


IMPLEMENTATION OF INTEGRATED EMERGENCY HEALTH SERVICES THROUGH MOBILE HEALTH UNITS FOR FLOOD-AFFECTED COMMUNITIES IN ACEH PROVINCE, INDONESIA

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Abstract

Background: Flood disasters disrupt healthcare systems and increase the risk of communicable diseases, chronic disease complications, malnutrition, and psychosocial problems among affected communities. An integrated emergency health response is essential to restore healthcare access during disaster situations.

Objective: This study aimed to describe the implementation of an integrated emergency health response through Mobile Health Units (MHUs) for flood-affected communities in Pidie Jaya Regency, Aceh Province, Indonesia.

Methods: A retrospective descriptive implementation study was conducted using routine program records from an emergency health response implemented in Buangan and Lueng Bimba villages following the 2025 flood disaster. Data were collected from medical records, service reports, logistics distribution records, psychosocial intervention reports, and monitoring documents. Quantitative data were analyzed descriptively using frequencies and percentages, while qualitative findings were summarized narratively. **Results:** A total of 763 patients received comprehensive healthcare services through Mobile Health Units. The intervention included medical consultations, nursing care, maternal and child health services, portable ultrasonography, point-of-care laboratory testing, nutritional support, psychosocial interventions, pharmaceutical services, and referral of high-risk patients. The most common health conditions were acute respiratory infections, skin diseases, diarrhea, hypertension, and diabetes mellitus. **Conclusion:** The integrated emergency health response effectively restored access to essential healthcare services and addressed the multidimensional health needs of flood survivors. Strengthening multidisciplinary Mobile Health Units and multisectoral collaboration may enhance disaster preparedness and improve the resilience of primary healthcare services.

Keywords: Flood Disaster; Mobile Health Unit; Emergency Health Response

Background

Floods are among the most frequent and devastating natural disasters worldwide, and their occurrence has increased in recent decades due to climate change, rapid urbanization, and environmental degradation. Beyond causing mortality and physical injuries, floods severely disrupt healthcare systems by damaging health facilities, interrupting transportation networks, limiting access to medicines, and reducing the availability of essential health services. The World Health Organization (WHO) emphasizes that flood disasters compromise food security, clean water, sanitation, shelter, and healthcare access, thereby increasing the risk of communicable diseases, chronic disease complications,

malnutrition, and mental health disorders. Effective disaster preparedness and resilient health systems are therefore essential to minimize the health consequences of flood emergencies (3).

The health impacts of floods extend well beyond the immediate disaster period. Populations affected by flooding are at increased risk of acute respiratory infections, diarrheal diseases, skin infections, injuries, and exacerbation of chronic illnesses due to interrupted continuity of care. Vulnerable groups—including pregnant women, infants, children, older adults, and individuals with chronic diseases—are disproportionately affected because of reduced access to healthcare services and nutritional support.

These complex health needs require comprehensive emergency responses that integrate preventive, promotive, curative, rehabilitative, nutritional, and psychosocial services rather than focusing solely on acute medical treatment (3).

One of the greatest challenges during flood disasters is maintaining continuity of primary healthcare services. Damage to healthcare infrastructure and transportation systems often prevents affected populations from reaching fixed healthcare facilities. To address these barriers, Mobile Health Units (MHUs) have become an increasingly important strategy for delivering healthcare directly to disaster-affected communities. A recent scoping review by Sheerazi et al. identified that MHUs have been deployed following earthquakes, floods, tsunamis, hurricanes, cyclones, and landslides, consistently improving access to outpatient healthcare where routine services were disrupted. However, the review also highlighted persistent operational challenges related to logistics, transportation, referral systems, communication, and standardized reporting, emphasizing the need for further evidence regarding the effectiveness and implementation of MHUs in natural disasters (1).

In addition to medical care, comprehensive disaster response should include disease surveillance, pharmaceutical support, nutritional interventions, mental health services, water, sanitation, and hygiene (WASH) programs, and community engagement. WHO recommends integrating mobile health teams with primary healthcare services to restore maternal and child health services, mental health care, epidemic surveillance, nutritional support, and outreach services in disaster settings. Such integrated interventions are essential to strengthen health system resilience and reduce preventable morbidity and mortality among disaster-affected populations (2).

