

Experience of Health Emergency Operations Center (HEOC) Activation in Tagulandang, Sitaro District

Faisal Budiman Edah, Eka Yudha Lantang, Alva Ch. Mangundap

Universitas Sam Ratulangi, Indonesia

Email: edahfaisal@gmail.com

ABSTRACT:

The Health Emergency Operations Center (HEOC) serves as a command center to coordinate emergency health response during disaster situations and public health emergencies. The existence of HEOC is very important, especially in Indonesia, where some areas are vulnerable to natural disasters, such as Sitaro District which consists of volcanic islands including Tagulandang. This study aims to evaluate the HEOC activation experience in Tagulandang, Sitaro Regency. The research used a descriptive method, which means it focused on describing the situation or phenomenon under study. Data was collected through direct observation, field surveys, as well as literature studies that support the understanding of the situation. After the data is collected, it is analyzed through several stages such as simplifying the relevant data, presenting the data systematically and drawing conclusions. The results showed that the activation of the Health Emergency Operations Center (HEOC) in Tagulandang, Sitaro Regency, was carried out as a quick step in dealing with the impact of the eruption of Mount Ruang. This activation aims to coordinate various aspects of health crisis management arising from the disaster. The role of the HEOC is crucial in promoting effective coordination during times of crisis. As a command center responsible for the management of various aspects of disaster management, HEOC has proven to be able to provide a rapid and well-organized response. The experience of HEOC activation in Tagulandang shows how important it is to have a well-coordinated health emergency response system in dealing with crisis situations such as natural disasters.

Keywords: Experience, activation, HEOC, Sitaro, Tagulandang, Mount Ruang Eruption Disaster.

INTRODUCTION

Indonesia is located in an area that has geographical, geological, hydrological and demographic conditions that are prone to disasters with a fairly high frequency. This condition makes the country often face various types of natural disasters, such as earthquakes, volcanic eruptions, floods, and landslides. Each disaster event not only threatens infrastructure and resources, but can also lead to public health emergencies (Andayani & Ishak, 2020). In many cases, disasters cause serious health crises, such as mass casualties that cause death, injury, and force thousands to millions of people to flee (Allen & Spencer, 2023).

Disasters accompanied by massive displacement often lead to significant public health problems. Over the past decade, both natural disasters and conflicts have forced many people from their homes, creating conditions that are highly vulnerable to the spread of infectious diseases. Displacement situations not only jeopardize the health of the displaced, but also potentially threaten global health security. This means that when displacement occurs the risk of disease outbreaks increases due to poor sanitary conditions, limited access to health facilities, and overcrowding in refugee camps (Culver et al., 2017).

In these situations, public emergencies occur in the health sector. Public health emergencies can have devastating consequences across a range of sectors, including social, economic and health, which can result in the loss of many lives in a short period of time. They are sudden and unpredictable, which makes them particularly dangerous. In general, a public health emergency is defined as an event or immediate threat caused by a disease or health condition that can pose a substantial risk of a large number of deaths, injuries or disabilities that are permanent or long-term (Allen & Spencer, 2023).

Responding to such situations requires strong collective action at local, national and international levels. Adequate and resilient health systems are needed to prepare, plan and manage these health emergencies. Without proper preparedness, the response to a health crisis will be ineffective and may exacerbate its impact (Serchen et al., 2023).

One important mechanism in dealing with health emergencies is through effective emergency response coordination. A Health Emergency Operations Center (HEOC) acts as a control center to coordinate health emergency response, especially during disasters or public health emergencies. A number of major countries have developed HEOCs with the main objective of dealing with public health emergencies in a more effective and organized manner. Governments in many countries are also beginning to change their approach, investing more in emergency preparedness, rather than simply waiting for a disaster to occur and responding afterwards (Bouso, 2019a). Unplanned disaster management can incur much greater costs and drain the country's financial resources, making careful planning essential (Bouso, 2019b).

