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RADIO COMMUNICATION SYSTEM: A CASE STUDY OF THE 2022 MOUNT BULUSAN ERUPTION IN SORSOGON, PHILIPPINES

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ABSTRACT: *In June 2022, the phreatic eruption of Bulusan Volcano affected the northwestern towns of Sorsogon, leading to power outages, road closures, and forced evacuations. This study explores the role of Very High Frequency (VHF) radio in disaster response and recovery. Researchers used Focused Group Discussions (FGDs) and interviews to gather insights from key responders, barangay officials, and partner agencies directly involved. Thematic analysis identified key themes: communication effectiveness, system reliability, and operational challenges. Purposive sampling included participants in both homogeneous and heterogeneous group discussions for diverse perspectives. The study found that the VHF radio system improved coordination and information dissemination when cellular networks were unavailable. These findings are consistent with those of Cid et al. (2017), who observed that, despite limited availability and weak signals in some areas, the resilience of VHF radio-supported communication both within and outside disaster zones. Communities with VHF radios maintained continuous contact at local and municipal levels. However, challenges included weak signals in remote areas, limited radio access, and information delays. Andreastuti et al. (2023) found that community participation and collaboration with local leaders enhanced disaster response mechanisms, including the use of VHF radios, before, during, and after disasters.*

Keywords: *Mt. Bulusan Eruption, VHF Radio Communication, Disaster Response, One Tone-One Frequency System*

INTRODUCTION

In June 2022, Mt. Bulusan erupted, producing a slow, gray ash plume that spread northwest. This impacted the towns of Juban, Casiguran, Irosin, Gubat, Barcelona, and Bulusan. Thick ashfall limited mobility, closed the Daang Maharlika Highway, and disrupted communication services. These conditions made information transmission and reception difficult for personnel.

The eruption severely affected 3,954 families—about 19,770 people—displacing them to evacuation centers inside and outside Juban, Irosin, and Casiguran. Agricultural losses in rice and high-value crops totaled ₱1,801,500.00. Volcanic eruptions are closely monitored for preparedness and mitigation (Coppola et al., 2020; Kurata et al., 2022). Despite this, many communities still face hardship due to limited awareness, resources, and preparedness. Research on readiness and cultural factors remains scarce. Risk assessment must account for the influence of government structures on disaster response.

Community vulnerability and behavioral intentions require more study (Barone et al., 2020). Although long-term prediction of eruptions remains challenging, contingency planning is crucial to minimize the impact. Communication is critical in managing disasters, especially in preparing communities for volcanic hazards (Asteria, 2016). Coppola et al. (2020) note that effective communication helps mitigate risks for at-risk communities.

Qualitative data in this study were collected from a selected group of participants, which may

not fully capture the range of experiences and perspectives present in the broader population. Consequently, these findings should be interpreted with caution, as generalizability is limited. Additionally, participant selection may introduce selection bias, which could potentially influence the results. Recognizing these limitations is important when drawing conclusions or applying study insights to other contexts.

Interpretation of the data is subjective, and the researcher's bias may influence the study's conclusions. While Focused Group Discussions (FGDs) provide in-depth qualitative insights, this method inherently limits the incorporation of measurable outcomes. The study lacks quantitative data such as recorded response times, number of messages exchanged, and objective measures of system reliability, which could complement the qualitative findings. This restricts the ability to make broad or definitive claims about system performance and may affect the study's comprehensiveness. However, future research aims to address these limitations by incorporating quantitative measures to validate the qualitative insights presented here. This planned mixed-methods approach will enhance the credibility and generalizability of the findings, offering a more robust understanding of the radio communication system's performance.

VHF radio communication is vital during volcanic eruptions because it is reliable, allows real-time coordination, and is cost-effective. Cellular and internet systems can fail when infrastructure is damaged, but VHF radios can operate independently if repeaters are available. This ensures continuous communication in remote, disaster-prone areas. Responders from LDRRMOs, partner agencies, and locals can communicate immediately and directly. This ability is crucial for evacuations and hazard warnings. VHF radios are also affordable and easy to use, requiring little infrastructure. This makes them practical for disaster response efforts both locally and globally.