Indonesia is one of the countries most vulnerable to hydrometeorological disasters because of its geographical location and climatic conditions. At the end of November and early December 2025, Aceh Province experienced severe flooding that affected multiple districts, causing extensive damage to residential areas, public infrastructure, educational facilities, agricultural land, and healthcare services. According to the project report, healthcare facilities experienced shortages of medicines, damaged medical equipment, disrupted logistics,

and reduced service capacity. Flood-affected communities also faced increased risks of acute respiratory infections, diarrhea, skin diseases, nutritional problems, and psychosocial distress, particularly among children, pregnant women, older adults, and individuals with chronic diseases.

To address these challenges, Universitas Lambung Mangkurat implemented an integrated emergency health response through multidisciplinary Mobile Health Units in Buangan and Lueng Bimba villages, Pidie Jaya Regency. The intervention combined emergency medical services, portable diagnostic technologies, pharmaceutical support, nutritional assistance, psychosocial interventions, health promotion, disease prevention, and referral services. Unlike many disaster response reports that focus primarily on emergency medical care, this program adopted a comprehensive community-based approach integrating healthcare delivery with nutrition, mental health, logistics, and disaster preparedness.

Although the importance of Mobile Health Units has been increasingly recognized, evidence describing the implementation of integrated emergency health responses in flood-prone settings remains limited, particularly in low- and middle-income countries. Existing literature predominantly discusses operational characteristics of Mobile Health Units, while relatively few studies report comprehensive multidisciplinary interventions combining emergency healthcare, nutrition, psychosocial support, health technology, and community recovery (1).

Therefore, this study aimed to describe the implementation of an integrated emergency health response through Mobile Health Units for flood-affected communities in Pidie Jaya Regency, Aceh Province, Indonesia. The findings are expected to provide practical evidence for strengthening disaster preparedness, primary healthcare resilience, and comprehensive emergency health service delivery in disaster-prone settings.

Method

This study employed a retrospective descriptive implementation study to describe the implementation of an integrated emergency health response following the 2025 flood disaster in Pidie Jaya Regency, Aceh Province,

Indonesia. The study utilized program implementation records to evaluate the delivery of multidisciplinary health services through Mobile Health Units (MHUs), with emphasis on healthcare accessibility, emergency medical services, nutritional support, psychosocial interventions, and disaster response coordination.

The intervention was conducted in Buangan Village and Lueng Bimba Village, Pidie Jaya Regency, Aceh Province, Indonesia, following severe flooding that occurred in late November 2025. The disaster caused substantial damage to residential areas, transportation infrastructure, educational facilities, agricultural land, and primary healthcare services, resulting in limited access to healthcare among affected communities. The emergency health response was implemented during two deployment periods from 20–24 December 2025 and 23–27 December 2025.

The emergency response was implemented through a multidisciplinary team from the Faculty of Medicine and Health Sciences, Universitas Lambung Mangkurat, in collaboration with the District Health Office, Regional Disaster Management Agency (BPBD), community health centers (Puskesmas), village authorities, and local volunteers.

Program implementation consisted of four sequential phases: (1) preparation and coordination through rapid health needs assessment, stakeholder coordination, development of emergency referral procedures, and procurement of medical logistics; (2) delivery of integrated emergency health services through Mobile Health Units, including medical consultation, nursing care, maternal and child health services, pharmaceutical support, nutritional interventions, psychosocial support, disease prevention, health education, and referral services; (3) routine monitoring and evaluation using disease surveillance, service monitoring, logistics assessment, patient satisfaction surveys, and daily field reports; and (4) sustainability activities through transfer of medical equipment, strengthening of disaster preparedness systems, and capacity building for community health volunteers.

Program data were collected from routine implementation records generated during emergency response activities. Data sources included patient registration forms, medical examination records, nursing documentation, pharmaceutical distribution records, laboratory examination reports, maternal health records,

psychosocial intervention reports, nutrition service records, logistics distribution reports, field observation reports, and routine monitoring and evaluation documents.

Variables extracted from program records included the number of patients receiving healthcare services, types of medical conditions encountered, utilization of maternal health services, laboratory examinations, nutritional interventions, psychosocial support activities, logistics distribution, referral cases, and implementation of portable health technologies during disaster response.