Previous research by Allen and Spencer (2023) highlighted the important role of the Health Emergency Operations Center (HEOC) in public health emergency management. HEOC activation promotes a rapid and coordinated response, involving multiple sectors to control the impact of disasters on public health. In Indonesia, a country with a high vulnerability to natural disasters, the existence of a HEOC is crucial to minimize the wider impact of disasters (Hadi et al., 2019; Sharma et al., n.d.).

Sitaro Regency, which consists of several volcanic islands including Tagulandang, is one of the regions in Indonesia that is often affected by natural disaster threats, such as volcanic eruptions and earthquakes. Gunung Ruang, is a stratovolcano-type volcano with a height of 725 meters above sea level located in Pumpente and Laing Patehi Villages, Tagulandang District, Sitaro Regency, North Sulawesi (Villarroel et al., 2025). The mountain is observed visually and

instrumentally from the Volcano Observation Post (PGA) located in Tagulandang District. The eruption of this mountain requires a rapid mitigation and handling response, especially in terms of public health (Asgary et al., 2024; Bailey et al., 2025; De Priester, 2016; Haryanto et al., 2020).

The activation of the HEOC in Tagulandang aims to ensure that the health system continues to run optimally despite the disaster situation. In addition, the HEOC also serves as a control center to coordinate various related agencies in responding to disasters in a comprehensive manner. A rapid and coordinated response through the HEOC is expected to reduce the adverse impacts caused by disasters, especially those related to health services. This study focuses on evaluating the HEOC activation experience in Tagulandang, Sitaro Regency, by reviewing the coordination process, barriers faced, and the impact on health services during disasters. Through this research, it is hoped that important lessons will be learned that can be used to strengthen the health emergency response system in Indonesia, particularly in high disaster risk areas such as Tagulandang.

Although various studies have discussed the importance of Health Emergency Operations Centers (HEOCs) in responding to public health crises globally, there is limited empirical research evaluating the real-world implementation of HEOC in disaster-prone, remote island regions like Tagulandang, Indonesia. Most existing literature focuses on national or urban-level operations and often overlooks logistical and coordination challenges faced in decentralized, infrastructure-limited areas. This study fills that gap by documenting the experience and evaluating the effectiveness of HEOC activation in a high-risk volcanic disaster context.

This research presents a unique case study of HEOC activation during the 2024 Mount Ruang eruption, offering a comprehensive analysis of inter-agency coordination, health service continuity, and emergency logistics in a geographically isolated area. It contributes new insights into the operationalization of HEOC at the district level, particularly in maritime disaster zones, where access, resources, and medical personnel are critically constrained. Unlike previous studies, it captures both immediate health responses and ongoing support challenges, providing a holistic view of crisis management.

The objective of this study is to evaluate the activation and operational effectiveness of the Health Emergency Operations Center (HEOC) in Tagulandang, Sitaro District, during the Mount Ruang eruption crisis. It aims to assess coordination mechanisms, logistical implementation, and the impact on health service delivery in order to derive practical lessons for improving disaster preparedness in similarly vulnerable regions.

This study provides valuable recommendations for policymakers, health authorities, and disaster response agencies by demonstrating the operational strengths and weaknesses of HEOC deployment in remote disaster zones. The findings can inform national strategies for decentralized health crisis management, contribute to capacity-building efforts in regional health offices, and enhance the resilience of health systems in the face of natural disasters. It also serves as a reference for future implementations of HEOCs across Southeast Asia's archipelagic regions.

METHOD

This research uses a descriptive method, which is one type of research that aims to describe phenomena that occur, both natural and man-made. These phenomena can include various aspects such as forms, activities, characteristics, changes, relationships, similarities, and differences between one phenomenon and another. The characteristic of descriptive itself is that the data obtained is in the form of words, pictures, and not numbers such as quantitative research (Rusli, 2021). In this study, data was collected through various methods, including direct observation in the field, surveys, and literature studies. This data collection process provides a strong foundation for understanding phenomena more deeply from various perspectives, both through direct observation of field conditions and through a review of relevant literature.