Volcanic eruptions affect physical and mental health, property, the economy, and the environment, and disrupt communication (Inter-Agency Standing Committee, 2007). Timely public information and effective communication are essential for disaster response (Moro-Murphy et al., 2011). Local Government Units (LGUs) can utilize these findings to enhance disaster plans and communication systems, minimize casualties, and strengthen disaster management in Sorsogon. The findings actively encourage community engagement with LGUs in preparation for volcanic hazards and local network improvements. Ultimately, this research provides a vital foundation for future studies, identifying critical gaps that need to be addressed for a stronger, more resilient disaster response and recovery in Sorsogon.

In disaster response, crisis communication is critical for reliable information (Bradley et al., 2014). VHF and two-way radios are vital in developing or middle-income countries, especially when power is out and other devices are unavailable. In 2015, radio systems effectively reached communities impacted by the Nepal Earthquake. They contributed to safe reconstruction and shared important disaster risk reduction information (Saha et al., 2021). VHF radios do not depend on central infrastructure, making them valuable during disasters. Emergency professionals must recognize the important role of amateur radio operators in emergency operations plans. Gill (2019) stresses the importance of VHF radio because it does not rely on central systems. Ahsan and Khatun (2020) identify VHF radio as a key management tool for disaster preparedness in Bangladesh's coastal communities. In the Bicol region, Onsay et al. (2025) highlight the crucial role of radio communication in preparing for Typhoon Kristine.

Cid et al. (2017) report that radio systems are low-cost, do not need terrestrial telecom infrastructure, and work during blackouts. This offers flexible solutions in crises. During the Mt. Merapi eruption, people relied on local and two-way radios for evacuation orders. In New Zealand, volcanic early warning messages were successfully sent through radio (Potter et al., 2014). During the May 2018 eruption of Mayon Volcano, VHF and satellite radio aided the evacuation of approximately 60,000 people in Albay (DeVex News, 2018). Two-way radios were resilient during

Hurricane Harvey (2017) and Hurricane Helen (2024), serving as a primary tool when power was out (Stone, 2024). In Bangladesh, VHF radios played a crucial role in supporting recovery after a cyclone and strengthening community resilience (Andreastuti et al., 2023). After Typhoon Yolanda, VHF radios and dual-band systems were key for local government communication in Tacloban (ReliefWeb, 2014). Lorenzo's work highlights the need for better disaster coordination and preparedness in the Philippines. Involving communities and stakeholders in disaster risk governance is vital for resilience (Chuidian, 2014; Hugelius et al., 2016; Panao, 2022; Valenzuela, 2021).

The Province of Sorsogon, due to its topographic setting, is vulnerable to various hydro-meteorological and geological hazards, including landslides, earthquakes, tsunamis, tropical cyclones, storm surges, flooding, flash floods, and volcanic eruptions. Mt. Bulusan is a stratovolcano with four prominent craters, a base area of approximately 400 km2, and an elevation of 1,599 meters above mean sea level (Figure 1). Formed within the caldera of Irosin, Sorsogon, and part of the Bicol volcanic chain, it is classified as one of the active volcanoes in the country and has erupted 18 times, with the most recent eruption occurring in June 2022 (Tayam, 2022).

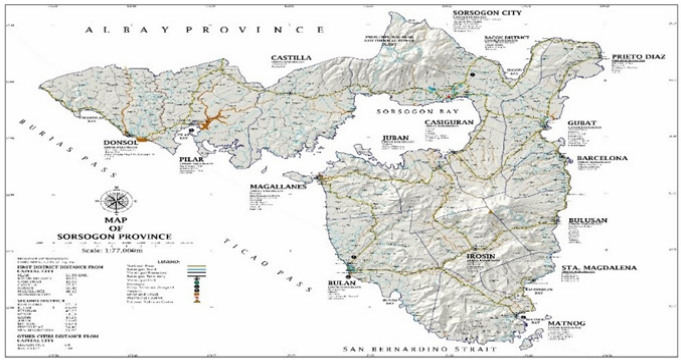

Figure 1. Map of the Province of Sorsogon. *Adapted from SPDRRMO Contingency Plan for Geologic Hazard. Tayam, M., May 2022*

Ashfall from the phreatic eruption was primarily distributed in the northwestern quadrant of the province due to the prevailing Easterlies (winds blowing from the east to southeast), which dispersed the ash in that direction. The municipality of Juban received extensive damage as thick layers of ash blanketed the area. Nearby municipalities, such as Irosin and Casiguran, also experienced ashfall due to their proximity to Juban (Figure 2; Tayam, 2022).