Data were analyzed descriptively. Quantitative variables were summarized using frequencies and percentages to describe service utilization and program implementation. Qualitative information obtained from field observations and monitoring reports was synthesized narratively to describe multidisciplinary coordination, emergency healthcare delivery, implementation challenges, and sustainability strategies. Findings are presented according to the major components of the integrated emergency health response.

This study analyzed routinely collected program implementation data from a humanitarian emergency health response. All data were anonymized before analysis, and no personally identifiable information was included in this report. The study was conducted in collaboration with local health authorities as part of the emergency disaster response program.

Results and Discussion

Results

The integrated emergency health response was implemented in two flood-affected villages, Buangan and Lueng Bimba, Pidie Jaya Regency, Aceh Province, Indonesia. The intervention was conducted through two deployment periods in December 2025 involving multidisciplinary teams from Universitas Lambung Mangkurat in collaboration with local health authorities.

Emergency health services were delivered through Mobile Health Units (MHUs), providing comprehensive medical care, nursing services, maternal and child health services, nutritional support, psychosocial interventions, pharmaceutical services, health education, and referral services.

Table 1. Summary of Emergency Healthcare Services Provided

Variable	Result
Deployment period 1	20–24 December 2025
Deployment period 2	23–27 December 2025
Villages served	2
Total patients	763
Patients (Deployment 1)	413
Patients (Deployment 2)	350
Pregnant women receiving portable ultrasound	9
Home visit services	Conducted
Laboratory examinations	Random blood glucose, cholesterol, uric acid

A total of 763 patients received healthcare services during the implementation period, comprising 413 patients during the first deployment and 350 patients during the second deployment.

The Mobile Health Units provided comprehensive emergency healthcare services at community health posts and through home visits for patients with limited mobility. Services included medical consultation, physical examination, medication, nursing care, obstetric ultrasonography, and point-of-care laboratory examinations for random blood glucose, cholesterol, and uric acid.

The most common health problems identified during service delivery were acute respiratory infections (ARI), skin diseases, diarrhea, hypertension, diabetes mellitus, and general health complaints requiring vitamin supplementation. Maternal and child healthcare constituted an important component of the intervention. Obstetric ultrasonography was performed for nine pregnant women, and nutritional support was provided for pregnant women, breastfeeding mothers, infants, children, and older adults through supplementary food and milk distribution.

Several patients required referral for further management, including cases of severe preeclampsia, suspected uterine myoma, developmental delay, herpes simplex infection, child malnutrition, and infant diarrhea with dehydration. These patients were referred to Meureudu Primary Health Center and the Health Emergency Operations Center (HEOC) for further evaluation and treatment.

Table 2. Major Health Conditions Identified During Mobile Health Unit Services

Disease/Condition	Clinical Management
Acute respiratory infection	Medical treatment
Skin disease	Medical treatment
Diarrhea	Medical treatment and rehydration
Hypertension	Medication and monitoring
Diabetes mellitus	Medication and monitoring
Pregnancy complications	Obstetric ultrasound and referral
Child malnutrition	Nutritional intervention and referral
Developmental delay	Referral
Herpes simplex	Referral
Suspected uterine myoma	Referral

The emergency response addressed both acute and chronic health conditions among flood survivors. Communicable diseases were dominated by acute respiratory infections, diarrhea, and skin diseases, whereas non-communicable conditions mainly consisted of hypertension and diabetes mellitus. Several high-risk maternal and pediatric cases requiring advanced care were identified during clinical assessment.

In addition to healthcare services, the program distributed humanitarian assistance to households in Buangan and Lueng Bimba villages. Basic food packages were distributed

Table 3. Humanitarian Assistance Distributed During the Emergency Response

Type of assistance	Description
Basic food packages	Distributed to affected households
Community kitchen supplies	Food ingredients
Supplementary food	Children
Milk	Pregnant women, breastfeeding mothers, children
Hygiene kits	Household sanitation
Clothing	Adults and children
Medical equipment	Essential medical devices
Cargo shipments	58 packages

to all households, while supplementary foods and milk were provided for nutritionally vulnerable groups. Hygiene supplies, sanitation materials, clothing, medical equipment, and household necessities were also distributed.

A total of 58 cargo packages containing medical supplies and humanitarian assistance were transported from Universitas Lambung Mangkurat to the affected communities. Distribution was coordinated with village authorities to ensure equitable allocation according to local needs.