The data analysis process began before researchers entered the field, continued during data collection in the field, and continued after completing surveys and observations. This analysis was carried out in stages, starting with data reduction, which is the simplification and selection of data that is considered the most relevant and important. Then, the data that has been reduced is presented for easy understanding and further analysis. The final step is conclusion drawing, where researchers make interpretations and conclusions based on existing findings, taking into account the results and relevance of the data that has been analyzed.

RESULTS AND DISCUSSION

Indonesia is known as a country that has abundant natural resources, but also faces a high risk of natural disasters. Indonesia's geographical condition located on the Pacific Ring of Fire causes very active geological dynamics, so the potential for natural disasters such as earthquakes, tsunamis, landslides, and volcanic eruptions is something to watch out for (Islami et al., 2023). One of the most significant disasters is volcanic eruptions, which often result in large material losses and fatalities (Nekada et al., 2023). The current eruption of the Ruang volcano in the Siau Tagulandang Biaro Islands Regency (Sitaro) in 2024 is one example of a natural disaster that has a wide impact on the people living around the area.

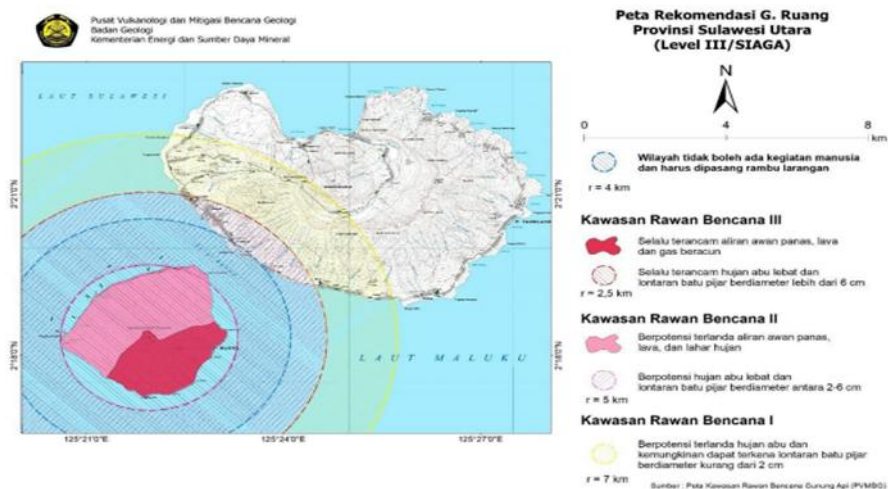
Mount Ruang has a long history of eruptions, since it was first recorded in 1808. The mountain has a periodic eruption pattern, with intervals of between one and thirty years. The last eruption before 2024 occurred in 2002, which was characterized by an explosive eruption followed by a hot cloud that caused damage to land and settlements and forced residents to evacuate. In 2024, the mountain's activity increased significantly again. On April 17, 2024, Mount Ruang experienced an eruption that produced an ash column about 3,000 meters above the summit. The volcanic activity of the mountain continued to increase, and its status was raised to level IV (AWAS), signaling a very serious threat to the surrounding communities.

In addition to the main eruption, seismicity recorded at monitoring stations shows an increase in seismic activity. Ranging from cluster earthquakes to shallow and deep volcanic

earthquakes, this seismic activity is an indication that the mountain is still in an active phase. Crater smoke that continues to rise with varying intensity also adds to concerns about the potential for further eruptions. On April 30, 2024, there was an eruption of Mount Ruang that began at 01:15 WITA with an earthquake that was felt up to Tagulandang Island. A gray eruption column was seen with moderate to thick intensity, moving northward, and reaching a height of about 2,000 meters above the mountain peak.