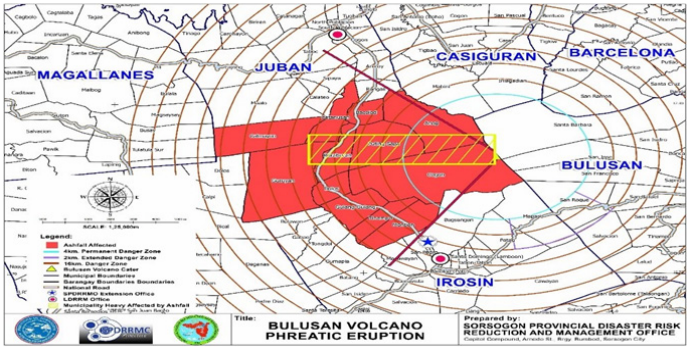

Figure 2. Bulusan Volcano Phreatic Eruption and Ashfall Direction. *Adapted from SPDRRMO Contingency Plan for Geologic Hazard. Tayam, M., May 2022*

The One-Tone-One-Frequency communication system is a key component in Sorsogon's volcanic eruption response plan, ensuring the efficient dissemination of information. An established, dependable communication protocol, similar to those used by government, non-government, or private sectors, is essential. By utilizing an established communication setup in every disaster-related activity or action plan in the Province of Sorsogon, the primary objectives are to provide timely and speedy information, decisions, reports, and coordination between or within the involved persons. Although other means of communication exist, VHF Repeaters, VHF, UHF, and HF are used primarily when an incident occurs in a remote area during a volcanic eruption. This map (Figure 3) illustrates

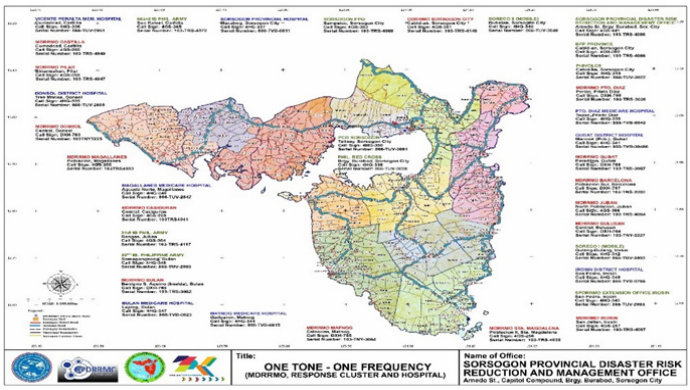

Figure 3. One-Tone-One Frequency. *Adapted from SPDRRMO Risk Communication Plan. Tayam, M., May 2022*

the existing communication setup for the Province of Sorsogon under the guidance of the Sorsogon Provincial Disaster Risk Reduction and Management Office (SPDRRMO) (Tayam, 2022). The VHF radio communication system operates in a "one-tone, on frequency" mode, utilizing a Simplex system for "talk or listen" operations on a single frequency.

All stations in Sorsogon (Table 1) use this system for prompt information dissemination. The SPDRRMO-Irosin Extension acts as the secondary hub for another congressional district. A licensed radio frequency ensures access to higher-quality, interference-free communication channels in Sorsogon, meeting government standards and regulations (Tayam, 2022).

The SPDRRMO will serve as the central hub and be responsible for daily roll calls and technical assistance. Operators must check signal strength, audio quality, and updates daily at 8:30 AM and 4:30 PM. All operators must use plain language when transmitting. Preventive maintenance