Psychosocial interventions targeted children through therapeutic play, art therapy, educational activities, and Psychological First Aid (PFA). Activities were conducted at the Pidie Jaya Health Office Emergency Operations Center, Buangan Village, and Lueng Bimba Village.

Table 4. Psychosocial Intervention Outcomes

Indicator	Result
Total children receiving psychosocial support	223
HEOC Pidie Jaya	3
Buangan Village	100
Lueng Bimba Village	120
Toy Packages Distributed	250
Down Syndrome Identified	1 child
Referral Completed	Yes

A total of 223 children participated in psychosocial activities, including three children at the district emergency post, 100 children in Buangan Village, and 120 children in Lueng Bimba Village. During psychosocial screening, one child with Down syndrome was identified and referred for further follow-up. Facilitators observed improvements in children's emotional expression, confidence, and positive social interaction throughout the intervention.

Spiritual support was also provided through the distribution of prayer garments, prayer mats, hijabs, and Qur'ans to affected communities and local places of worship.

Implementation of the integrated emergency health response demonstrated that Mobile Health Units enabled rapid restoration of healthcare access in flood-affected communities despite damaged infrastructure and limited transportation. Multidisciplinary collaboration among healthcare professionals, local government,

and community stakeholders facilitated delivery of comprehensive healthcare services, nutritional support, psychosocial interventions, logistics distribution, and referral services. Program sustainability was further supported through transfer of medical equipment to local healthcare facilities and strengthening of community disaster preparedness.

Discussion

The present study demonstrated that an integrated emergency health response delivered through Mobile Health Units (MHUs) successfully restored access to essential healthcare services for flood-affected communities in Pidie Jaya Regency. A total of 763 patients received comprehensive healthcare services, including medical consultations, nursing care, maternal and child health services, laboratory examinations, nutritional support, and referral services. These findings indicate that mobile healthcare delivery can effectively compensate for disruptions in fixed healthcare facilities during disaster situations.

Flood disasters frequently damage health facilities, interrupt transportation networks, and reduce the availability of essential medicines, creating substantial barriers to healthcare access. Under such circumstances, rapid deployment of mobile healthcare services enables continuity of primary healthcare while reducing delays in diagnosis and treatment. Recent evidence from a scoping review by Sheerazi et al. reported that MHUs consistently improve access to outpatient healthcare following floods, earthquakes, hurricanes, and other natural disasters by delivering healthcare directly to affected populations. Nevertheless, the authors emphasized that effective implementation requires strong coordination, referral systems, logistics, and communication, all of which were incorporated into the present emergency response through collaboration among the university, district health office, BPBD, Puskesmas, and village authorities (4).

The disease profile identified in this study was dominated by acute respiratory infections, skin diseases, diarrhea, hypertension, and diabetes mellitus. Similar patterns have been reported in previous disaster responses, where respiratory infections, diarrheal diseases, and exacerbation of chronic diseases constitute

the most common reasons for seeking care from MHUs after floods. These findings reinforce the importance of maintaining integrated primary healthcare services rather than focusing exclusively on trauma management during flood emergencies (11).

The use of portable ultrasound and point-of-care laboratory testing enhanced the capacity of field medical teams to provide rapid diagnosis and timely clinical management in resource-limited settings. Portable ultrasound facilitated obstetric assessment of pregnant women, resulting in the identification and referral of one woman with suspected uterine myoma. Similarly, digital laboratory devices enabled rapid assessment of blood glucose, cholesterol, and uric acid levels, supporting immediate clinical decision-making for patients with chronic diseases (10).

Portable diagnostic technologies have become increasingly valuable in disaster medicine because they allow healthcare providers to perform bedside examinations without relying on damaged hospital infrastructure. A recent study conducted in another disaster-affected area of Aceh demonstrated that portable ultrasound reduced geographic barriers to maternal healthcare, improved timely diagnosis, and strengthened continuity of care through collaboration with community midwives. These findings are consistent with the present study, where portable ultrasound facilitated early identification of high-risk pregnancy conditions requiring referral to higher-level healthcare facilities (5).