As a result of this volcanic activity, the radius of the area recommended for evacuation was extended to 6 kilometers from the mountain peak. However, at 09:00 WITA, the evacuation distance was increased to 7 kilometers due to increased mountain activity. The following is a map of the distribution of recommendations for areas that should not be entered due to high risk sourced from Dr. Ir. Muhammad Wafid A.N., M.Sc as Head of the Geological Agency of the Ministry of Energy and Mineral Resources

Map of recommendations for Mount Ruang in North Sulawesi Province



The map depicts the risk area around Mount Ruang, North Sulawesi Province, which is set to be at Level III (Alert) and Level IV (Watch) in April 2024. This map provides guidance regarding the boundaries that are safe for residents to do activities and areas that are potentially affected by volcanic eruptions. Areas within the dangerous radius are determined based on the potential for hot cloud flows, rockfalls, and ashfalls that often accompany volcanic eruptions. Disaster Prone Area III, with a radius of about 2.5 km from the summit of the mountain, is the zone with the highest level of danger, where the potential for hot cloud flows, rock fall, and toxic gases is very large. This area is designated as an area that must be avoided by the community.

Disaster Prone Area II, which is within a 5km radius of the summit, is also threatened by hot cloud flows and ejected material. In this area, there is a risk of falling rocks with a diameter of 2-6 cm that could potentially endanger safety. Meanwhile, Disaster Prone Area I covers the

area within a 7km radius of the summit, where ashfall and smaller rockfalls (1-2cm) are expected. Within this area, the threat of eruption is lower, but still requires high vigilance.

The eruption continued at 02:32 WITA, this time accompanied by a loud rumbling sound. Although the height of the eruption column could not be observed due to the darkness of the night, rockfall was reported at the Ruang Volcano Observation Post (PGA) located on Tagulandang Island. The eruption lasted until 04:30 WITA, and during this period, the seismic monitoring equipment at Mount Ruang, the RAPS station, was damaged.

Volcanic activity intensified, and at 08:35 WITA, a large eruption was observed accompanied by hot cloud flows, which moved to reach the sea in the northeast sector of Mount Ruang Island. The eruption column was recorded to reach a height of about 5,000 meters above the summit, with a gray to black color and quite thick intensity, moving to the east and south.

Eruptions that occurred on 17 April and 30 April 2024 caused damage to seismic activity monitoring stations, including RUA3 station located about 1.5 kilometers from the active crater and RAPS station located 2.7 kilometers from the active crater on Mount Ruang Island. As a result of this damage, on May 3, 2024, new monitoring equipment was installed on Ruang Island, namely station RUA4 located about 2 kilometers from the active crater. This station has been used to calculate seismic activity to date.

Visual observations of Mount Ruang activity in the period 1-12 May 2024 showed that the crater smoke that came out was white, with thick intensity, weak pressure, and reached a height of 100-400 meters above the top of the crater. However, the height of this smoke column showed a stable trend towards the end of the period. On 13 May 2024, the crater smoke remained white with the same intensity, weak pressure, but the height of the smoke column was observed to decrease slightly, which was in the range of 200-300 meters above the crater peak.

In terms of seismicity, the number of deep and shallow volcanic earthquakes in the period May 1-12, 2024, after the major eruption on April 30, 2024, tended to decrease. Although continuous tremors were still recorded, the amplitude began to decrease with a dominant range of 2 to 4 mm. On May 13, 2024, seismicity recorded until 06:00 WITA only recorded 1 gust earthquake and 1 distant tectonic earthquake, as well as continuous tremor with a dominant amplitude of 2 mm.

Based on the results of visual monitoring and seismic data showing a decrease in volcanic activity, the status of Mount Ruang's alert level was lowered from Level IV (Caution) to Level III (Alert) on May 13, 2024 at 09.00 WITA. In response to the previous increase in volcanic activity of Mount Ruang, the Regent of Siau Tagulandang Biaro Islands issued Decree No. 100 of 2024 which established an emergency response status for Mount Ruang. This decision was then extended through Regent Decree Number 116 of 2024, which extended the emergency response status for 14 days, so that disaster management is carried out quickly, precisely and integrated according to applicable standards and procedures.