Table 1. Simplex Station Identification

STATION IDENTIFICATION	FREQUENCY	OPERATION
Operation Center (SPDRRMO)	159.57-Mhz	Simplex
Bulan Medicare Hospital	159.57-Mhz	Simplex
Donsol District Hospital	159.57-Mhz	Simplex
Gubat District Hospital	159.57-Mhz	Simplex
Irosin District Hospital	159.57-Mhz	Simplex
Magallanes Medicare Hospital	159.57-Mhz	Simplex
Matnog Medicare Hospital	159.57-Mhz	Simplex
Pto. Diaz Medicare Hospital	159.57-Mhz	Simplex
Castilla District Hospital	159.57-Mhz	Simplex
Sorsogon Provincial Hospital	159.57-Mhz	Simplex
MDRRMO Barcelona	159.57-Mhz	Simplex
MDRRMO Bulan	159.57-Mhz	Simplex
MDRRMO Bulusan	159.57-Mhz	Simplex
MDRRMO Casiguran	159.57-Mhz	Simplex
MDRRMO Castilla	159.57-Mhz	Simplex
MDRRMO Gubat	159.57-Mhz	Simplex
MDRRMO Irosin	159.57-Mhz	Simplex
MDRRMO Juban	159.57-Mhz	Simplex
MDRRMO Matnog	159.57-Mhz	Simplex
MDRRMO Magallanes	159.57-Mhz	Simplex
MDRRMO Prieto Diaz	159.57-Mhz	Simplex
MDRRMO Pilar	159.57-Mhz	Simplex
MDRRMO Sta. Magdalena	159.57-Mhz	Simplex
C/MDRRMO Sorsogon City	159.57-Mhz	Simplex
903rd Philippine Army	159.57-Mhz	Simplex
Sorsogon Prov. Police Office	159.57-Mhz	Simplex
22nd IB Philippine Army	159.57-Mhz	Simplex
SPDRRMO Extension Office - Irosin	159.57-Mhz	Simplex
PRC Sorsogon Chapter	159.57-Mhz	Simplex
PCG Sorsogon	159.57-Mhz	Simplex
BFP Sorsogon	159.57-Mhz	Simplex

Adapted from SPDRRMO Risk Communication Plan. Tayam, M., May 2022

includes checking connections, wires, and antennas, cleaning radio sets, conducting power supply checks, and troubleshooting. Information from the scene is relayed via VHF radio to the nearest station, which forwards it to the central hub (SPDRRMO Main). The main hub then sends it to the concerned facility and relays feedback to the original sender, ensuring a timely response during emergencies.

During a Mount Bulusan eruption, emergency distress calls should be directed to the Community/Municipal Disaster Risk Reduction and Management Office (C/MDRRMO) and the Provincial Disaster Risk Reduction and Management Office (SPDRRMO) for immediate disaster response. Responders will be deployed to affected areas to conduct rapid assessments, triage victims, and implement interventions in accordance with volcanic disaster protocols. Priority transport will be given to victims with severe respiratory issues, burns, or trauma. Conscious victims will be informed about their transport to the designated public hospital, while the team leader will make decisions regarding unaccompanied individuals. Victims must complete a signed refusal form if they prefer a different facility. In the event of a Mount Bulusan eruption, effective communication is crucial for ensuring a swift and coordinated disaster response. Directing all emergency distress calls to the C/MDRRMO and SPDRRMO will enable the rapid deployment of responders to affected areas for immediate action.

MATERIALS AND METHODS

This study examines how information is received and transmitted through an Inter-Agency Operability and VHF Two-way Radio Communication Network among Local Government Units (LGUs), the barangay level, and other national agencies. It proposes recommendations for the Provincial Government of Sorsogon, including disaster officials, to prioritize improving communication in disaster management as a key aspect of national development in the Philippines. Following the methodology outlined by Wimmer & Dominick (2013) and Minichiello et al. (2008), the study uses qualitative data collection methods, including Focus Group Discussions (FGDs) and in-depth interviews. Ideas and insights from participants were used to support questions, highlight different viewpoints, reinforce key findings, and provide insights into often-overlooked areas.

Participant Selection and Data Collection

Participants were selected for their firsthand experience in disaster responses, providing direct insights into Mt. Bulusan's communication challenges. Purposive sampling included individuals from diverse roles, such as barangay officials, emergency responders, social workers, medical staff, teachers, and radio operators.

A mix of homogeneous groups for sensitive discussions and heterogeneous groups for diverse perspectives was employed. The homogeneous approach grouped participants based on shared backgrounds, such as barangay officials or medical personnel, to encourage open discussions on specific challenges. In contrast, heterogeneous groups combined different sectors to facilitate cross-sectoral insights and collaboration. Four focus group discussions (FGDs) were conducted, each lasting 60 minutes, to examine participants' experiences in depth. Selection also considered geographical representation from affected municipalities, experience with VHF communication, and willingness to participate. This approach ensured a comprehensive understanding of communication effectiveness, system reliability, and operational challenges.