Beyond improving diagnostic accuracy, portable technologies also contribute to strengthening health system resilience by extending essential diagnostic services into remote and disaster-affected communities. The integration of portable diagnostic equipment within Mobile Health Units therefore represents an important strategy for improving disaster preparedness and emergency healthcare delivery.

Emergency health interventions should extend beyond clinical care to include nutritional support and provision of basic necessities. In this study, supplementary foods, milk, hygiene kits, sanitation supplies, clothing, and medical equipment were distributed to flood-affected households, while vulnerable populations received additional nutritional assistance (9).

Flood disasters frequently disrupt food supply chains and reduce household food security, increasing the risk of malnutrition among children, pregnant women, breastfeeding mothers, and older

adults. WHO emphasizes that restoration of nutrition services and essential supplies is a critical component of emergency health response because nutritional deterioration may occur rapidly when access to healthcare and food is simultaneously disrupted. Similarly, recent disaster nutrition programs implemented following floods in Indonesia have shown that integrated nutrition support and infant and young child feeding education contribute to protecting vulnerable populations during the recovery phase (6).

The distribution of medical equipment to local health facilities further supported continuity of healthcare services beyond the emergency response. This approach aligns with current concepts of health system resilience, in which emergency interventions should strengthen local healthcare capacity rather than provide only temporary humanitarian assistance.

Psychosocial support constituted an essential component of the integrated emergency health response. Therapeutic play, drawing therapy, and Psychological First Aid (PFA) were provided to 223 children, with facilitators observing improvements in emotional expression, confidence, and social interaction. Screening also enabled early identification of one child with Down syndrome who was subsequently referred for further follow-up (7).

Children are particularly vulnerable to psychological distress following disasters because they experience disruption of daily routines, loss of safe environments, and uncertainty regarding future conditions. Therapeutic play and art-based interventions provide developmentally appropriate opportunities for children to express emotions and reduce anxiety while strengthening coping mechanisms. These approaches are widely recommended within Mental Health and Psychosocial Support (MHPSS) frameworks for humanitarian emergencies.

Indonesia has progressively institutionalized Mental Health and Psychosocial Support within its disaster management system, recognizing psychosocial care as a core component of emergency response. Previous studies have highlighted that effective psychosocial interventions require multisectoral collaboration, integration with primary healthcare services, and

community participation. The implementation model observed in the present study reflects these recommendations by combining psychosocial support with healthcare delivery, community engagement, and referral mechanisms (8).

The findings of this study demonstrate that integrated emergency health responses delivered through multidisciplinary Mobile Health Units can effectively restore healthcare accessibility while simultaneously addressing medical, nutritional, psychosocial, and public health needs following flood disasters. The combination of portable diagnostic technologies, community-based interventions, nutritional support, logistics distribution, and structured referral systems represents a comprehensive approach to disaster health management.

However, this study also highlights the importance of strengthening preparedness before disasters occur. WHO has recently emphasized that climate-related disasters increasingly threaten healthcare facilities and that resilient health systems require investments in workforce capacity, emergency logistics, digital health systems, water and sanitation infrastructure, and climate-resilient healthcare facilities. Future disaster preparedness strategies in Indonesia should therefore prioritize integrated planning involving government agencies, academic institutions, primary healthcare facilities, and local communities to ensure continuity of essential healthcare services during future emergencies.

Conclusion

The integrated emergency health response implemented through Mobile Health Units (MHUs) effectively restored access to essential healthcare services for flood-affected communities in Buangan and Lueng Bimba villages, Pidie Jaya Regency, Aceh Province. The multidisciplinary intervention successfully delivered comprehensive healthcare services to 763 patients, including medical consultations, nursing care, maternal and child health services, portable diagnostic examinations, nutritional support, psychosocial interventions, pharmaceutical services, and referral for patients requiring advanced care. The integration of portable health technologies, such as portable ultrasound and point-of-care laboratory testing, enhanced the capacity of healthcare providers to perform rapid diagnosis and timely clinical decision-making in disaster settings.

Beyond clinical care, the provision of nutritional assistance, humanitarian logistics, psychosocial support, and community-based health education contributed to addressing the multidimensional health needs of disaster survivors. Collaboration among academic institutions, local health authorities, disaster management agencies, and community stakeholders was a key factor in ensuring effective implementation of the emergency response despite damaged infrastructure and limited healthcare resources.

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