On May 18, 2024, the activity level of Mount Ruang was downgraded again from Level III (Alert) to Level II (Vigilant) after a further decrease in its volcanic activity. However, the Siau Tagulandang Biaro Islands Regent Decree Number 122 of 2024 extended the emergency response status until June 10, 2024, given the potential danger that still exists.

As a result of the eruption of Mount Ruang, a significant impact was felt by the community, especially on health facilities such as the Tagulandang Health Center and Tagulandang Regional Hospital which were damaged. Until the time of the eruption, repairs to these facilities had not been carried out due to the high activity status of the mountain, and it was feared that it would be useless if there was a subsequent eruption. Cleaning has been done at both facilities, but repairs will wait until the status of Mount Ruang is declared safe. In addition to physical damage, health records show that hypertension and acute respiratory infections (ARI) are the most common diseases experienced by outpatients in the affected areas. This phenomenon requires a rapid response in handling these health issues, especially to prevent worse conditions in the midst of an emergency situation.

In the theory of health care in emergency situations, a key challenge is the ability to provide quality care under conditions of limited resources, such as in disaster areas, conflict zones, or extreme environments. Henry et al. (2018) explain that in the worst cases, adequate care can only be provided with the help of external resources sent to the disaster site. The various challenges that arise in a disaster environment affect every level of care, from the site of injury to the evacuation of victims to more modern health facilities, if possible. Therefore, trauma center preparedness to handle mass casualty incidents is one of the important aspects of disaster response. This preparation involves critical medical services, such as anesthesiology, although there is no exact limit on the number of victims that defines an incident as a mass casualty incident. Most of the characteristics of such incidents relate to the capacity of healthcare facilities in handling emergency patient surges (Butterworth et al., 2013).

In addition, in an emergency, the process of sorting patients is based on available and required resources. Treatment priorities start from airway management with cervical spine protection, followed by respiratory stabilization, circulation, and bleeding control. Factors that determine triage priorities include the severity of the injury, the patient's chances of survival, and the availability of resources. In the case of mass casualties, patients with life-threatening problems and injuries to multiple body systems should be treated first (Rehatta et al., 2019).

Based on the Minister of Health Regulation No. 75/2019 on Health Crisis Management, preparedness and mitigation in the health sector are essential in dealing with disasters. One of the mandates in this regulation is the organization of a Health Cluster to handle health crises in all phases, both pre, during, and post-crisis. The Health Cluster serves to provide an effective and efficient response to health crises. In emergency situations, the Health Cluster will activate the Health Emergency Operation Center (HEOC) as a command center that coordinates all health

crisis response efforts (Hardhantyo et al., 2023). This HEOC must be implemented at the District/City level so that crisis management efforts can run according to standards.

The activation of the HEOC in Tagulandang, Sitaro District, was a direct response to the eruption of Mount Ruang. The activation of the HEOC aims to coordinate all aspects of health crisis management arising from the disaster. The North Sulawesi Provincial Health Office provided assistance in health crisis management, and ensured that the HEOC was properly activated to coordinate all efforts in the field. On 20 April 2024, a health crisis management assistance team from the Ministry of Health was also mobilized to Tagulandang Island to assist in the process of assistance and activation of the HEOC.

During this emergency period, various measures were taken by the local health crisis team. From April 17 to 29, 2024, the Head of the Sitaro District Health Office, who also acted as the chairperson of the HEOC, conducted a number of meetings with the Bupati and other high-ranking leaders in the region. Active coordination was conducted with the Ministry of Health's Health Crisis Center Team, as well as with the Central and North Sulawesi Provincial HEOCs, to ensure that all aspects of the emergency response ran smoothly. In addition, coordination was also conducted with Tagulandang Puskesmas and RSUD, as well as with health facilities in Manado, such as Prof. Dr. R. D. Kandou Hospital and ODSK Hospital, to mobilize patients from Tagulandang to Siau or refer patients to Manado using ships.