The selection of participants aimed to enhance understanding of disaster response and community resilience, particularly in relation to the Mount Bulusan eruption. Various sectors played crucial roles in the response, rehabilitation, and recovery efforts. The study ensured a comprehensive view of how the Mount Bulusan eruption was managed at various levels by including participants actively involved in different aspects of the disaster response. Their collective experiences highlighted the strengths and weaknesses of existing disaster response mechanisms, illuminating areas for improvement in future preparedness and recovery efforts.

Focus Group Composition

The four focus groups were organized as follows:

- **Group 1: Community Representatives.** This group comprised twelve community representatives from Juban, Irosin, and Casiguran, the municipalities most severely affected by the eruption. These representatives shared firsthand experiences of evacuations, relief distribution, and recovery efforts. As primary recipients of assistance, they provided critical insights into the effectiveness of emergency response measures, gaps in aid distribution, and the long-term socio-economic impacts on their communities.
- **Group 2: Barangay Officials.** The second group consisted of ten barangay officials from these towns, who played a crucial role in coordinating local disaster response. Their responsibilities included mobilizing community-based emergency plans, managing evacuation centers, and ensuring the efficient distribution of resources such as food, water, and medical supplies. Their perspectives highlighted the logistical challenges in disaster response, including communication barriers, limited resources, and the need for better coordination between local and national agencies.
- **Group 3: Disaster Management Professionals.** The third group consisted of nine professionals, including four social workers, a radio operator, and two responders from the Sorsogon Provincial Disaster Risk Reduction and Management Office (SPDRRMO). These individuals were chosen for their expertise in disaster response and management. Social workers played a vital role in addressing the psychological and social well-being of affected individuals. The radio operator provided essential communication support. SPDRRMO responders shared their experiences coordinating rescue and relief efforts, emphasizing the importance of rapid assessment and deployment in volcanic disaster scenarios.
- **Group 4: Education, Health, and Emergency Services.** Finally, the fourth group included three teachers from Juban, five medical staff members from Irosin, and two firefighters. These participants were involved in disaster preparedness and response efforts following the eruption. Teachers ensured student safety and incorporated disaster preparedness education into their curriculum. Medical staff provided critical emergency healthcare services. Firefighters assisted in rescue operations, evacuation efforts, and managing fire hazards.

Organizing participants into these four groups facilitated a thorough analysis of the disaster response during the Mount Bulusan eruption. Each group had specific roles that provided insights into aid distribution, logistical coordination, and emergency management. This categorization ensured a diversity of perspectives, improved data organization, and highlighted strengths and gaps in the disaster response. By representing key sectors—community members, local officials, professionals, and emergency responders—the study identified challenges in inter-agency coordination and resource allocation, offering valuable insights for enhancing future preparedness and response efforts.

Data Analysis

Data collected from FGDs and interviews were analyzed and outlined following the methodology established by Bradley et al. (2014) for evaluating the effectiveness of disaster risk communication. A thematic analysis was employed to identify key themes related to communication effectiveness, system reliability, and operational challenges. Transcripts were meticulously reviewed, coded, and categorized to emphasize both the strengths and limitations of the VHF radio system. To enhance clarity for non-methodologists, the analytic journey undertaken in this study can be summarized as follows: 1. Communication effectiveness was evaluated by

analyzing the role of VHF radios in facilitating timely information relay. 2. System reliability was assessed based on the ability of VHF radios to maintain communication during network failures. 3. Operational challenges were explored considering the obstacles faced in implementing the radio communication system. These findings were subjected to validation through peer debriefing and participant verification to minimize potential bias. Nevertheless, the absence of quantitative data regarding response times and message transmission rates limited the scope of the analysis.

RESULTS AND DISCUSSIONS

SPDRRMO Focused Group Discussion Interviewees

Communication Effectiveness

Interviewees highlighted that using "One Tone—One Frequency" shortens the relay of information from the ground to concerned offices, ensuring all Local Government Units (LGUs) operate on the same frequency for uniform communication across Sorsogon. VHF radios were essential for facilitating communication regarding food, medical, and psychosocial support. They transmitted updates from barangay-level evacuation centers to the municipal and provincial levels. This role is supported by the study of Bradley et al. (2014), which emphasizes the importance of avoiding delays in relaying information during disaster response. Effective communication is essential for accessing reliable information and delivering needed services. A key implication of the study is the necessity to prevent and mitigate disasters, prepare the population in advance, and disseminate information both before and during the disaster response.

