rapid establishment of other rescue centres, quick shifting of a large number of flood affected population to those flood centres & temporary shelters on the river embankments, supplying all the necessary items & services for daily living as well as establishing the provision of all medical services keeping no one left behind were the other ways of making the at-risk population flood resilient. There was no obvious upsurge of any outbreak prone diseases in the post-flood period due to the implementation of robust disease surveillance & preventive strategies.

The situation came under control around 31<sup>st</sup> October 2024. A two and half month-long battle was successful only because of the extremely well-coordinated, well-convergent, effort demanding exercise which was implemented through full time field level activities of 14 Medical Officers, 20 Staff Nurses, 22 Community Health Officers, 25 Health Assistant (Female)s, 20 Community Health Assistants, 81 ASHA workers and other supporting staffs including sweepers & scavenging staffs. Public as well as the People's representatives were satisfied after getting adequate medical services at the critical time from the health department and they have no complaints about health department regarding their course of activities during the long crisis phase. This extraordinary effort has received recognition from the electronic and print media also.

#### **IV. Conclusion:**

Flood cannot be completely prevented by any strategy. Adaptability and resilience should be integrated along with mitigating measures to effectively protect human health, animal health & the environmental health from flood related adversities. Specific aspects demanding convergent approaches like mobility to water logged areas, infrastructural support to setup medical camps, temporary hospital, opening of rescue centres. Timely reaching of health care service to those flood centres would have been impossible without the approaches from all the line departments.

#### **Limitations:**

There were definite gaps in data preservation during the whole process. Data keeping was not up to the mark. So, the exact number of cases of the outbreak prone diseases and the entomological surveillance data remained within a gray area.

#### **Acknowledgement:**

The State Health Department, Govt. of West Bengal expresses their sincere thanks and gratitude to the following officials / departments for their sincere participation for effectively managing the crisis & preventing catastrophic incidents for humans, animals as well as to protect the environment.

1. Dr. Raghaves Majumdar, Assistant Director of Health Services (Epidemiologist), Government of West Bengal, Swasthya Bhaban, Kolkata.
2. Mr. Nitin Singhanian, District Magistrate, Malda
3. Mr. Anup Chakraborty, Block Development Officer, Manikchak Community Development Block, Malda.
4. Health Care Providers from different tiers (Medical Officers, Staff Nurses, Community Health Officers, Health Assistant-Female, Community Health Assistants, ASHA workers, and other supporting staff including sweepers & scavenging staff) of Manikchak Community Development Block, Malda.
5. Department of Animal Resources Development, Department of Civil Defence, Department of PWD, Police/ Security personnel of Malda district.

#### **References**

- [1]. Floods [Internet]. World Health Organization. 2020 [Cited 2025 April 16]. Available From: [https://www.who.int/health-topics/floods#tab=tab\\_1](https://www.who.int/health-topics/floods#tab=tab_1)

- [2]. Koka PM, Sawe HR, Mbaya KR, Kilindimo SS, Mfinanga JA, Mwafongo VG, Et Al. Disaster Preparedness And Response Capacity Of Regional Hospitals In Tanzania: A Descriptive Cross-Sectional Study. BMC Health Serv Res. 2018 Nov 6;18(1):835. Doi: 10.1186/S12913-018-3609-5. PMID: 30400927; PMCID: PMC6219171. [Cited 2025 April 25].
- [3]. Jordan K, Lewis TP, Roberts B. Quality In Crisis: A Systematic Review Of The Quality Of Health Systems In Humanitarian Settings. Conflict And Health. 2021 Feb 2;15(1):7. [Cited 2025 April 25] Available From: <https://doi.org/10.1186/S13031-021-00342-Z>
- [4]. Wang L, Cui S, Li Y, Huang H, Manandhar B, Nitivattananon V, Et Al. A Review Of The Flood Management: From Flood Control To Flood Resilience. Heliyon. 2022 Nov 1;8(11). [Cited 2025 November 20] DOI: 10.1016/J.Heliyon.2022.E11763