Health services were also provided on ships transporting evacuees from Tagulandang to Siau, as well as at health posts that had been established. The team also regularly reports on the latest situation related to the Mount Ruang eruption disaster management, while continuously evaluating daily activities to keep the crisis response effective. On April 23, 2024, several additional measures were taken, including the distribution of masks to protect residents from the impact of volcanic ash and the evacuation of patients who had suffered accidents. The team also provided assistance for patient referrals, and made visits to pregnant women who needed care. Assistance from the North Sulawesi Provincial Government was also handed over to Tagulandang Regional Hospital on the same day, and daily data reporting continues to monitor the health situation in the region.

In facing the health crisis due to the eruption of Mount Ruang, a number of countermeasures have been carried out through various organized sub-clusters. One of the most significant is the efforts of the Health Services Sub-Cluster. The eruption caused severe damage to health facilities in Tagulandang Sub-district, bringing health services to a halt. To overcome this, the function of the hospital was moved to Puskesmas Minanga, which was used as an emergency hospital. In addition, as some health workers were affected, medical personnel from Siau island, including from Puskesmas Ulu, Puskesmas Ondong, and RSUD Lapangan Sawang, were mobilized to provide health support in Tagulandang. Assistance also came from the TNI, POLRI, North Sulawesi Provincial Health Office, Crisis Center Team, and Prof. Dr. R. D. Kandou Hospital Manado.

The Disease Control, Environmental Health, and Clean Water Sub-Cluster also dealt with problems arising from damaged health facilities and obstructed treatment for patients, especially patients with pulmonary TB and Leprosy. Volcanic ash from the eruption also caused a risk of respiratory diseases such as ARI. To reduce this impact, masks were distributed to the community. The person in charge of the TB and Leprosy programs ensured that patients continued to receive treatment for at least one month. For patients outside Tagulandang, they are directed to the nearest health facility. Meanwhile, refugees with infectious diseases are also separated from other refugees to minimize the risk of transmission.

The eruption also contaminated clean water, so the Health Office coordinated with various agencies, including PDAM and the PURPKP Office, to provide tankers to supply clean water to the community. The Nutrition Services Sub-Cluster also faced challenges in collecting data because the community did not evacuate centrally. To overcome this, the Health Office and puskesmas coordinated with village heads so that data could be collected immediately, especially regarding pregnant women with Chronic Energy Deficiency (CHD), infants with nutritional problems, and the elderly who needed intervention.

The Mental Health Services Sub-Cluster faced difficulties in finding and recording patients with mental disorders because the community was not concentrated in one evacuation site. Nevertheless, the Health Office continues to coordinate with community health centers to track the whereabouts of patients with mental disorders. To alleviate the psychological impact of the disaster on children, Mother Paut from Siau conducted learning and playing activities with displaced children.

In addition, the Reproductive Health and Maternal and Child Health (MCH) Sub-Cluster also faces challenges in maintaining the personal hygiene of the community, especially related to reproductive health services. Services such as family planning, check-ups for pregnant women, and services for adolescents and couples of childbearing age were disrupted. To address this, health posts were established, and health workers were augmented in evacuation centers. Affected pregnant women were evacuated to Siau island and Manado's Bapelkes to ensure they received adequate care.

Meanwhile, the DVI (Disaster Victim Identification) Sub-Cluster reported that there were no fatalities or missing persons. The Biddokkes Health Post remains active in providing health and DVI services. The DVI team is also on standby to serve victim identification if needed, following procedures in four phases, namely the Crime Scene Phase, Ante Mortem, Post Mortem, and Reconciliation.

Finally, the efforts of the Health Logistics Team aim to ensure the availability of medicines and other medical equipment. The Siau Tagulandang Biaro District Health Office supplied various medical needs, including medicines, oxygen cylinders, and medical devices. Additional assistance also came from the North Sulawesi Provincial Health Office, TNI, POLRI, and the Ministry of

Health's Health Crisis Center Team. Other organizations such as Prof. Dr. R. D. Kandou Hospital Manado also sent logistical assistance to meet the needs on the ground.