System Reliability

In some LGUs, specific barangays were equipped with VHF radios for local and municipal communication. However, delays occurred in some barangays due to the topographic setting and the distance from the repeater system.

Operational Challenges

During the Mt. Bulusan eruption's road-clearing operations, concerned agencies relied on VHF radios to coordinate ash-clearing activities along the Maharlika Highway from Juban to Irosin, particularly given the zero-visibility period in Juban and Irosin following the eruption.

Juban, Casiguran, and Irosin interviewees, including barangay officials

Communication Effectiveness

FGD participants from three municipalities agreed that no prior information was given during the unrest period of Mt. Bulusan. Only after the eruption did local officials inform them using the public address system, while additional information was transmitted through VHF radio to the LGU/MDRRMO. An interviewee from Añog, Juban, said, “It was a gloomy day, and clouds covered Mt. Bulusan.” We did not hear any rumbling sound before it erupted. After Mt. Bulusan spewed ashes, the LGU-Juban informed us through VHF radio and advised an immediate evacuation, as our barangay was within the 4-km PDZ. We were the first to be affected.” Inlagadian, Casiguran participants stated, “Since we are located on the north vent of Mt. Bulusan, we were the first to see the ash plume.” Minutes later, ash reached our barangay, and our officials advised us to evacuate immediately.” Interviewees from Monbon shared, “Mt. Bulusan faces our barangay.” We did not experience ashfall right after the eruption, but we did hear rumbling sounds, especially at night. Local officials announced the evacuation using a megaphone in coordination with the Municipal Disaster Risk Reduction and Management Office (MDRRMO). Similar key findings from the study by Adreastuti et al. (2023) indicated that the local community's perceived risks, knowledge, and experiences are essential to have a desired public response where the personal communication of the local community and local officials, including experts in a geological context is necessary to instill

self-responsibility in times of disaster, considering such communication within the communities have experienced a history of eruptions.

System Reliability

Some barangay officials revealed that while some have VHF radios, others do not. They rely on traditional methods, such as the public address system, to relay information. One official noted, “We used cellular phones as an alternative to inform concerned officials, but it would be better if we were provided with VHF radios.” This demonstrated that capacity, with the involvement of local leaders, could facilitate the participatory risk assessment of communities grounded in traditional practices, local realities, and existing policies and strategies. Andreastuti et al. (2023) also noted that local capacity can enhance participation and communication, disaster response, and support from local leaders. In emergencies and when cellular signals are weak, VHF radios become a reliable option; they are exceptionally reliable when phone signals are weak or unavailable.

Operational Challenges

Barangay officials prioritized ensuring public safety over disseminating information, which sometimes led to communication delays. Additionally, another barangay official stated, “After the ashfall, our priority was to evacuate and ensure everyone’s safety.” We will report the situation and the number of evacuees only after we have settled.” Some officials admitted they were unfamiliar with using VHF radios. One said, “If VHF radios can help us relay information faster, we would appreciate training and a manual on how to use them.” Additionally, one of the key findings of Andreastuti et al.'s (2023) study highlighted the importance of addressing public needs during the eruption of Merapi Volcano in Indonesia. The lack of such support can hinder access to vital information before, during, and after a volcanic eruption. Therefore, education, training, and skill development in volcanic management are essential components of effective disaster risk management.

Partnered Agencies

Communication Effectiveness

Interviews with barangay officials and FGD participants from Juban, Casiguran, and Irosin revealed significant issues with communication effectiveness during the Mt. Bulusan unrest. Participants from all three municipalities agreed that they received no prior information before the eruption. Local officials only informed them using the public address system after the event, with additional information transmitted via VHF radio to the Local Government Unit (LGU) and Municipal Disaster Risk Reduction and Management Office (MDRRMO).

An interviewee from Añog, Juban, stated, “It was a gloomy day, and clouds covered Mt. Bulusan. We did not hear any rumbling sound before it erupted.” He added, “After Mt. Bulusan spewed ashes, the LGU-Juban informed us through VHF radio and advised an immediate evacuation, as our barangay was within the 4-km PDZ. We were the first to be affected.”

Participants from Inlagadian, Casiguran, reported, “Since we are located on the north vent of Mt. Bulusan, we were the first to see the ash plume. Minutes later, ash reached our barangay, and our officials advised us to evacuate immediately.”

Interviewees from Monbon shared, “Mt. Bulusan faces our barangay.” They noted, “We did not experience ashfall right after the eruption, but we did hear rumbling sounds, especially at night.” Local officials announced the evacuation using a megaphone in coordination with the MDRRMO.

These findings align with the study by Andreastuti et al. (2023), which indicated that the local community's perceived risks, knowledge, and experiences are essential for a desired public response. The study emphasizes that personal communication between the local community, local officials, and geological experts is necessary to instill self-responsibility in times of disaster, particularly within communities with a history of eruptions.

System Reliability

Some barangay officials disclosed a disparity in resources: while some barangays have VHF radios, others do not, forcing them to rely on traditional methods, such as the public address system, to relay information. One official noted, “We used cellular phones as an alternative to inform concerned officials, but it would be better if we were provided with VHF radios.”

This situation demonstrates that building local capacity, with the involvement of local leaders, can facilitate participatory risk assessment grounded in traditional practices, local realities, and existing policies and strategies. Andreastuti et al. (2023) also noted that local capacity can enhance participation, communication, disaster response, and support from local leaders. In emergencies and when cellular signals are weak or unavailable, VHF radios are a reliable communication option.

Operational Challenges

Barangay officials prioritized ensuring public safety before disseminating information, which sometimes resulted in communication delays. One barangay official stated, “After the ashfall, our priority was to evacuate and ensure everyone’s safety. We will report the situation and the number of evacuees only after we have settled.”

Additionally, some officials admitted they were unfamiliar with using VHF radios. One official said, “If VHF radios can help us relay information faster, we would appreciate training and a manual on how to use them.”

The lack of support and familiarity with communication tools can hinder access to vital information before, during, and after a volcanic eruption, a key finding also highlighted in Andreastuti et al.’s (2023) study on the Merapi Volcano in Indonesia. Therefore, education, training, and skill development in volcanic management are essential components of effective disaster risk management.

CONCLUSION AND RECOMMENDATION

The Focus Group Discussion (FGD) findings among participants revealed both positive and negative facets of the radio communication and operational systems used during the eruption of Mt. Bulusan. On the positive side, the radio communication system in Sorsogon improved communication efficiency, and the use of VHF radios was crucial during the disaster. This shared frequency reduced duplicate dispatches and conserved scarce resources, directly benefiting the coordination efforts and disaster response. Partner agencies effectively utilized this system and could potentially equip barangays with it, which would aid local and municipal communication.

Nevertheless, challenges were noted; some areas faced communication issues due to topographic settings, and crucial facilities lacked VHF radios. Additionally, the cellular signal was unreliable during power outages; therefore, VHF radios are essential as a substitute for communication during disaster response to prevent information gaps.

The radio communication system in the province is currently limited to Local Disaster Risk Reduction and Management Offices (LDRRMOs), district hospitals, and select frontline agencies. It enables the timely and efficient sharing of information, decision-making, reporting, and coordination among or within the involved parties. The availability of funds for Local Government Units (LGUs) will influence the procurement of VHF radios in respective barangays. Nonetheless, the implementation of the "One Tone-One Frequency" VHF radio communication system in Sorsogon demonstrates its effectiveness in strengthening disaster response, ensuring effective management, and delivering timely support across the province.

Given the topographic challenges causing weak radio signals and communication delays, the author recommends installing an additional repeater. This would improve information transmission from remote areas and reduce delays. However, a comprehensive study is necessary to determine the optimal placement of these repeaters and ensure coordination with

telecommunications providers.

A structured policy is crucial for implementing additional repeaters in Sorsogon. Notably, the 2022 Mt. Bulusan eruption has spotlighted the urgent need for improved communication infrastructure, shifting political attention towards disaster preparedness. This shift provides a timely opportunity to advocate for the allocation of Local Disaster Risk Reduction and Management Fund (LDRRMF) resources. LGUs should integrate GIS-based assessments to determine optimal locations and coordinate with the National Telecommunications Commission (NTC) and private providers for co-location and investment sharing. Clear budget guidelines under the LDRRMF must support funding, maintenance, and upgrades to ensure effective disaster risk reduction and management. Embedding these measures into official policies will enhance real-time communication and disaster response.

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