Based on these activities and efforts, the activation of the Health Emergency Operations Center (HEOC) in Tagulandang in the face of the Mount Ruang eruption provided a number of important implications and lessons that can be applied in similar disaster situations in the future. One of the main lessons learned is the importance of preparedness. Natural disasters can occur anytime and anywhere without any warning. Therefore, good preparedness is the main foundation in minimizing negative impacts on public health (Pudjiastuti, 2019). This mitigation can include readiness in terms of human resources, facilities, logistics, and procedures that must be carried out when a disaster occurs.

The role of the HEOC itself is significant in facilitating good coordination during a crisis. As a command center that manages various aspects of disaster management, HEOC has demonstrated its effectiveness in providing a rapid and structured response. Its existence encourages every element involved in crisis management, from health workers to other authorized agencies, to communicate and work well together. The existence of the HEOC allows information to be collected and analyzed quickly, so that the steps taken can be more targeted and in accordance with the needs in the field.

In addition, another important lesson is the importance of multi-sector collaboration in disaster management. Cooperation between various parties, such as the TNI, POLRI, Health Office, and international organizations, shows that disaster management cannot be done by one sector alone (Erlinawati, 2020). By creating good collaboration, efficiency and effectiveness in responding to disasters can be improved, both in terms of sending aid, handling health, and evacuating the community. This synergy ensures that affected communities can immediately receive the assistance they need.

Another important aspect is access to health services. In disaster situations, access to health services is a top priority, especially for people in remote areas such as Tagulandang. The activation of the HEOC helps health services to be provided in a fair and equitable manner. The government and relevant agencies need to ensure that all individuals, including those in remote or disaster-affected areas, have equal access to health facilities. Health insurance is part of human rights that must be safeguarded, especially in emergency situations where medical needs increase.

The experience from the activation of the Health Emergency Operations Center (HEOC) in Tagulandang in responding to the health crisis due to the eruption of Mount Ruang provides concrete evidence of the importance of a well-coordinated health response system. The HEOC has demonstrated its effectiveness in managing crisis situations, including in responding to urgent needs, such as the dispatch of health workers, distribution of medicines, as well as handling infectious diseases arising from disasters. As a command center responsible for

coordinating various related parties, HEOC can provide a rapid and organized response so that health services can be continued even in emergency conditions.

However, while effective, this experience also highlights some challenges that still need to be addressed to improve disaster preparedness in the future. One of the biggest challenges is providing access to health services not only for people living in urban centers, but also for people in remote and hard-to-reach areas, such as small islands. Limited access to health facilities in these areas often exacerbates the impact of disasters, and requires further efforts from the government and relevant agencies to upgrade health infrastructure, improve medicine distribution channels, and have sufficient health workers available.

In addition, another challenge is the sustainability of support for affected communities after the emergency response period is over. While HEOC is able to respond quickly in emergency situations, equal attention must also be paid to the long-term recovery phase. Many of the disaster-affected communities still require advanced health services, including psychosocial support, chronic disease care, and restoration of nutrition and reproductive health (Harville et al., 2021). This requires a greater commitment from the government to provide sustainable services, including strengthening local health capacity to continue operating properly post-disaster.

CONCLUSION

The activation of the Health Emergency Operations Center (HEOC) in Tagulandang, Sitaro Regency, was an immediate and strategic response to the eruption of Mount Ruang, aimed at coordinating all aspects of health crisis management during the disaster. As a centralized command center, the HEOC played a vital role in ensuring effective communication, resource mobilization, and service continuity under emergency conditions. This experience demonstrates the critical importance of a well-coordinated and structured health emergency response system in minimizing the health impacts of natural disasters. The successful coordination facilitated by the HEOC highlights key lessons in preparedness, inter-agency collaboration, and the need for rapid health interventions. However, the response also revealed persistent challenges, particularly in ensuring equitable access to health services in remote areas and maintaining long-term support for affected populations beyond the initial emergency phase. For future research, it is recommended to conduct comparative studies across different HEOC deployments in Indonesia to evaluate best practices, identify region-specific barriers, and develop a scalable model for disaster-prone island communities.

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